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Climate Risk, Governance, and Institutional Adaptation Challenges in Liberia

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Abstract

Sea level rise, intensifying floods, and deforestation pose urgent risks to low-income coastal countries, yet climate adaptation remains constrained by governance and resource gaps. Despite Liberia's prominence in global vulnerability rankings, little research has examined the country's adaptation processes and barriers. This case study addresses that gap by analyzing Liberia's environmental vulnerabilities and institutional responses. The study first describes key vulnerabilities, including coastal erosion, urban flooding, rainfall and temperature variation, deforestation, and waste management and pollution. It then reviews the main organizations and policy frameworks engaged in climate adaptation and mitigation across the country. The study shows that despite formal policy frameworks such as the National Adaptation Plan and REDD+ Strategy, climate action remains fragmented, underfunded, and politically marginalized. Findings reveal how governance gaps, including limited institutional capacity, donor dependence, overlapping mandates, chronic neglect of basic services, and exclusion of local communities undermine adaptation, leaving frontline communities to rely on self-organized strategies. The disconnect between national planning and local realities reveals deeper tensions between development goals and environmental sustainability. Liberia's experience highlights how vulnerability is co-produced by socio-ecological systems and governance failures, offering insights for more inclusive, context-sensitive climate adaptation in the Global South.

Introduction

Climate change poses a profound threat to nations in the Global South, particularly those with limited institutional capacity and high exposure to climate-related hazards. Liberia, a country situated along Africa's Atlantic coast, exemplifies this dynamic. Its vulnerability is shaped by a combination of geographic exposure, particularly to sea level rise and coastal erosion, and structural weaknesses, including inadequate infrastructure, limited governance capacity, and competing development priorities. Climate-related disruptions, such as coastal flooding and erratic rainfall patterns, have far-reaching implications for food security, livelihoods, and urban infrastructure. Despite the existence of multiple

national adaptation strategies and legal frameworks (Government of Liberia [GoL], Environmental Protection Agency of Liberia [EPA], & United Nations Development Programme [UNDP], 2020; REDD+ Implementation Unit, 2022), climate action remains unevenly implemented and insufficiently prioritized in Liberia's political and development agendas.

This article synthesizes climate risks and governance dynamics in Liberia. Although climate change is an urgent global issue, there is limited academic research on Liberia, despite its high exposure to environmental hazards and governance constraints. *Climate risk* refers to the potential for climate-related hazards such as sea-level rise, extreme rainfall, flooding, and drought to cause adverse impacts when combined with conditions of exposure and vulnerability (Li et al., 2021; Salisu & Okolo, 2023). In Liberia, these risks are heightened where environmental degradation and weak governance intersect. For instance, deforestation accelerates soil erosion and disrupts rainfall patterns, increasing both flood frequency and heat intensity (Lawrence et al., 2022). *Climate governance* refers to the systems of policies, institutions, and decision-making processes often spanning multiple levels and actors through which the state and its partners attempt to manage climate risks and pursue adaptation (Heinen et al., 2022; Broto & Bulkeley, 2020).

Monrovia, the capital and the most populous city in the country, stands at the epicenter of Liberia's climate crisis. National policy documents such as the *National Adaptation Plan (NAP) 2020–2030* and *Liberia's First Adaptation Communication to the UNFCCC* recognize Greater Monrovia as a critical climate intervention site due to its high exposure and socio-economic vulnerability (GoL, EPA, & UNDP, 2020; EPA, 2021). Yet, this formal recognition has not translated into substantive on-the-ground progress. As Bah and Ulibarri (2025) document in their study of two of Monrovia's most climate-exposed informal settlements, West Point and New Kru Town, residents continue to face recurrent erosion events, deteriorating housing, and inadequate or stalled protective infrastructure. In the absence of meaningful state intervention, communities have resorted to self-organized efforts, such as makeshift sea defenses and barriers to protect themselves. More generally, Liberia's climate governance remains underfunded, technically siloed, and politically marginalized. Climate change is rarely featured in electoral discourse or mainstream political debate, further undermining its integration into national development planning. And climate impacts are exacerbated by rapid urban growth, institutional fragmentation, and weak enforcement mechanisms. Monrovia is home to nearly 40% of the country's population; its growth has outpaced governance capacity, leading to deepening inequalities in land tenure, service provision, and resilience planning (Wang & Sietchiping, 2017).

These governance and implementation gaps reflect broader tensions in climate governance across the Global South. This gap between formal policy and on the ground adaptation reflects broader tensions in climate governance across the Global South: between international commitments and local capacity, between development aspirations and environmental constraints, and between donor-driven agendas and community needs. In this sense, Liberia's experience parallels that of other Global South states, where weak institutional capacity, limited infrastructure, fragmented governance, and urban incompleteness similarly constrain adaptation (Cobbinah et al., 2015; Watson, 2009, 2014; Zerbo et al., 2020; Ziervogel et al., 2017). Liberia's experience, particularly in its coastal regions, offers an instructive case for understanding how structural constraints shape climate adaptation in low-income, highly exposed contexts. In addition, Liberia experienced a 14-year civil war (1989–2003) that caused far-reaching socio-

economic impacts. Other post-conflict states such as Sierra Leone and Mozambique also face funding gaps, fragile governance, and overlapping mandates that constrain adaptation (Schubert, 2024; Sitati et al., 2021; Turay et., 2023; Wannewitz et al., 2024). These parallels underscore how Liberia’s challenges reflect not only local governance limits but also the broader vulnerabilities of coastal states emerging from conflict.

