

Green Bonds and Carbon Markets in Developing Economies: A Case Study of Mozambique

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DOI: <https://doi.org/10.51583/IJLTEMAS.2025.1409000077>

Received: 31 July 2025; Accepted: 07 Aug 2025; Published: 10 October

Abstract: This article explores how green bonds, carbon markets, and related instruments can unlock climate finance in developing countries, with a focus on Mozambique. Drawing on the Roadmap for Green Finance in Mozambique (FSDMoçambique & EED Advisory, 2021) and international evidence, it highlights the rapid growth of global sustainable debt markets -over USD 3 trillion in lifetime issuance - and the emerging role of carbon pricing and debt-for-climate swaps. Despite Mozambique's modest participation to date, recent regulatory developments - including a draft decree on green, blue, and social bonds - and negotiations for debt swaps (e.g., with Belgium) signal growing commitment. However, structural barriers persist, including weak regulatory capacity, limited bankable projects, and macroeconomic volatility. Opportunities lie in the country's renewable energy potential, donor-backed technical assistance, and integration into regional initiatives such as the SADC Green Bond Program and the Africa Carbon Markets Initiative. The paper synthesizes best practices from Africa and beyond - such as Kenya's sovereign green bond, Seychelles' debt-for-nature swap, and blended finance models - and proposes integrated policy actions to scale green finance in Mozambique. Key recommendations include finalizing sustainable bond regulation, developing a national green taxonomy, and investing in institutional capacity and transparency frameworks.

Keywords: Green Bonds; Carbon Markets; Climate Finance; Mozambique; Sustainable Investment.

I. Introduction

Climate change poses acute risks to developing economies, often multiplying poverty and fiscal stress (FSDMoçambique & EED Advisory, 2021, pp. 6–8; World Bank, 2023). Mobilizing finance for mitigation and adaptation is therefore urgent. In recent years, new instruments – notably green bonds and carbon markets – have emerged globally to channel capital into climate-friendly investments (FSDMoçambique & EED Advisory, 2021, p. 11; World Bank, 2019, pp. 5–9).

Green bonds are debt securities whose proceeds are earmarked exclusively for projects with environmental benefits, such as renewable energy, water infrastructure, and sustainable land use (FSDMoçambique & EED Advisory, 2021, pp. 11–12). Carbon markets, in turn, enable the trading of emission reduction credits, either through voluntary offset schemes or compliance mechanisms like carbon taxes and cap-and-trade systems (World Bank, 2019, pp. 15–18). When designed effectively, these tools can align private investment with national climate goals and attract both concessional and commercial international capital.

This article investigates the intersection between green bonds and carbon markets in developing countries, with a special focus on Mozambique. We adopt a practical, policy-relevant approach, drawing on both academic literature and a recent Roadmap for Green Finance in Mozambique (FSDMoçambique & EED Advisory, 2021, pp. 6–32), commissioned by FSD Mozambique (FSDMoç) and EED Advisory.

We also incorporate up-to-date data from institutional sources such as the IMF, World Bank, IFC, and Climate Bonds Initiative, along with relevant case studies from Africa and beyond. Our aim is to offer guidance to policymakers and investors by examining how green finance mechanisms can drive sustainable investment in Mozambique's economy, which remains highly vulnerable to climate shocks (FSDMoçambique & EED Advisory, 2021, p. 8).

The analysis covers: global and African best practices; Mozambique's institutional and regulatory context; specific instruments such as green and blue bonds, debt-for-climate swaps, blended finance, and carbon trading mechanisms; and the barriers and opportunities for scaling up these instruments in the national context.

The structure of this article is as follows: we begin with a literature review of green bonds and carbon markets globally and in Africa. We then describe our analytical approach. The findings section addresses Mozambique's climate finance context, available instruments, and practical challenges. Finally, we present conclusions and policy recommendations.

II. Literature Review

Global Trends in Green Bonds and Sustainable Debt

The green bond market has expanded explosively in recent years. By the first quarter of 2024, annual issuance reached a record *USD 195.9 billion*, pushing cumulative green bond volume above *USD 3 trillion* (Climate Bonds Initiative, 2024a). When including social and sustainability bonds - together referred to as *GSS+ bonds* - total aligned debt reached *USD 4.71 trillion* by Q1 2024 (Climate Bonds Initiative, 2024a).

According to the Climate Bonds Initiative, 2024 has been described as “*the most prolific on record*” for sustainable debt issuance (Climate Bonds Initiative, 2024a). This rapid growth reflects a combination of surging investor demand and the maturation of green finance labeling and taxonomy standards, particularly in regulated markets.

