



African Social Research Volume 3

Climate Change and Environmental Politics in Africa

JULY 2023



**PROGRAM ON AFRICAN
SOCIAL RESEARCH**

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A special thanks to Michelle Woodward for her editorial assistance.

African Social Research is an open access publication. Authors retain all rights to their contributions. To cite: Climate Change and Environmental Politics in Africa, *African Social Research* 3 (Summer 2023).

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Climate Change and Environmental Politics in Africa

Adam Branch and Marc Lynch

The threat posed by climate change to the African continent has attracted a great deal of attention from policy communities in recent years. But climate change is more than just the intensifying physical impacts of global warming. Indeed, climate change is invoked by state officials, donors, international agencies, NGOs, civil society activists, and media to justify a wide range of policies, claims, and interventions throughout society. Adaptation, mitigation, resilience, and sustainability are now everywhere and are themselves having a wide range of different impacts, subject both to celebration and to intense critique. Meanwhile, environmental historians, anthropologists, and geographers in African Studies have shown that contemporary climate change needs to be grounded in longer environmental, political, and social histories, and shown the ways that different communities and individuals can attribute vastly different meanings to the same landscapes or environmental or climatic processes. But the voices of scholars from the African continent itself have been less prominent: a recent study of 156 peer-reviewed journal articles published on African energy transitions between 2000-2021 found that only 25% of them were authored by African scholars, and that there were systematic blind spots in their topics, methods, and policy recommendations.

In January 2023, the Program on African Social Research convened a workshop at Mohammed VI Polytechnic University in Rabat, Morocco, to discuss the many possible meanings and forms of the politics of environmental change. A diverse, multidisciplinary group of almost a dozen early career scholars from across the continent participated in two days of discussions, searching for both commonalities and differences in the political experience of the environment. Their papers are collected here as a starting point in a broader cross-African conversation, with the goal of centering African knowledge production and bringing the voices of emerging scholars from the continent into the conversation about environmental politics

and climate change. These papers illuminate the ways these different meanings are constructed, as well as drawing out the political implications of the contestations over these divergent understandings.

The first major theme that emerged was the importance of being attentive to indigenous or local knowledge of the environment in contrast to the expert knowledge claimed by Western science. Sometimes, the former is identified as particularly African forms of thought, while the latter is identified as Eurocentric and Western, even if its proponents may be African themselves. As the papers explore, these different forms of understanding can underpin different modes of environmental practice. On the one side, we see, for instance, the locally meaningful processions of the Amazigh talghnja ritual (see Bourhous in this collection) or traditional modes of adapting to climatic variability in the Niger Delta (see Boroh and Jack in this collection). In comparison, ostensibly expert, Eurocentric knowledge can underpin incoherent or inappropriate modes of dealing with environmental disruption, only exacerbating challenges faced by communities while sidelining forms of adaptation well grounded in long local histories and practices. Traditional strategies of adaptation to rising water levels or to drought may seem irrational or misguided to foreign experts, but in fact reflect lessons learned at the local level through centuries of experience and practices consistent with existing social structures and cultural norms.

Disjunctures can also arise between internationally driven projects imposed in the name of climate change adaptation or mitigation for global environmental benefit – such as the Ouarzazate Solar Power Plant (see Bengezi in this collection) – and their impacts upon local communities. Global mitigation efforts rooted in international best practices and technologically-driven mega-projects can produce intense local environmental violence with differential impacts on marginalized

communities (see Ou-Salah in this collection). As Mukamba shows in this collection, such disconnects between local forms of practice rooted in local knowledge and global projects rooted in scientific expertise show the dangers inherent in such top down approaches. As James Scott long ago reminded us, top-down efforts to standardize and impose large scale development projects too often end badly.

Public debates and contentious discourse over environmental politics are a key window into these disconnects between the global and the local, and between scientific expertise and indigenous practice. Chikaipa's contribution to the collection shows how different understandings of the environment in Malawi can play themselves out in debates among activists, NGOs, government officials, corporations, and the state about an environmentally-driven ban on single-use plastics. Ou-Salah's shows how Moroccan women have struggled to challenge their marginalization and vulnerability through contentious social movements which center gender and legal rights. Lunyago's closely tracks the intense debates over land degazetting in Uganda, showing how political actors challenge environmental justifications to expose the corrupt political economy driving such practices. The mounting environmental crisis that many of the papers refer to can lead to the realignment of different actors and forces into new alliances, or to further fragmentation of positions. What arises from the papers as a whole is a picture of the intense, complex, and deeply significant debates around environmental understandings and around just solutions to environmental harm.

The papers engage the insights of the literature on political ecology to reveal how firmly embedded environmental and ecological processes and crises are in social and political structures. While global climate change can seem abstract, social and political factors produce environmental change directly – whether oil companies poisoning the land, mining firms contributing to atmospheric pollution, or states dispossessing peasants of land in the name of conservation. The papers demonstrate how social and political factors need to be taken into consideration in order to understand the

uneven vulnerability of different communities and groups to environmental harm. The papers look back to colonial histories as establishing the frameworks in which environmental damage is inflicted today, often with total impunity, as well as to the more recent history of neoliberalism gutting state capacity and social resilience to cope with environmental disaster. Today, it is the continuation of capitalist extractivism, whether of scarce minerals needed for the “green” energy transition, land for solar plants, or oil for the fossil economy, that creates the context for environmental devastation. Critically, the essays explore existing inequalities and divisions within communities – in particular along intersecting lines of gender or class – ensure different experiences of environmental harm, in particular the “slow-onset harm” associated with mounting climate change. Climate change is not just an environmental process but also a social process, and these papers help establish the importance of critical social science to accompany environmental science.

Finally, these papers show the importance of historicizing contemporary climate change. The environment has long been intertwined with and constitutive of political and social institutions. The Niger Delta's rising sea levels and changing precipitation patterns caused by global climate change are part of longer history of environmental devastation caused by the fossil fuel economy via oil and gas extraction. These global environmental changes are realized through and in the context of particular local environmental and climatic histories that need to be accounted for. But the interventions and policies occurring in the name of adapting to or mitigating climate change are also part of longer histories of often unaccountable intervention and dispossession. Throughout the essays, we get a picture of the overwhelming unpredictability and uncertainty that is increasingly coming to characterize African environments. This uncertainty is produced not just by global climate change but also by long histories of environmental violence, by interventions in the name of resolving climate change, and by high-stakes debates and contestations among different communities and actors over the present and future of the natural world. ■

Neoliberal Logics in Renewable Energy Imaginaries: The Development of Morocco's Noor Ouarzazate Solar Power Plant

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In 2009, the government of Morocco declared a shift away from fossil fuels—95 percent of which is imported—with a goal of 42 percent of total energy usage to be provided by renewable energy by 2020 (Foroudi 2021; Raouf 2013). While Morocco did not reach the intended target by 2020, it succeeded in reaching 37 percent of green energy production and now aims for 52 percent renewable energy by 2030 (ESFC Investment Group 2022; Foroudi 2021). To achieve this ambitious goal the government of Morocco created three agencies, The Moroccan Agency for Sustainable Energy (MASEN), the Research Institute for Solar Energy and New Energies (IRESEN) and the Moroccan Agency for Energy Efficiency (AMEE). All have received extensive funding from national, regional, and international banks, as well as private corporations (Beacom and Moulton 2020).

The Noor Ouarzazate Power Plant (NoorO) has been at the forefront of Morocco's plan to reach its ambitious 2030 goal and propel Morocco into a new modernity fueled by renewable energy. The four-phase massive solar power project, which spans over 3,000 hectares of land in the region of Ouarzazate, has received regional and international attention as one of the “world's largest concentrated solar power” (CSP) plants (Johanson 2021). Through this project, which is “implemented via a public-private partnership, between MASEN and the [Arabian Company for Water and Power] ACWA Power,” Morocco has sought to pave the way regionally within Africa and internationally as a leader in renewable energy alternatives (Bakkoury 2020; Okpanachi et al. 2022). According to the Climate Investment Fund's feature story on the NoorO power plant, the 2 million mirrored panels are meant to provide over 2 million Moroccans with clean energy, reduce carbon emissions by 760 thousand tons per year, and potentially catalyze the construction of more “de-risked large CSP solar

plants around the world” (Ouarzazate: Lighting Up the Sky 2018).

Despite these rosy predictions, Morocco's visions of sustainable development have been dimmed by the privileging of a public-private neoliberal development model that aims to sustain and further imbricate development in neoliberal extractivist logics. This paper uses the NoorO solar project to examine the role of expertise and decision making within the global environmental governance and sustainable development nexus through a multi-scalar approach.

Development Models and Neoliberal Logics

Western development models like modernization theory, which emerged within Western academic spaces in the 1950s and 1960s, argue that the key to development is for countries to adopt Western-style institutions, values, and technology (Rostow 1960; Roxborough 1988). This model continues to dominate the crafting of development policies and practices and wreaks havoc on developing countries (Mitchell 2002; Goldman 2005). As Timothy Mitchell (2002) has demonstrated, development discourses were introduced and sustained in the Global South through the privileging of the rule of experts and their socio-technical imaginings. Mitchell analyzes the ways in which neoliberal economic expertise and techno-scientific development projects are intertwined and how they are presented as objective and logical. Mitchell goes on to warn that, “we should not mistake this economy for a freestanding object but examine it as the relationship between expertise and the world to which it refers—a world that, on closer inspection, never has the simplicity, logic, or fixedness that the expertise of economics assumes” (Mitchell 2002: 300). Mitchell points to the neoliberal fixation

on economic impartiality as the guiding force for development and explains the importance of adopting a critical lens in order to see how this construct underlies biased and often Eurocentric expert opinions.

Dependency theorists have argued that the visions and imaginaries of Western experts under the instructions of Western elites and institutions have constructed a development framework that is reflective of Western colonial administration and constitutes a form of economic imperialism (Amin 1977; Handelman 2016). This argument has been further strengthened and articulated by anti-development and post-development theorists who argue that development paradigms in Western academic knowledge production are rooted in colonial imaginaries of the legitimate and capable Western doer and the illegitimate, incapable and backward Global South. According to these scholars, development is an elitist project aimed at benefiting the few while disempowering those living in the margins (rural areas and slums) of the Global South (e.g., Escobar 1995, 2018; Esteva and Prakash 1998; Matthews 2004; Rahnema and Bawtree 1997).

This critical perspective points to a key question: Who makes the call within global environmental governance and sustainable development and what are the consequences of expert rule? Legitimacy and expertise within global environmental governance is similarly constituted through power relations—the privileging of Eurocentric Western expertise within global environmental governance reconstitutes asymmetrical power relations within the realm of sustainability governance. These inequities expand beyond state-to-state interactions to encompass governance organizations, corporations, and civil society actors (Bexell 2020; Boehmer-Christiansen 1999; Ervine 2007; Gupta & Sanchez 2012; Sanwal 2015). Thus, global responses to climate change, which on their face seem to be based on scientific expertise and modernizing aspirations, are in fact rooted in development logics of the past that privilege Eurocentric assumptions about what knowledge is, who possesses it, and who holds the power and resources to disseminate it nationally, regionally, and globally.

The World Bank and Elite Actors in Morocco's Transition Towards Renewable Energy

The World Bank, one of the primary funders of climate mitigation technologies in the Global South and particularly in Morocco, is at the forefront of the global renewal of developmentalism and neoliberalism. The NoorO power plant is not just a localized project of the Moroccan nation-state but rather the product of a vision of many beyond Morocco due to its transformative potential in ushering in a new modernity locally, regionally, and globally fueled by renewable energy. Thus, the project needs to be analyzed as a product of global environmental governance and expertise at the supra-national, national and local level to fully grasp the intricacies and tensions involved in constructing a new modernity of climate mitigation technologies.

The World Bank has been one of the key players in sustainable development as it has attempted to revamp its image through the creation of the Climate Investment Fund and the promotion of sustainable development and climate financing. The World Bank, however, continues to rely on Western experts and funding from Western states, which have monopoly over its activities. Scholars have argued that the World Bank has “become leading international agents of global environmental ‘governance’ and ‘sustainable development’” (Boehmer-Christiansen 1999: 27). Multiple stakeholders are invested in the dissemination and actualization of the World Bank’s Sustainable Development Goals (SDGs), including corporations as private funders and international funding agencies.

Scholars have rightly criticized the SDGs as removed from local realities and community knowledge and thus as fundamentally flawed (e.g., Cummings et al. 2017; Leach 2013; Ramalingham 2015). Diane Stone (2003), for example, argues that the power of the Bank to lead the charge of sustainable development initiatives and global environmental governance generally is rooted in its attempts to disseminate a universal model of expertise on world issues. According to Stone

(2003) and Michael Goldman (2005), the World Bank has utilized a great deal of its resources for the dissemination of information and has been alternately called the “Knowledge Bank.” This dynamic can be seen in the early days of the Conference of the Parties (COP) meetings. Sonja A. Boehmer-Christiansen (1999: 28) discusses the leaked documents from the 1998 COP3 in Buenos Aires that reveal the Bank’s ambitious goal “to take control of the international carbon trading market worth [at the time] 90 billion pounds by 2020.”

Morocco’s dependency on the imported development models of neoliberal institutions like the World Bank began in the early 1980s, when the kingdom was “forced to submit to shock therapy under the auspices of the unholy trinity (International Monetary Fund, IMF; World Bank; and World Trade Organisation). In 1983, a programme of structural adjustment was negotiated with the IMF and the World Bank, one of the first plans of its kind in the region” (Catusse 2009). In the case of Morocco’s renewable energy projects, another one-of-a-kind public-private partnership model features regional and international development banks like the African Development Bank, the Climate Investment Funds, the World Bank, the European Commission, European Development Bank, KfW, and the French Development Agency.

The Noor Ouarzazate regional and international funders, as well as Moroccan stakeholders, have all utilized grandiose scientific imaginaries to substantiate and legitimize the NoorO project as a model of sustainable development governance and thus a win-win-win for stakeholders.¹ Their approach is clearly visible in how the project has been advertised and presented on their websites, in interviews and in policy documents and reports. For instance, upon entering the Climate Investment Fund’s “Ouarzazate, Morocco” webpage, the viewer is immediately drawn to several futuristic animations of the NoorO solar power plant. The caption plastered across the moving visuals reads, “Lighting up the Sky.” This caption speaks to the

grandeur of the NoorO plant, which can be seen from space and is the largest concentrated solar power plant in the world. Such socio-technical imaginings (Jasanoff and Kim 2015) embody wider visions of global futures that rely on the idea of a linear and clear progression from fossil fuel energy and its pervasive destruction of the Earth to clean technologies and their ability to save the world.

These visions of transforming the desert are not new. They are rooted in socio-technical Orientalist imaginaries that exaggerate the threat of desertification and minimize the desert’s potential (Bengezi 2022). Such imaginaries are almost always backed by scientific studies and promote techno-scientific development solutions based on objective scientific truths despite their fluidity, which allows organizations to shape them to fit the molds of current neoliberal objectives. For example, the World Bank changed its tune regarding the threat of desertification over time. A report produced in 1988 titled “Dryland Management: The ‘Desertification’ Problem” (Nelson 1988) claimed that a study conducted in 1975 to show how “the Sahara Desert is advancing south at 5.5 km/year” was in fact disputed and that there is little evidence to support it.. More recently, the World Bank has produced a report titled “Driving Transformation: A Climate Roadmap for the Middle East and North Africa” (2022) that described desertification as “encroaching” and solar energy as a necessary area of transformation to prevent desertification, among other consequences of climate change. The report ends by stating, “at this critical moment for battling climate change, we look forward to working with policymakers, members of the private sector, and development practitioners to create a greener, more resilient MENA.”

While desertification is a real threat to the Maghrib (see Bengezi 2022), it is increasingly weaponized by international, regional, and national actors using win-win logics, for example, by claiming that the high levels of solar radiation in desert areas can be harnessed to produce large amounts of clean energy, while also mitigating the impacts of desertification.

1 Sustainable development cannot be easily defined. However, for the purposes of this paper, I utilize the definition by Alice Benessia and Silvio Funtowicz (2015), which explains that sustainable development embraces the need to address climate change in tandem with the need to address social inequalities and promote democratization.

The potentials of solar energy imaginaries are becoming realities as national governments and stakeholders embrace them, with Ouarzazate as the chosen site for Morocco's first renewable energy development project. The Libyan and Tunisian governments have also announced solar power plants (Bellini 2022; Takouleu 2020).

Grandiose Dreams and Mediocre Realities

The NoorO project has been recognized by the World Bank and the African Development Bank Group as a model for other developing countries to follow in their pursuit of renewable energy. They praise the project's innovative financing mechanism, its successful public-private partnership, and its ability to mobilize significant investments from both the private sector and international development finance institutions. The World Bank and the African Development Bank also highlight the project's positive impact on local communities, which includes the creation of jobs and the promotion of environmental sustainability (African Development Bank Group 2019; Climate Investment Funds 2022). For instance, the African Development Bank trumpeted in a headline that, "After Success in Morocco, the African Development Bank Develops Another Giant Solar Power Plant in the Sahel" (2021). Moreover, national officials and stakeholders initially publicized the project as a template for building African capacity for renewable technologies as well as providing national benefits by lowering energy bills and supporting community development initiatives (Bakkoury 2020; King 2022; Prisco 2016).

However, under the shiny headlines and rhetoric of elite actors is a darker reality. As Amin Belghazi and Mohammed Sammouni (2020) and Sarah Ryser (2019) note, the communities living in proximity to the NoorO plant have benefited little from the project. Instead, these rural communities have seen a decrease in access to water in an already water-scarce area because maintaining CSP technologies requires water for cooling (Bengezi 2022). Moreover, promises of lower energy bills have not materialized, and the project has put Morocco's vulnerable economy further into deficit.

From the start of the project, ACWA Power sold every kilowatt-hour (kWh) of energy at 1.62 Moroccan Dirhams (MDH) which meant that the cost of solar power exceeded that of coal and wind power, sold at 0.6 DH (Gharbaoui 2021). According to Hayat Gharbaoui (2021), when looking at the first three phases of the NoorO project, prices per kWh varied from 1.62 to 1.38 MDH and sold at 0.85 to the National Office of Electricity and Drinking Water (ONEE). MASEN bears the difference between the purchase price at ACWA and the sale price at ONEE. Concerns over Morocco's choice of the more expensive but newer technology of concentrated solar power over photovoltaics (PV) is not new and has been questioned by various Moroccan and regional news agencies and journalists (Belghazi and Sammouni 2020; Faloui 2023; Raouf 2013). This widely criticized decision has dimmed the light on the potential of grandiose large-scale solar energy power plants.

Mustapha Bakkoury, the "soon to be ousted" president of MASEN has taken the fall for the project's mishaps, framing the problem as that of a single individual to avoid direct scrutiny of the underlying conceptual problems (Faloui 2023). *Maghreb Intelligence*, for instance, reported that "Bakkoury was aware of this fact even before the launch of the second and third phases, but he did not want to take responsibility for it" (ibid.). They go on to point the finger solely at Bakkoury by stating that, "he took the easy way out by sticking with concentrated solar power, which was approved by international—mainly German—donors, even though he could have switched to photovoltaics, which had become more competitive." It is true that CSP technology was studied and shown to have both environmental and economic pitfalls prior to Morocco's shift towards CSP technology. Among those studies is a report by the United States' National Renewable Energy Laboratory (NREL), which has noted both environmental and cost limitations of CSP technologies (International Energy Agency 2010; National Renewable Energy Laboratory 2013). Such limitations were noted in 2010 and include issues around land acquisition, water use, greenhouse gas emissions, and economic cost (ibid.).

Holding Bakkoury solely responsible for the failures of Noor Ouarzazate distracts from the underlying issue of neoliberalism's continued hold on international development through the avenue of climate mitigation development projects. The World Bank has praised Morocco for adopting the public-private partnership model even though it has played a role in Morocco's current and accumulating deficit. Ahmed Zahran, the CEO of the Egyptian start-up Karm Solar, argues that the struggles of Morocco's solar power projects are due to the neoliberal public-private partnership model that developing states have relied on in constructing renewable energy projects (Africa News 2021). According to Zahran, "The companies are focused on selling electricity to their buyer and are not interested in contributing to the infrastructure of the countries in which they operate." As Morocco works towards launching the second massive solar power project, which is projected to be larger than the Noor Ouarzazate project, many questions remain about Morocco's renewable energy future and whether it is truly sustainable or just another neoliberal development trap.

Conclusion

Like the old modernity that served the West and national elites economically, the new modernity of renewable energy alternatives reproduces power asymmetries that further marginalize the Global South while sustaining and enriching the Global North and elite actors. Neoliberalism needs new markets to prey on for its continued sustenance within the global arena. One such area that is eliciting concern worldwide is the increasing need to address climate change. Climate mitigation technologies, like CSP solar power plants, have been paraded as a frontier solution to providing the world with electricity while only needing to populate portions of the "barren" desert. However, expertise rooted in Eurocentric and Orientalist imaginaries that continue to uphold extractivist neoliberal development models have failed to light up Morocco as the NoorO project intended. Rather, the project has done little to address social inequalities or aid in reducing Morocco's dependence on imported fuel and has instead led to environmental, social, and economic pitfalls.

Have the shortcomings of the NoorO project made Morocco's ambitious dreams a cautionary tale? On the surface it has, especially given that the second CSP project slated to start construction in 2019 in Midelt has stalled in recent years due to cost, technology use, and the governance of the project (El Karmouni 2022). That project will also utilize a hybrid of solar technology that encompasses both CSP and PV; it has been reported by Ghassan Wail El Karmouni (2022) that the project will rely on PV technology due to its lower cost. However, it will also continue to rely on the private-public partnership that undoubtedly led to the mishaps of the Noor Ouarzazate project (ibid.). As such, what remains to be seen is how local communities, who have given the now relaunched project over 4,000 hectares of land, will benefit. Will this project, costing 20 billion dirhams, reignite Morocco's solar futurities or dim it with further debt? ■

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Adaptation Strategies to Climate Change Amongst Small Holder Farmers in Nigeria's Niger Delta Region

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Agriculture has always been an integral part of human society. The changes that occur in the environment due to climate change impact every level of society and politics, including farmers and their farm produce, both directly and indirectly (Fatile, 2013). Agriculture generates revenue for the government at all levels, particularly those associated with the local areas and hinterlands. In addition to revenue generation, agriculture serves as a means of livelihood accommodating widespread socio-economic activities that provide employment opportunities for a large number of persons, especially smallholder farmers, marketers and processors of agricultural products. As climate change impacts the ecosystem, the effects will inevitably be felt across that vital agricultural sector.