By analyzing Liberia’s climate vulnerabilities, institutional gaps, and community-level responses, this case study contributes to broader discussions on adaptation, resilience, and environmental justice in resource-constrained settings. This article draws on: (1) document analysis of national policies and laws (e.g., NAP 2020–2030, NCCPRS, REDD+ Strategy, NDCs), Liberia’s National Budget (FY2025), and implementation reports; (2) a targeted review of peer-reviewed scholarship on Liberia and comparable post-conflict or low-income coastal states in the Global South; and (3) grey literature, datasets (e.g., World Bank climate profiles and projections, United Nations Office for Project Services exposure estimates, Afrobarometer Round 10 awareness data, Global Forest Watch tree-cover change), and news reports from reputable local and international agencies (e.g., FrontPage Africa, Liberian Observer, Reuters) to capture recent developments and public discourse.

Case examination

Environmental vulnerability in Liberia

Liberia covers a land area of 96,320 km² and has an estimated population of 5 million (Figure 1). Its low-lying coastal geography, combined with dense settlements, makes it highly vulnerable to climate-induced hazards such as sea level rise, coastal erosion, extreme rainfall variability, and flooding (World Bank, 2021). These are the country’s primary climate risks—hazards directly driven or intensified by changes in the global climate system. Other stressors, such as deforestation and pollution, are human-induced environmental pressures that exacerbate climate risks by weakening ecosystems, reducing natural buffers, and amplifying exposure to floods, droughts, and heat stress. Climate risks are also intensified by high poverty rates and economic dependence on climate-sensitive sectors, including agriculture, fisheries, forestry, and mining. As a result, Liberia ranks 29th globally on the 2021 Global Climate Risk Index, reflecting its exposure and limited adaptive capacity (World Bank, 2021). This section examines both categories of vulnerability: (1) direct climate risks (e.g., sea-level rise, rainfall variability, and flooding), and (2) anthropogenic pressures (e.g., deforestation and pollution) that compound climate impacts. Table 1 summarizes the regional distribution of these impacts.

Coastal Erosion and Sea Level Rise

Liberia’s low-lying coastal zone, which stretches over 350 miles along the Atlantic Ocean, is increasingly threatened by a combination of sea-level rise, coastal erosion, and intensifying storm events. These pressures are particularly acute in densely populated urban centers like Monrovia, where decades of unplanned expansion, sand mining, and the degradation of natural coastal buffers such as mangroves have compounded the impacts of climate change. According to UNOPS (2022), approximately 2.2 million Liberians are at risk of flooding, and 320,000 face direct threats from coastal erosion. In West Point alone, more than 1000 homes have been lost and over 1000 people displaced, often without formal relocation support or compensation. The effects are most visible in informal urban settlements such as West Point and New Kru Town, where residents have suffered from repeated storm surges and sea

erosion, flooding, and displacement. In New Kru Town, partial infrastructure, such as rock barriers, has been constructed, but implementation remains uneven and concentrated around political or administrative landmarks rather than areas of greatest human need (Bah & Ulibarri, 2025). Similar dynamics are playing out in rural counties like Sinoe, Grand Kru, Grand Bassa, and Grand Cape Mount, where rising seas are encroaching on communities and homes, yet national-level interventions remain absent, leaving communities to face the worsening impacts. Looking ahead, coastal erosion is likely to continue; a recent projection for Greater Monrovia predicts a 16 cm rise in sea level by 2030, potentially impacting over 675,000 people and inundating 9,500 hectares of land (World Bank, 2021).

Flooding in Greater Monrovia

Flooding has become one of the most pressing climate-related challenges in Greater Monrovia and its surrounding counties. Driven by extreme rainfall, inadequate infrastructure, and weak institutional coordination, floods in Liberia's capital are now a recurring threat with increasing intensity and social impact. Monrovia receives an average of 5,250 mm of rainfall annually, making it one of the wettest cities in the world. Monthly peaks regularly exceed 1,000 mm, and isolated events of over 435 mm in a single day have been recorded. This extreme precipitation, particularly during the rainy season from May to October, fuels pluvial (rainfall-based) flooding, now the most widespread and damaging flood mechanism in the city (World Bank, 2021).

Low-lying and densely populated informal settlements are the most affected. Areas like Peace Island, West Point, Slipway, Clara Town, Logan Town, and New Kru Town frequently experience submerged roads, stagnant surface water, and widespread inundation of homes due to poor drainage and unregulated construction on wetlands. Many neighborhoods lack an interconnected drainage system, leading to flooding during moderate rainfall. A combination of pluvial, fluvial (river), and coastal flooding compounds the crisis. Fluvial flooding from the St. Paul River often pushes into Stockton Creek and the Mesurado estuary, while coastal zones such as New Kru Town and West Point are exposed to rising tides and overtopping (World Bank, 2021).