However, issuance remains geographically concentrated: Europe and North America continue to dominate, while Asia-Pacific leads in year-on-year issuance growth. Importantly, Africa’s share, although historically small, is beginning to grow: in Q1 2024 alone, African-aligned GSS+ issuance increased by 1,692% year-on-year to *USD 4.9 billion*, albeit from a low base (Climate Bonds Initiative, 2024a).

Developed countries issued virtually all of the world’s green bonds until recently. For example, global green bond issuance grew 300-fold from 2007 to 2019 (FSDMoçambique & EED Advisory, 2021, p. 11). However, by mid-2021, Africa had issued only 16 green bonds, accounting for just about 1.5% of global issuance (FSDMoçambique & EED Advisory, 2021, p. 11).

By early 2025, this number had grown to approximately 76 issuances totaling *USD 9.6 billion* across the continent (FSD Africa, 2025, p. 3). Nevertheless, the market remains highly concentrated: South Africa, Nigeria, Morocco, and Egypt, together with multilateral issuers such as the African Development Bank (AfDB), account for around 91% of Africa’s green bond volume (FSD Africa, 2025, pp. 5–6).

In short, Africa’s green bond market is still nascent and fragmented. Its development is hampered by the absence of dedicated regulatory frameworks, a limited number of creditworthy green projects, and high issuance costs - which in Africa can reach up to 5% of the bond volume, compared to about 0.9% in Europe (FSD Africa, 2025, p. 9).

Policy research highlights the considerable potential for scaling green bond markets in emerging economies. An ODI–FSD Africa policy briefing stresses that Sub-Saharan Africa needs approximately *USD 50 billion per year* for climate adaptation, and that sovereign and supranational green bonds could be key to catalyzing private investment (Tyson, 2021, pp. 4–5). Their key recommendations include: (i) enhancing regulatory frameworks, (ii) developing a pipeline of bankable green projects, and (iii) providing technical assistance to new issuers (Tyson, 2021, p. 6).

Similarly, analysts at the World Bank find that blending green bonds with complementary policy tools, particularly carbon pricing, can significantly improve climate impact and debt sustainability. They describe these as “*strong synergies from combining green bonds with carbon pricing*” (Heine et al., 2019, pp. 13–19).

Carbon Markets: Definitions and Outlook

Carbon markets exist in two forms. Compliance markets are government-mandated (e.g., the EU Emissions Trading System or carbon taxes), whereas voluntary markets involve private actors buying offsets. Globally, direct carbon pricing mechanisms (taxes and ETS) now cover approximately 23% of total greenhouse gas emissions, generating about *USD 95 billion* in public revenues during 2022 (World Bank, 2023; Twidale, 2023). This represents significant growing policy commitment, as the share of emissions priced rose from just 7% a decade ago to ~23% today (World Bank, 2023). However, developing economies lag behind in implementation. Within Sub-Saharan Africa, only South Africa currently enforces a carbon tax, while countries like Kenya, Gambia, Namibia, Nigeria, and Uganda are in the process of developing one (IMF, 2025, pp. 4–5).

Voluntary carbon markets for offsets have proliferated over the past decade, although their credibility and environmental integrity vary significantly. Globally, voluntary carbon trading was on track to reach around *USD 1 billion* in 2022, driven by increased climate commitments from private-sector actors (ACMI, 2022). In Africa, however, the volume of voluntary carbon trading remains very limited - estimated at under *USD 100 million* by 2021 - due primarily to supply-side constraints (ACMI, 2022).

A comprehensive overview by the Africa Carbon Markets Initiative (ACMI) identifies several key barriers, including limited developer capacity, high transaction costs, unclear or absent regulatory regimes, and weak local demand - with South Africa being a notable exception (ACMI, 2022). In response, ACMI was officially launched in 2022 to significantly boost supply and demand for African carbon credits.

The initiative sets ambitious targets, aiming to mobilize around *USD 6 billion* in carbon finance by 2030, and scale to between *USD 120–200 billion* by 2050, largely by supporting country-specific carbon market strategies, regulatory frameworks, and credit standardization (ACMI, 2022, para. 6).

Several types of voluntary credits, such as REDD+ and renewables-based offsets, have gained some traction in Africa. However, the overall market is still emerging, and partnerships with international institutions - such as the Integrity Council for the Voluntary Carbon Market (ICVCM) and ACMI - are working to enhance credit quality, transparency, and alignment with global benchmarks (ACMI, 2022).