The Niger Delta region of Nigeria was home to agricultural activities long before the discovery and eventual exploration of crude oil in the mid-1950s. Even a decade ago, agriculture in the Niger Delta contributed approximately 40% of the country's Gross Domestic Product (GDP), and it also engaged over 70% of the labour force (FMARD, 2012). However, the agricultural sector provided just about 23% to the nation's Gross Domestic Product (GDP) in the first half of 2022 (FMARD, 2022). While there are many potential causes, many attribute this striking decline in only one decade to the adverse effects of climate change.

Agricultural production processes are hugely dependent on climate conditions. Hence, a change in the composition of the climate is bound to have effects on the agricultural sector. As defined by Lemke (2006), climate change is the complete variation of the average state of the atmosphere over time, ranging from decades to millions of years in a region or across the entire globe, at least partly driven by anthropogenic activities. Climate change has especially significant impact on the livelihood

system of vulnerable communities in rural areas. The Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report notes that people who live in communities located in marginal lands and whose livelihoods are highly dependent on natural resources are among the most vulnerable to the effects of climate change (IPCC, 2007).

As Inuwa (2019) has posited, climate change adaptation measures have mostly relied upon modern approaches to taming its associated impacts. This has left out traditional and indigenous ways that local people around the world have deployed to adapt to climate change. The reason for this neglect are embedded within the age-long elevation of Eurocentric models over Afrocentric ones, which is typical of the colonization of knowledge that has characterized the global intellectual balance of power. Fagade (2018) has argued that in the same way in which the western world has colonized every sphere of knowledge, they have also colonized the knowledge of climate change and other environmental discussions especially those surrounding measures of control and in particular the sustainable development discourse. In this essay, I examine the Niger Delta Valley to show how indigenous and traditional methods of mitigation have been neglected in attempts to mitigate the impacts of climate change.

The Niger Delta

Climate induced increases in the frequency and intensity of flooding are an existential threat to farming in flood prone localities. In Nigeria, flooding has not historically been a major challenge even in the Niger Delta region, but it has now become a severe challenge. The magnitude of flooding, resulting from high rainfall and rise in sea level and the change in temperature, have become

some of the most potent adverse consequences of climate alterations in the Niger Delta region. But the region is particularly vulnerable to these effects because it has suffered devastation due to the activities of international oil companies (IOCs) for decades. Oil exploitation has caused the loss of crops and aquatic life as well as causing severe health issues across the human population. One cannot separate the dilemma of climate change in the Niger Delta region from the activities of oil companies when assessing the effects of environmental change. Flooding in the Niger Delta has become an annual issue with huge impact on smallholder farmers who seem to be the most vulnerable when compared to other players in the agricultural sector's value chain.

Smallholder farmers have over the years developed their own methods to navigate the vagaries of the environment. But there is a huge disconnect between their efforts and the programs adopted by successive governments, which reduces the chances of institutionalizing the traditional measures of adaptation to climate change by these farmers. The lack of government support for indigenous smallholder farmers' locally-informed climate change adaptation techniques has left those approaches under-resourced, unevenly implemented, and largely rudimentary in terms of evolving into more sophisticated techniques to combating climate change and improving agricultural production. This has meant that as flooding increases relentlessly in its intensity and potency, farmers continue to experience severe shocks with appreciable risks to agricultural activities which challenge their adaptive resilience to its impacts. Therefore, in the absence of government support which ordinarily should have served as some kind of institutional safety net especially with regard to adaptation techniques, farmers are increasingly vulnerable to climate change impacts with devastating effects on crop yield and by extension household income. The adaptive capacities or resilience developed over time have become insufficient to address the progressive and aggressive impact of climate change.

This study therefore examines the adaptive capacity to climate change amongst smallholder farmers

in Bayelsa State, Nigeria. How have small holder farmers coped with the impact of climate change especially flooding on their activities? How has the flooding affected their planting and harvesting behaviour? How has it affected the nature and quantity of crops they plant? And how has the absence of governmental support for locally-informed adaptation measures inhibited effective responses to these mounting problems?

Literature review

The Niger Delta region is fertile and suitable for agricultural production. Some of the common crops that can be grown on the soil of the region include cassava, plantain, cocoa, maize, melon, okra, palm oil, rubber and yam. Other farmers specialize in the domestication of animals such as goats, pigs, poultry, sheep, snail, rabbit among others, while the availability a large expanse of sea makes feasible aquaculture (like fish farming) (Abisola, 2013).

According to the 2022 Environmental Performance Index (EPI), Nigeria occupies the 168th position out of a total number of 180 countries in terms of environmental sustainability. In 2009, the average CO₂ emission in Nigeria was 74.14 million metric tons, which increased to 80.51 million metric tons. In 2019, the International Energy Agency (IEA) placed the value of Nigeria's CO₂ emissions at 92.02 million tons and further predicted it to rise to 130.10 million tons. Africa as a whole contributes only 3% globally to greenhouse gas emissions, but Nigeria alone contributes one third of that amount, 0.98% is concentrated in the Niger Delta region.

Nigeria has been confirmed to be one of the highest emitters of GHG in Africa (Akinro, Opeyemi, & Ologunagba, 2008). Oil development, and especially the practice of gas flaring, has played a critical role in this disproportionate impact emanating from the Niger Delta region. It has at least 123 gas flaring sites, which flare 1.8 billion cubic feet of gas every day and discharge 45.8 billion kilowatts of heat into the atmosphere (Olurin & Agbola, 2003, cited in Ikehi, Onu, Ifeanyieze, & Paradang, 2014). The World Bank

Development Report of 2008 found that Nigeria accounts for roughly one-sixth (1/6) of worldwide gas flaring. Nigeria flares about 75% of its gas, all of it in the Niger Delta region. Gas flaring in the Niger Delta region has thus contributed at a high level to the increase of GHG which alters climatic composition over time.

The existing atmospheric reality in the Niger Delta region has affected the livelihoods of Niger Deltans, especially smallholder farmers, especially through the devastating annual flooding which has in part been caused by these environmental changes. Those in coastal areas whose livelihood depends on the seawards farming are compelled into looking for other sources of livelihood as the increase in sea levels have had a negative consequence on the accessibility of sea foods, while the landward farmers are faced with flooding and/or oil spillage. (Fischer et al, 2005; Nnamchi & Ozor, 2009).

The Collective Stress Theory

This study adopts the Collective Stress Theory (Barton, 1969). In his book titled '*Communities in Disaster*', Barton proposed what is today acknowledged as the first sociological theory in the study of human resilience to climate change and other manmade or natural disasters. He laid out an analytical structure which showed how collective stress situations such as climate change drive new actions that can promote coping mechanisms amongst people. Applying Barton's theoretical approach to "collective stress" to the study of climate change has led to key constructs such as the "emergency social system," "mass convergence" and "therapeutic community" (David, 2008, p. 2), now used as standard terms in the field of impact management either as a result of man-made or natural disasters.

According to Barton (1969, p. 38), the basic assumptions of the theory are that "*Collective Stress*" situations occur when a significant part of the social system is faced with situations that threatens their collective resilience. Situations that amount to collective stress can come from sources either outside or inside the system. External sources include earthquakes, tornadoes, floods,

droughts, hurricanes, blights, war, loss of markets or sources of supply. Internal sources include economic depression, inflation, slums, strikes, riots, banditry, revolutions, civil wars, mass purges, and even the growth of tyranny. Climate change and its associated outcomes such as flooding or long periods of sunshine set in motion just such a dynamic process that creates widespread stress to smallholder farmers, who in line with Barton's theory attempt to adapt by activating existing social and cultural practices. One of Barton's major contributions to the theory is that socio-cultural and individual resilience techniques are critical mediums for alleviating the impact of natural or man-made disasters on affected people especially at the community level. Local communities may be resilient, but they lack the required institutional capacity to manage the outcomes of disasters on their own. As a result, collective actions oftentimes require collaborative actions by community members to create a viable lifeline.

Methods

The study is qualitative in nature. The study was carried out in the Niger Delta region, located in the Southern part of Nigeria and consisting mainly of the oil producing States, Abia, Akwa-Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and River. The population of the Niger Delta region based on the 2016 population projections by the National Population Commission (NPC) is 42,637,086 (NBS, 2018). Bayelsa State was purposively chosen out of the nine Niger Delta states given that it is the most impacted by flooding each year. For this study, ten (10) resident farmers from Otuoke community were selected as sample to take part in a key person's interview (KPI) to generate primary data. The secondary sources of data came from journal articles, textbooks and other relevant documentary sources from the Internet. The generated data were analyzed qualitatively using the thematic approach particularly the use of verbatim quotes.

Findings

The people of the Niger Delta region are conscious of the changing attributes of the

environment and how much this has affected their agricultural activities. The impact of climate change manifestations is significantly felt, as oil exploration, refining and other anthropogenic activities such as gas flaring and bush burning continue to take place. Hence, the people of the Niger Delta, especially Bayelsa, continue to take adequate steps towards adapting to the changing nature of their environment as a result of climate change.

Box 1 below highlights the major and most common problems that the people face as a result of climate change.

- i. Unpredictable pattern of rainfall affecting historical patterns of cultivation
- ii. Rising sea level
- iii. Flooding of houses, farmland and animal houses
- iv. Pollution of clean water sources
- v. Spread of disease to humans, plants and animals
- vi. Hotter environment leading to heat stress

Source: Field survey, 2022.

Smallholder farmers in the study area have witnessed unpredictable patterns in which rainfall is affecting the historical character of cultivation, rising sea levels which has been known to be responsible for the continuous issues of flooding that had since been associated with the region, pollution of clean water sources both for humans, animals and even plants, spread of diseases occasioned by the contaminated waters, and a hotter environment leading to heat stress with its adverse effect on agricultural production. One of the KPI participants noted:

Before now we used to be able to predict when and how rain is going to fall but presently, we cannot even tell when it is going to rain or shine, we are faced with persistent rainfall most of which is acidic or contaminated with lead. KII/participant/male/43years/Otuoke Community/November, 2022.

Bayelsa State, unlike other parts of the country is characterized by a consistent level of heavy downpour. It is also easily flooded, as a coastal low-lying area. However, due to increased and varying extent of precipitation attributable to climate change, the occurrence of flooding has increased with rivers and oceans easily overflowing their banks. This was observed in the 2022 flooding that impacted negatively on agriculture in the region.

In Box 2 below, the study revealed the adaptive strategies that the farmers have employed.

- i. Adjusting planting and cultivation timing to the recent pattern of rainfall
- ii. Adoption of premature harvesting
- iii. Diving to harvest during flooding situation
- iv. Intensive fertilization for crop quick crop production
- v. Adoption and use of early maturing plants/animals
- vi. Sand filling of flooding areas to prevent flood encroachments

Source: Field survey, 2022.

The information from the structured interviews as presented in Box 2 suggest that adjusting planting and cultivation timing to the recent pattern of rainfall, adoption of premature harvesting, diving to harvest during flooding situation, intensive fertilization for quick crop production, adoption and use of early maturing plants/animals and sand filling of flooding areas to prevent flood encroachments have all been adopted as strategies to cope with the climate situation. As noted by one of the KPI participants:

Flooding has become perennial in Nigeria especially here in Bayelsa, but regardless of that we still need to farm and fish if we must survive, so what we do is to cultivate during the first quarter of the year and harvest as quickly as possible, sometimes we harvest even before the crops has fully matured. KII/participant/male/43years/Otuoke Community/November, 2022.

The condition in Bayelsa state has become so critical that a good number of life forms are threatened by the consequences of climate change. Another participant noted that:

If only the perennial flood was the problem, we had to deal with we wouldn't be so badly affected, but the activities of the oil companies have further degraded our lands and water bodies so even when we plant, we're not guaranteed of a bountiful harvest. Also, we practice deep sea fishing due to the environmental violence faced by the rivers as a result of oil spillage occasioned by the activities of IOCs

KII/participant/male/43years/Otuoke
Community/November, 2022.

Other participants observed that this has been employed by the people to withstand the threat posed to their farming occupation and by extension, food security by climate change. They affirm that due to the flood, they have resorted to planting and harvesting before the usual planting and harvesting seasons; as some tend to plant immediately the flood subsides and harvest before the flood resumes while some resort to planting mainly crops such as pepper, cassava that can withstand the negative impacts of climate change such as flooding.

Conclusion and Recommendations

This study revealed that people of the region have been suffering from the activities of IOCs before now in terms of oil spillage and gas flaring, and had to look for means of surviving by adopting several adaptation strategies. Among these strategies are adjusting planting and cultivation timing to meet the pattern of rainfall, adoption of premature harvesting, diving to harvest during flooding situation, intensive fertilization for crop quick crop production, adoption and use of early maturing plants/animals, sand filling of flooding areas to prevent flood encroachments, deep sea fishing. However, these strategies are mostly adopted by smallholder farmers at the individual or household level, and due to the degree of impact by climate

change, these strategies may only record very minimal successes and may not withstand the adverse risks that climatic change poses to farming. The implication of these findings is that the government should not dismiss the strategies that are working for the people to cushion the effect of climate change and should help to scale up and support those local initiatives at the community level. Government should enact policies that will reduce activities that increase the potency of climate change in the Niger Delta and Bayelsa. And smallholder farmers should be empowered with requisite tools to withstand the challenges of climate change by improving on existing adaptive capacities. ■

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Rainmaking Rituals in the Era of Climate Change: A Spatial Approach

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This essay analyzes the rainmaking ritual of *talghnja*, commonly practiced by local communities in North Africa when rain fails to come. It is a procession that temporarily inhabits public space through movement, symbols, and the enactment of the Amazigh myth of *tislit n'Anzar* (the bride of Anzar – literally, the bride of the rain). The essay relies on Henri Lefebvre's conceptualization of “lived space” to understand how the habitation of space through the ceremonial procession of *talghnja* makes myth burst into public space and become visible in it as a concrete, albeit ephemeral, expression of collective memory and a shared imaginary. In times of mounting uncertainty due to water scarcity, unreliable rainfall and risks and challenges related to climate change, performing rainmaking rituals is arguably more than just a manifestation of local tradition and folklore. It is a political act precisely in its apolitical form, in the hopes and demands enclosed in it, but also in the dimension of vulnerability and helplessness that the appeal to supernatural intervention reveals.

Introduction

Rainmaking rituals have long been practiced in the Maghreb when rainfall is scarce or irregular, but in the era of climate change these rituals assume renewed meaning with arguably political significance. Climate change constitutes a major threat for North African countries and societies. Extreme weather events such as scorching temperatures, persistent droughts, and floods, have become more and more frequent. In Morocco, for example, the year 2022 witnessed one of the worst droughts in four decades, with water in dams and reservoirs dropping to the lowest levels in many years.¹ A recent World Bank report described the situation in Morocco as one of “structural water stress” (The World Bank, 2022), and the worsening water crisis has prompted the Moroccan authorities to mandate rationing.

In contrast to such political and technical responses, some rural communities have turned to traditional rainmaking rituals known as *talghnja* (which in Amazigh² means wooden spoon) to cope with drought spells and unreliable rainfall. The practice of *talghnja* is most commonly practiced in Morocco and Algeria but is also found in Tunisia.³ It consists of a ceremony of rogations and prayers for rain that enacts the Amazigh myth of *tislit n'Anzar* (the bride of Anzar—literally the bride of the rain). When confronted with extreme weather conditions and natural disasters, resorting to rituals and traditional practices is not surprising. People often turn to traditional practices informed by indigenous knowledge and religion that constitute their society's collective imaginary to deal with climate uncertainties (Nyawo, 2017).

Situated at the intersection of ethnography and environmental politics, this essay adopts a spatial approach to highlight the symbolic and political dimensions of a seemingly apolitical ritual practice. While rainmaking rituals such as *talghnja* are sometimes discounted as mere folklore, this essay argues that their eruption into public space is more than just a manifestation of local tradition, especially in times of mounting uncertainty due to climate risks and challenges. Performing rainmaking rituals can be viewed as political acts precisely in their apolitical form since they crystallize and make visible the hopes, needs, and demands of individuals and communities and reveal levels of fragility, vulnerability, and despair so high that people turn to supernatural and divine powers to seek relief. By focusing on the spatial dimension of rainmaking rituals, this essay attempts to capture the perceptions and understandings of space and the physical environment—the messages communicated, the identities revealed, and the collective imaginaries mobilized—that unfold and are given concrete form in public space at the moment of ritual performance.

The essay first describes the ritual of *talghnja* practiced in Morocco and elsewhere in North Africa. Next, it uses a spatial lens inspired by Henri Lefebvre's conceptualization of "lived space" to understand how the appropriation of space through the ceremonial procession of *talghnja* makes myth burst into public space and become visible in it as a concrete, albeit ephemeral, expression of collective memory and a shared imaginary. Finally, the essay explores the political implications of the eruption of rainmaking rituals into public space.

Talghnja and Anzar: Living Traces of Ancient Berber Practices and Beliefs

The very existence of an Amazigh mythology and cosmogony is a contested question (Benamara, 2022). The Berberologist Henri Basset (1920), for example, insisted that Berbers possessed no myth, only rite (Abrous and Chaker, 2004). For others, however, the practices and rituals still performed today constitute traces of old belief systems that predate the coming of Islam and other monotheistic religions. Given the oral nature of Berber culture, settling this debate is not possible, as oral accounts remain the only way to access Berbers' experience of the world. The ritual of *talghnja* is said to be connected to the myth of *tislit n'Anzar*, the bride of Anzar. A presentation of this myth is provided by Henri Genevois (1978) based on accounts collected among the Ait Ziki in Kabylia, Algeria. In his book *Mots et choses berbères*, Emile Laoust (1920) offers one of the earliest and most detailed descriptions of the ritual of *talghnja* in Morocco. These early accounts and texts about the myth of *tislit n'Anzar* and the ritual of *talghnja* were part of a body of ethnographic studies associated with colonial rule in North Africa, and the knowledge produced admittedly bears the Orientalist marks of the colonial project. However, as they are some of the only written and detailed accounts available, they can be a useful resource when complemented with more recent scholarship and ethnographic observations.

According to the myth, as recorded by Genevois, Anzar, the god of rain, fell in love with a beautiful girl who used to bathe in a river and wanted to marry her. Yet each time Anzar came down from

the sky and approached the girl, she withdrew from him. When Anzar finally managed to declare his passion, the girl refused his proposal for fear of what people would say. Angry, Anzar suddenly disappeared taking with him all the water of the river. Breaking into tears, the girl stripped off her clothes and implored Anzar to come back. Immediately, lightning struck, and Anzar embraced the girl. Water started to flow again in the river, and the earth turned green (Genevois, 1978).

The ritual of *talghnja* has long been practiced before the sowing season, with many variations across regions and communities (Gélard, 2006). The ritual consists of dressing a wooden spoon as a doll representing a bride and parading it through the streets. The procession is composed mainly of women and children who pray and sing to invoke the rain. As the procession progresses, alms and donations are collected for the preparation of a communal meal while the doll is sprayed with water. At the end of the ceremony, the doll is often dismantled or destroyed. The ritual of *talghnja* is fraught with meaning and symbolism. Some interpretations note, for example, the ritual's sexual references, as suggested by the use of a wooden spoon to symbolize the bride whose body is to receive the life-giving water of Anzar, in the same way that rain fertilizes and gives life to the earth (Camps and Chaker, 1989).

Most of the contemporary ritual performances are a mixture of Berber myth and Islamic discursive elements, as the chants and prayers are usually addressed to Allah and the communal meal is meant to be an act of *sadaqa*, Islamic charity. In some instances, the Islamization of the ritual can also be seen in the parading of the doll around marabouts and shrines of saints to seek their *baraka*, or divine blessing (Hamouda, 2016). An important discursive element is a supplication for God to have mercy "for the sake of children and the mute [animals]," both often considered as symbols of innocence and vulnerability. In short, ritual performances of *talghnja* join together a variety of religious, spiritual, and symbolic elements and representations. Questions about the coherence of these representations, the extent to which participants are aware of the origins, meanings, and

connotations of the ritual, and whether it is based on fact or fiction are not what is important here. What matters is that the ritual practice is part of people's collective memory, transmitted through generations as stories "one tells in order to orient oneself in the world" (Assmann, 2011, p. 59).

Inhabiting Space Through Ritual Practice

Ritual is a way of inhabiting and appropriating space. Space is often understood as simply the physical environment that contains human activities and social relations. This static view makes a sharp distinction between the physical environment on the one hand and human activity on the other, with very little attention to the interactions between them. More dynamic understandings of space focus on the relational and mutually constitutive nature of space and the social relations it supports by examining how space is constructed and formed through social practices and interactions (Massey, 2005). As Massey (2005) puts it, "if time unfolds as change then space unfolds as interaction" (p. 61). Understanding space as something constructed through interaction reveals how it can be produced in different ways and with multiple, coexisting, layers of meaning that allow for different modalities of inhabiting and appropriating it.

This approach highlights the different kinds of social spaces that are produced and actualized during ritual practice and performance. Henri Lefebvre's theorization of social space as a triad of perceived, conceived, and lived space is a useful analytical tool for understanding how rituals not only take place in a particular physical space but also produce and disclose different spaces constituted through superimposed meanings and symbols. According to Lefebvre, while perceived space refers to the "materialized, directly sensible and perceivable" space (Rogers, 2002, p. 29) and conceived space refers to the ideas, representations, and discourses deployed to conceptualize a certain space, lived space is "space as directly *lived* through its associated images and symbols, and hence the space of 'inhabitants' and 'users'... the space which the imagination seeks to change and appropriate. It overlays physical space, making symbolic use of

its objects" (Lefebvre, 1991, p. 39). As the domain of lived experience, lived space is inseparable from perceived and conceived space, but it focuses attention on people's experience as they engage in a spatial event, including ritual performance.

More specifically, lived space allows us to see how practices such as movements, activities, gestures, incantations and chants, as well as the mobilization of specific symbols, delineate and produce a particular "ritual space" in which specific narratives, collective imaginaries, and even entire cosmologies, are articulated and given life. Ritual is place-making. It imbues a particular space with meaning, thereby demarcating it and setting it apart from other spaces, whether permanently (as in the creation of a designated sacred space) or fleetingly (as in the use of profane spaces for performing ceremonies, celebrations, and ritual processions). At the same time, rituals make spatially visible the subjectivities and the identities of the participants. In other words, ritual practice produces space, organizes it according to symbols and representations that evoke specific worldviews as well as communicate specific messages about those who take part in ritual performance.