The human toll of flooding is staggering. Deemie (2025) reports that forecasts warn that more than 825,000 people are at risk nationwide, with Monrovia at the epicenter. In 2024 alone, floods displaced over 100,000 residents and killed at least nine people, including children. Flooded communities face cascading hazards, including disease outbreaks, loss of income, destruction of homes, and repeated displacement. Despite these realities, Liberia's National Disaster Management Agency (NDMA) remains critically underfunded, with no operational funds in place for flood preparedness or early warning systems. As a result, the agency relies heavily on donor funds. The lack of institutional readiness is compounded by the failure to implement and maintain early warning infrastructure. A \$10 million early warning system, funded by the Green Climate Fund and managed by the African Development Bank, was delayed for years due to administrative mismanagement and political interference under the previous administration. As of mid-2025, disbursement conditions were only just being fulfilled, with the hope that an operational system may be in place by the next rainy season (Deemie, 2025; Mehnepaine, 2025).

The magnitude of the flooding crisis has even prompted discussions about relocating Liberia's capital city. In July 2024, a Senate joint committee proposed the idea of moving administrative functions to a safer location, citing Monrovia's overpopulation, poorly functioning sewage and drainage infrastructure, and geographic vulnerability as unsustainable in the face of climate change. Though no official site has

been selected and the financial feasibility remains uncertain, the proposal signals growing national concern over the long-term viability of Monrovia as a political and economic center (RFI, 2024). At the core of Liberia's flood crisis is not only a changing climate but also deep systemic fragilities of informal urbanization, weak land governance, and decades of underinvestment in urban planning.

Changing Rainfall Patterns and Increased Temperatures

Liberia's climate is divided into two major zones: an equatorial system with year-round rain in the south and a tropical system with distinct wet and dry seasons in other areas (Stanturf et al., 2013). The rainy season in Liberia occurs from May to October, while the dry season extends from November to April. Historically, this climatic balance supported predictable agricultural cycles and steady river flows. However, climate variability is increasingly disrupting these patterns. Rainfall has become more erratic, marked by both prolonged dry spells and abrupt, high-intensity downpours. These extremes undermine traditional farming calendars and reduce the reliability of rain-fed agriculture, which remains the dominant livelihood for rural Liberians. The consequences are cascading. Farmers face greater uncertainty about planting and harvest seasons, and the risk of crop failure has increased, especially for staple crops like rice and cassava. In some regions, early cessation of rains has forced farmers to replant, while in others, floods have wiped out maturing crops. These shifts have severely impacted food production, water availability, and hydroelectric generation capacity (Kenneh & Greaves, 2016; USAID, 2012).

Temperature trends compound these challenges. Between 1960 and 2006, Liberia experienced a rise in average annual temperatures of 0.8°C, with projections indicating continued warming into the 21st century (USAID, 2012). Though seemingly modest, this temperature increase has significant ecological and public health implications. Warmer conditions accelerate evaporation, reducing soil moisture and increasing heat stress for crops, livestock, and people. In urban areas, the heat amplifies the "urban heat island" effect, exacerbating discomfort and raising cooling costs in a country where access to electricity remains limited. Higher temperatures also create favorable conditions for the spread of climate-sensitive diseases such as malaria and diarrheal infections, particularly in overcrowded and under-resourced communities. Communities already facing poverty, food insecurity, or poor infrastructure are less equipped to adapt, making climate change a driver of both environmental and social vulnerability.

Deforestation

Liberia is home to one of the most extensive and ecologically significant forest systems in West Africa, including portions of the Upper Guinean Forest, an internationally recognized biodiversity ecoregion. These forests are vital not only for global climate regulation but also for sustaining local livelihoods, traditional knowledge systems, and ecosystem stability. However, Liberia's forest cover has been steadily eroded over the past two decades due to a convergence of economic pressures, weak regulatory enforcement, and competing land use priorities. The primary drivers of deforestation include commercial logging, often facilitated by concessions granted to foreign companies; the rapid expansion of smallholder and industrial agriculture, particularly for palm oil and rice production; and unregulated artisanal and small-scale mining, which disturbs forest soils and pollutes water sources. These activities are often incentivized by short-term economic gain and inadequate monitoring capacity at the local and national levels. Moreover, land tenure insecurity and overlapping claims between customary and statutory systems make forest governance fragmented and contested. This accelerating deforestation intensifies climate risk

by reducing carbon storage, eroding soils, and disrupting rainfall cycles, thereby heightening floods, droughts, and heat stress. Forest clearing also increases exposure to biodiversity loss. In this way, deforestation acts as both a driver and amplifier of climate-related hazards in Liberia.

As of 2010, approximately 97% of Liberia's land area was covered by natural forest, yet by 2022, Liberia had lost around 150,000 hectares of tree cover, contributing to an estimated 95.4 million metric tons of CO₂ emissions (Global Forest Watch, 2023). The ecological consequences of this deforestation are severe. Forest degradation directly reduces Liberia's carbon storage capacity, weakening its role as a regional carbon sink at a time when climate mitigation is critical. This loss of natural vegetation also destabilizes rainfall patterns and erodes soil quality, thereby increasing the risk of floods during the rainy season and droughts during the dry season. The cascading impacts are particularly acute for rural communities that rely on forest resources for food, firewood, medicine, and income. As tree cover declines, so too does biodiversity, including endemic and endangered species that are integral to Liberia's ecology.

In recent years, Liberia has witnessed a rise in deforestation driven by the influx of Burkinabe and Ivorian nationals engaged in cocoa farming and small-scale mining, particularly in northeastern and southeastern counties like Nimba and Grand Gedeh. According to the NGO Coalition of Liberia, many migrants have cleared large portions of primary forest often without legal land rights or environmental oversight, leading to land degradation, violent conflicts, and threats to protected areas such as the Grebo-Krahn National Park. The Coalition warns that some local leaders have facilitated this influx by informally allocating forest plots to foreign cocoa farmers, exacerbating disputes between communities, migrants, and the Forestry Development Authority. The situation has reached a crisis point, with calls for the Liberian government to issue permits, enforce land laws, and prevent further destruction of reserved forests (FrontPage Africa, 2025; Oracle News Daily, 2025).