Synergies and Best Practices

Recent research reveals substantive linkages between carbon markets and green finance. For example, Ren et al. (2022) demonstrate empirically that carbon futures prices “*Granger-cause*” green bond returns, indicating that carbon market trends can influence green financial asset performance (Ren, Tang, & Wen, 2022, p. 4). This suggests that stronger carbon pricing signals may directly impact investor expectations and capital allocation in green finance markets.

Policy analyses confirm these findings. The World Bank notes that carbon pricing and green bonds can “*jointly strengthen sustainability*”, particularly when deployed in tandem to finance climate projects and manage transition risks (Heine et al., 2019, pp. 13–19). In practical terms, carbon revenues can be used to improve the bankability of climate projects, thereby making green bonds more attractive to investors. Simultaneously, green bonds can finance projects that generate carbon credits, which are then sold in voluntary or compliance markets - creating virtuous financial cycles.

Several best-practice examples illustrate these synergies. Senegal’s 2022 pilot green bond, for instance, explicitly financed a public bus fleet projected to reduce approximately 5,400 tCO₂ per year, thereby blending project finance with anticipated emissions savings (FSD Africa, 2023). Belize and Seychelles have pioneered debt-for-nature and debt-for-climate swaps, redirecting sovereign debt repayments into marine and climate projects, which also help generate verified emissions reductions (World Bank, 2021, pp. L228–L233).

Moreover, blended finance platforms - which combine donor concessional finance with private capital - have underpinned several early-stage green projects in Africa. A key example includes small hydropower investments in Rwanda, made possible through de-risking by multilateral actors and green bond proceeds (Tyson, 2021, p. 7).

In terms of process, several operational lessons have emerged in the development of green bond markets in developing countries. Experience shows that government-backed guarantees, policy clarity, and institutional capacity building are often essential during the early phases of market development (FSDMoçambique & EED Advisory, 2021, pp. 20–22).

The Kenya case offers a useful precedent. In 2019, Kenya’s National Treasury, in collaboration with the Capital Markets Authority (CMA), issued a formal circular providing comprehensive green bond guidelines, which covered areas such as issuance frameworks, listing procedures, and reporting requirements (Tyson, 2021, pp. 5–6). This led to Kenya’s first sovereign green bond issuance in 2019, which successfully attracted investor interest and set a benchmark for the region.

After-market assessments of Kenya’s green bond program emphasize that an enabling environment - including clear policy guidance, technical assistance to issuers, and investor outreach - was critical to success (Tyson, 2021, pp. 5–6; FSDMoçambique & EED Advisory, 2021, p. 21).

Similarly, Multilateral Development Banks (MDBs) such as the African Development Bank (AfDB), World Bank, and International Finance Corporation (IFC) have played pivotal roles in incubating national green bond programs. These institutions have frequently acted as anchor buyers, technical advisors, or risk mitigators, which was instrumental in the success of green bond issuances in Nigeria, Uganda, and other African countries (World Bank, 2020, pp. 15–18).

Globally, these experiences suggest that developing country governments can effectively jump-start green finance ecosystems by:

- (i) setting robust and internationally aligned standards;
- (ii) providing fiscal or risk-based incentives such as tax exemptions or guarantees; and,
- (iii) demonstrating credibility and leadership through pilot green bond issuances (FSDMoçambique & EED Advisory, 2021, pp. 20–23).

III. Methodology

This study synthesizes both qualitative and quantitative evidence through a structured literature and policy analysis. We conducted a narrative review of academic publications, institutional policy papers, and financial market data related to green finance instruments, particularly green bonds and carbon markets.

Key documents include World Bank and IMF working papers on climate finance (Heine et al., 2019; IMF, 2025), Climate Bonds Initiative (CBI) market trend reports (Climate Bonds Initiative, 2024), and policy briefings by FSD Africa, ODI, and other African policy think tanks (Tyson, 2021).

Crucially, our methodology integrates insights from the FSDMoçambique – EED Advisory Roadmap for Green Finance (FSDMoçambique & EED Advisory, 2021, pp. 6–32), a study that included landscape assessments and stakeholder consultations across public, private, and donor sectors in Mozambique. This roadmap provides locally grounded data, qualitative inputs, and proposed strategic interventions tailored to Mozambique’s capital market environment.