Taking Place: Rainmaking Rituals in the Era of Climate Change

In a context largely dominated by orthodox Islamic beliefs and practices, the eruption of the rainmaking ritual of *talghnja* every now and then in public space represents an appropriation of space in which existing socio-cultural representations and perceptions symbolically transform it, even if only momentarily, into the space of myth and ancient beliefs. For the duration of the ritual, public space becomes inhabited by mythical Berber characters and divinities. In space thus transformed, the ritual performance is a way to placate and cajole the weather, anthropomorphized as Anzar, by offering him his beloved bride, with the hope of triggering rainfall that will produce fertile soil and land. As a spatial event, ritual performances enacting the myth of *tislit n'Anzar* seem briefly to decenter orthodox Islamic beliefs and practices, including the Islamic prayer of *istisqa*, which is also performed—usually in mosques and prayer halls

and by order of established religious authorities—to invoke rain in times of drought. The moment of ritual thus illuminates the multiple layers of beliefs, ideas and worldviews that can coexist in the culture of a society, shaping people’s perceptions of space and mediating their relationships with the physical environment. These public ritual moments show that *talghnja* is an important part of rainmaking traditions in the Maghreb, and that orthodox Islamic beliefs are a layer that covers a multitude of other beliefs and representations—including Berber ones—that are part of people’s collective memory and continue to be transmitted through generations.

In present-day performances of *talghnja*, ritual participants, largely unwittingly, blend together fragments of Berber myth with Islamic elements and references, blurring the boundaries between center and periphery and the lines between orthodox and unorthodox practices. This illustrates the fundamentally eclectic character of culture but also of lived space, which is “full of contradictions and seeming opposites” and dissolves sharp dichotomies and binary distinctions between center and periphery, between time and space, between nature and culture, between orthodox and unorthodox, between sacred and profane (Rogers, 2002, p. 37). Viewed from the perspective of lived space, the performance of the rainmaking ritual of *talghnja* ceases to appear as some kind of anomaly or as an occurrence that has little connection with and relevance for modern life beyond its folkloric (and aesthetic) character. Rather, it begins to appear as a particular way of inhabiting space that discloses already existing symbolic structures and shared imaginaries that constitute a sociocultural substratum that also informs how space is experienced. At the same time, the ritual conveys specific messages about people’s relationship with their environment in times of water scarcity and unreliable rainfall that have broader resonance in a context of global concerns about climate change.

An essential component of *talghnja* is the habitation and appropriation of space through processional movement. According to Janusek (2016), “to *process* is to move with others in an orchestrated, synchronized manner toward a common

destination. Procession is a communal, structured, and directed sociospatial performance” (p. 4). In processions, participants’ way of inhabiting space is defined by their collective performance, their shared intention and purpose, and their shared beliefs, while the element of spectacle and theatricality produces a sensory and emotional experience of space. Focusing particularly on religious processions, Gaël Rideau (2019) shows that what is at work is a dialectic relationship between meaning, emotions, religion, and space. In a similar vein, participants in the ritual procession enacting the Berber myth of *tislit n’Anzar* are part of a sensory experience shaped by prayers, chants, music, and so forth. A range of emotions both constitute and emanate from the rainmaking procession, including despair, vulnerability, and anxiety but also hope, piety, and faith that prayers will be answered by a merciful god.

In addition to revealing the multiple sociocultural frames that inform people’s complex relationship with their milieu, looking through the spatial lens reveals how the emotions engendered by that relationship appear and take place in public space through processional movement. In other words, the uncertainties and anxieties that people experience in times of drought and climate insecurity go from invisible to visible. It is as if ritual participants carved out and claimed a space for expressing their worries and concerns about the impact of extreme weather conditions on their livelihoods. If, as Janusek (2016) argues, “ritual is first and foremost, a mode of paying attention” (p. 7), this materialization in space is important since it draws attention to the hardships of communities affected by drought and unreliable rainfall.

Although traditional rainmaking rituals such as *talghnja* are quite different from strategies of adaptation and mitigation connected with the global discourse on climate change, they are of great importance for two reasons. First, while appearing to be a mere manifestation of folklore and tradition, they represent an immediate mechanism of stress relief for communities confronted with insecurity caused by climate uncertainty. Second, rainmaking rituals can be viewed as political acts precisely in their apolitical form. In performing the

ritual, participants do not turn to the state for help and support in accessing critical water resources. Water scarcity is here not seen primarily as a matter of water management policies and is not primarily connected to failures of policies to enhance resilience and adaptation to climate change.⁴ Rather, the rainmaking ritual conveys a sense of fragility and helplessness that are so high that people appeal directly to divine and supernatural powers. As Hémond and Goloubinoff (2002) put it, “when the rains arrive late or fall too irregularly, the harvest is compromised, which generates great anxiety among the population. Only a deep, regular and ritualized relationship with the supernatural beings responsible for the elements can overcome this uncertainty” (p. 254). Even when water scarcity and droughts are perceived to be connected to climate change, many communities have very few expectations from the state and official authorities when it comes to climate risk management. In this sense, rainmaking rituals are not intended as political acts, as they are directed not at the state but at the supernatural and the divine.

In times of mounting climate-related risks and challenges, however, these rainmaking rituals nonetheless signify politically, since—by inhabiting and transforming public space—they make visible and draw attention to the hardships connected to drought and unreliable rainfall. Hannah Arendt famously described public space as the “realm of appearances,” linking the concept of the political to appearance and publicly coming into view. While the *talghnja* ritual does not easily fit Arendt’s description of the political as action and speech—indeed, it is not at all meant to be political—there is still a sense in which the ritual is political in an eminently Arendtian way. While participants may view it as an apolitical act, it nonetheless signifies politically as a particular acting in concert that makes the participants and their vulnerability and helplessness appear in public space, where “whatever appears in this brilliantly illuminated space is thereby pushed to the center of common concern” (Canovan, 1985, p. 618).

One can even see the ritual procession performed in *talghnja* as an unintended political demonstration

signaling the hardships and anxieties connected to these climate risks. Evans (2016) notes this similarity between processions and protests, arguing that “today processions are often politically motivated, such as protests or demonstrations against economic inequality, climate change, or government policy. Nonetheless, they are communal rites and generate solidarity” (p. iv). While rainmaking rituals first and foremost are an expression of the insecurity and hardship suffered in times of drought and unreliable rainfall and constitute a coping mechanism for affected communities, they are also an indicator of vulnerability in an era of climate change (Shaffer, 2017) and can at the same time be viewed as an unintended but important political act in a context of global concerns about climate change.

Conclusion

Using a spatial approach, this essay has explored the significance of rainmaking rituals in the era of climate change by analyzing the North African performance of *talghnja* enacting the Berber myth of *tislit n’Anzar*. Rituals produce and transform space by mobilizing symbols, representations, and worldviews, thus revealing while also contributing to people’s multi-layered experience of space. In times of climate uncertainty, performing rainmaking rituals is a way for people to connect with the environment they inhabit and to manage their relationship with the earth by invoking the graces of the sky and conjuring the supernatural powers that control them. Making use of Lefebvre’s notion of “lived space,” this essay shows how looking at the practice of *talghnja* through a spatial lens reveals the wider implications of a seemingly isolated event in public space. Adopting a spatial approach illuminates how symbolic structures form coexisting sociocultural layers that shape how space is experienced. This approach also shows how the spatial event of ritual performance makes visible the vulnerability and sense of insecurity of communities confronted with drought and scarce rainfall and how this is politically relevant in times of mounting concerns about climate-related risks and challenges. ■

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Endnotes

- 1 The fill rate of water reservoirs did not exceed 25 percent, Ouzzane, N. 'Alerte sur le taux de remplissage des barrages au Maroc', *Le360*, 23 Nov. 2022. <https://fr.le360.ma/economie/alerte-sur-le-taux-de-remplissage-des-barrages-au-maroc-270963/>
- 2 In this essay, the terms Amazigh and Berber are used interchangeably.
- 3 In Tunisia, a ritual known as Ommek Tangou (or Omek Tannou) has strong similarities with talghnja.
- 4 In Morocco, for example, the package of policies known as "Plan Maroc Vert" has been widely criticized for delivering only limited results and falling short of its stated objectives.

Media Discursive Practices and the Representation of Single-Use Plastics Ban in Malawi

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Introduction

The problem of single-use plastics is a global environmental challenge that has received particular attention in Malawi. The media has played a crucial role by providing an arena for the campaign and public debates on reducing the use of plastics. The media, through its discursive practices, became a critical agent in framing, presenting, and representing discourses and realities on single-use plastics, thereby setting the agenda and influencing public policies towards the ban on single-use plastics in Malawi. The media have a mandate to facilitate dialogue and provide relevant information to citizens so that members of the public can gain a better understanding of their society (McCombs and Shaw, 1993). In this regard, Malawi's media played a significant role in increasing the public's understanding and knowledge of the threat caused by single-use plastics in the environment.

Research on single-use plastics in Malawi has generally focused on examining how improper plastic waste management has impacted the environment (Griffin and Karasik, 2022; Kalina et al. 2021; Kasinja and Tilley, 2018; Turpie et al. 2019). In particular, these studies have examined how plastic waste affected the agricultural and tourism industries, two key sectors for generating revenue in Malawi. This article departs from the previous studies and focuses instead on the role of the media in shaping public debate on the topic. It explores the following questions: Who were the key sources or actors in the coverage of the single-use plastic issues in the newspapers? How did the media discursively frame the single-plastic use ban for the public? What was the tone of coverage and presentation of the single-use plastics ban in the media? This article finds that the key topical issues that dominated and framed media coverage of the ban were human interest stories and health. In addition, sources were primarily experts, with

political and expert representations dominating the narratives. The media coverage reproduced the views of those in power, which solely focused on the implementation of the ban without suggesting potential alternatives that could empower local communities to create opportunities from plastic waste. Finally, human interest and economic themes on single-use plastics dominated the coverage in the newspapers. This article presents a critical review and analysis of how various media discourses on the single-use plastic ban were framed and the tone of coverage as presented in and by the local print media.

The rest of this article is organized as follows. First, the above section sets the context of the study as it highlights the significance of the media in facilitating the general understanding of critical issues that directly affect the public, specifically the single-use plastic ban. Secondly, the paper discusses the ban in Malawi, especially focusing on how it was enacted and the current status quo. The third section discusses the thematic and content approaches that are deployed to assist in the analysis and interpretation of the data, and presents the methodology used in the collection of data. The subsequent sections give an account of the results and discussion, specifically focusing on the dominant news sources of the media articles, and how discourses on the ban have been packaged and presented in the local print media. Finally, the article presents its conclusions and reflections.

The Single-Use Plastics Ban

In Malawi, concerns about the impact on ecosystems and human well-being of single-use plastics have been growing over the past decade. An increase in population alongside a rapid rate of urbanization has exacerbated the reliance on these plastics in both formal and informal markets (Griffin and Karasik, 2022), which includes street

vendors, retail shops, supermarkets, and chain stores. Socially, single-use plastics are used as carrier bags and as secondary packaging for various products, especially fresh products like meat, fruits and vegetables, and fish. They are widely used due to their low cost, lightness, resistance to damage, and packaging convenience. Additionally, the amount of plastics has increased during the Covid-19 pandemic as most of the personal protective equipment (PPE) that include gloves, medical/surgical face masks, goggles, face shields, gowns, respirators (N95 or FFP2 or FFP3 standard or equivalent), and aprons being made, primarily, of single-use plastics (see de Sousa, 2021). As such, plastics have been part of people's daily lives for many decades. Most often they are not properly disposed of, creating a potential environmental hazard in most urban spaces.

In March 2015, following global concerns around the environmental damage caused by single-use plastics waste to the ecosystem and climate change, Malawi joined other countries in ratifying all the international conventions, protocols and policies to protect the environment by instituting a ban on single-use plastics and imposing hefty taxes on outlet shops that could sell them. During the last decade, a lengthy court battle ensued between the government, supported by environmental activists, and the Plastic Manufacturers Association of Malawi (hereafter PMAM) after the ban on the importation, production, trade and commercial distribution of single-use plastics that are less than 60 micrometres in thickness. Some single-use plastic manufacturers sought court relief by obtaining a stay order to restrain the implementation of the ban, but in 2019 the court dismissed the stay and ruled in favour of the government to sustain the implementation of the ban on single-use plastic. The court agreed with the Government's position that plastics manufacturers had been given sufficient warning and time to prepare to wind up on the production of thin plastics.

Notwithstanding this landmark judgement on the ban, single-use plastics are still available on the Malawian markets. Clandestine industries have continued the production and importation

of single-use plastics, as reported widely in the Malawi local print media (Malata 2021). This has resulted in a heated and polarized debate about the ban on single-use plastics between environmental institutions, the government, plastic producers, and average citizens. Environmental institutions and other stakeholders claim that single-use plastics are dumped openly, contributing to the clogging of roadside drains, rivers and lakes and causing flooding and the reproduction of parasites that spread different infectious diseases including malaria and cholera. A case in point is the recent cholera scourge which at the time of writing this article claimed the lives of over 1,412 people (Public Health Institute of Malawi, 2023). On the other hand, average citizens especially common people have argued in favour of single-use plastics, because they are cheap and easy to use. For some, selling plastic carrier bags has sustained their livelihoods. As one of my interviewees commented:

I see that the plastic ban policy is not in the interest of us the poor people, we have no stable jobs, a substantial capital to start other businesses, then how can we feed our families? Selling single-use plastics has been part of our daily life survival to put food on the table. How can the government come to think of banning single-use plastics when they have not provided us with alternative businesses that can thrive with low capital. **(Single-use plastic vendor, Limbe Market, Blantyre)**

Another respondent had the following sentiments;

This policy has put us shopkeepers in a difficult position because we must look for alternative strategies to serve customers who purchase a lot of goods. What the government is proposing using sack bags which are not sustainable with to our daily profits or income. Customers shun to buy such carrier sack bags because they are expensive and, in the end, it is us who will make losses because we will still be giving them freely for us to make money. **(A Shop-owner, Zomba City)**

From both comments, the fact that single-use plastics have instrumental and social value signifies



Figure 1

how difficult it is to enact the ban without potential alternatives for the general public. It confirms the observations about the presence of the product on the market regardless of the numerous government and environmental stakeholders' calls to stop using it forthwith. Figure 1 shows some hawkers selling single-use plastic bags in the Blantyre city market.

Given this polarisation, the media's role in promoting public understanding of the risks related to single-use plastics including the dangers and threats of using plastics is quite significant. As Welzenbach-Vogel et. al (2022) observe, news media reports may help to foster fundamental changes in individual and societal lifestyles in terms of sustainable development. And as earlier highlighted, media is broadly recognized as having the potential to influence public attitudes (McCombs and Shaw, 1972). Its discursive and practical mechanisms set a broad agenda that influence public policies relating to local responses. The print media had the power to set and shape discursive agendas including the public understanding of the issue in the country by making certain issues more prominent in the news. This article uses thematic analysis to critically review and analyse newspaper articles on how various discourses and debates on single-use plastics

are packaged and presented in and by the local print media.

Thematic and Content Analysis

I deploy content and thematic analysis to examine different discourses and debates in various published articles in the local print media on the plastic ban issue in Malawi. The method draws from Sarantakos's (2012: 314) understanding that 'content analysis aims at analysing the content of texts or written communication.' Thematic analysis is the method for systematically identifying, organizing and offering insight into patterns of meaning (themes) across a qualitative dataset (Braun and Clarke, 2012). This method, then, is a way of identifying what is common to the way a topic or an issue is talked or written about, and of making sense of those commonalities. Maguire and Delahunt (2017) argue that the purpose of thematic analysis is to identify themes, in other words, to establish important and interesting patterns from the data to address the research questions. The thematic analysis provides an opportunity for researchers to move beyond calculating unambiguous words or statements or expressing ideas. As Namey, Guest, Thairu, and Johnson (2008) explain, themes develop clues that

are linked to raw data as summary markers for later analysis, which may include key topics within the data set or comparing frequencies of themes. Boyatzis (1998) observes that a good thematic analysis discovers the relationships between diverse subjects via interpretation. This is much more than simply summarizing the data. I use this method to critically analyse the contents of news articles, civil society online platforms and other reports on the environment.

Braun and Clarke (2006) identified two levels of thematic analyses, namely semantic and latent. The semantic analysis concentrates on the surface or word-level meaning of what the subjects have said or written. In latent analysis, the researcher “starts to identify or examine the underlying ideas, assumptions and conceptualisations – and ideologies – that are theorised as shaping or informing the semantic content” (Braun and Clarke 2006: 84). The present study was informed by the latent analytical approach to transcend the mere surface word interpretation of meanings and to deconstruct responses from the subjects regarding the implementation of the ban on single-use plastics.

Thematic analysis is used on data gathered through a documentary method of content analysis. The study gathered data from articles published in *The Nation* and *The Daily Times* newspapers. These publications were selected because they are mainstream quality papers with a wide circulation and the highest average readership in terms of English publication including regular and consistent coverage in Malawi. In addition, both print media outlets have well-established archival documentation of news articles both electronically and in print, which could be accessed easily. The study collected articles that directly covered and made references to the issue of the single-plastic ban between January 2019 and December 2022. The unit of analysis for this study was news articles hence all the news headlines related to single-use plastics were selected for analysis. The selection of the articles was based on the headlines or leads that made mention of single-use plastics. It should be underlined that though the media landscape is gradually shifting towards social media online

platforms, print media is still more prominent and serves the broad and diverse public in Malawi. Although the limited space dedicated by the Malawi print media to single-use plastics raises concerns, the primary focus of this study is on reviewing and analysing the quality and modes of the media representations of thin plastic waste. In this section, the presentation of study results will be based on these main sources of information and the critical key topical issues or themes.

Results and Discussion: Packaging of the News on Single-Use Plastic Ban

The study of these two newspapers had two key findings. First, the environmental policy frame dominated the representation of the single-use plastics ban. In terms of the sources of the news, journalists relied on government officials, experts and stakeholders on the environment in the sourcing of information on single-use plastic.

Sources of the News

An interesting observation in the analysis of the news articles is the over-reliance on government and environmental experts for the discursive construction of single-use plastics in Malawi. The print media have given government and civil society officials in the environmental sector more power to define and set the agenda for the single-use plastics ban. In total 223 quoted news sources were identified from 87 articles. The most prominent official voices were from the government authorities and institutions (67%) with the most views sought from the ‘Ministry of Environmental Affairs’, Civil society stakeholders on the environment (15%), scientific experts (12%), the general public (2%) and unspecified sources (4%). The data shows that the media largely reproduced the views of those in power, especially the construction of the legislation and policies of the thin plastics ban. The most prominent sources were government officials, environmental experts and civil society members from the environmental sector. The analysis clearly shows a massive indexing whereby journalists used government authorities to legitimise actions by the different institutions towards the ban. There is only an insignificant difference between *The Nation*

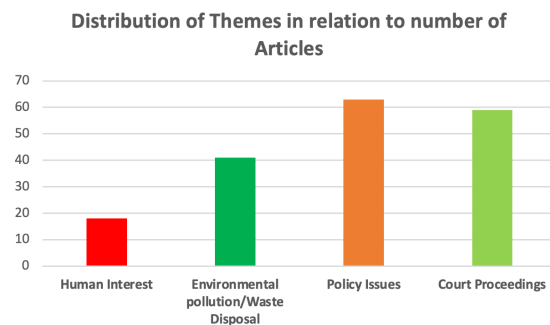
and *The Daily Times* newspapers, which both largely used government and civil society officials as sources in their discursive construction of thin plastics news. The articles typically highlighted the roles, occupations or status of the government or civil society officials quoted to foreground their unique identities and authenticate the information on single-use plastics. There were also some anonymized sources and stories because the newspapers did not want to take responsibility for the views expressed about the ban on thin plastics.

Most often, local people or communities were conspicuously absent among the sources consulted to offer various opinions and experiences on the single-use plastics ban. The indexing of specific experts could be seen as the media's deliberate attempt to transfer responsibility to the individuals' institutions concerned with the environment and set an agenda on the effectiveness of the ban on single-use plastics. The high incidence of using expert, government and civil society stakeholders views politicised the news on the single-use plastic ban because the views of the local people directly affected by the plastic ban were muted and marginalized. The media could have instead prioritized and privileged the voices of ordinary citizens, which may have given insights into the problems that have led to the continuation of using plastics.

Types of Themes in the News Articles

News reports are organized around specific themes that contain topics or related subjects guiding the readers' understanding of relevant issues. Thematic analysis in news discourse determines the respective linear and hierarchical relationships within the text (van Dijk 1988). News stories may have more than one topic with the media producers emphasizing specific issues that should be regarded as significant, through the use of specific discursive or linguistic features. Fairclough (1995) argues that media discourses employ various framing features that are manipulative in favor of the preferred interpretation of the reported discourse. Journalists make sense of information by emphasizing a select number of thematically-related attributes which reflect the ideology and agenda of the publication's owners.

Given the nature of the issue, knowledge and understanding of single-use plastics are certainly fundamental for public communication purposes. As far as the journalistic packaging of single-use plastics is concerned, a close reading of the full set of data revealed that the newspapers foregrounded the following related key themes: policy, court proceedings, environmental pollution/waste disposal, and human interest. Sometimes there is an overlap or intersection of various topical issues. The figure below presents the distribution of the themes.



The figure above shows that policy dominated all the other themes, followed by court proceedings, primarily coverage of the case between the single-use plastics manufacturers against the government's decision to ban thin plastics. In most media reports, the framing of single-use plastic focused on the policy issue informed by the common view of plastic waste as a potential threat to Malawi and its environment. On 9 January 2021, *The Nation* newspaper had a bold headline titled, 'CSOs want govt to act on plastic ban', and similarly in *The Daily Times* on 27 May 2021 which reads 'Court ends Malawi's thin plastics battle', illustrates how the media advocates for the plastic ban policy. Many other articles centred on a policy theme revolve around neglecting the policy by manufacturers, traders and ordinary citizens. However, the newspapers shy away from presenting different pragmatic solutions or alternatives that could directly empower those affected by the ban. There is also a theme on environmental waste/ disposal that centred on blaming the ordinary citizens' use and lack of proper disposal of single-use plastics rather than on their concerns about the ban.

Conclusion

Overall, the critical investigation of the themes shows that the media avoids critically unpacking the underlying causes of the continued use of single-use plastics in Malawi. The paper shows that the media coverage of single-use plastics relied on information from the privileged elites such as environmental experts, government and civil society stakeholders on the environment. Most often the indexing of these officials was from the information gathered through press conferences and briefings. Local or community voices that use single-use plastics in their daily lives are conspicuously absent in most of the news articles. The media then clearly set an agenda to enforce the ban on plastics. The study establishes that media discourses of the thin plastic ban reproduce the views of those in power, especially in the construction of policies and other legislations.