Waste Management, Air, and Water Pollution

Liberia faces severe deficiencies in waste management infrastructure nationwide, with Greater Monrovia at the epicenter. As of 2022, Monrovia had only three designated dumpsites and a limited fleet of garbage trucks, resulting in sporadic pickups and trash mounds reaching up to two meters high in some neighborhoods (Doe, 2022). The only engineered landfill, at Whein Town, has long exceeded its capacity, and proper waste treatment facilities are virtually absent. Waste is frequently dumped indiscriminately into wetlands, streets, and rivers, or burned in the open.

Drainage, sewage, and wastewater systems are similarly inadequate. Most urban areas lack sewerage networks or wastewater treatment plants, causing untreated sewage to overflow into wetlands, rivers, and streets during heavy rains. In downtown Monrovia, areas such as Waterside and Broad Street often experience flooding mixed with raw sewage. In many informal settlements, including West Point, Slipway, Clara Town, and Freeport, the absence of adequate toilets or sewage disposal enables open defecation along beaches and rivers. These infrastructure gaps are compounded by governance failures. Until 2024, Liberia lacked a comprehensive national strategy for solid waste management, and overlapping institutional mandates hindered coordination (UNEP, n.d.). Local authorities are chronically under-resourced; in 2023, the Monrovia City Corporation allocated only about 5.25% of its budget to waste services (Zayzay, 2025). A National Solid Waste Management Policy was validated in late 2024, but implementation is hampered by limited funding, enforcement, and technical capacity (EPA, 2024).

The environmental and public health impacts of waste and pollution are severe. Uncollected waste attracts vermin, clogs drainage systems, and serves as breeding grounds for mosquitoes, contributing to diseases. Open burning of garbage degrades air quality, releasing particulate matter and methane. Contaminated surface water exacerbates the spread of waterborne diseases such as cholera and diarrhea as well. Poor waste management also heightens climate-related risks. Heavy rains in Monrovia routinely overwhelm drains clogged with plastic and organic debris, triggering or worsening floods. These events spread solid waste and sewage through streets and homes. As a result, these events heighten climate-related risks, such as urban flooding and emissions.

Climate governance and key stakeholders in Liberia

Climate change governance in Liberia is primarily led by the Liberia Environmental Protection Agency (EPA) and the National Climate Change Secretariat (NCCS). The EPA, established under the Environmental Protection and Management Law of 2002, is the lead regulatory body responsible for environmental policy, monitoring, enforcement, and coordination across government agencies. The NCCS focuses on coordinating climate change initiatives and developing policies for adaptation and mitigation efforts, such as the Nationally Determined Contributions (NDC) and the NAP.

Beyond the EPA and NCCS, Liberia's climate governance landscape involves a multi-level and cross-sectoral network of actors, including government ministries and agencies, international partners, civil society groups, communities, and academic institutions. Table 2 summarizes these actors and their responsibilities, showing how roles are distributed across planning, funding, coordination, and implementation. In practice, ministries take the lead on planning, infrastructure, and regulation, while international partners provide most funding and technical support. Civil society groups and NGOs focus on advocacy and awareness, and local communities rely on grassroots adaptation strategies. Academic institutions, though still emerging, contribute to research and climate education.

Despite this wide array of ministries and actors, Liberia's governance framework remains fragmented, with weak coordination and overlapping responsibilities undermining effective implementation. For example, both the EPA and the National Disaster Management Agency hold responsibilities for disaster preparedness and climate resilience, but without formal coordination mechanisms, their work often proceeds in parallel, leading to gaps in implementation. Similarly, climate data and planning functions sit both within the Ministry of Transport (through its meteorological division and climate change and environment unit) and the EPA, creating duplication and fragmented reporting, and weakening the EPA's role as national coordinator. These overlapping mandates not only diffuse accountability but also slow the integration of climate priorities into sectoral planning, leaving frontline communities exposed to climate risks. Potential sources of conflict among these actors could arise from different priorities and interests. Accordingly, land concessions granted to multinational corporations, particularly for large-scale agricultural projects, often lead to the displacement of rural communities that rely on these lands for farming and cultural survival. These practices foster environmental degradation and weaken land rights, generating widespread grievances that often become catalysts for local resistance and environmental protests.

Climate Policies and Programs

Liberia's civil war ended in 2003, after 14 years of conflict. The 2005 elections marked the return to democratic governance, with President Ellen Johnson Sirleaf's administration beginning in 2006. Since

2005, Liberia has established several high-level national policy frameworks to address climate change as part of the post-conflict rebuilding. The list below focuses on broad national policies and programs related to climate mitigation and adaptation officially adopted by the government since 2005.