We systematically extracted policy recommendations and implementation barriers from that roadmap, as well as from relevant domestic policy materials, including draft regulatory decrees currently under discussion by Mozambique’s Ministry of Economy and Finance and the Central Bank (Banco de Moçambique, 2023). Additionally, we reviewed relevant press releases and donor communications, including official statements about Mozambique’s debt-for-climate swap negotiations with partners such as Belgium (AIM, 2024).

By triangulating these varied sources, we identify how green bonds and carbon markets intersect in practice, and what regulatory, institutional, and financial constraints and opportunities are present in Mozambique. Where comparative data is available, we also integrate global benchmarks, such as regional issuance volumes and market growth rates, to contextualize national findings.

This hybrid analytical approach - which combines top-down macro-policy evidence with ground-level, country-specific insights - is designed to produce actionable guidance for public decision-makers, investors, and international development partners.

IV. Findings and Discussion

Mozambique's Context and Climate Finance Needs

Mozambique is a climate-vulnerable low-income country, having experienced moderate economic growth in recent years - with GDP growth projected at 2.3% in 2021, rising to 4.5% in 2022 - but remains highly exposed to climate-related shocks such as cyclones, floods, and droughts (FSDMoçambique & EED Advisory, 2021, pp. 7–9). These recurring events impose significant adaptation costs, particularly in sectors like energy and transport, which will require low-carbon expansion pathways.

Against this backdrop, the Mozambican government increasingly acknowledges the need for innovative climate-aligned finance. However, green finance remains underdeveloped at the domestic level. A 2021 market assessment notes that “*green finance is a concept few (in Mozambique) are aware of,*” and that existing sustainable finance mechanisms are largely “*piecemeal and uncoordinated*” (FSDMoçambique & EED Advisory, 2021, p. 10). Identified barriers include limited stakeholder awareness, scarcity of investment-ready green projects, and weak institutional frameworks (FSDMoçambique & EED Advisory, 2021, p. 11).

Moreover, the country's financial sector is constrained by broader macroeconomic risks - including sovereign debt overhang and inflationary pressures - which elevate the perceived risk of long-term climate investments.

Nevertheless, Mozambique has initiated some nascent climate finance elements. The National Strategy on Climate Change (ENAMMC, 2012) and the establishment of the National Environment Fund (FUNAB) under the Ministry of Finance represent foundational efforts to institutionalize climate finance (MICOA, 2012). More recently, a draft decree was developed in 2025 to provide a regulatory framework for sustainable bonds, including green, blue, and social bonds (360 Mozambique, 2025a).

In this draft, green bonds are defined as instruments to finance projects benefiting the environment or mitigating climate change, while blue bonds target marine conservation and ocean-related sustainability efforts - a particularly promising fit given Mozambique's 2,700 km coastline (FSDMoçambique & EED Advisory, 2021, p. 12). Social bonds, meanwhile, would focus on financing inclusive social infrastructure, such as healthcare, housing, and education.

According to the draft decree, issuers of sustainable bonds must list their securities on the Maputo Stock Exchange (BVM) and conduct trades via the Central Securities Depository, thereby promoting market transparency and investor confidence (360 Mozambique, 2025b). If enacted, this legislation would align Mozambique's regulatory framework with global standards such as the Green Bond Principles (ICMA) (360 Mozambique, 2025b).

Green Bonds in Mozambique: Opportunities and Challenges

Opportunities for developing a green finance ecosystem in Mozambique are increasingly visible. The country's financial sector is expanding, comprising several large commercial banks, microfinance institutions, and emerging capital market structures. As these actors build technical capacity, they could progressively support green bond issuance (FSDMoçambique & EED Advisory, 2021, p. 25).

Mozambique also possesses a rich natural asset base, including abundant hydropower, solar irradiation, and wind corridors, which makes it ideal for hosting eligible green projects under recognized taxonomies. For instance, planned renewable energy plants, rural water infrastructure, and coastal ecosystem restoration initiatives - especially within vulnerable provinces like Inhambane and Zambézia - are well-suited for green bond financing (FSDMoçambique & EED Advisory, 2021, p. 27).

At the policy level, domestic support is materializing. The government's draft decree on sustainable bonds, which defines the framework for green, blue, and social bonds, indicates a strategic commitment to integrating green finance into Mozambique's broader economic development agenda (360 Mozambique, 2025).

In addition to domestic momentum, regional and international initiatives are positioned to bolster Mozambique's green finance efforts. Notably, FSD Africa's SADC Green Bond Program, launched in 2021, was created to assist Southern African countries in issuing green debt, providing technical support, certification tools, and investor outreach platforms (FSD Africa, 2023).