Though the anti-plastic bag policies have been implemented repeatedly, there is stern resistance from ordinary citizens and the business fraternity. Media being the most potent tool of communication in the public sphere would have vouched for a policy review that has to consider various alternatives including socio-economic activities in the implementation of the single-use plastics ban in Malawi. It should have helped to have less contested implementation as in other countries such as Uganda, in East Africa (see Behuria, 2019). Media coverage of single-use plastics could have adopted a sustainability communication approach by repackaging the information and making the general public aware of the threats of single-use plastics and offering possible alternatives to replace plastic. The general public feels detached from the single-use plastic ban policy because they have not contributed their views on how to avert the problem. Malawi print media should consider balancing the presentation by including the people directly affected by the ban and those involved in the plastic products and industry. ■

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Exploring the Interplay Between Climate Shocks and Household Welfare in Ethiopia

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Introduction

The fragile economy and agriculture-based livelihoods of many developing countries are highly natural resource dependent. The rapid and dynamic change of the world environment puts pressure on the lives of the general public in such countries in innumerable ways. This susceptibility of an economy and the livelihoods to such environmental perils manifested itself in multifarious ways, including economic shocks, natural disasters, and conflict-related losses which cause an annual economic loss of more than USD 250 billion, according to the 2017 Sustainable Development Goals (SDGs) (Gershon et al., 2020). Climate change manifests in African countries as both “gradual decline in the length of rainy seasons, frequent droughts, floods, heatwaves and dust storms” and also extreme weather shocks such as floods, droughts, rainfall variability, rainfall precipitation, high temperatures, and more (Asmare, 2018). Such climate impacts have severe effects on the welfare of household (Zanhoun & Acma, n.d.; Thanh et al., 2020; Shiferaw et al., 2014))

In the face of these pressures, apart from the usual traditional government responses and insufficient initiatives, there are no strong institutions or preventive actions that would help to minimize the impacts of climate shock on the life of the poor or to help them cope with these changes (Federman et al., 2014). Agriculture is the dominant sector for the economy of many developing countries in general and Sub-Saharan Africa (SSA) in particular. Ethiopia, the focus of this paper, has such an agriculture based economy, with the sector remaining the main activity and contributing the lions share in GDP, employment creation and exports (Solomon et al., 2021). Rainfed agriculture represents the largest proportions, meaning that

good agriculture seasons are conditioned by good rainfall and ideal temperature. Due to this, climate change poses a threat to the agricultural sector and agriculture-based livelihoods (BIRTHAL & HAZRANA, 2019). Rainfall variability, driven at least in part by climate change, is among the dominant factors affecting the productivity and production of agriculture and the livelihood of the poor and their economies (BIRTHAL & HAZRANA, 2019).

Climate change has particular effects on developing countries with greater dependence on rainfall agriculture with small landholdings, low agricultural productivity, slow economic growth and persistent poverty (Lottering et al., 2021). Drought leading to decreased crop yields and livestock production accounts for about 25% of the natural disaster of the continent (Shiferaw et al., 2014). Such drought has been increasing in frequency, intensity and duration with climate change. The situation is especially critical as dozens of millions of people as still food-insecure and children are at risk of acute malnutrition (Mare et al., 2018). Climate shock both directly and indirectly negatively impacts agricultural production, causing loss of life, deterioration of health, loss of livelihoods and the like. These all work towards the reduced effects of the household welfare (Zimmerman & Carter, 2003).

The effects are not evenly distributed. Climate change impacts are mediated through “several factors such as population, technology, policy, social behavior, land use patterns, water use, economic development, and diversity of economic base and cultural composition” (Naumann et al., 2014). Further, Amartya Sen also argued that drought leads to famine and loss of livelihoods to the extent that there is capability failure which in turn depend on market access and people’s social, economic and political entitlements (Singer, 1982; Koo &

Martin, 2021; Kinda, 2016). The effect of climate change is higher in threatening the life of the rural poor households than the urban and non-farm households. Drought regions are more prone to the climate change shocks than other areas (Solomon et al., 2021). Deforestation, soil erosion and land degradation all contribute to the food security status and welfare status of households. Thus, the issue of climate change needs critical intervention on ways to minimize its impact so that the burden of poverty will be lessened and the welfare aspects of the households will be improved.

Unfortunately, different studies come up with inconclusive results. The effect of climate change is significant with some of them and inconclusive with others. Household characteristic variables play an important role in this regard. Thus, the present study aims to comprehend the heterogeneous effects of the climate shock on household welfare using the socioeconomic survey data from Ethiopia's Central Statistical Authority (CSA), wave 4 (2018/19). The study builds by integrating the dominant aspects of climate vulnerability shocks typically drought, rainfall variability and temperature variations. The novel contribution of this study is providing a comprehensive assessment the effects of climate shock by developing the augmented variable by the interaction of the climate shock variable with the household characteristic variable. The study used instrumental variable approach.

Methodology

Other scholars have handled the inquiry hypothesis in distinct manners: the portfolio asset bifurcation (Zimmerman & Carter, 2003); poverty trap hypothesis (Barrett et al., 2016); the poverty dynamics breaks out the household and individual level that is disaggregate the impact of shocks by asset holding, the individual level effects and the permanent consequences of shocks (Hoddinott, 2006); the livelihood diversification approaches (Ellis, 2000). This study used an instrumental variable method to capture the heterogeneous effects of the economy wide impact of climate

change on household welfare. Along with the key indicators of climate change such as drought, flood, rainfall variability, temperature and the like, they study also took into account the effect of other control variables influencing the household welfare.

Data from climate shocks and the welfare effects were taken from wave 4 (2018/19) of the Ethiopian socioeconomic survey by the Central Statistical Authority. This is publicly available data. The empirical strategy follows the works of (Vijay, 2000) based on the permanent income and full insurance models of consumption dynamics. According to this approach the mitigation of adverse impacts of shocks and consumption smoothing is done by resorting to different coping mechanisms. The two major shocks were identified based on the cross-sectional variations of the idiosyncratic shocks which are unique to households, and covariate shocks where many households experience the shock together. Major shocks considered here are: temperature variation, rainfall variability, drought, and market shocks (price volatility).

The following hypotheses need to be evaluated when taking into account such viewpoints on how shocks affect the wellbeing of households:

H1: The effects of climate shocks matter in influencing the decomposed household welfare.

H2: The heterogenous effects of climate shocks matter in influencing the household welfare.

H3: The market shock matters in influencing the household welfare

The empirical analysis is commenced by providing the conceptual framework of the study that frames the econometric model to be applied. The major shocks are identified and the direction of movement from each shock to the multiple well-being effects of each shock is also set.

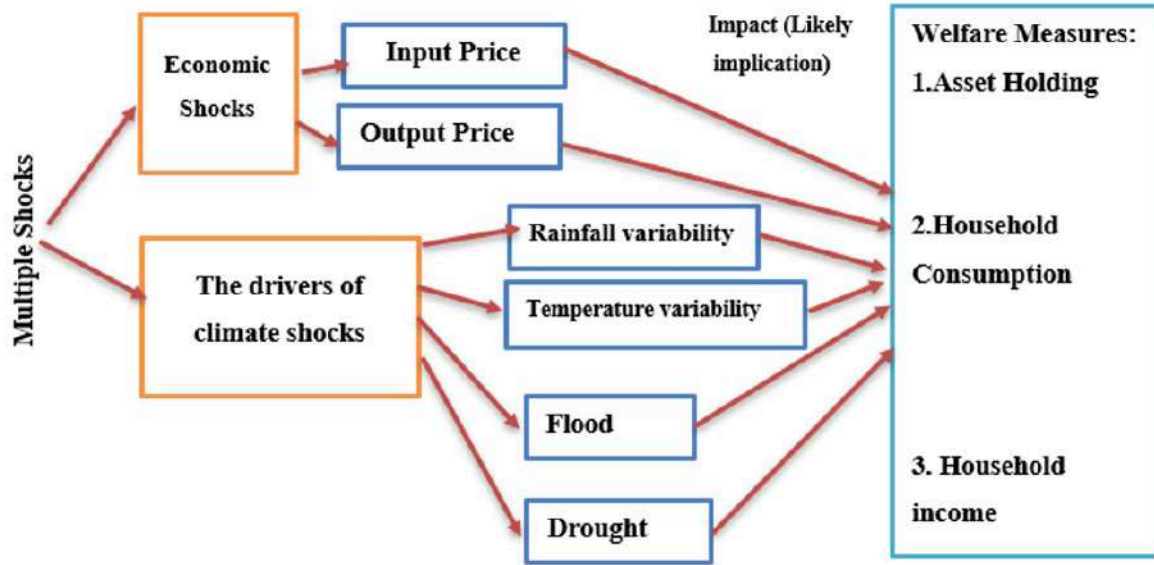


Figure 1: The diagrammatic representation of the climate shock induced welfare analysis. The conceptual framework of the study. By the author, 2022.

The conceptual framework of the study

The econometric model used to estimate the effects, the heterogenous impacts of shocks on dependent variable (household welfare outcome) follows the following specification:

$$Y_i = f(CS_i, OS_i, X_{ij}) \text{----- (1)}$$

Where Y_{ij} represent the dependent (outcome) variable showing the welfare indicator of household (food consumption here), ICS is the vector of the climate shock variables (drought, temperature variation and rainfall variability), OS represents vector of other shock variables, here the economic (market) shock variables, and X represents vector of household characteristics.

The econometric challenge handled through the instrumental variable regression approach.

$$Y_i^j = \varphi_i + \beta_j CS_i^j + \beta_k OS_i^k + \delta_i X_i^l + \varepsilon_i \text{----- (2)}$$

The instrumental variable approach is used to estimate the welfare outcome j for household i . The dependent variable (Y_i^j) is a continuous variable taking positive values and it is regressed on the j climate shock variables of household i (CS_i^j), on the k other shock variables of household i (OS_i^k) and on the l vector of explanatory variables of household i (X_i^l). The specification control for vector of explanatory variable includes the demographic characteristics of households and the social features. This measure considers: financial capital (access to credit), natural capital (land ownership), household size, sex of the household head, religion of the household head and marital status. The last term is error term (ε_i). This study's primary focus is on examining the coefficient of shock variables in general and the coefficient of climate shock factors in particular. Additionally, Table 1 below provides detailed explanations of the variables employed in the study.

Table 1: Description of Study Variables

Variables	Definitions
Household size	Household Size
Access to credit	Whether the household borrowed at least 150birr during the last 12 months
Age	Age of the household in completed years
Temperature	Annual mean temperature (degC*10)
Annual Rainfall Average	Average annual rainfall (mm)
Drought	Climate Shock Drought
Flood	Climate Shock Flood
Heavy rain fall	Climate shock heavy rain fall
Food Consumption expenditure	Annual expenditure on food items
Land Ownership	Whether the household have the right for parcel either alone or jointly
Marital Status	Marital Status of the household
Religion	Main religion of the household head
Household sex	Gender of the household head

Source: Author's compilation, 2022

Estimation Strategy

The instrumental variable approach (IV estimation), which is used in such models to get around the endogeneity issue, is used to estimate the stated econometric model (Wooldridge et al., 2010). The IV coefficient is consistent and greater than the OLS estimates even though the dependent variable is measured using a continuous scale and the ordinary least square (OLS) method is used to produce estimates (Faradiba, 2021).

From the above multiple regression model:

$$\ln(Y_i^j) = \varphi_i + \beta_j CS_i^j + \beta_k OS_i^k + \beta_l X_i^l + \varepsilon_i \text{-----} (3)$$

The OLS assumption that there should be no correlation between the explanatory variables and the error term is violated when the explanatory variables and error term are correlated, hence it cannot be applied for estimation. Such issue has been described as an endogeneity problem that the OLS approach cannot handle. Breaking the link between the two gives the solution for OLS and

with the following condition, the instrumental variable approach is employed to deal with the case.

$$\ln(Y_i^j) = \varphi_i + \beta_j CS_i^j + \beta_k OS_i^k + CS_i^j \pi' X_i^{l'} + \beta_l X_i^l + \varepsilon_i \text{-----} (4)$$

The key contribution of this paper is examining the heterogenous impact of climate shocks along with the effect of shocks on the household welfare. Thus, the basic model is augmented by interacting the climate shock variable with household characteristic variable and the extent to which π is different from zero demonstrates the degree of the heterogeneity of shocks across the household characteristics.

Result and Discussion

The estimated impacts of climate shocks on household wellbeing are covered in this subsection using the welfare indicator of household food consumption expenditures. Three significant topics are covered in this section. These are: Summary of descriptive statistics, the OLS and IV regression results, as well as the post estimation results.

Descriptive Statistics

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lfood_expdr	6,694	10.39	0.739	5.337	13.746
lmean_temp	6,804	5.31	0.203	4.635	5.733
lrain_fall	6,804	6.54	0.463	4.844	7.390
lage	6,661	3.68	0.350	2.564	4.595
lsqage	6,661	13.69	2.595	6.579	21.115
hh_size	6,770	4.24	2.286	1	19
access_to_credit (Yes =1, No=2)	6,770	1.88	0.326	1	2
religion	6,658	2.48	1.420	1	8
land_ownership	6,764	1.19	0.395	1	2
marital_status	6,659	2.63	1.47	1	7
hhsex (Yes =1, No=2)	6,661	1.31	0.463	1	2
drought (Yes =1, No=2)	6,770	1.93	0.252	1	2
flood (Yes =1, No=2)	6,770	1.99	0.116	1	2
heavy_rain_fall (Yes =1, No=2)	6,770	1.98	0.109	1	2
rise_price-food (Yes =1, No=2)	6,770	1.87	0.336	1	2
rise_price_inputs	6,770	1.94	0.222	1	2

Source: Authors compilation from CSA data, 2022

The above tables shows the summary statistics of the variables used for the analysis.

Regression Analysis

Following is a presentation of the regression results for the heterogeneous impacts of climatic shocks on household welfare. The relationship between the climate shock variables and household welfare, as measured by household food spending, is negative and substantial, as shown in table 3 below. According to OLS and 2SLS (IV) estimations, a 1 degree increase in the mean temperature expressed causes a 0.095 and 0.062 percent decrease in family welfare other things remaining the same. The same is true for household welfare, which decreases by 0.051 and 0.046 percent, respectively, with a 1% increase

in rainfall variability other things keeping constant. This demonstrates how negatively the climatic shock variables impact the wellbeing of the household. This signifies that the households' capacity to meet their food consumption demand is compromised by climate-related shocks. Variability in temperature and rainfall are deemed unfavorable weather conditions that impair production, earnings, and spending on food consumption. Thus, the channel through which the climate shock uses to influence the wellbeing of the household matters. In this case, the fall in agricultural production causes a decrease in household income, which further causes a decrease in the amount spent on food, worsening household

welfare. Thus, the climate variability impact is very eminent and there is a negative effects of climate variability on the household welfare This finding is consistent with (Tefera et al., 2022; Weldearegay & Tedla, 2018; Mumuni, 2022; WU et al., 2021; Mekonnen et al., 2021).

The economic shocks, rise in price of food and rise in price of inputs, are closely related to the well-being of the poor. We therefore measure the welfare effects of the price change from producer and consumer sides. From the producer side, an increase in price of inputs decreases agricultural production and leads to

market instabilities. This, further escalates the price of output and increase in consumption expenditure to be at the same level of consumption as that of before. Thus, increase in prices of food and prices of input worsens the welfare of the household. An increase in price of food also leads to consumption switching to less quality and cheaper, less organic food items which are not good for health and hence affects well-being negatively(Magrini et al., 2015). Price shocks have detrimental effects on household welfare and poverty (Anna,2015); (Adekunle et al., 2020); (Tukae & Xiaohua, 2016); (Etang Ndip & Touray, 2019).

Table3: Estimation of the household welfare responses to climate shocks

VARIABLES	OLS	IV(2SLS)
	lfood_expdr	lfood_expdr
lmean_temp	-0.057 (0.043)	-0.054 (0.043)
lrain_fall_variability	-0.069** (0.020)	-0.064** (0.021)
Shock_hetro	0.113 (0.087)	0.108*** (0.029)
rise_in_price_of_food	-0.058** (0.027)	-0.058* (0.027)
rise_in_price_of_inputs	-0.125*** (0.039)	-0.125*** (0.039)
drought	-0.007 (0.108)	
log(age_hh-Head)	1.768*** (0.476)	1.755*** (0.476)
log(sqage- hh-Head)	-0.234*** (0.064)	-0.232*** (0.064)
hh_size	0.098*** (0.005)	0.096*** (0.005)
Access_to_Credit	0.063** (0.027)	0.062** (0.027)
Land_Ownership	0.053** (0.022)	0.051** (0.060)
Marital_Status	-0.051*** (0.007)	-0.052*** (0.007)
Constant	7.734*** (0.944)	7.696*** (0.915)
Observations	6,492	6,487
R-squared	0.130	0.128

Source: Author's computation (2022)

Household characteristics matter for the ability to adapt to climate shocks. As there are few other sources of income generation in rural areas, land is the primary source of agricultural output there. Therefore, access to land cause an increase in farm yields, which raises household income and increases spending on food. Land ownership therefore results in significant increases in production and welfare (Mogues, 2011). Up to a point, a household's ageing results in a rise in production due to increased efficiency and experience in agricultural practices. This ultimately caused a rise in income and food expenditures. In comparison, both OLS and 2SLS (IV) estimations demonstrate that square age has a diminishing impact on the welfare of the household, demonstrating that productivity declines over time and that

retirement occurs(Oshimi et al., 2016). Further, household size has positive impact on the welfare of households showing that family size and economic welfare are positively related(Espenshade et al., 1983). Marital status contributes negatively to the welfare of the household as per the empirical results of the study. Another interesting result is the heterogenous effects of shock on the household welfare. This heterogeneity is captured by the interaction of the climate shock (drought) with the natural capital (land ownership) and it is statistically significant at conventional levels. This shows that there is a degree of heterogeneity in the effects of the climate shocks among the household characteristics(Etang Ndip & Touray, 2019). Access to credit has positive and significant impact on the welfare of households. ■

APPENDIX: Postestimation tests for IV-based estimations

A series of postestimation tests can be used while implementing IV-based estimations. These tests are: Relevance condition, Test for endogeneity, test for overidentifying restrictions, test for weak instruments,

Test for Endogeneity: The Durbin-Wu-Hausman (DWH) test

In a regression model, the DWH test finds endogenous regressors (predictors). The OLS will fail if endogenous variables are used in the model since they are dependent on other factors. When there is a correlation between the predictor variable and the error term, an alternate strategy is the instrumental variables estimator.

```
. estat endog,
```

```
Tests of endogeneity
```

```
Ho: variables are exogenous
```

```
Robust score chi2(1) = 2.21666 (p = 0.1365)
```

```
Robust regression F(1, 6474) = 2.41825 (p = 0.1200)
```

From the above endogeneity test the null hypothesis of variables are exogenous is accepted and the instrumental variables used in the IV regression analysis are the proper ones as the p values are not significant. We cannot conclusively reject the null hypothesis of exogeneity.

Weak Instrument Test (Relevance criterion)

The caliber of the instrumental variables taken into account affects how reliable the endogeneity test is. This establishes the instrument's capacity for explanation. The chosen instrument needs to be relevant and exogenous (Ullah et al., 2020) and this is done using the Stok -Yogo test shown below. As shown below the instruments are strongly influencing the endogenous variable at conventional level of significance. This shows the explanatory power of the instrument. This is the relevance criterion conditions of the instruments where $Cov(X, Z) \neq 0$. As shown below the two IV variables are individually significant (t-test) and jointly significant from the F-test.


```
. reg lrain_fall drought lag_lrain_fall
```

Source	SS	df	MS	Number of obs	=	6,674
Model	1389.02672	2	694.51336	F(2, 6671)	>	99999.00
Residual	22.842391	6,671	.003424133	Prob > F	=	0.0000
				R-squared	=	0.9838
				Adj R-squared	=	0.9838
Total	1411.86911	6,673	.211579366	Root MSE	=	.05852

lrain_fall	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
drought	.0100915	.0029161	3.46	0.001	.004375 .015808
lag_lrain_fall	.9901003	.0016088	615.44	0.000	.9869465 .993254
_cons	.0452266	.0106238	4.26	0.000	.0244006 .0660526

```
. test drought lag_lrain_fall
```

```
( 1) drought = 0
( 2) lag_lrain_fall = 0

F( 2, 6671) = 2.0e+05
Prob > F = 0.0000
```

Further, from the first step regression given below R-squared (R^2) and the adjusted R-squared (\bar{R}^2) shows the normal coefficient of determination obtained by regressing the endogenous variable on the exogenous and instruments. But, for the weak instrument test R^2 and \bar{R}^2 are not that much relevant. In place, the Shea's partial R^2 explaining how much the instruments explain the endogenous variable matters a lot. Since the value is almost around the normal R^2 with minor differences, it is a good signal that the instruments are not weak. This can further be confirmed from the F-statistic. F statistic with two instruments is highly significant. The rule for weak instrument test is comparing the F- statistics with the 2SLS and Likelihood Information Maximum Likelihood (LIML) and how much bias we are going to tolerate (10% or 20%, or 25% or 30%). At all levels of bias, the F-statistic is greater than the 2SLS bias and the LIML bias. And, hence we can conclude that the IVs are the strong instruments of the endogenous variable.

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(2, 6474)	Prob > F
lrain_fall	0.9837	0.9837	0.9807	122920	0.0000

Shea's partial R-squared

Variable	Shea's Partial R-sq.	Shea's Adj. Partial R-sq.
lrain_fall	0.9807	0.9806

Minimum eigenvalue statistic = **164187**

Critical Values # of endogenous regressors: **1**
Ho: Instruments are weak # of excluded instruments: **2**

	5%	10%	20%	30%
2SLS relative bias				(not available)
2SLS Size of nominal 5% Wald test	19.93	11.59	8.75	7.25
LIML Size of nominal 5% Wald test	8.68	5.33	4.42	3.92

Test of the overidentifying restriction test

The over identification test is done after the regression is run with IV method and this test is applied to check the exogeneity conditions of the instruments. It is the test of checking whether the instruments are correctly identified and uncorrelated with the disturbance term.