- ***National Forestry Reform Law (2006)***: Shortly after the civil war, Liberia overhauled its forest governance with the passage of this law. The *National Forestry Reform Law* of 2006 ensures sustainable management and conservation of Liberia's forests, regulating logging and promoting forest protection and community rights (ClientEarth, 2006). This law curbs deforestation and improves forest governance, a foundation for climate change mitigation in the forestry sector.
- ***National Adaptation Programme of Action (NAPA) (2008)***: As a least-developed country party to the UNFCCC, Liberia formulated *NAPA* in 2008 to identify urgent adaptation needs. The *NAPA* highlighted Liberia's high vulnerability to climate variability and extreme events (e.g., impacts on agriculture and coastal areas), and it proposed priority adaptation projects to reduce risks for rural communities (EPA, 2008). This was Liberia's first climate adaptation plan, guiding initial resilience-building efforts.
- ***National Disaster Management Policy (2012)***: Recognizing the link between climate change and disaster risks, the government adopted a *National Disaster Management Policy* in 2012 to strengthen disaster risk reduction. This policy provides an overall framework for disaster management in Liberia and complements other national plans and policies on climate adaptation (Republic of Liberia, 2012).
- ***Climate Change Gender Action Plan (ccGAP) (2012)***: Liberia also developed the *ccGAP* to ensure climate strategies are gender-responsive. This plan mainstreams gender equality into climate change policies and programs, recognizing that women and men face different vulnerabilities. The *ccGAP* identified priority areas – agriculture, coastal zones, forestry, health, water/sanitation, energy, with gender-focused climate actions in each (REDD+ Implementation Unit, 2022).
- ***National REDD+ Strategy (2016)***: To further tackle emissions from deforestation and forest degradation, Liberia developed a *National REDD+ Strategy* in 2016. This strategy outlines measures to reduce forest loss and conserve carbon stocks as part of the international REDD+ mechanism. By 2019, Liberia had established a forest reference emission level and other technical frameworks under REDD+ (REDD+ Implementation Unit, 2022).
- ***National Climate Change Policy and Response Strategy (NCCPRS) (2018)***: Liberia's EPA led the formulation of an overarching climate change policy and strategy, finalized in 2018. The *NCCPRS* provides a high-level framework for addressing climate change across all sectors. It articulates the government's vision and goals for mitigation and adaptation, and enhances coordination among ministries and stakeholders (REDD+ Implementation Unit, 2022).
- ***National Adaptation Plan (NAP) (2020–2030)***: Building on the *NAPA*, Liberia prepared a comprehensive *NAP* to guide medium- and long-term adaptation efforts. The *NAP* (covering 2020–2030) was launched as a blueprint for enhancing resilience across sectors. It adopts a sector-based planning approach, identifying adaptation priorities in critical sectors such as agriculture, forestry, energy, fisheries, coastal zones, and waste management (GoL, EPA, & UNDP, 2020).
- ***Nationally Determined Contributions (NDC) (2015 & 2021)***: Liberia has made international climate commitments under the Paris Agreement. Its first NDC, submitted in 2015, pledged a

15% reduction in greenhouse gas emissions below business-as-usual by 2030, with a long-term goal of carbon neutrality by 2050 (REDD+ Implementation Unit, 2022). The NDCs also emphasize adaptation measures to bolster climate resilience, setting quantitative targets for mitigation and outlining adaptation initiatives.

- **National Methane Roadmap Action Plan (2024):** Liberia's commitment to reducing methane emissions is highlighted in this policy. Targeted interventions include improved rice cultivation and livestock practices, waste separation and landfill methane recovery, expansion of clean and affordable energy access, and promotion of electric vehicles alongside restrictions on older vehicle imports (EPA, 2024).

Liberia's climate efforts are supported by international law and financing. The country is a signatory to global agreements, including the United Nations Framework Convention on Climate Change (UNFCCC), Paris Agreement, and Global Methane Pledge. Development partners such as the World Bank, French Development Agency, and the Green Climate Fund have committed over US\$90 million through initiatives like the Liberia Urban Resilience Project and Monrovia Integrated Development Project. These investments focus on flood defenses, urban infrastructure, and adaptive capacity, particularly in coastal cities (Green Climate Fund, 2019; Mehnepaine, 2023).

Barriers to climate action

The barriers to more aggressive climate action in Liberia span institutional, social, financial, and informational domains. These challenges interact to produce a governance system that is reactive rather than proactive.

Limited Institutional Capacity and Technical Expertise

Liberia's government and institutions face challenges in implementing and enforcing climate change policies due to limited resources, capacity gaps, and a lack of technical expertise. A national climate adaptation review identified "low technical and institutional capacity" as a core challenge, noting too few specialized professionals, scarce training opportunities, and even a lack of climate change curriculum in universities (NAP-GSP / UNDP / LDC Climate, 2018). This skills gap leaves key agencies like the EPA and NDMA under-equipped to prepare for disaster, collect data, plan interventions, or enforce regulations. A notable example is the \$10 million early warning system funded by the Green Climate Fund and managed by the African Development Bank. Although designed to provide real-time flood and climate risk monitoring, the project was delayed for years due to administrative mismanagement (Deemie, 2025). This delay left communities exposed to repeated floods without timely warnings. Such implementation failures highlight how technical weaknesses translate directly into vulnerability on the ground. More broadly, climate initiatives often rely heavily on external experts and donor support, limiting national ownership of adaptation processes. This capacity deficit not only delays policy implementation but also erodes government credibility; for example, 80% of Liberians rate their government's performance in protecting the environment as "poor" (Afrobarometer, 2023), reflecting public frustration with weak institutional responses. These gaps in expertise and weak coordination mechanisms exemplify the fragmentation of Liberia's climate governance system, where agencies operate in silos rather than through integrated strategies.