Moreover, global agencies such as the International Finance Corporation (IFC), the Green Climate Fund (GCF), and Swedish bilateral development partners are offering technical and financial support to develop frameworks, taxonomies, and market infrastructure (FSDMoçambique & EED Advisory, 2021, p. 29). These partnerships are critical to ensuring that Mozambique's future issuances align with international best practices and attract climate-aligned capital.

Challenges to implementing a vibrant green finance ecosystem in Mozambique remain substantial. First, the pipeline of investment-grade green projects is still limited. Many potentially eligible initiatives - such as *off-grid solar* and *rural energy systems* - are small in scale, lack credit history, or are operationally fragmented, making them unsuitable for conventional bond structures (FSDMoçambique & EED Advisory, 2021, pp. 18–21).

Second, the cost of bond issuance is often prohibitive for smaller issuers. According to the FSD Africa Green Bond Report (2025), African issuers may face issuance costs of up to 5% of bond value, compared to less than 1% in developed markets - a substantial hurdle for municipalities or SMEs without external support (FSD Africa, 2025, p. 4).

Third, market liquidity remains low in Mozambique. The country has a limited pool of institutional investors, and secondary market trading is minimal, which raises yield spreads and discourages long-term capital engagement. Additionally, Mozambique has yet to develop a national green finance taxonomy or reporting standards, which increases the risk of “greenwashing” and undermines investor confidence (FSDMoçambique & EED Advisory, 2021, pp. 23–24).

The Roadmap for Green Finance in Mozambique also identifies weak regulatory oversight, a lack of technical capacity among both financial institutions and regulators, and inexperience with climate risk disclosures and environmental labeling (FSDMoçambique & EED Advisory, 2021, p. 25). Finally, macroeconomic instability - including currency volatility, elevated interest rates, and sovereign debt stress - makes the issuance of long-term green bonds less attractive to investors (IMF, 2025, p. 9).

Considering these challenges, the Roadmap suggests a phased, pragmatic approach. One strategy is to “*start small and public*” - for example, by launching a sovereign green or climate bond to establish benchmarks and crowd-in private capital under a transparent policy framework (Tyson, 2021, p. 6). Governments can ring-fence revenues - such as proceeds from natural resource extraction or environmental taxes - and issue a green bond backed by these earmarked flows, improving market credibility and investor trust.

A recent IMF survey indicates that several sub-Saharan African (SSA) countries - including Benin, Kenya, Namibia, Nigeria, and South Africa - are already experimenting with sovereign climate-related bond issuance (IMF, 2025, p. 11). Mozambique could follow this path, once fiscal discipline and policy alignment are sufficiently established.

Parallel to sovereign initiatives, the government and partners could pilot private sector demonstration deals - such as a renewable energy mini-grid financed by an international financial institution (IFI) guarantee or backstop - thereby creating proof-of-concept instruments. According to both the Roadmap and FSD Africa, developing a pipeline of such projects is essential for scaling the market and attracting blended capital (FSD Africa, 2025, p. 8; FSDMoçambique & EED Advisory, 2021, p. 26).

Debt-for-Climate Swaps

Debt-for-climate swaps are emerging as a promising financial innovation to align sovereign debt management with climate objectives, particularly in developing and small island states. These instruments convert scheduled debt repayments into local climate investment, providing both fiscal relief and climate finance (Essers et al., 2021).

According to a recent policy study, these swaps can “*kill two birds with one stone*” by simultaneously reducing external debt burdens while funding mitigation and adaptation projects (Essers et al., 2021). The typical structure involves a creditor country cancelling or redirecting a portion of debt owed by a developing country, under the condition that equivalent or partial funds are invested domestically in climate-related programs.

Mozambique is now actively pursuing this model. In mid-2025, Finance Minister Lucas Gonçalves publicly confirmed that Mozambique had entered into negotiations with Belgium to redirect €2.4 million of its total €5.7 million bilateral debt towards climate action initiatives (AIM, 2025; Kingdom of Belgium, 2023). The agreement is set to be implemented between 2023 and 2028, with funds earmarked for early warning systems, disaster risk planning, and community resilience programs in climate-vulnerable provinces like Sofala and Zambézia.

The Belgian concept note characterizes this agreement as a “*triple win*”: (i) Mozambique obtains new climate finance, (ii) Belgium demonstrates global leadership in climate action and innovation, and (iii) local institutions gain technical and operational capacity (Kingdom of Belgium, 2023).