The results of the test based on the chi-square of the Sargan's and Basman's tests are not significant (see p value below) implying that the instruments are valid and the model is correctly specified. This shows that the null hypothesis of the exogeneity is not rejected and the IVs are truly exogenous ones.

estat overid, forcenonrobust forceweights

Tests of overidentifying restrictions:

Sargan chi2(1) = **.000634** (p = **0.9799**)
Basman chi2(1) = **.000633** (p = **0.9799**)
Score chi2(1) = **.000611** (p = **0.9803**)

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Indigenous Knowledge and Climate Change Adaptation in Niger Delta Coastal Communities

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Abstract

Countries of the Global South are disproportionately affected by climate change. Due to poverty and limited technology, the capacity of developing countries to address climate risks is constrained. These problems have often left poor communities to rely on Indigenous knowledge systems rather than the state to adapt to climate change (Raimi, Jack and Boroh, 2016). This study demonstrates how marginalized communities mobilize local resources to respond to climate change risks in the absence of formal interventions from government. It examines the climate risks to coastal communities in the Niger Delta region of Nigeria and the Indigenous knowledge systems and practices that aid adaptive responses to climate vulnerability.

Based on the analysis of qualitative data collected through personal observations and oral interviews, the study finds that the lived experiences of climate change in coastal communities in the region manifests in increasing vulnerability to sea level rise, coastal flooding, and coastal erosion. The study demonstrates that the knowledge of mangrove forests and creeks, knowledge of community history, and Indigenous worldviews that uphold the sacredness of the environment such as totemism promote sustainable use of natural resources. These Indigenous knowledge systems and worldviews are instrumental to climate change adaptation, as communities rely on local technologies to construct flood-resilient houses and shoreline stabilization to protect farm settlements and fishing areas from flooding and coastal erosion. These approaches, however, have differential impacts on climate risk reduction as greater unpredictable climatic scenarios could reduce their effectiveness. These Indigenous practices should be integrated into conventional scientific approaches to achieve sustainable climate change mitigation in the region.

Introduction

Indigenous Knowledge (IK) refers to the understandings, skills, and philosophies of Indigenous peoples, developed through long and multigenerational histories of interaction with the natural world and adapting to highly variable and changing ecological and social conditions (UNESCO, 2017). These Indigenous knowledge systems are historically linked to the divergent socio-cultural practices associated with Indigenous people's responses to different environmental conditions. This is evident in sub-Saharan Africa, where Indigenous communities rely heavily on such knowledge and practices to mitigate the impacts of extreme weather conditions on natural resource-based livelihood systems. Some of these strategies include relying on Indigenous irrigation systems, adopting more resilient varieties of staple crops (Gyampon and Asante, 2011), utilizing traditional sustainable water and land resource usage practices, sustainable traditional land tenure systems, crop rotation, organic agriculture (Ajani et al, 2013), shifts between farming and other livelihood activities (Simelane, 2004), as well as prayers and supplications to the supreme being (Theodori, 2014; Fabiyi and Oloukoi, 2013; also see Bourhrous in this collection). Likewise, smallholder farmers across the Niger Delta region have developed several adaptation strategies to reduce their vulnerability to climate risks (see Boroh in this collection). Despite the increasing recognition amongst scholars that Indigenous knowledge is an important resource for climate change adaptation (Adger, et al., 2014; Pareck and Trivedi, 2011), it is often neglected by governments and policymakers in climate change adaptation efforts (IPCC, 2014). The marginal integration of traditional wisdom embedded in Indigenous knowledge systems (Berkes et al, 2005) continues to undermine participatory approaches to mitigating climate change impacts across the world (Picollela, 2013; Petzold, et al. 2020) and limits adaptation policy and practice.

The Intergovernmental Panel on Climate Change addressed this gap in policy, research and practice in its fifth assessment report (IPCC, 2014) by advocating that scholars, policymakers, and governments utilize IK systems alongside formal scientific approaches for more effective climate change adaptation and promotion of ethical and sustainable adaptation practices (Petzold et al. 2020). Addressing the gap in policy has increased the demand for documentation of IK systems and practices that contribute to climate change adaptation, especially in countries like Nigeria where climate change impacts are disproportionately manifest. This article explores and documents the IK systems and practices that promote climate change adaptation in coastal communities of Nigeria's Niger Delta.

The Niger Delta region, which hosts Africa's largest oil industry, is strategically located at the southernmost part of Nigeria bordering the Atlantic Ocean. Its location makes it vulnerable to two types of risks. First, Indigenous communities in the area are threatened by increasing climate risks such as sea level rise, coastal flooding, and coastal erosion (Raimi and Jack, 2017). Second, the increasing livelihood and human security risks associated with over six decades of crude oil and gas exploitation (Jack, 2017) have caused widespread environmental pollution. These problems are coupled with unsustainable environmental consumption patterns driven by mass poverty that further exacerbates climate change vulnerability in the region (Jack, 2019). The interactions between these factors makes the Niger Delta a high-risk region for climate change impact, and the marginality of its environment represents a good case study for understanding how Indigenous communities utilize their IK systems to adapt to environmental changes. The article therefore addresses two important research questions. First, what are the IK systems and environmental perceptions of the Niger Delta people? Second, how do existing IK systems shape practices of adaptation to climate change in the region? Relying on the personal observations of the researcher and evidence generated from research participants, the paper reveals how IK and understandings of the natural environment shape adaptation to climate change impacts. The study

utilizes the Kalabari ethnic group of Rivers state as a case study because their area is disproportionately susceptible to climate change impacts as it consists of a cluster of coastal island communities. To document the nature of environmental history and knowledge in the area, community stakeholders including elders, women, traditional rulers, and youths were purposively sampled for oral in-depth interviews across selected Kalabari communities such as Buguma, Ido, Elem-Kalabari, Abalama, Tombia, and Obonnoma. I rely on the lived experiences of community dwellers to provide insights into the impacts of climate change in the area and the IK systems developed to aid adaptation. I used the emic approach to cultural analysis, relying heavily on my personal experiences and observations as a member of the Kalabari ethnic group residing in the coastal city of Port Harcourt to provide an insider perspective.

In this study I first examine the climate change scenario in the Niger Delta region and then present the traditional environmental knowledge systems and practices of Indigenous Kalabari communities as they relate to climate change adaptation. An evaluation of their strategies reveals a varying degree of effectiveness. The concluding section makes a case for the need to integrate Indigenous adaptation strategies with formal scientific approaches for an effective participatory and sustainable climate change mitigation plan in the Niger Delta region.

Climate Change and Coastal Vulnerability

The Niger Delta region is disproportionately impacted by climate change-induced extreme weather events. Diurnal tides, surf zone induced waves, and longshore current lead to perennial flooding and erosion (Abija, Abam, Teme and Eze, 2020), resulting in shoreline vulnerability (Oyegun, Lawal, and Ogoro, 2016). These extreme events are associated with sea level rise, which accounts for shoreline retreat and erosion along the coast lines of Bayelsa (81,532 m), Rivers (17,519 m), and Akwa Ibom (8,590 m) between 1991 and 2018 (Abija, Abam, Teme and Eze, 2020). Flooding also contributes to the salinization and contamination of coastal aquifers, as well as of ground and surface freshwater bodies. The region is notably a high-

risk flood zone (Njoku, Effiong, and Ayara, 2020; Bariweni, Tawari and Abowei, 2012) as coastal communities along the 853-kilometer stretch of the Nigerian coast are vulnerable to ocean surges (cold flooding) as well as overflow of river banks (warm flooding) (Fabiya and Oloukoi, 2013).

The increasing vulnerability of coastal communities in the Niger Delta to climate change impacts has concomitant effects on local communities who subsist within an already marginal environment that is devastated by oil and gas pollution (see Boroh, this collection). The primary traditional livelihood practices of these communities are predominantly fishing and farming as well as mangrove harvesting, which are all negatively impacted by flooding and coastal erosion. Settlements and basic infrastructure are also threatened by climate events that predispose human communities in the area to internal displacement problems and associated health implications, especially for vulnerable groups.

The Kalabari-speaking people can be found in Akuku-Toru, Asari Toru, and Degema Local Government Areas of Rivers state, in the eastern Niger Delta region. They occupy over 22 villages covering an area of about 1,000 square miles, including the three major towns of Abonnema, Buguma, and Bakana. The Kalabari area is situated near the capital city of Port Harcourt to the northeast, the mouth of the New Calabar River in the southeast, the mouth of the Santa Barbara River in the southwest, and the village of Orusangama in the northwest (Horton, 1965). The Kalabari people, who have lived in this area for over 500 years (Alagoa and Tamuno, 1989), are linguistically and culturally members of the great bloc of Ijo-speaking people of the Niger Delta. Economically, while the area hosts major oil and gas operations, fishing and trading has remained the traditional livelihood support system of the Kalabari people for centuries.

Local Perceptions of Climate Change and the Environment

The Kalabari cosmology and environmental world view is centered around the creation of all life forms from clay by the Supreme Being called Tamuno

who created and sustained not only the visible, tangible world but also a host of lesser spirits. According to Horton (1984), the Kalabari people see their world as controlled by a complex array of personal forces. First, they have to reckon with the fixed spirits called *teme*. It is believed that every person, animal, plant, and thing have its guiding spirit, which controls its behavior “as a steersman controls his canoe” (ibid). Then, over and above such spirits associated with particular material objects, there are three great categories of free spirits (who are lesser than and created by Tamuno) who influence whole masses of phenomena. These include the Amaoru—founding heroes of the community who are now deified, such as the Kalabari national goddess Awomina-Akaso. The second set of spirits is known as the Duein—the ancestral founders of the various lineages and houses and finally the Owuamapu—spirits of the waters who created the rivers and creeks and are responsible for their continued existence, the water conditions in them and for the fish and other fauna that inhabit them. Horton (1984) argued that there seems to be a marked difference in character and function between Amaoru and Duein on the one hand and Owuamapu on the other. Amaoru and Duein are essentially concerned with the continued existence of human groups, while Owuamapu are concerned with the non-human environment. As a way of characterizing this difference, he classified the Amaoru and Duein as “forces of society” and Owuamapu as “forces of nature.”

The worldview of the Kalabari people is largely influenced by their perceptions of their natural environment. These perceptions range from spiritual knowledge to beliefs about the physical environment and plants and animals that are believed to be abodes for spirit beings. The places where these plants and animals live, such as the mangrove forests, rivers, and creeks are also sacred to the people. The spiritual knowledge and environmental perceptions of the Kalabari people inform their environmentally sustainable practices that have provided options for climate change adaptation for decades.

For example, beliefs held by the Kalabari people confer special protection over environmental resources by preventing some trees and animals from being harvested for food and by designating

sites in the communities as sacred due to their status as abodes of deities or spirits. Since there is little or no human activity in such places, these beliefs act as traditional modes of natural resource conservation. Some of these sacred sites identified in the study include Ogu-Okolo in Obonnoma community, Anya-Abissea in Abissea community, and Aju-Owu Sawo Anga in Tombia community. The sacred groves provide protective mangrove cover for communities against rising flood waters and extreme ocean surge and winds.

Spiritual knowledge also informs practices that reduce climate change risks. The Kalabari people believe that aquatic resources come from Owuamapu, water spirits, hence these forces of nature are also considered responsible for the changes in the climatic conditions and extreme weather events such as sea level rise, ocean encroachment, and flooding. The perception of extreme weather events as an outcome of the activities of water spirits has necessitated corresponding spiritual responses to mitigating climate risks. These responses include Indigenous restrictive practices such as *mu-gbai* (restrictive period from mangrove harvesting), *toru-kiki* (restrictive period from sea fishing) and *toru-sikiri* (ritualistic sacrificial cleansing to appease the water spirits in the sea). These spiritual responses are targeted at ensuring a harmonious relationship between the community and forces of nature.

Indigenous Technologies for Climate Change Adaptation

The environmental worldviews of the Kalabari people and the IK systems associated with their interactions with the natural environment have enabled communities to harness local resources and Indigenous technologies to respond to changing climatic conditions in their environment for centuries.

The construction of flood-resilient houses is a prime example of how the Kalabari mitigate risks associated with coastal flooding. I observed that most houses along riverbanks are built on wood or concrete platforms as a means of raising the houses above flood levels (Plate 1).



Plate 1: Houses constructed on raised platforms above flood level in the study area. Photo by author.

Floating houses constructed with mangrove wood are also common, as this enables houses to stay suspended on the river surface as the flood water rises without getting inundated. Furthermore, inland areas where flood waters have submerged access roads, wooden bridges locally known as ‘monkey bridges’ are built across communities to aid movement from one end to another, while wooden canoes are the popular means of transportation within communities during high tidal flood periods.

To mitigate the impacts of coastal flooding and erosion, communities in the study area rely on Indigenous shoreline protection that uses local resources and technology. For example, they construct shoreline walls with chicoco mud, locally known as *lika*, and mangrove wood known as *angala* to serve as defense against rising waters and erosion (Plate 2). In some cases, sandbags are also used to protect the riverbanks from being inundated by flood waters.



Plate 2: Local shoreline protection with chicoco mud (lika) in the study area. Photo by author.

Another useful adaptation strategy that was found in the study area was the reliance on Indigenous meteorological systems to forecast flood seasons and extreme weather events, which provide early warnings for communities to anticipate and prepare for flood disasters. Knowledge of the seasons, movements of the river tide, appearance and movements of specific kinds of aquatic animals and fish serve as local signs and flood indicators in conjunction with the spiritual knowledge of the environment. In addition to physical preparedness, communities also make sacrifices to appease the specific water spirits and deities who are believed to be in control of the natural forces in the ocean.

Evaluating Indigenous Approaches to Climate Change

IK systems, as already established in the introductory section, are useful tools in promoting climate adaptation, especially in areas such as Nigeria's Niger Delta where formal science-based climate adaptation interventions are absent. An evaluation of the Indigenous approaches described above reveal that while some of the outlined approaches are found to be effective, others are not. For instance, the reliance on Indigenous meteorological systems provides early warning systems for communities to develop mechanisms for disaster risk preparedness and reduction. More so, the construction of flood-resilient houses and the use of chicoco mud for shoreline protection has been found to be effective, while community protected forests effectively provide cover against flooding and ocean surges. Reliance on sacrifices to the deities and water spirits, however, have not been found to be effective as there are no scientific measures to indicate its impact. Regardless, these ritual sacrifices provide opportunities for communities to build social and psychological resilience (see Bourhrous in this collection). While the efficacy of these Indigenous strategies is not in doubt, unpredictable severe climatic scenarios could reduce their effectiveness. For instance, severe ocean surges have the capacity to inundate chicoco-based shoreline protection and submerge houses built on raised platforms, while floating houses may be least affected. These observations suggest that Indigenous approaches

need to be integrated with formal scientific approaches for sustainable and participatory climate change adaptation in the Niger Delta.

Conclusion

This paper critically examined coastal vulnerabilities to climate change in the Niger Delta region of Nigeria which is disproportionately impacted by sea level rise, coastal flooding, and coastal erosion. In the absence of modern technologies and limited adaptive capacity to mitigate these environmental challenges, which pose severe human security risks, coastal communities of the region have relied on Indigenous knowledge systems to develop adaptation strategies to the changes in their environment. Long-standing Indigenous environmental worldviews and beliefs about the physical environment, especially the marine ecosystem, have engendered practices that are useful in mitigating climate change impacts. While these practices, like totemism and the use of local flood and erosion control mechanisms, are useful in promoting adaptation, they are yet to be mainstreamed into climate change mitigation frameworks in the country. These Indigenous practices should be integrated into conventional scientific approaches to climate change mitigation in the region. This goal could be achieved through a participatory bottom-up approach of strengthening Indigenous techniques associated with natural resource use and management coupled with modern flood and erosion control infrastructure such as levees, dikes, and seawalls. ■

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Resisting Degazetting of Forests and the Discourse of Development in Uganda

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Introduction

On October 28, 2021, a bill was introduced in the Ugandan parliament to degazette (remove protected status from) three central forest reserves: Kiula, Wamale, and Bajo, all located in Kayunga district.¹ Member of Parliament Charles Tibandeke argued that the motion to degazette aimed to provide room for “human settlement and industrial parks.”² Parliament justified this bill by stating that, “land constituting Wamale, Kiula and Bajo central forest reserves have been heavily settled on by about 70,000 households” due to “increased urbanisation.”³ Despite resistance by farmers and other elements of society, Bajo Forest reserve was sold to Kiira Motors, a Ugandan state enterprise, to establish a car assembling plant.⁴

It should be noted that at the heart of the state’s development discourse is industrial development, which necessitates acquisition of immense amounts of land, including forests and swamps. But this priority leads to encroachment on lands that are considered vital for fighting the global crises of environmental degradation and climate change. This paper questions state-driven and state-enforced notions of land, development, and environmental conservation in the context of degazetting by re-centering a perspective that emerges from society. Dealing with questions of the environment and climate change requires engaging with the multiple and complex structural issues of colonialism, capitalism, and neoliberalism that reproduce the problem using state and global environmental governance discourse. The increasing use of development discourse, which is couched in the language of industrial development, to justify land dispossessions through degazetting makes it important to question the implications of that discourse for the environment and climate change. Based on ethnographic findings, I use a critical reflection on farmers’ resistance to degazetting to

offer an alternative sociological discourse on land use, development, and environmental conservation.

Neoliberalism and Environmental Conservation

Historically, colonial and neoliberal conservation efforts have typically been driven by a Eurocentric perspective that prioritized the preservation of “natural” or “pristine” environments over the needs and rights of local communities.⁵ Colonization was characterized by the widespread exploitation of natural resources, with nature treated as a commodity to be exploited for the benefit of the colonial power. The communities living on those territories were, at best, an obstacle to be overcome during that exploitation and, at worst, deployed as active agents of the destruction of natural resources. Indigenous territories were often treated as business enterprises with seemingly limitless resources, resulting in serious environmental consequences.

Political ecologists have conceptualized neoliberalism as a complex yet divergent assemblage of ideologies, institutions, discourses, actors, and practices whose main mandate is to ensure that processes of financialization, marketization, and commodification are expanded and entrenched in society.⁶ The adoption of neoliberal principles in conservation, in ways similar to colonial conservation, can be attributed to the search for new investment opportunities for the generation of surplus capital framed within the discourse of the “green economy” in ways that foreground dominant ideologies and power.⁷ Holmes and Cavanagh have pointed to the ways in which neoliberalism creates “new subjectivities and forms of governance” in a bid to secure “profits for the individuals and institutions.”⁸ Neoliberal conservation projects carry with them longer and broader imprints of histories of environmental regulations and processes of state formation. The

social impacts of neoliberal conservation should be thought of within this broader historical and political context, alongside broader questions of land reform, power, development, and class.⁹

In the Ugandan context, Nakangu has shown that the roots of conservation governance are historical and political, and its neoliberalization can be located in the longer political history of Uganda's governance of protected areas right from the colonial period.¹⁰ Similarly, Cavanagh and Himmelfarb highlight how conservation governance in Uganda has a direct relationship to its longer history of state formation, with an enduring tension between the "conservation authorities" and the Ugandan society.¹¹ This tension manifests in neoliberal interventions as a focus not on conservation itself but on its exploitative, dispossessive, and marginalizing logic. As Nel would argue, there has been an extended commercialization and privatization of the forestry sector in Uganda, which has been accelerated by the adoption of neoliberal structural adjustment programs and extensive external intervention. This situation has weakened state management capacity, since the focus has been put on the "creation of markets for timber and as a more recent novelty carbon markets for carbon stored in woody biomass."¹² Both public and private agencies have continued to front a neoliberal discourse that looks at "forests and carbon resources as natural capital to which economic calculations can be unproblematically applied."¹³ To Nel, the neoliberal discourse naturalizes the newly neoliberalized status quo in ways similar to how the colonial discourse naturalized the "crown lands and forest reserves." In the end, the discourses depoliticize "their local context, simplifying perceptions of the forestry crisis to linear narratives that justify technical fixes and obfuscate the more complex socio-political explanations for and nuanced responses to deforestation."¹⁴ He argues that forest areas became naturalized as normative, intrinsic conservation spaces that required utmost defense while disregarding them as socio-cultural entities. They became "products of colonial and neoliberal regimes of production and conservation."¹⁵ In the end, what has been conserved is spaces to be exploited later through schemes such as degazetting

with the blame being put on ordinary people whom they claim attack the already preserved and conserved ecosystems like forests.

Nel argues that the mainstream (Western, colonial, and hegemonic) forestry discourse has put the blame of deforestation and forest degradation on the "black man,"¹⁶ categorized into three destructive forms: the man with the axe, the man with the pen (politicians, bureaucrats, forest managers, and rangers) and the man who settles (seen as an encroacher and criminalized for degrading the protected areas on which they settle). Following this logic, the state and its neoliberal conservation counterparts have considered the "man who settles" as the target of the degazetting bill for the three central forest reserves in Kayunga district, which describes the local inhabitants as an encroacher on a forest with no title to the land, and so justifying the need to degazette the forests and establish industries. These local inhabitants are seen as illegal and subject to expulsion when new investments take place on the leased central forest reserves because they usually lack the capacity to prove "their continuous connection to the land for more than 12 years."¹⁷ The discourse in the end privileges the elite, rich, and powerful at the expense of those who are far from the levers of power. The Ugandan debate resonates with the normative neoliberal discussions on land rights and security of tenure as advanced by the World Bank through its chief proponent and economist Hernando de Soto, who suggests that those can only be achieved if such lands are put into "productive use."¹⁸ The discourse further seems to be based on a commodified understanding of land and other natural resources without regard to the other social relations connected to it.

The Parliamentary Debate on Degazetting

The debates in parliament on degazetting the three central forest reserves mirror the current framework and interests of the state and capital. The bill had three intentions: One, to deal with the question of encroachment on a forest reserve [defined in terms of "the third black man" described above]; two, to provide security of tenure [at the expense of the security of local communities]; and three, to

promote industrial development [at the expense of environmental sustainability].

First, the bill claimed that “land constituting Wamale, Kiula and Bajo central forest reserves have been heavily settled on by residents, numbering about 70,000 households, resulting in the establishment of four trading centres, seven parishes and 29 villages in the two sub-counties.”¹⁹ The bill thus defined the enemy and the threat to the forest as the ordinary people who had settled on the land. It goes further to suggest that people had already started establishing schools, hospitals, and worship centers with titles being issued by the Ministry of Lands, Housing, and Urban Development. The theoretical and practical implication of such a narrative is that the forests and other protected areas are depicted as being threatened by a local, land-hungry community, which threatens not only the forest as nature but also the potential for future development.