Exclusion of Locals in Decision-making

These institutional shortcomings are compounded by weak participatory structures. Even when policies exist on paper, the absence of community voices in planning and implementation often leads to procedural injustice. Many climate initiatives in Liberia have struggled with insufficient inclusion of local communities in decision-making. Climate policies and projects tend to be designed in Monrovia or by international consultants, with limited input from those on the front lines of climate impacts. As a result, there is exclusionary planning and procedural injustice. Excluding local knowledge and priorities can lead to maladapted projects, such as infrastructure that communities don't use or maintenance schemes that fail once external actors leave. When the Liberian government announced plans to relocate West Point residents after major erosion events, community members were not adequately consulted. Residents described the process as top-down, with relocation sites like VOA Community selected without meaningful participation. This lack of consultation led to distrust and resistance, with some residents refusing to move or later returning to West Point.

This issue also appears over large-scale land concessions for agriculture, mining, and forestry projects, which have repeatedly been granted to multinational corporations without the prior informed consent of local communities. Communities reported confusion about land rights and benefit-sharing, as negotiations were often held between the government and external partners, sidelining affected local landowners. Such concessions, often promoted as vehicles for economic recovery, have displaced households, reduced food security, and degraded forests, reinforcing both environmental and social vulnerabilities (Friends of the Earth International, 2013). These findings suggest that Liberia's barriers to climate action are not only technical or financial, but also procedural, resulting from the disconnect between planning frameworks and lived realities in communities. Improving Liberia's climate governance would thus entail more participatory approaches, ensuring that locals have a say in policies that affect their livelihoods and that traditional knowledge informs climate solutions on the ground. This top-down approach shows how climate action is often procedurally unjust and fragmented across levels of governance, with national actors and international partners sidelining community participation.

Budgetary Gaps and Limited Access to Funding

This procedural exclusion intersects with another structural barrier: Liberia's limited fiscal space. Even when communities are consulted, the lack of sustainable funding undermines implementation and leaves adaptation heavily dependent on donors. Pressing economic and development needs often overshadow climate action in Liberia. The government tends to prioritize immediate goals like job creation, roads, poverty reduction, and infrastructure needs, leading to a slower pace of climate action.

Liberia is among the world's poorest countries, with more than half the population living below the national poverty line, and basic infrastructure and services are lacking. While the country has made important strides in securing international partnerships and donor funding for climate resilience, its national investment in environmental governance remains limited. A review of the 2025 budget for the Liberia Environmental Protection Agency (Figure 2 and Table 3) illustrates critical gaps in both operational support and long-term financial planning. Although Liberia faces high exposure to climate-related hazards, the EPA is allocated only USD 2.4 million in the 2025 fiscal allotment. This budget is disproportionately low given the agency's expansive mandate, which includes coordinating national environmental policies, enforcing compliance, overseeing concessions, and implementing multilateral

environmental agreements. The limited fiscal allocation raises concerns about the prioritization of its environmental mandate within Liberia’s national development agenda.

Further scrutiny of the budget (Table 3) underscores that over 52% of the EPA’s funds (\$1.26 million) are allocated to employee compensation, while only \$253,539 is directed toward the use of goods and services necessary for program implementation, public outreach, and environmental monitoring. Compared to 2024, when the agency had \$733,429 in goods and services, this represents a sharp decrease in operational capacity. In contrast, the portion of the budget allocated to non-financial assets (i.e., capital investments in infrastructure and equipment) increased to \$900,000, most of which is connected to externally supported climate projects. This trend shows a structural imbalance in the EPA’s financial architecture, one that supports institutional maintenance over programmatic delivery. Without adequate resources for field activities, community engagement, or compliance monitoring, the agency remains constrained in its ability to implement meaningful climate efforts.

Perhaps most critically, the 2025 budget reveals that all major climate resilience projects are funded through external sources, rather than national revenue. The Monrovia Metropolitan Climate Resilience Project and the Climate Information Systems Project, for example, are supported by substantial international grants, including funding from the Green Climate Fund and technical assistance from the African Development Bank. While Liberia’s national budget lists allocations of \$500,000 and \$400,000, respectively, for these projects in 2025, these amounts likely represent limited administrative costs or co-financing requirements. The core funding for these initiatives comes from external sources, highlighting Liberia’s reliance on international donors to finance its climate adaptation programs. While such donor support is essential, the absence of substantial national investment reflects a deeper issue: the lack of political and fiscal ownership over climate governance. This dependency not only makes long-term planning vulnerable to fluctuations in donor priorities but also indicates that climate action remains peripheral within Liberia’s national policy and budgetary framework rather than being treated as a development imperative (Figure 2; Table 3). The EPA’s budgetary structure thus shows how Liberia’s climate institutions remain chronically underfunded, with scarce resources available for actual program delivery.