This model reflects a synergistic approach to development finance, where sovereign liabilities are repurposed into green outcomes, thereby complementing grants, concessional loans, and private investment streams in Mozambique’s climate finance architecture.

Globally, successful debt-for-climate and debt-for-nature swaps offer valuable precedents. For example, in Seychelles, a 2015 swap restructured approximately USD 30.2 million of Paris Club debt to finance marine conservation efforts, including the establishment of the Seychelles Conservation and Climate Adaptation Trust (SeyCCAT) (Climate Policy Initiative, 2021; IMF, 2015). Similarly, Belize executed a USD 364 million “*blue bond*” transaction in November 2021, repurchasing roughly USD 553 million of external debt at a discount, with proceeds earmarked for marine protection and sustainable ocean planning (Nature Conservancy, 2021; Fontana-Raina & Grund, 2022).

An IMF working paper notes that other Sub-Saharan African peers, including Cabo Verde and Seychelles, have piloted such debt-for-climate swaps, demonstrating regional applicability (IMF, 2023). However, these swaps also face notable challenges: they require willing creditor partners, the establishment of robust project governance, and often demand additional concessional financing and capacity building (UNDP, 2023).

While implementation can be complex - with details such as verifying emissions reductions, managing trusts, and ensuring transparency - debt-for-climate swaps can be particularly pragmatic for Mozambique. They offer a means to convert sovereign debt

liabilities into concrete climate investments, thereby advancing both debt sustainability and climate resilience (Essers, Cassimon, & Van Campenhout, 2021).

Blended Finance

Blended finance combines concessional or donor funds with private capital, aiming to mitigate investment risk - a particularly useful structure in high-risk, developing market contexts. In Africa, the annual infrastructure finance gap, estimated at *USD 130–170 billion*, cannot be bridged by public funds alone (AUDA-NEPAD & Africa-Europe Foundation, 2025).

Blended finance structures catalyze private sector investment by providing guarantees, grants, or first-loss capital to make projects in renewable energy, water, or agriculture more attractive to investors. In Mozambique, mixed financing has already been deployed; for example, the IFC facilitated a hybrid mini-grid project by combining concessional funding from the Climate Investment Funds (CIF) with commercial IFC capital, reducing overall project costs and delivering lower energy tariffs to underserved communities (IFC, 2024).

Internationally backed de-risking facilities, including those from the Green Climate Fund (GCF) and African Development Fund Institutions (ADFI), further complement these blended models by covering early-stage risks that would otherwise deter private investment. Sub-Saharan Africa has witnessed numerous examples: partially guaranteed solar power projects, pooled pension fund investments in climate infrastructure, and World Bank-supported mini-grid programs in neighboring countries (Global Infrastructure Hub & IFC, 2022; World Bank, 2023).

Carbon Market Mechanisms

The Voluntary Carbon Market (VCM) presents an untapped opportunity for Mozambique to generate climate finance through projects such as reforestation, improved cookstoves, mangrove restoration, and methane capture. Despite its abundant natural carbon sinks - including forests, wetlands, and mangroves - the country's VCM participation remains minimal, primarily due to barriers in project development, including lack of funding, limited technical capacity, and absence of standardized verification protocols (FSDMoçambique & EED Advisory, 2021, p. 30).

To unlock the potential of VCMs, Mozambique would need to establish clear Monitoring, Reporting, and Verification (MRV) systems, along with a national registry of carbon credits to ensure transparency and build investor confidence (UNDP, 2022). Some donors, such as UNDP and the World Bank, have supported early-stage REDD+ and AFOLU (Agriculture, Forestry and Other Land Use) projects, which can feed credits into international voluntary markets.

According to the Africa Carbon Markets Initiative (ACMI), African participation in VCMs faces persistent challenges, including limited access to upfront finance, high transaction costs, and low carbon credit prices, especially where non-carbon co-benefits (such as biodiversity protection or community development) are not adequately priced (ACMI, 2023). Mozambique stands to benefit from ACMI's regional interventions, particularly in capacity building, regulatory harmonization, and the development of high-integrity African carbon standards (PMI Clean Energy, 2023).

Compliance or Voluntary Partnerships: Under Mozambique's Nationally Determined Contribution (NDC) submitted under the *Paris Agreement*, the government intends to leverage international carbon market mechanisms, including *Article 6* transfers of mitigation outcomes, to enable cross-border trading of emission reductions and potentially generate climate finance (FSDMoçambique & EED Advisory, 2021, p. 31).