Second, the bill claims that people who are settled on this land are insecure, defined in part as an issue of tenure security. The bill states that, “unless the land belonging to Wamale, Kiula and Bajo central forest reserves is degazetted to allow human settlement, the 70,000 households currently occupying that land will continue having no security of tenure on the land and the continued land wrangles and land evictions in the district are likely to continue unabated.”²⁰ Degazetting here is broadly aimed at what the sponsor of the degazetting bill, Member of Parliament (MP) Patrick Nsanja called “economic justice” with emphasis on “justice for all.” He noted that land titles were issued to only a few lucky people. Couching the degazetting project in the language of providing security of tenure to the people follows a path typical of neoliberal discourse. It is important to note in this context that some people had started getting land titles on this same land. The question becomes, which people? MP Idah Nantaba (one of the critics of the bill) says the people getting titles are investors and politically connected elites who have the resources and power and thus are not a threat to the land under the terms of the neoliberal discourse. The reality of who is getting titles turns the logic of titles on its head: Titling does not offer

tenure security and can change whenever particular, powerful interests emerge. Tenure security becomes meaningless, it seems, when the industrial park establishment can evict people and dispossess them. The same government that defended degazetting in the name of issuing titles to society to afford them security simultaneously offers such titles only to certain interests and not to others. For the first time, this represents an acceptance that titles are not the ultimate security guaranteed by the government, which contradicts its neoliberal logic. Where the sponsors of the bill claimed to be securing the land for the ordinary people, MP Nantaba suggests that the process involves land grabbing, including the titles that were initially issued to those who have them. She notes that when the government issued land titles to a few individuals in the forest reserve, it only issued them to those who have the capacity to grab land. When the government talks of tenure security, it therefore has in mind a conception of security that only protects private developers, political elites, and multinational companies and not the local communities on the land.

Third, the bill argues that “the land currently occupied by Wamale, Kiula, and Bajo central forest reserves in Kayunga District is suitable for establishing industrial parks” and thus promotion of “development.” It argues that this would be to the benefit of the community since it will in turn create more “jobs, ease accessibility of land for investments, introduce new research, technologies, and skills development as well as boost Uganda’s exports.”²¹ The people would supposedly benefit from the spill-over effects that come with the investments although not as investors. But in whose interest is a car assembly plant? Clearly, the talk of increasing “urbanization” notwithstanding, the idea of degazetting was not aimed at creating space for human settlement. Rather, the objective of the members of parliament was to free up such land for setting up an industrial park. The idea of industrial parks falls squarely within the neoliberal framework and definition of development. Advocates of (neoliberal) development argue that these parks will provide markets for the area’s agricultural output, as raw materials for the industries, as well as create job opportunities for the people.²² As

such, the intention of the legislators to give out land to investors through the aid of the legislature was laid bare. The creation of jobs, a market for raw materials, and development of skills are core components of the neoliberal development agenda usually used to justify massive land grabs.²³

Resistance to the Bill

The bill attracted resistance from both members of parliament and the community. In their response, critical Members of Parliament argued that the bill hoodwinked people by claiming that it intended to promote development and tenure security but would instead dispossess them of the land and give it to investors and politically connected local elites. MP Nantaba argued that numerous investors and developers had already started encroaching on the land and dispossessing community members. For instance, she points to Modern Agri Infra Limited as one of the developers who occupied the land and who are in court over the same land. How then can one be convinced that the degazetting bill is not for purposes of consolidating the private ownership of such people and dispossessing the poor who cannot afford the titles? From this perspective, degazetting can only be seen as a move aimed at handing the land to investors and political elites. The security of ordinary people to use land cannot be achieved when huge chunks of forest land are to be cleared to allow the establishment of industries.

Outside of parliament, the Ssabanyala (cultural leader of Banyala of Kayunga), Kimeza, joined the protest and resistance against the sale of the forests by claiming that the act is illegal and the forest is more important than the industries to the people of Kyunga and surrounding areas.²⁴ He accused the Resident District Commissioner, Ssempala—who he claimed was not even from the district—of being behind the transaction. The Ssabanyala argued that the Bajo forest reserve is “environmentally important for the area.” Because of his strong fight against the sale (and given his military status) some government officials at the district accused the “Ssabanyala of harbouring selfish interests in his fight against what he says is the illegal sale of the forest.”²⁵ The question of selfishness is attributed to the fact that he was planning to give the land to his

“subjects” to continue farming and cattle grazing, since some community members were already using parts of the forest for these purposes. This criticism of the Ssabanyala by district leaders shows that the interests of people were not their concern, and they would rather allow investors to take the land than let the people use it. The Ssabanyala denied having any selfish interest and vowed to fight to his last drop and encouraged his successor, in case he died in the process, to continue to protect the forest reserve.

Given the violent path the resistance was taking, a meeting was held in early August 2021 to discuss the issue between the various parties, including the cultural leader, community members, the national forestry authority, and government officials both local and national. It is reported that in the meeting, around 50 cattle herders attended “carrying big sticks” while the National Forestry Authority (NFA) and the Ssabanyala’s prime minister were both protected by armed men. In the meeting, these cattle herders expressed the need to continue “using the forest reserve for grazing their cattle while the ordinary occupants of the forest... still want[ed] possession of the land.”²⁶

Despite having the support of the Ssabanyala, community members did not have the strength to fight directly these powerful forces that were “grabbing the land, well connected and sometimes armed.”²⁷ It took the intervention of the National Forestry Authority (NFA) to engage them in a court battle “seeking the nullification of many land titles that had been issued out on these [forest reserves].”²⁸ Even then, the case remained in court given the power of those who acquired the land.²⁹ NFA’s attempt was couched in the language of environmental conservation and protection. Forest conservation is important, but it becomes problematic when it is used to serve the interests of capital and political power. MP Nantaba argues that it makes no sense to support a motion to degazette forests, which have issues already in court and that the move was tantamount to ‘wasting’ taxpayers’ money.³⁰ Nantaba’s argument is important for two reasons: First, it questions the whole narrative of environmental conservation, and second, it interrogates the motives of the state in

land formalization and degazetting. It shows that the state is not concerned with the interests of the community and ordinary people. This skepticism is confirmed by MP Anthony Akol (co-sponsor of the bill) who stated thus:

We are saying the Government should degazette—and yet you are saying the Government went to court—if it were people who went to court, I would understand the confusion. Madam Speaker, we want to direct the Government to degazette and it is the Government that went to court. Therefore, where is the complication?³¹

MP Akol seems to suggest that both moves are government moves and no one has a right to challenge the issuing of land titles in forest reserves and the move to degazette. Neither moves, however, seem to be in the interest of society. When he says that if it was the people, not the NFA, complaining, then they could understand the confusion, it means people have to be on their own and up in arms with government which is supposed to protect them. The ideal is that these are institutions of and for society. But if indeed they are, they are only for a certain section of society that constitutes what has been called “the deep state”—the idea that ultimately the move is in the interest of the few within the ruling circles of our society.

In interviews, community members expressed their resistance in ways that challenged the overall epistemic and practical linear understanding of land use, conservation and (industrial) development. A respondent, in questioning the intentions of the supporters of the bill, noted that, “at a critical moment like today, when there is so much need to preserve the environment, government has given out a forest to be cleared and establish a car assembling plant.”³² Such comments suggest that the people of Uganda are not blind to environmental and climate change questions, even when some of them occupy land which is considered a reserve. The clearing of forests for industrial development can have negative impacts on the environment and local communities. It can lead to habitat destruction, loss of biodiversity, and

degradation of ecosystem services, such as water and air purification. Official discourse seems to be referring to reserves as capitalist reserves that will secure land for the capitalist class and politically connected elites to exploit in future through schemes like titling and degazetting.

Despite the resistance to degazetting, Bajo Forest reserve was ultimately given to Kiira Motors to establish a car assembling plant on two square miles.³³ This move faced opposition from the local community and some Members of Parliament that lean toward the interests of the community, just like its predecessor the degazetting bill.³⁴ Once again, the forces of resistance were labeled as “self-seekers.”³⁵ It is important to note that despite Bajo being a forest reserve, under government control, it was sold to Kiira motors³⁶ in the manner of what Marx considered to be state-enforced ‘primitive accumulation’³⁷ and what David Harvey would call ‘accumulation by dispossession’.³⁸ Issuing land to Kiira Motors serves to confirm MP Nantaba’s warning that such schemes aim to dispossess the people without their knowledge and consent, couched in the language of development. Ugandan historian Lwanga-Lunyiigo earlier warned that “the benefits derived or to be derived from investment may not be worth the loss the nation incurs by destroying her natural heritage.”³⁹ Establishing a car factory can only be at the expense of the climate and environment, for example by clearing forests that would otherwise help abate climate change impacts.

Living with the Land and Not Off the Land: De-commodifying Land and Rethinking Development

How can we imagine questions of land use, development, and environmental conservation from the vantage point of society? In this section I engage some views from the communities that may help us unravel the intentions and interests of the bill to degazette. Taking these views into account is not only important in advancing the different meanings and values attached to (forest) land but also to guide theoretical and policy discussion in ways that serve society’s collective interests. This process is important because conservation efforts,

modes of land use, meanings of development, and knowledge systems that emerge from the community have been disregarded or marginalized by the state through its reproduction of neoliberal and colonial modes.⁴⁰ In response, a decolonial endeavor must address the broader socioeconomic context and dismantle the structures of oppression that lead to the marginalization of local community members, their knowledge and practices.

It has been established through ethnographic research that people attach multiple values to land through the numerous modes of land use. Often these are relevant for dealing with the future impacts of climate change and environmental conservation since they preserve the environment to varying degrees.⁴¹ For the community, the forest in question is not just a forest or merely land which is being fought over by different parties. The local community envisions other forms of land use and development. As interviewees explain, land, and particularly forest land,

offers us fresh air and is believed to be a source of generating rains. These lands are used as grazing grounds for those who have animals. Land is a source of firewood for the community.⁴²

In the process of collecting firewood in the forests and shrubs, a lot of conversation on social and economic life used to happen. Today, the individualization of land has also resulted into the individualization of social life.⁴³

Forest land has always been very essential as it provided people with space to get air and breathing space. But today forest lands are getting extinguished. People are clearing them in the name of setting up industries and factories. This is destroying the very reason for which such land was reserved. Now every piece of land is looked at as one for commercial purposes. We no longer have land which contains trees to give us fresh air. People are no longer getting communal grazing areas; people are no longer having space for communally collecting firewood.⁴⁴

The above quotes demonstrate, first, that land has multiple uses and meanings, for example to some it is used as a source of firewood, to others it can be used as grazing grounds, and for yet others it is a space for society building through social (including economic and political) conversations. Most important of all, land is considered a source of life. Unlike the commoditized meaning of land, where it is just a commodity to be bought and sold and used to promote linear development through setting up industries, here it is not limited to a single universal use. Secondly, the quotes make it clear that these modes of land use are more consistent with aspects of environmental conservation and coping mechanisms for dealing with the impacts of climate change. People articulated how land can be used sustainably, for example, when it is used as a source of firewood, people only collect the dead branches and stems which have fallen off the trees.⁴⁵ The bill to degazette the forests would bury all these aspects of land use and limit it to only commercial, monetized, and marketized uses. A third lesson to be learned from the interviewees is that they point to the gendered implications of degazetting the forest. Degazetting will add a larger burden on women already busy with multiple tasks including fetching firewood and water since development of the land for commercial purposes would make the two more scarce.

These comments by community members offer a critique of the exclusive materiality attached to land and to the discourses of development, climate change, and environment promoted by the state. It is also a critique of the global large-scale land-grabbing projects, which are propagated by the neoliberal development agenda in the name of industrial development and ends up dispossessing and evicting people. When people resist such schemes as degazetting, they are not only resisting because of the “material loss to livelihood and dwelling” but also against “symbolic obliteration from the landscape—their removal from its history, memory and representation.”⁴⁶ Meaningful development must be consistent with other social values and modes of land use. The dominant narratives on land and development emphasize the needs of industry, while society’s needs—driven by numerous issues including livelihood, social life,

culture, and politics—are neglected. This discourse shows that the farmers are not interested in living *off the land* through, for instance, industry and large-scale production, but to live *with the land* through grazing, growing food, and fetching water and firewood on it. It is not necessarily about what comes out of using the land but what comes with the land. This way of viewing land is not to suggest that the whole idea of development is bad or conservation efforts irrelevant but to show that often they are used to serve particular interests and not the general interests of society. And yet, society must be put at the center of any development undertaking.⁴⁷

To briefly conclude, the colonial, neoliberal, and capitalist logics have impacted our perception of land immensely, and of nature more generally, by viewing them as a commodity. This perspective has influenced the discussions around land, development, and environmental conservation by focusing attention on technical and purely economic issues, yet the question is also political, social, and epistemic. In that light, the bill to degazette the three forest reserves would do nothing but promote dispossession and evictions of the masses occupying the land while at the same time causing a threat to the environment. ■

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Water Resource Management and Climate Change in South Kivu, Democratic Republic of Congo: The Case of the Ruzizi Plain

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Climate disturbances are at the root of long periods of drought as well as heavy rains in many regions of the world, both of which threaten human security. The Democratic Republic of Congo is not spared from this reality. The Ruzizi Plain in South Kivu Province is an area populated by several ethnic groups, most of whom are farmers and herders, as the soil is very rich. However, for some years now, this region has been experiencing serious seasonal changes, such as six to nine months without rain followed by heavy showers that ravage houses and fields and sometimes kill people.

This situation is at the root of insecurity and tension within the local population. The long periods of drought cause a shortage of water for farmers and cultivators as well as for the rest of the local population. Heavy rains, on the other hand, cause flooding of houses, fields, and people, resulting in homelessness, starvation, and loss of life. These climatic disturbances in the region undermine the security of local populations; they also cause conflict between ethnic groups over water and exacerbate other pre-existing issues. The main question to be asked is: Faced with the effects of climate change in the Ruzizi Plain, how should water be managed?

The Ruzizi Plain is located to the north of Lake Tanganyika, between the high mountains of the Congo-Nile ridge on the Burundian side and the Mitumba mountain range in the east of the Democratic Republic of Congo. Due to its latitude, the Plain should enjoy a humid tropical climate. However, as it is located to the west of the Congo-Nile ridge, it receives very little of the maritime influences brought by the trade winds from the Indian Ocean (Mashika, 2000). It therefore has a semi-arid climate and frequent annual rainfall

deficits that significantly affect the productivity of the local population, which is made up of numerous ethnic groups, notably the Bafuliru, Bembe, Bavira, and Banyindu, the majority of whom are farmers, and the Banyamulenge and Barundi, most of whom are livestock breeders. In addition, the Plain experiences a late and sometimes abrupt return of rains (Cirimwami et al., 2019) resulting in flooding, landslides, and erosion. The question of how to manage water resources in the face of these climatic disturbances is critical.

I use multiple methodologies to address this important question. First, I examine the current scholarship on environmental issues related to the impact of climate change on water resources. Then I present my qualitative data collected through individual interviews and focus groups with key actors and organizations (farmers, herders, local administrative authorities, farmers' organizations, religious denominations, and civil society actors). My study area consists of Katogota, Luvungi, Bwegera, Luberizi, and Sange. The choice of these sites was based on their sensitivity and importance in relation to the research theme, as their context best illustrates climate issues. Finally, I used the technique of direct observation in the Luberizi area's rice irrigation canals to get a feel for the reality of certain information collected.

In this essay, I present the field results that reveal how water shortages (drought and deforestation) generate or exacerbate tensions within the community and the ways in which these conflicts are resolved. The essay concludes with a global analysis and some recommendations from those who participated in interviews and focus groups.

Water Shortages: Drought and Deforestation

Anthropogenic practices and activities that are detrimental to the environment cause climatic disturbances that result in prolonged drought. In the Ruzizi Plain, infrequent rainfall has been observed throughout 2021. There was not a single month with abundant rain. In contrast to historical patterns, the dry season spanned all months of the year, from January to December. This situation has resulted in the degradation of the vegetation cover. The problems caused by intermittent rain, notably the lack of water (for the local population) and grass (for the animals)—as well as low agricultural productivity—have produced conflicts within the community, especially the famous tensions between herders and farmers. Some herders, in search of pasture for their cattle, do not hesitate to destroy the crops of the farmers.

The practice of denuding areas that were once covered by trees in favor of either agriculture or housing, or both, has also played a major role in the disruption of rainfall. On this subject, the Secretary of the Itara-Luvungi Group explained: “In the old days, it was difficult to see two successive villages here in Luvungi with the naked eye. This is because there were trees almost everywhere. But nowadays, following the deforestation, one can see two or three localities from a distance with the naked eye.”¹

The Ruzizi Plain region has several rivers. The Ruzizi River, from which it takes its name, is the main river that runs along this region and empties into Lake Tanganyika. Several other small rivers cross the plain from the mid and highlands. These rivers together constitute the water resources for the populations of the region. Farmers use them to irrigate their fields in the dry season, and livestock breeders use them to water their herds. For the inhabitants, in addition to the water from the boreholes, these rivers also serve as a source of drinking water.

For example, in Sange, the Association des Consommateurs d’Eau Potable de Sange, ACEPS for short, is the main organization distributing drinking water in the town. However, ACEPS is no longer able to serve the entire population,

which has doubled in number in a situation of climatic disturbances related to the environmental degradation of recent years. According to the chief of the Kajembo neighborhood of Sange city, despite the rotation system instituted, there is still a shortage of drinking water in the city’s eight neighborhoods supplied by ACEPS (Rutango, Museni, Kibogoye, Kahungwe, Kinanira, Kyanyunda, Nyakabere I, and Kajembo). The neighborhood of Nyakabere II, unlike the other eight, is supplied with drinking water by the Maji Ya Amani Project.²

Another example comes from Luvungi, where there are several drinking water points spread throughout the villages, which can only be accessed after payment of a monthly fee. At the time of our visit, the service responsible for distributing this water had raised the price per month from 500 Congolese francs to 1,000 Congolese francs. A pastor of a local Protestant church complained: “This increase is considered arbitrary by consumers, especially as the purchasing power of most of the local population is low and they are therefore unable to raise the sum. This situation is at the root of the tensions between the local population and the local authorities, who are accused of mismanaging drinking water.”³ And the Civil Society coordinator added: “In addition to this mismanagement, there is also a shortage of water in this entity due to the fact that the pipe coming from the catchment source in Lubarika is blocked by fields, which is also used for irrigation in the dry season.”⁴

There are several rivers in the Ruzizi plain that provide water for irrigating fields and for drinking, such as the Sange river. The head of the environment department of the Sange township told us that an irrigation canal from the river has been built for the rice fields and where the cows also come to drink.⁵ However, during the dry season, irrigation water can be a source of conflict between farmers. In this regard, the president of a local agricultural cooperative told us that: “In the rice fields in Kiringi, Rurambira, Ndogombo, Kahuli, Rugoze, etc during the dry season, farmers tend to each appropriate a larger quantity of water to irrigate their fields, which creates tensions between them.”⁶

Finally, flooding (and the resulting erosion) in the Ruzizi Plain threatens the human security of the local population. The heavy rains of the last three years, which preceded our visit to the area, washed away fields and houses, causing famine and the displacement of the population. On this subject, a geography teacher in a secondary school in the area, himself a victim of these floods, described the situation in these terms: “Several houses in the Lumumba III, Ruvubu II, Bandare I and II, Majengo I and II, Adra, Rugobagoba, Itara I and II neighborhoods in Luvungi, were destroyed due to the lack of a good drainage system, which caused the waters of the Ruvubu, Kamujeri, and Kise rivers to overflow as a result of the rains. Several fields cultivated in swamps were also destroyed as a result of the floods. This situation was at the root of a considerable drop in harvests and the displacement of the victims to other districts.”⁷ And Pastor Mwalaga added the following: “Beyond the famine and the displacement of populations that these floods can create, they are also a source of conflicts between victims when it comes to reconstituting or re-measuring the affected plots of land.”⁸ A resident of Sange added that the same scenario had occurred in the Nyakabere II neighborhood of the Sange district.⁹

From the above, the observation of the parish priest of the Catholic parish of Sange was that “in general, the lack of water channels from the rivers was the cause of flooding and erosion during heavy rains, destroying the entire ecosystem of the region.”¹⁰

Resolving Water Access Tensions

Competition over water is a source of tension in these communities, as everyone needs to have access to an increasingly scarce resource either to irrigate their fields or to use in their households. For example, in Sange, mothers argue over the water standpipe and sometimes fight for access to drinking water. On the other hand, in Luberizi, Luvungi or Bwegera, tensions between farmers arise around irrigation water.

Farmers’ committees have been set up to regulate issues related to irrigation water and to resolve the resulting conflicts. If necessary, those conflicts can be transferred to either local authorities

or ad hoc NGOs, or both, which proceed to reconcile the concerned parties. In this regard, a block leader in the Luberizi farmers’ cooperative, COOPALU for short, told us the following: “With the support of ZOA, a proposal for an irrigation schedule in Luberizi is being prepared. This will allow all farmers to be served in turn, i.e., by rotation. Also, the block leaders are circumventing conflicts between farmers through a series of sensitizations.”¹¹

As for the resolution of tensions resulting from access to drinking water, once again, it is the local authorities who take charge in collaboration with the organizations set up to distribute water to the inhabitants, like with ACEPS in Sange.

Finally, due to the almost total lack of national policies for managing conflicts related to access to water in the different localities mentioned above, this issue remains the prerogative of local initiatives. Associations and committees have been set up for this reason by the local population with the support of some NGOs working in the sector of conflict resolution.

Conclusion

The 17 United Nations Sustainable Development Goals, or SDGs for short, set out a pathway to a better and more sustainable future for all by 2030. They address global challenges including poverty, inequality, climate, environmental degradation, prosperity, peace and justice.¹² Guaranteeing access to water for all and ensuring sustainable management of water resources (SDG 6); combating climate change (SDG 13); preserving and restoring terrestrial ecosystems, sustainably managing forests, combating desertification, and halting the loss of biodiversity (SDG 15); remain especially relevant goals for the Democratic Republic of Congo.

The palpable effects of climate change in the Ruzizi Plain are due not only to the geographical location of the region but are also exacerbated by anthropogenic activities on the ecosystem. The systematic felling of trees for economic needs or for construction and development to deal with the multiple movements of populations in the region

(refugees, displaced persons, farmers, herders and transhumant herders for example) could be at the root of the climatic disturbances. Moreover, reforestation remains almost ineffective.