Limited Awareness of Climate Change

Even with adequate funding, the effectiveness of adaptation depends on public understanding and support. However, Liberia faces a persistent awareness gap that constrains collective action. According to Afrobarometer Round 10 (conducted in 2024), 68% of Liberians say they have heard of climate change, leaving nearly one-third (32%) still unfamiliar with the concept (Afrobarometer, 2025). While this marks progress compared to other Sub-Saharan African countries, awareness levels still leave a large knowledge gap that could constrain local engagement in adaptation efforts. This awareness gap poses a significant barrier to adaptation because citizens who do not recognize climate change are less likely to demand government action or adopt proactive responses. This lack of awareness has serious implications for adaptation capacity. Rural communities and populations with lower levels of education are the least likely to have heard of climate change, leaving them less equipped to link climate variability with agricultural cycles or livelihoods. In such contexts, extreme weather events are often attributed to supernatural or religious causes rather than systemic climate shifts. In contrast to climate awareness, Afrobarometer finds that 71% of aware Liberians believe climate change is making life worse, and 82% think the government

must act now, even if it comes with significant costs (Afrobarometer, 2025). However, the trajectory of awareness over time shows fragility. Afrobarometer data show that awareness rose steadily from 54% in 2018 (Round 7) to 77% in 2020 (Round 8), reflecting heightened public discourse at the time. But this progress was reversed by 2022 (Round 9), when awareness fell back to 61% (Afrobarometer, 2025). This drop highlights how climate change remains a low-salience issue in Liberia, vulnerable to competing crises such as economic hardship, which often dominate the national conversation. Strengthening climate literacy is therefore essential for Liberia's long-term resilience. Policy interventions could include integrating climate change into school curricula, establishing climate clubs in secondary schools, and training teachers on environmental issues. At the community level, awareness campaigns and participatory workshops could help bridge gaps in understanding and create opportunities for local voices in adaptation planning. Media strategies are equally critical, given Liberia's low literacy rates and widespread use of radio. Targeted radio programming and storytelling can play a particularly effective role in reaching both rural and urban populations. Without such investments in public awareness, procedural injustices are likely to deepen, as communities lacking climate knowledge risk exclusion from decision-making processes that affect their land, livelihoods, and futures.

Conclusion

Liberia's experience demonstrates the complex and often contradictory landscape of climate governance in highly vulnerable, low-income countries in the Global South. The country's environmental vulnerabilities, such as coastal erosion, flooding, deforestation, pollution, and erratic rainfall, are compounded by weak institutions, limited fiscal capacity, and underdeveloped infrastructure. These weaknesses reduce the state's ability to translate policy commitments into sustained local action. At the same time, human-induced pressures such as deforestation and pollution further amplify climate impacts by eroding natural buffers and deepening community exposure.

Despite the adoption of multiple climate policies and participation in international frameworks, implementation remains fragmented, underfunded, and largely dependent on external actors. These governance constraints mirror broader patterns across the Global South, where adaptation is often hindered by similar tensions between international commitments and local capacity, development goals and environmental protection, and top-down policymaking. Similarly, like other post-conflict and low-income coastal states in the Global South, local actors in Liberia continue to display adaptive agency through self-organized responses to flooding, erosion, and other environmental threats.

Liberia's experience with climate adaptation thus offers a valuable lens for understanding how structural governance limitations shape climate vulnerability in resource-constrained settings. Moving forward, its success will depend not only on increased climate finance and infrastructure investment but also on strengthening institutions, deepening participatory governance, and centering community-led adaptation.

Case Study Questions

1. How does Liberia's geographic location influence its climate risks?
2. In what ways are physical risks (e.g., rainfall, erosion, temperature) exacerbated by human decisions, behavior, or infrastructure?
3. What are the most significant barriers to implementing climate policy in Liberia?
4. In what ways do Liberia's economic and infrastructure goals complicate its climate actions?

5. What role do international actors play in supporting Liberia's climate efforts?
6. What transferable lessons can other Global South coastal countries draw from Liberia's experience?

Author contributions

Mohammed W. Bah: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **Nicola Ulibarri:** Conceptualization, Methodology, Supervision, Validation, Writing – review & editing.

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Competing Interests

The author declares no competing interests.

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Figures and Figure Legends



Figure 1. Liberia’s location in Africa (left) and county boundaries (right). Adapted from Pistininzi (2021), *Our City Forest*, and *World Atlas* (n.d.).

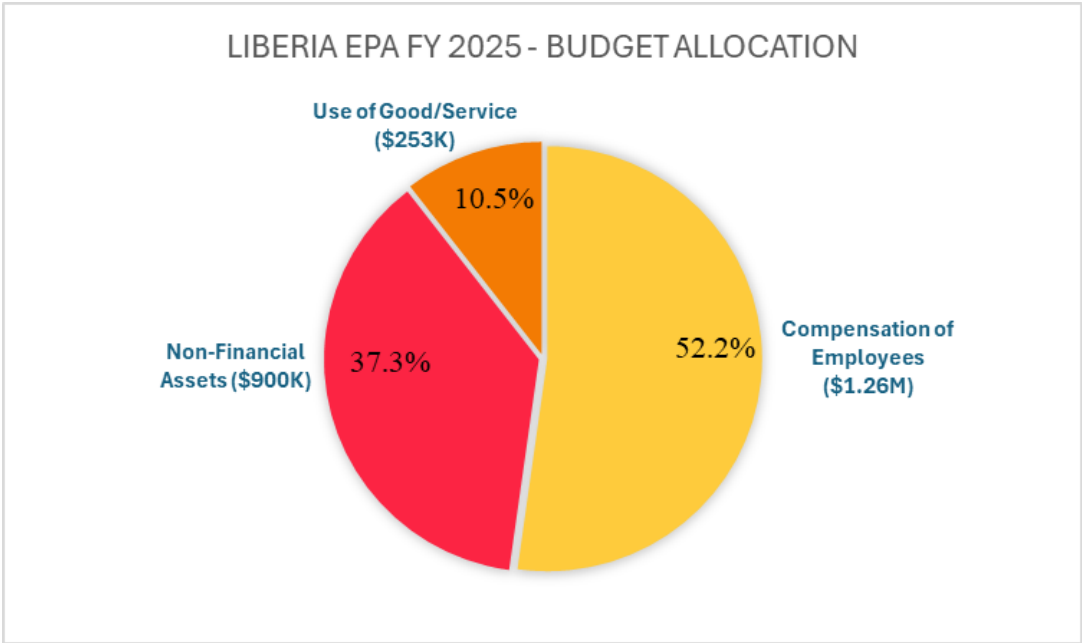


Figure 2. Liberia EPA FY2025 National Budget Allocation.