At present, introducing a national carbon pricing mechanism or emissions trading system (ETS) appears unlikely in the short term, given the limited adoption among African peers. Instead, Mozambique may pursue voluntary carbon-offset programs, such as those offered by the private sector (FSDMoçambique & EED Advisory, 2021, p. 31; IMF, 2025, p. 9).

Importantly, during the Fourth International Conference on Financing for Development (FFD4, June 30–July 3, 2025), Mozambique's Minister of Finance highlighted the country's intent to "*maximize the gains of the carbon market to catapult financing*" - a commitment reflecting the integration of carbon markets into national strategy (Club of Mozambique, 2025).

One potential pathway involves integrating carbon revenue into green bond structures. For example, a bond issued to finance a renewable energy installation could be partially repaid through the sale of resulting carbon credits - thereby creating a reinforcing cycle in which carbon markets and green bonds operate synergistically (Heine et al., 2019, pp. 13–19; Tyson, 2021, p. 6).

Carbon Tax vs ETS: Although it lies somewhat outside Mozambique's near-term policy scope, implementing a national carbon tax or cap-and-trade system (ETS) would directly internalize the social cost of greenhouse gas emissions. Global experience - notably the 2024 State and Trends of Carbon Pricing report - shows that such mechanisms now generate record revenues, exceeding *USD 104 billion* in 2023, with over half of this income allocated to climate and nature-related programs (World Bank, 2024).

These instruments have increased coverage significantly: upwards of 24% of global greenhouse emissions are now subject to carbon pricing, primarily via taxes or ETS (World Bank, 2024; Twidale, 2024). However, pricing levels remain below the range needed to meet ambitious climate goals, and social impacts must be managed - highlighting the importance of sequencing price reforms alongside social protection measures (World Bank, 2024; World Bank, 2025).

In the Mozambican context, carbon markets are expected to remain voluntary in the medium term, as the country strengthens its regulatory environment, develops institutional capacity, and establishes monitoring and verification systems before introducing mandatory carbon pricing (FSDMoçambique & EED Advisory, 2021).

Regulatory and Institutional Issues

Implementing effective green finance infrastructure in Mozambique requires foundational investments in regulations, institutional coordination, and market standards. The *Roadmap for Green Finance in Mozambique* emphasizes the urgent need for a national green finance strategy backed by legislation and supported by an institutional anchor with sufficient political and technical capacity (FSDMoçambique & EED Advisory, 2021, pp. 36–38).

Specifically, the roadmap proposes the establishment of a Green Finance Unit housed within the Ministry of Economy and Finance, which would lead inter-institutional coordination with key actors including the Bank of Mozambique, development finance institutions (DFIs), commercial banks, and civil society representatives. As visualized in Figure 5 of the roadmap (p. 37), this unit would play a central role in:

- Drafting and enforcing green finance regulations;
- Developing and updating a national green taxonomy aligned with international standards (e.g. SDGs, EU or South African taxonomies);
- Supporting issuers and financial intermediaries with guidance and tools;
- Facilitating donor engagement and blended finance schemes.

Currently, Mozambique lacks a unified national green taxonomy. While technical efforts are underway to establish a classification framework - potentially mapping local project categories against South African and SDG-aligned taxonomies - a comprehensive and enforceable system is still in development (FSDMoçambique & EED Advisory, 2021, p. 38).

Establishing these elements would help standardize green financial flows, improve investor confidence, and lay the groundwork for scaling instruments such as green bonds, blue bonds, and carbon-linked finance.

The legal and regulatory frameworks governing Mozambique's financial markets must adapt to effectively support the green finance ecosystem. A proposed decree on sustainable bonds - currently under review - represents a critical step toward creating an enabling environment. The decree sets out eligibility criteria, listing obligations, and disclosure rules for green, blue, and social bonds, and mandates that all such instruments be traded via the Maputo Stock Exchange (BVM) and central depository system to ensure transparency and traceability (360Mozambique, 2025; FSDMoçambique & EED Advisory, 2021, pp. 38–39).

To enhance investor confidence, Mozambique is encouraged to align the new decree with international frameworks, such as the Green Bond Principles of the International Capital Market Association (ICMA). Moreover, the country could adopt fiscal incentives, such as climate tax credits or reduced issuance costs, for certified green instruments - an approach successfully applied in South Africa and Morocco (ICMA, 2023; IMF, 2025, p. 11).