This phenomenon is at the root of the extreme weather conditions that result in interrupted rainfall for several months on the one hand, and the return of the rains on the other, which is sometimes sudden and causes flooding. In both cases, this situation affects the natural resources in the region, particularly the water resources that are essential to the lives of the local populations.

This dynamic poses great challenges to the management of resources, which remain to be met at local, national, and international levels as recommended by the United Nations Sustainable Development Goals.

Members of local communities who have taken the lead in trying to resolve these challenges have offered suggestions such as developing water pipes in the neighborhoods that suffer from flooding during the rainy season and taking care of the victims. They also suggest that creating irrigation channels for fields in swampy areas would allow year-round cultivation, even in the dry season, which would increase harvests and help eradicate famine. Another suggestion is to regulate the supply of drinking water throughout the region in order to curb shortages and the harassment suffered by the local population. Addressing the water challenges will require sensitizing farmers about reforestation through ad hoc local associations and cooperatives to remedy the problems of climate change, which are the main cause of transhumance in the Ruzizi Plain. ■

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ANNEX



Photo 1: Emergency canal built by the population in LUVUNGI to evacuate the water that causes flooding in the neighbourhoods



Photo 2. View of the RUVUBU River in LUVUNGI



Photo 3. National road N°5 in SANGE in a state of disrepair due to erosion

Endnotes

- 1 Interview with Mr Fandi Kimbumbu, Secretary of the Itara-Luvungi Group, August 2021.
- 2 Interview with Mr Oswald Tshombe, Kajembo District Chief, Sange & Focus Group with some members of the farmers' organisation FARAJA, Sange, August 2021. Maji Ya Amani was a project aimed at reducing inter-community conflicts related to access to water in the Ruzizi Plain. It was implemented by the International Rescue Committee (IRC) Consortium, ZOA and Search for Common Ground (SFCG).
- 3 Interview with Mr Wilondja Mwalgalwa, Pastor at the 8th Ceepac Maendeleo Church, Luvungi, August 2021.
- 4 Interview with Mr Blaise Byatanga, Coordinator of the New Civil Society of the Itara-Luvungi Group, August 2021.
- 5 Interview with Mr Edouard Kabiona, head of the environment and sustainable development department of the city of Sange, August 2021.
- 6 Interview with Mr Thomas Kabuya, president of the Tuamuke agricultural cooperative, Luvungi, August 2021.
- 7 Interview with Mr Christophe Wakao, professor of geography at Neema Institute, Luvungi, August 2021.
- 8 Interview with Mr Wilondja Mwalgalwa, pastor at the 8th Ceepac Maendeleo church, Luvungi, August 2021.
- 9 Interview with Mrs Bellagia Bingingwa, resident of Nyakabere II, Sange, August 2021.
- 10 Interview with Father Jean-Bosco Bisimwa, Catholic parish priest of Sange, August 2021.
- 11 Interview with the block leader of the Luberizi farmers' cooperative, COOPALU (responsible for managing the irrigation canal so that each field can be supplied with water in turn), Luberizi, August 2021. ZOA is a Christian international non-governmental organization and supports people who suffer because of armed conflict or natural disasters, by helping them to rebuild their livelihoods. <https://www.devex.com/organizations/zoa-international-36724>
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The Interplay Between the Sino-congolaise des Mines (Sicomines) and Climate Change

*Nciko wa Nciko*¹

Introduction

The Democratic Republic of the Congo's mining sector is dominated by approximately 20 companies.¹ According to the Congolese Chamber of Mines, Chinese mining companies control around 70% of this sector.² The DRC possesses substantial reserves of critical minerals, including being the world's largest producer of cobalt, for which it accounts for over 70% of world production in 2020.³ Additionally, the country ranks sixth in copper production.⁴

China has actively engaged in the mining sector of various African countries through resource-for-infrastructure (R4I) deals.⁵ The Sino-congolaise des mines (Sicomines) deal, signed with the DRC in 2008 and often referred to as the deal of the century, is one of the most controversial of these R4I deals that China has ever entered into with an African country.⁶ This deal was a contract established to repay a \$6 billion loan that came from the China Export-import (Exim) Bank. Of this amount, \$3 billion was allocated for infrastructure development, such as roads, hospitals, universities, and housing, while \$3.2 billion contributed to the creation of Sicomines – the mining company that is to minerals (mainly copper and cobalt) to repay the \$6 billion.⁷

Scholarship and general discourse on Sicomines tend to focus on two areas. The first area is economic and political and aims to determine the winners and losers of the Sicomines deal in terms of its political and economic effects.⁸ The second is on human rights, including the environmental risks associated with Sicomines.⁹ However, despite the focus of civil society organizations on human rights and environmental concerns, there is a lack of critical analysis regarding Sicomines' contribution to climate change. Given that the DRC produces

approximately 70% of the world's cobalt, with 35% attributed to Chinese mining companies, of which Sicomines is the primary player, Sicomines' disregard for CO2 emissions could have significant implications for climate change.¹⁰

Methodology

This paper is based on fieldwork conducted in the Congolese mining cities of Lubumbashi and Kolwezi during the months of April and May 2022. The findings have been arrived at through interviews, and existing studies and reports on Sicomines, as well as Congolese legal texts and policy documents. Lubumbashi and Kolwezi formed the focus of this paper because Congolese civil society organizations and government bodies that have engaged with Sicomines regarding human rights and environmental issues are mainly located in these two cities. The civil society organizations interviewed include Initiative Bonne Gouvernance et Droits Humains (IBGDH), Observatoire Africain de Ressources Naturelles (Afrewatch), Carter Center, and Action Contre l'Impunité pour les Droits Humains (ACIDH). These organizations regularly work together on Sicomines' operations in the DRC.

Government bodies interviewed included the ministère de l'Environnement et Tourisme and Direction pour la Protection de l'Environnement Minier (DPEM) in Kolwezi, the Agence Congolaise de l'Environnement (ACE) in Kolwezi, the Procureur Général près la Cour de Lualaba in Kolwezi, Générale des Carrières et des Mines (Gécamines) and Division des Mines in Lubumbashi, and the Bureau de la Météorologie in Lubumbashi. Additionally, an anonymous Sicomines officer and Professor Sabin Mandé, an expert in environmental protection, formed part of the interviewees of this paper.

1 LL. B, Strathmore University Law School; LL.M, Geneva Graduate Institute of International and Development Studies. He did this paper as an Early Career Researcher for the United States Institute of Peace. He presented it at join the Program on African Social Research's (PASR) third Junior Scholars' Workshop in Rabat, Morocco, on January 11th and 12th, 2023.

Findings

Congolese law and government bodies

The representatives of civil society organizations interviewed expressed a lack of confidence in the Congolese judicial system, not only regarding Sicomines but also the entire mining sector's violations of human and environmental rights.¹¹ Some officers within civil society organizations have even faced security risks, including imprisonment and death threats, when investigating mining-related issues.¹² They cited limited resources dedicated to pursuing legal action, as well as the judicial system's perceived lack of impartiality and its undue regard to procedural technicalities at the expense of delivering justice. Emmanuel Umpula et Céline Tshizena of Afrewatch noted that taking legal action in Congolese courts and tribunals is doomed to failure, because class actions – which could make sense against Sicomines' violations – are not encouraged under Congolese law.¹³ Indeed, to bring any action before courts and tribunals is dependent on the will of the individual victims who have suffered human rights violations as a result of mining activities. It is in this vein that Tshizena concludes that civil society organizations are discouraged to approach courts and tribunals.¹⁴ Umpula has noted that certain communities have gotten a favorable decision against mining companies before the African Commission of human rights; unfortunately, the DRC government has never implemented that decision.¹⁵

Given this reality, civil society organizations in the DRC mining sector primarily focus on conducting studies, producing reports, and issuing communiqués to raise awareness of human rights and environmental violations for which Sicomines (amongst many others) is responsible. Their aim has been to engage government bodies, to make them aware of these issues, and promote transparency in the mining sector at national, regional and international levels.¹⁶

The lack of state power in addressing environmental impacts related to Sicomines' activities is primarily attributed to the exclusive authority that the Congolese Division Provinciale Des Mines

(DPEM), a state body, has in dealing with related environmental issues.¹⁷ Government bodies with technical environmental expertise, such as the Agence Congolaise de l'Environnement (ACE), the Ministère Provincial de l'Environnement et Tourisme, and the Parquet General of Lualaba (court), have limited power in regulating the impact that mining activities have on the environment. Their intervention can only happen if done in collaboration with DPEM.¹⁸ Angela Thionda-Luanga, the Director of ACE, recounted instances where her Agency attempted to assess adverse environmental impacts caused by Sicomines' activities. She shared that her Agency was prevented from doing so by Sicomines officials who were quick to invoke provisions of the Congolese Mining Code of 2018 that demand that no environmental action in the mining sector should be carried out unless it is done in collaboration with DPEM.¹⁹

This highlights a lack of transparency and operational synergy between DPEM and other government bodies that have the skills and the expertise to deal with environmental issues. The Ministère Provincial de l'Environnement et Tourisme, the Parquet General of Lualaba and the ACE have argued that environmental questions in the mining sector should be handled by environmentalists, suggesting a need for restructuring and improved operational synergy between relevant government bodies.²⁰ But, as of the time of writing this paper, this had not happened.

Ilunga Mwela, President of the Parquet de Lualaba, emphasized the politicization of the DRC mining sector as a reason for the lack of transparency.²¹ He alleged corruption at various levels, including within DPEM and civil society organizations. Mwela cited examples to support these allegations and suggested that some civil society organizations may prioritize financial gain over environmental justice, ultimately hindering cases from reaching the Parquet de Lualaba.²²

Sicomines and climate change

Mining companies in the DRC have been accused of deforestation and polluting rivers on which local communities rely, as well as of discharging

toxic waste onto their farms, which has adversely affected their crops. The focus on these types of issues has been very anthropocentric, caring only for immediate, direct, and visible adverse environmental issues that can be felt on the human skin. Yet, there is more to the environment than what is immediately, directly, and visibly impacted on the human skin.²³ Sicomines, on paper, respects reforestation as required by the DRC Mining Code of 2018. It pays a reforestation amount to the Fond Forestier National (National Reforestation Fund), a government body that facilitates reforestation (though Lukanfi notes that there is a lack of transparency in dealing with this fund). But there has not been any attention to the atmospheric pollution/CO₂ emissions for which Sicomines is responsible, even though the Mining Code requires that the methods and equipment used by mining companies must be environmentally friendly.

All the organizations and government bodies interviewed were clear that they have never conducted any systematic study on the link between mining activities and climate change in the DRC.²⁴ Sabin Mande, an environmental law professor, argues that scholarship and general discourse on mining activities are also silent on the link between Sicomines and its CO₂ emissions.²⁵ But those are real, he argues, noting that the soil acts as a carbon sink, but once opened, it releases CO₂ emissions into the atmosphere. Furthermore, the equipment and methods used by mining companies such as Sicomines are not climate-friendly.²⁶ Umpula of Afrewatch has shared that the methods used by Sicomines for mining and the methods it relies upon are carbon-intensive.²⁷ Whatever the case, the DPEM, the ACE, and the Ministry of the Environment, as government bodies that may address environmental issues such as CO₂ emissions resulting from the mining sector, as well as the civil society organizations interviewed, all lack the technological and scientific capabilities to assess the amount of CO₂ emitted into the atmosphere by Sicomines and other mining companies in order to hold them liable for their respective emissions.²⁸

Conclusion

As producers of approximately 35% of the world's

cobalt and controlling a significant portion of copper production in the sixth-largest copper-producing country, the contribution of Chinese mining companies to climate change cannot be ignored. Therefore, it is crucial to address CO₂ emissions stemming from the DRC mining sector. While the mining copper and cobalt are expected to play an important role in the just transition, Sicomines' behaviour should remind us to

“[A]nticipate that some extractive corporations will appropriate the term just transition as a way of countering negative public sentiment or in an effort to mobilise consent and promote a hollowed-out understanding of justice.”²⁹

From the findings presented in this paper, a critique may conclude, and fairly so, that there is no justice in the just transition that Sicomines' copper and cobalt may be claimed to promote. Steps must be taken at multiple levels of governance. Nationally, Congolese law should grant government bodies with more knowledge and expertise in environmental matters the leading role in addressing environmental pollution in the mining sector. Furthermore, Congolese courts and tribunals should facilitate class actions and dispense justice expeditiously, without undue regard for procedural technicalities. One significant drawback that persists in the DRC Constitution (2006) is that ordinary citizens and civil society organizations lack standing before Congolese courts to challenge the constitutionality of international agreements that are not climate-friendly, such as the Sicomines contract.

One possible avenue for action is that the DRC has joined the East African Community (EAC). Unlike the DRC Constitution, which denies locus standi to ordinary DRC citizens when challenging international agreements such as the Sicomines contract, they now have standing before the EAC. Article 30 of the EAC Treaty states that any resident of a Partner State may refer the legality of any Act, regulation, directive, decision, or action of a Partner State or an institution of the Community to the Court, on the grounds of unlawfulness or infringement of the provisions of the Treaty.³⁰ Therefore, the DRC's joining the EAC could have a ripple effect of expanding access to justice, not only

for conscientious civil society organizations but also for ordinary citizens. It is worth noting that the EACJ's jurisprudence has been both progressive and bold, operating in a region where adherence to national sovereignty is particularly strong, even in an autocratic sense.³¹ Conscientious civil society organizations and Congolese citizens can start bringing cases pertaining for example to Sicominex's emissions before the EACJ in case DRC courts and tribunals are compromised.

At the international level, it may help that we start conversations regarding how a home state of a transnational corporation (TNC) should be liable for the emissions of its TNC in a host state. To operationalize this, states might consider adopting at one of the upcoming COPs what I have elsewhere argued for and called "Trans-Nationally Determined Contributions (TNDCs)". By TNDCs, I have meant that a TNC's home state (China in our case) commits to account for the CO₂ emissions that its TNC (Sicomines to a significant percentage) is responsible for in a host state (the DRC).³² ■

Endnotes

- 1 LL. B, Strathmore University Law School; LL.M, Geneva Graduate Institute of International and Development Studies. He did this paper as an Early Career Researcher for the United States Institute of Peace. He presented it at join the Program on African Social Research's (PASR) third Junior Scholars' Workshop in Rabat, Morocco, on January 11th and 12th, 2023. See République Démocratique du Congo, Ministère de l'Économie Nationale -<https://congominex.org/system/attachments/assets/000/001/440/original/listes_Mines_et_carri%C3%A8res.pdf?1517237881> accédé le 8 août 2022.
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- 15 See Brice Martial Djeugoue, 'RD Congo: IHRDA, ACIDH et RAID soumettent une communication devant la Commission africaine' IHRDA on 10 March 2011 -<<https://www.ihrda.org/fr/2011/03/ihrda-acidh-et-raid-soumettent-une-communication-contre-la-rdc-devant-la-commission-africaine/>> on 8 August 2022. See also Emmanuel Umpula et Céline Tshizena (Afrewatch officials, Entretien du 15 Avril 2022 à Lubumbashi).
- 16 Ibid.
- 17 Angela Thionda-Luanga (Directrice de l'ACE au Lualaba), Entretien du 20 Avril 2022 à Kolwezi. Voir aussi Ndala Lukanfi (Directeur de Cabinet, Ministère de l'Environnement et Tourisme), Entretien du 19 Avril 2022 à Kolwezi.
- 18 Article 11, Décret N° 038/2003 Du 26 Mars 2003 Portant Règlement Minier Tel Que Modifié Et Complété Par Le Décret N°18/024 Du 08 Juin 2018. Voir aussi Article 504, 09 mars 2018 - Loi n°18/001 modifiant et complétant la Loi n° 007/2002 du 11 juillet 2002 portant Code Minier. Voir aussi Ndala Lukanfi (2022). Voir aussi N°18/024 Du 08 Juin 2018.
- 19 Ndala Lukanfi (Directeur de Cabinet, Ministère de l'Environnement et Tourisme), Entretien du 19 Avril 2022 à Kolwezi.

- 20 L'agent de Sicomines a préféré que son entretien soit gardé dans l'anonymat.
- 21 Ilunga Mwela (Procureur General près le Parquet de Lualaba), Entretien du 19 avril 2022.
- 22 Ibid.
- 23 Professeur Sabin Mande (Cabinet d'Avocat RSP et Associes), Entretien du 4 Mai 2022.
- 24 Angela Thionda-Luanga (Directrice de l'ACE au Lualaba), Entretien du 20 Avril 2022 à Kolwezi. Voir aussi Ndala Lukanfi (Directeur de Cabinet, Ministère de l'Environnement et Tourisme), Entretien du 19 Avril 2022 à Kolwezi).
- 25 Professeur Sabin Mande (Cabinet d'Avocat RSP et Associes), Entretien du 4 Mai 2022.
- 26 Ibid.
- 27 Emmanuel Umpula et Céline Tshizena (Afrewatch officials, Entretien du 15 Avril 2022 à Lubumbashi).
- 28 See all the interviews (Entretiens).
- 29 Nicholas Bainton, Deanna Kemp and Eleonore Lebre, "The energy-extractives nexus and the just transition" Volume 29, Issue 4, Sustainable Development, 2021, 626.
- 30 Article 30, The Treaty Establishing the East African Community (Amended on 14th December, 2006 and on 20th August, 2007).
- 31 Gathii, J, 'The under-appreciated jurisprudence of Africa's regional trade judiciaries', 12(2) Oregon Review of International Law, 2010, 246.
- 32 See Nciko wa Nciko, *Trans-Nationally Determined Contributions for Climate Justice: Resolving a Paris Agreement's Contradiction that Is Working against Developing States* (December 10, 2022). Springer Nature Switzerland AG 2022 European Yearbook of International Economic Law 2022.

Gender, Land Rights and Slow Onset Environmental Change in Morocco

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The subordinate position of rural women in Moroccan law and society hinders their ability to respond to slow processes of environmental change. To better grasp change and continuity in the countryside and the gendered consequences of climate change, it is crucial to study the daily life experiences of peasant women. This approach is especially important since their unequal position in society is the result of complex negotiation processes and is not simply the outcome of structural forces (Bossenbroek, 2016). This study also looks at whether these slow environmental changes are altering the position of women in the household.

Most studies in the field of agricultural change focus on privatization processes or sudden environmental change, the consequences of which are easier to document than those of slow onset changes such as sea level rise, loss of biodiversity, rising temperatures, desertification, and land and forest degradation (Ahlers, 2010; Bossenbroek, 2016; Lastarria-Cornhiel, 1997). But large geographical areas—in Morocco as elsewhere—are confronted with slow onset changes and are expected to suffer even more in the coming years (IPCC, 2022). To date there has been little research into the gendered consequences of these environmental changes and the different ways subjects experience and understand these processes (exceptions include Van Praag, 2021; Gioli and Milan, 2018).

Unequal gender relations and access to resources make women more vulnerable to environmental change than men (Masika, 2002). Individuals' adaptive capacity is highly dependent on income, education, health and access to natural resources, and women tend to be poorer, less educated, less healthy and have limited direct access to, or ownership of, natural resources. As a result, women are disproportionately affected by environmental change (Demetriades and Espen, 2010; Masika, 2002). For example, Chindarkar (2012) states that environmental change—especially due to global

warming—will negatively affect food production and the availability of natural resources such as water. Since women are primarily responsible for collecting water for the household, a shortage of water may increase the burden on women.

Given the country's extensive agricultural production, increasing desertification and drought due to climate change are eroding people's adaptive capacities since their resilience is largely related to land ownership, sales, mortgages, or products of the land (Adger et al., 2018). Land inheritance and ownership is gender specific in Morocco, a situation that can be traced back to the period when it became a French Protectorate in 1912. The 'Dahir' degree of 1919 transferred overall responsibility for communal land from indigenous authorities to the state. This shift facilitated land appropriation by the French colonists and its incorporation into capitalist modes of production (El Khalaoui, 2022). After independence in 1956, the state retained the same structures established by the French colonial regime to control land transactions. Specifically, the state established committees of male representatives who spoke on behalf of their rural communities. In addition, a tutelary council was established within the Ministry of the Interior to centralize decision making, oversee transactions, handle disputes, and distribute compensation (Salime, 2016).

Consequently, inheritance law in Morocco remains one area of law regulated by the Mudawwana (Morocco's Family Code) rather than by the Civil Code. In 2004, several reforms were made to the Mudawwana to address gender inequalities, yet the Law of Succession was not amended (Berriane, 2015). Under the current law, male relatives receive double the inheritance share of a woman, making these provisions of family law particularly unfavorable to female children and surviving female spouses. With fewer resources, women's access to education and health care is more difficult, increasing their economic precarity (Yavuz, 2016).

It is worth noting that the Qur'an and the Sunnah clearly explain that although women do not have equal rights to men in terms of inheritance, they do have special rights related to inheritance, dignity, and custody of the children in the family (Haque et al., 2020). Specifically, Islam secures women's financial rights, which must be handled by a male legal guardian (such as her father, brother or husband), and stipulates that financial support is a mandatory responsibility in all life circumstances (for example, the financial support of a daughter by her father, of a married woman by her husband, of an orphan by her grandfather or paternal uncles). Research by Haque et al. (2020) shows, however, that these Islamic principles are often violated in practice, especially when an inheritance is divided among heirs after the death of their parents. As a result, women who are unmarried, widowed, divorced, or do not have sons frequently experience dispossession, leading to their impoverishment and eventual settlement in slums located near their communal land, according to Salime (2016).

Addressing women's inequality: Efforts by citizens and the state

The first social movement in contemporary Morocco to protest women's marginal status in land rights was the Sulaliyyates movement of 2007 led by rural women. The Sulaliyyates movement gives utmost importance to communal land as a critical element in the quest for economic liberalization, developmental endeavors, and improved political representation, as stated by Salime (2016). (Salime, 2016). The Sulaliyyates movement strongly condemns the widespread corruption within the systems involved in land liberalization. They also raise concerns about the pervasive sexism present in interactions with state officials who oversee land transactions. Furthermore, they highlight the impact of the colonial legal framework and traditional customs, which prioritize indigenous men in these transactions while excluding women. (Salime, 2016). The land right, which -refers to rights to use, control, and transfer a parcel of land - was eventually given to them via a series of ministerial circulars that were issued by the ministry between 2009 and 2012. Real reforms, however, were still not forthcoming (Berriane et al., 2015).