Region	Key Environmental Risk	Impacted Population
Greater Monrovia	Sea level rise, coastal	675,000 people at risk; 9,500 hectares land (by 2030)
West Point (Monrovia)	Coastal erosion, displacement	6,500+ displaced; 800+ homes destroyed
New Kru Town (Monrovia)	Coastal erosion, infrastructure collapse	Limited protection; informal settlements exposed
Peace Island (Monrovia)	Flooding (heavy rainfall and poor drainage on the Mesurado wetland) and erosion of surrounding wetlands/mangroves	An informal settlement highly vulnerable to recurrent flash floods and ground erosion. (Poor drainage and proximity to water mean floods regularly inundate homes, forcing frequent evacuations)
Hotel Africa (Monrovia)	Coastal erosion along the Atlantic shoreline (Virginia community)	Communities along the coast have been destroyed by encroaching waves
Sinkor (Monrovia)	Coastal erosion and urban flooding from heavy rains	Rapid erosion is eating away at Monrovia's Sinkor beachfront as the coast is exposed to periodic flash floods
Rivercess County	Coastal erosion (along the Cestos coastline) and deforestation (from logging in interior forests)	Communities at risk of displacement; logging has begun to degrade water and land resources
Sinoe County	Coastal erosion	High erosion vulnerability
Grand Kru County	Severe coastal erosion	One of the most erosion-prone counties
Grand Cape Mount County	Erosion and flooding	Flooding and erosion-prone
Grand Bassa County	Coastal erosion (especially around Buchanan) and seasonal flooding in low-lying areas	One of the most erosion-prone counties; flooding events periodically affect communities (e.g., hundreds of families have been displaced during intense rainy seasons)
Maryland County	Coastal erosion (ongoing shoreline loss in Harper and nearby towns) and flooding from intense rains	The capital, Harper, has seen its beaches and infrastructure steadily eroded, threatening homes along the coast
Margibi County	Flooding (river overflow and rainfall inundation) and coastal erosion (notably around Marshall)	Frequent heavy rains cause floods and beach erosion (exacerbated by sand mining)
Lofa County	Seasonal Wildfires: During the dry season, savanna areas (like Foya District)	Recurring wildfires destroy crops, homes, and food

	suffer yearly bushfires fueled by dry winds and the spread of grasslands on degraded former forests	
Nationwide	Rainfall variability, temperature rise, deforestation	Approximately 2.2 million Liberians remain at risk of flooding, over 825,000 face immediate flood exposure during the peak rainy season, 320,000 are vulnerable to coastal erosion, and 2.1 million are exposed to windstorms

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634 **Table 2.** Organizations and their Roles in Climate Adaptation Governance.

Category	Actors	Actions
National Ministries	Ministry of Agriculture; Ministry of Mines & Energy; Ministry of Public Works; Ministry of Transport; Liberia Land Authority; National Disaster Management Agency; Ministry of Health; Forestry Development Authority; Liberia Electricity Corporation; Liberia Water And Sewer Corporation; National Fisheries & Aquaculture Authority; Ministry of Finance & Development Planning	Planning, coordination, infrastructure development, climate data provision, regulation, funding
International Partners & Funders	United Nations Development Programme; United Nations Environment Programme; World Bank; African Development Bank; United Nations Environment Programme; Green Climate Fund; Adaptation Fund	Funding, technical assistance, policy support
Civil Society & NGOs	Local NGOs and civil society organizations	Advocacy, awareness, community projects
Local Communities	Communities facing climate risks	Self-organization, grassroots adaptation, traditional knowledge
Academic Institutions	Higher education institutions	Research, education, training

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637 **Table 3.** EPA Budget Structure (FY2025) and Climate Governance Implications.

Budget Component	Amount (USD)	% of Total Budget	Governance Implication
Compensation of Employees	\$1,260,927	52%	Prioritizes salaries over environmental programming
Use of Goods and Services	\$253,539	10%	Limited funding for implementation, outreach, and monitoring
Non-Financial Assets (Capital Projects)	\$900,000	37%	Tied to donor-funded initiatives; limited domestic direction-setting
Climate Protection Fund - Monrovia Metropolitan Climate Resilience Project	\$500,000	N/A (External)	Co-finance; demonstrates reliance on external actors for national climate programs; substantial Green Climate Fund support
Climate Protection Fund - Enhancing Climate Information Systems	\$400,000	N/A (External)	Fully funded by Green Climate Fund and African Development Bank with minor non-attributed co-financing; the Government of Liberia's budget line likely reflects administrative hosting, not substantive financial ownership
Total EPA Budget	\$2,414,466	100%	Reflects structural underinvestment in climate policies

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