To further address the challenges facing women in employment and social inclusion that are affected by slow onset environmental changes, the Green Morocco Plan (GMP, Plan Maroc Vert) included the issue of gender inequality in their two pillars of reform between 2008 and 2020. The first pillar aimed to accelerate the move toward modern and competitive export-oriented agriculture and the second aimed to support the transition of smallholder farmers from traditional family farms to more modern farming practices. These goals were to be accomplished through the conversion, intensification and diversification of local natural resources, while also promoting the sustainable use of natural resources and employment of women in the most isolated parts of the country. Here, conversion" refers to the process of transitioning towards modern and export-oriented agriculture. "Intensification" refers to increasing the productivity and efficiency of farming practices, while "diversification" refers to expanding agricultural activities to include a wider range of crops or products. While this plan sounds promising in theory, the GMP has raised some serious concerns, primarily around social class and education. Berriane (2011) and Damamme (2014) have shown that illiterate rural women play a subordinate role in these cooperatives compared to more educated women who are endowed with higher status and more responsibilities. Similarly, Montanari and Bergh (2019) found that only educated people in the region can benefit from projects in the second pillar, given the administrative burden and the necessary initial financial contribution. Therefore, they argue that the external guidelines of the GMP were not designed to give women agency to express their needs, define their aspirations and act on them.

The ability of rural women to express their needs and aspirations when confronted with environmental change is affected by a range of behavioral codes in rural Morocco that define the appropriate behavior of women, depending on social differences such as age and marital status (Bossenbroek 2016). For example, different standards and codes of conduct apply to unmarried, married, divorced, and single mothers. Married women in early marriage are usually responsible

for household chores and do not perform other work outside the home. Young married women usually do not perform any work on land owned by their in-laws, so their activities are limited to cooking, washing, cleaning, and caring for the children. Unmarried women are subject to slightly different codes of conduct. Their behavior is tightly circumscribed and controlled to prevent gossip and not damage the image of a good future bride, wife, and mother. If women deviate from the dominant female rural ideal, they risk being questioned. In such a context, a misstep can easily lead to harsh judgments and gossip. Adhering to these behavioral norms can therefore restrict a local community's options as they adjust to the increased need for seasonal work due to slow onset environmental changes. More specifically, environmental changes can increase the need for seasonal work in the whisky industry due to factors such as shifting harvest seasons, unpredictable weather patterns, and the demand for temporary labor during peak production periods. Income is lost because of the unfavorable views of women employed in the agricultural industry, for example when male farmers and supervisors use derogatory terms to describe female wage workers as unmarried women who engage in inappropriate conduct (Bossenbroeck, 2016).

Methodology

In this article I use insights from in-depth interviews conducted with farmers in Morocco (all the respondents in this study identify themselves as male or female). Using qualitative data provides a better understanding of how people perceive and deal with their vulnerability to slow onset environmental change and the social security and land inheritance systems, as well as a clearer picture of the available resources and opportunities within the household. We chose this approach because there is growing discomfort among scholars with the conventional scientific representations focused on numbers of people living in rural areas, which have often not done justice to their own narratives and explanations.

During the period of October and November 2021, we conducted qualitative semi-structured

interviews with inhabitants of the Souss-Massa region in Morocco, particularly in Houara, Tiznit, Belfaa, Tamraght, Tagadirt, Tikouine, Taliouine, Taroudant, and Imouzer. Respondents were selected through snowball sampling, starting from connections made through associations. In total, 38 interviews were conducted, with 15 female and 23 male respondents. The age of interviewees ranged from 19 to 82 years old. The participants were all dependent on agricultural tasks for their livelihood (either on a self-employed basis or as employees on larger farms). These interviewees were chosen because communities that rely heavily on agricultural activities are more vulnerable to water scarcity and suffer more from drought than other communities. The rural women in the Souss-Massa region are often uneducated and in some cases illiterate, which led many to refuse to participate as they did not feel entitled to be interviewed. To ensure that respondents did not feel intimidated, I briefed them clearly about the objectives of this research and invested sufficient effort and time to develop a relationship of trust, which included asking for a tour of their fields as well as cooking and eating together.

The main goal of our method of biographical-narrative interview is to generate a spontaneous autobiographical narrative (Apitzsch and Siouti, 2007). By enabling the participants to tell their own stories and creating a context in which they feel comfortable exploring their feelings and experiences, we can learn more about those aspects of their lives which crucially affected their adaptive capacity. We asked participants about their perceptions of environmental changes in their surroundings and how these perceptions changed over time, their knowledge about environmental changes and migration dynamics. Since migration is often seen as a potential adaptation strategy to deal with environmental changes, all participants were also asked whether they aspired to migrate, their motivations to do so or reasons to stay, and whether these factors were related to the environmental changes they perceived. Qualitative research methods, namely this biographical approach, enabled us to systematically study the long and fragmentary nature of migration trajectories (Findlay & Li, 1997). All interviews

were transcribed and translated into English. The data analysis facilitating software Nvivo was used to structure, code, and analyze the data. All names were replaced by pseudonyms to guarantee anonymity.

Environmental Change, Migration, and Agriculture

Amin et al. (2019) demonstrate in their research how rural women play an increasing role in agricultural production, yet their contribution continues to be largely overlooked in development plans, conventional agricultural and economic analyses and policies. Several women indicated that the lack of land ownership is one important reason why they are often absent in plans and policies and that their lack of ownership strongly impacts their life decisions. Women's economic instability can also be reinforced by the family law provisions on inheritance in Morocco. These rights are particularly unfavorable to female children and surviving female spouses, as they give male relatives double the share of women (Yavuz, 2016). We heard these concerns from many of our interview subjects:

We women start off at a disadvantage compared to our brothers, for example. Here, men still prefer to have sons so that they can pass on everything. It is very difficult for us women to inherit, and especially in agriculture this is a big disadvantage because then it is literally all about what we have put so much work into that then goes to brothers or sons who often invest much less time in it. But I know that the law will never change. Because I only have daughters, I am sometimes afraid of what the future will bring. (Fedoua, 45 years old, Houara)

Yes, at the moment my husband is seriously ill, so I am responsible for everything. That does bind me and I have a lot of fears because of that. I myself am not the owner of land, just as is rarely the case here in Morocco. We simply gain access to land through male relatives, such as a spouse, brother, or father. Because of this arrangement, we are always very vulnerable;

a death, divorce, or simply a change of mind on the part of a man can leave us without land and therefore no income. (Yosra, 35 years old, Taroudant)

Furthermore, women's lack of property ownership resulting from the gender-specific land inheritance system renders them more reliant on the decisions of male family members regarding their livelihood and economic activities. Like most male farmers, the younger generation of men, who are slated to inherit and take on the responsibility of cultivating and maintaining the land, no longer show interest in the agricultural sector. This situation also affects the farming activities of women who have invested significant effort in the land for years. For instance, Karima, a 25-year-old resident of Talioune, recounted that her father did not wish to keep their land due to his advanced age and the increasing challenges posed by drought, which had led to a decline in profits. Her father also realized that to endure the droughts, he would have to invest more in his land, which due to inheritance agreements would never be owned by his daughters. Therefore, he chose to sell it and use the proceeds to make ends meet. As Karima explained, "My father decided to sell it [their land] because it became too expensive for him because of drought and costs of water."

Daouad, a 40-year-old man from Tikiouine, also speaks about how "the next generation" of men and women no longer continue their agricultural work as there is not enough work. He states that this trend has been partially influenced by changes in the weather:

The weather has definitely changed here. Rain used to already start this month. The climate has changed even for the bees. It's sometimes surprising because you get to the orange blossom season, but there are strong winds that prevent the flowers from blossoming and disperse everything before the bees ever get a chance to feed, even after we've prepared everything for the season, and after we spent money on it. [...] We prepare for six months for that one particular season, and it's only one month of orange blossom. It's that month

where we make the most profit of the entire year, and if anything goes wrong with it we lose a ton of money, so it is a big risk. [...] These risks also mean that our children, or for example my wife, can't continue to work with me. It is already a tough job and it is getting tougher due to weather changes, which means we have to make choices as to what to put money into.

Despite the limited employment options available on family-owned agricultural land, we found that women are compelled to explore alternative income-generating avenues, while men continue to exploit the limited opportunities on their own property. An example of this phenomenon can be observed in the account of Fedoua, a 45-year-old female resident of Houara, who reports that the region has been experiencing severe rainfall after prolonged periods of drought for a number of years now, resulting in significant disruptions to agricultural operations and household income.

I actually started looking for a job three years back when this region began to be threatened by floods as there are cases of heavy rains that go on for more than three or four months. Then we have to stop farming, we are put to a stop, and sometimes it takes all of our produce and leaves the land drowning in one meter of water and sometimes it can reach one meter and a half. The floods even destroy our wells. During those periods, nothing could really be done, and the men are always playing chess. But, of course, we could not survive with that, so then it was most logical that my husband would take care of the farming and that I would look for an external income. (Fedoua, 45 years old, Houara)

The decisions made by fathers regarding the future prospects of their daughters are also shaped by the consequences of environmental changes. Unpredictable weather patterns and escalating drought conditions led to a reduction in cultivated areas, resulting in declining profits for small landowners. The existing land inheritance systems

and the adverse consequences of environmental changes render the land less suitable for agriculture, making it less appealing for investment. This situation profoundly impacts the status of rural women, who are dependent on men and cannot inherit land, and has led to a shift in household decision making and a decreased focus on agriculture. Consequently, wages earned by women workers, both within and outside the household, assume a critical role in sustaining the livelihoods of rural families. Our study revealed that when seeking assistance, smaller-scale farmers tend to hire women for lower paying and labor-intensive roles, rather than men. Although these female roles are considered rather easy jobs, they require patience and accuracy (Baada and Najjar, 2020). Despite unfavorable working conditions, women persist in taking on such challenging work (Bossenbroek and Ftouhi, 2021). Therefore, while formal employment is frequently viewed as a means of empowerment in Western societies (de Haas and Van Rooij, 2010), in reality this trend may render rural women more susceptible to economic, social, and cultural exclusion.

Conclusion

This research highlights the ways in which the consequences of gradual environmental change fall disproportionately on women and intensify the precarious position of women in society by taking into account local gender expectations, dependencies, and gender-specific land inheritance systems. Our results reveal that uncertainty about environmental changes can increase women's vulnerability, leading to actions such as families selling their land. Prolonged periods of drought are exacerbating women's insecure position as it leads to a rise in seasonal work. While men continue to utilize the remaining opportunities on their own land, women are often forced to explore alternative avenues to generate additional income. Hence, gradual environmental changes can aggravate the vulnerability of rural women, making them more susceptible to economic, social, and cultural exclusion. ■

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Water Scarcity as a Threat Multiplier in the Lake Chad Basin

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Introduction

Water scarcity in Lake Chad is a serious threat multiplier to peace and security in a region already threatened by the Islamist group Boko Haram. Water scarcity has not only destroyed livelihoods and invaluable biodiversity but has also exacerbated pre-existing conflicts between riparian communities. Nearly 30 million people depend directly on the Lake Chad Basin's water resources for their daily lives. But today it is one of the areas most exposed to the phenomenon of water stress in Africa and in the world (Sambo, 2013; Suyru, 2021). Over the last six decades, the size of Lake Chad has decreased by 90 percent due to overuse of water and the impact of climate change (UNEP, 2018). The surface area of the lake has plummeted from 26,000 square kilometers in 1963 to less than 1,500 square kilometers today. While researchers at the French Institut de Recherche pour le Développement (IRD) argue that Lake Chad is not disappearing, and that its alleged disappearance is a hydro-political myth, the effects of water scarcity on the riparian states including Cameroon, Chad, Niger and Nigeria are indisputable.

Each year Lake Chad experiences extreme water-related events, including heatwaves and extended droughts that often lead to conflicts. Cameroon, for instance, experienced a violent dispute over water between fishermen and herders in a town near the border of Lake Chad in December 2021 that led to the death of 22 people and the displacement of another 100,000 (Scher, 2022).

The main objective of this study is to analyze the impacts that water scarcity has on peace and security issues in the Lake Chad Basin. The growing impact of the combined effects of climate change and anthropogenic activities on the availability and distribution of Lake Chad's water resources creates the risk of a resurgence of water-use conflicts, until

now contained within the cooperative framework of the Lake Chad Basin Commission (LCBC). My research highlights the central place that water bodies occupy in regional peace and security issues. My research methodology is based on data collection, primarily papers published by academics and other sources of information on the internal dynamics of Lake Chad water management, as well as an examination of geopolitical maneuvering.

In the search for solutions to preserving the water resources of Lake Chad, and strengthening their integrity and sustainability, a theme has emerged in the rhetoric of the official speeches of riparian state leaders: Lake Chad is threatened with extinction, and everything must be done to save it. Their rhetoric is supported by some African academics inspired by several Intergovernmental Panel on Climate Change (IPCC) reports on climate change and forecasts based on satellite observations carried out by NASA in the region during the last five decades. These scholars argue that if no emergency measures are taken for the rescue of Lake Chad, it will soon disappear under the combined effects of climate change and strong demographic pressures. This rhetoric is a powerful bargaining tool used by African states to fundraise from international donors for various development projects likely to allow better mitigation and adaptation to climate change. Thus, during the COP 21 held in Paris in 2015 the alarmist rhetoric over Lake Chad wielded by the riparian states overwhelmed the scientific opinion of the IRD scholars.

As a prelude to the official opening of COP 21, a mini summit brought together former French President François Hollande, ex-African Union Commission President Dlamini Nkosanana Zuma and 12 African heads of state, whose declaration of principles deplored “the progressive drying up of Lake Chad by linking this drying up with the insecurity which reigns today in the region”

(Usigbe, 2019). With this official declaration, the policymakers sought to sound the alarm and draw the attention of the international community to the situation prevailing around the water resources of Lake Chad. Former Chadian President Idriss Déby Itno also expressed his dissatisfaction with the lack of response to the catastrophic situation. Later, at the United Nations General Assembly in September 2019, President Buhari of Nigeria added that “Lake Chad is shrinking as its population explodes. It is a critical situation, the decrease in cultivable land and rainfall is a source of unprecedented problems” (Usigbe, 2019). Following these official statements, civil society organizations focused more on the socioeconomic difficulties confronting local populations, and IRD researchers reiterated their reservations about the claims of the possible disappearance of Lake Chad (Suyru, 2021).

Water Scarcity Due to Human Activity or Climate Change?

The literature devoted to hydrographic and hydropolitical studies of Lake Chad reveals that there is debate over the real causes of water scarcity in this region. While some believe that global climate change is the primary cause of water scarcity, others point towards human activities. Western researchers from the IRD argue that the causes of water scarcity in Lake Chad are less to be found in climate change than in overuse of water and demographic pressure. Lake Chad is a fragile ecosystem because of the persistence of intensive agricultural irrigation activities implemented by the riparian states, which has over time led to the depletion of water resources (Lemoalle and Magrin, 2014). Michael Foe and Jonathan Foley similarly affirm that Lake Chad is threatened with disappearance because of irrigation practices, which are estimated to extract more than 10 cubic kilometers per year (Foe and Foley 2001). This amount of water represents half of the annual contributions of Logone-Chari River, the main tributary into Lake Chad in the period 1994–2004, which is a huge level of extraction that has had irreversible consequences (Foe and Foley, 2001).

Whatever the cause of its scarcity, water is a strategic asset for all states bordering Lake Chad.

Each of those states has intense needs for water to realize their development projects. Lake Chad water resources occupy a central place in the agricultural and pastoral activities practiced within the territories of each riparian state, especially for irrigation and also for the creation of income-generating activities, in particular for women, and food security (GIZ-CBLT, 2016). In Chad for instance, agriculture consumes about 190 million cubic meters of water per year. Such irrigation is very recent, dating only from the great drought of 1973. The rice growing perimeter of Sategui-Deressia extends over an area of 1,850 hectare and is supplied by a water canal on the Logone river with a capacity of around 50 cubic meters per hour, while the water requirement amounts to 1 million cubic meters per year (GIZ-CBLT, 2016). On the Cameroon side, rice production draws on the Logone-Chari hydrosystem, made up of water retention dams including Maga (625 million cubic meters), Mokolo (5 million cubic meters), Tourou (804,000 cubic meters), and Oumbeda (144,000 cubic meters).

Like Chad, Cameroon undertook a major program of hydro-agricultural development mainly for the production of grains, including wheat and rice, during the 1970s and 1980s with support of international funds (Ebogo, 2013). The estimated water needs for Cameroon’s irrigation represent nearly 70.28 percent of the total water needs in the Lake Chad Basin. The water resources of Lake Chad are therefore highly strategic for Cameroon, because it is far more important to agriculture than the basin of the coastal waters (49 percent) (Ebogo, 2013).

In Nigeria, the Kano River Irrigation Project in Kano State has water needs estimated at 25,000 cubic meters per hectare. Water reservoirs mainly built in Nigeria have enabled many inhabitants of the area to obtain water supplies and to ensure, and even to diversify, their crop production. An example is that of Alau Dam, which supplies the city of Maiduguri with water. However, the extent of Nigeria’s withdrawal of water from the area of Lake Chad has remained significantly lower compared to Chad and Cameroon. Withdrawals by Nigeria are estimated over the past 10 years at about 2,500 cubic meters/year including 1,800

cubic meters for irrigation and 200 cubic meters for livestock watering.

The Consequences for Peace and Security in the Lake Chad Region

Despite the institutionalization in 1964 of the Lake Chad Basin Commission (LCBC) as a multilateral framework for the concerted management of water resources (Saibou, 2004; Ahidjo, 2010), there remains inequality in water distribution between riparian states and communities because of existing disagreements in the governance of Lake Chad resources. As a transboundary body of water, the Lake Chad water resources do not only follow the borders of the riparian states. Access to the water is highly interdependent. Increased exploitation of its upstream basin by certain states produces effects on the water quantity and quality of the downstream basin. According to Arnel Sambo, “the construction for example of water retention dams by these countries leads to the reduction of the flow of the rivers which cross the countries located downstream, and this fact provokes protest from the latter and very often leads to conflicts” (Sambo, 2008).

Every state in the Lake Chad region covets access to and exploitation of its water resources for the implementation of agricultural projects, which are part of the national strategies of all the riparian states. Since the eve of their independence in the early 1960s, conflicts have arisen over the management and use of water resources. These conflicts relate to the diversion of water, to the management of land and the exploitation of fish resources. While such conflicts have often been ironed out thanks to the multilateral mechanism of the LCBC, others persist and reflect the primacy of state sovereign interests over the collective management of resources.

The combined effects of human activities and climate change on Lake Chad’s water resources have intensified the competition between states. Because of the inability of the LCBC to efficiently fulfill its mission of collective management, the riparian states have taken unilateral initiatives to serve the needs of their respective populations in terms of

water access and fish resources. These initiatives can be understood, in part, as an unequal distribution and exploitation of water resources by each state and by the demographic weight of the population which depends on these resources for daily survival. For instance, in the early 2000s, Chad accused its neighbor Cameroon of diverting water from the Logone river by over-irrigating the rice crops of Maga in far north Cameroon and by constructing water retention dams, such as that of Lagdo in North Cameroon. Another example is that a large part of Chad’s fish production—some 100,000 tons a year—goes to Cameroon and Nigeria without control or official authorization (Bouimon, 2010). Cameroon invoked its right to exploit the resources of its soil and its subsoil by posing as the sole guarantor and manager of the resources resulting from its territorial heritage. However, Nigeria challenged this sovereignist management of water resources by Cameroon, causing significant power rivalries between Nigeria and Cameroon over the management of the Lake Chad water resources. For example, in the 1980s, Cameroon created a dam in the locality of Maga used for rice irrigation, while Nigeria developed two irrigation projects by digging canals that dried up the water on the Cameroonian side (Ahidjo, 2010).

The growing constraints on Lake Chad water linked to its scarcity and unequal distribution raises concerns about the potential for future conflicts (Sambo, 2013). The possibility for conflict is heightened because of the acceleration of internal migrations of people searching for areas conducive to the development of fishing, agriculture, and livestock activities. Since 2010, Lake Chad has become a space of asymmetrical conflicts between not only the armed forces of the riparian states but also the non-state armed groups that are proliferating and attempting to control the sources and strategic resources of the lake. The emergence of these criminal gangs around Lake Chad is not the result of chance. They are not only the result of the political and security history of an area long marked by the recurrence of political instability and armed conflicts, but also the result of a shifting regional complex characterized by the Islamist thrust in the Sahel since the collapse of Libya. Taking advantage of the weak adaptation

and mitigation capacity of the riparian states facing climate change, the non-state armed groups settled themselves in the periphery of Lake Chad with the aim of capturing for their benefit the rents linked to the exploitation of its resources. The abundance of resources, the intensity and diversity of trade, including illicit products, weapons, and drugs, the importance of monetary circulation, the existence of four borders and the obstacles to territorial control clearly appear as the main issues that favor acts of criminality (Lemoalle, J and Magrin, 2014). States in the area have responded militarily to the security threat that these groups now represent not only to people but also increasingly to their national security.

The illicit activities that have taken root on the roads leading to the large trading areas of Lake Chad have also spread into its waters. The Chadian politician Ngalejy Yorongar affirms that at “Lake Chad these thugs aboard speedboats intercept itinerant traders coming from Maiduguri (Nigeria) or Chad to dispossess them of their goods. Lake Iro in the middle Chad region is also not immune to this piracy. The itinerant traders who sail on this lake are frequently ripped off by organized soldiers” (Yorongar, 2010). The theft of cattle, kidnappings, and hostage-taking with a view of ransoming wealthy traders are the primary activities of these non-state armed groups. In any case, whether enabled by roadblocks or sporadic incursions and attacks by uncontrolled elements of certain armed forces, criminality in Lake Chad is a diffuse phenomenon that follows the route of water resources. According to Issa Saibou, “the essential issue of cross-border crime in general and highway-banditry in particular within the Lake Chad [Basin], lies in determining the nationality of criminals than in their transmigration.” (Saibou, 2005).

Conclusion

The specter of imminent water wars has long been invoked in a context of water scarcity in the Middle East and in certain African regions (Zeitoun and Warner, 2006; Chellaney, 2013). It is in this context that a security discourse on water emerges on the part of national and international

institutional actors who are intervening in the Lake Chad region. A panoramic look at the official documents of these institutional actors shows that access to the water resources of Lake Chad now constitutes a security issue (UNDP, 2006). ■

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The Program on African Social Research aims to provide opportunities for feedback, networking, mentoring, and meaningful collaborative possibilities between junior scholars based in Africa and established scholars based both within and outside of the continent, especially those with diasporic and other ties to African countries. PASR is supported by the Carnegie Corporation of New York. It is based at the Marxe School of Public and International Affairs, Baruch College, City University of New York.