The absence of a national green taxonomy limits the ability of investors to assess the environmental integrity of local issuances. Mapping Mozambique's taxonomy to existing international standards (e.g. South Africa's Green Finance Taxonomy or SDG-linked frameworks) could catalyze market development (FSDMoçambique & EED Advisory, 2021, p. 39).

Furthermore, capacity building for key regulatory actors - including the Bank of Mozambique, the Ministry of Finance, and supervisory bodies - is imperative. The Roadmap for Green Finance calls for specialized training in climate risk assessment, green asset valuation, and ESG disclosure for both regulators and financial institutions (FSDMoçambique & EED Advisory, 2021, pp. 38–39). This aligns with IMF guidance on incorporating climate-related financial risks into macroprudential supervision - through tools such as climate stress testing, scenario analysis, and disclosure mandates (IMF, 2023, p. 14).

On the infrastructure side, the Maputo Stock Exchange (BVM) is expected to list all sustainable bonds; thus, enhancing its technical and institutional capacity to monitor climate-linked instruments is critical. A well-functioning central securities depository will ensure proper custody and traceability. For carbon credit mechanisms and debt-for-climate swaps, clear and independent governance structures must be established. For example, a neutral trustee or *oversight committee* could monitor proceeds from swaps to ensure alignment with climate objectives.

Crucially, institutional coordination is still fragmented. The Roadmap warns that poor inter-agency collaboration - especially between the Ministry of Finance, Ministry of Environment, and regulatory agencies - creates bottlenecks (FSDMoçambique & EED Advisory, 2021, p. 40). A "*whole-of-government*" approach, potentially via a Green Finance Task Force, is needed to consolidate fragmented mandates and drive coherent reform.

Synergies and the Climate Finance Ecosystem

Bringing it all together, green bonds and carbon markets can function as complementary components of an integrated climate finance ecosystem in Mozambique. For instance, a blended public-private climate fund could be structured to mobilize donor funds,

domestic banks, and institutional investors (e.g. pension funds) to invest in a diversified portfolio of climate-aligned projects - such as renewable energy, climate-resilient agriculture, and reforestation. These projects could be partially financed via green bonds, with additional returns generated through the sale of carbon credits where projects yield verifiable emission reductions (FSDMoçambique & EED Advisory, 2021, pp. 30–32).

In parallel, sovereign debt-for-climate swaps could redirect portions of debt service toward local adaptation or resilience programs, as already explored in negotiations with Belgium and other partners (aman-alliance.org, 2025). This multi-instrument approach increases the resilience and financial viability of Mozambique's green investment strategy.

The latest global data illustrates the scale of opportunity: as of Q1 2024, aligned sustainable debt issuance (green, social, and sustainability bonds – GSS+) surpassed USD 4.7 trillion, with USD 272.7 billion issued in that quarter alone, according to the Climate Bonds Initiative (Climate Bonds Initiative, 2024a). In contrast, Africa's total Q1 issuance was only *USD 4.9 billion*, indicating a large potential gap - but also a growing trend, as African issuance rose 1,692% year-on-year from a low base (Climate Bonds Initiative, 2024b).

Mozambique can bridge this gap by launching credible green finance products, aligned with international principles and supported by robust governance frameworks. An illustrative investment ecosystem would combine green bonds, carbon revenues, and concessional finance in layered capital structures - enhancing bankability and derisking climate investments (World Bank, 2024; FSDMoçambique & EED Advisory, 2021, pp. 30–34).

However, to realize this vision, Mozambique must address shared structural barriers common to both green bonds and carbon markets. Chief among these are:

Weak project pipelines: a limited supply of bankable, climate-aligned investment opportunities;

Inadequate monitoring and evaluation (M&E) systems: both instruments demand rigorous climate impact tracking (e.g. emissions reductions, adaptation outcomes), which Mozambique's institutional capacity currently struggles to provide (FSDMoçambique & EED Advisory, 2021, p. 38);

Low data transparency: the lack of national climate finance tracking tools undermines donor confidence and risks fund misallocation, as also noted in broader Sub-Saharan Africa evaluations (UNDP, 2023; GCF, 2022).

Mozambique would benefit from establishing a climate finance database, in line with Green Climate Fund (GCF) guidelines, to consolidate and track disbursements, results, and reporting across green finance channels (GCF, 2022). Doing so would not only improve donor alignment but also increase investor trust in the performance of green financial instruments.

Country Case – Kenya

Kenya offers a compelling example of integrated climate finance. In 2019, the Government of Kenya issued a *USD 41 million* sovereign green bond, channeling proceeds into county-level projects including solar power, forest restoration, and water access (IMF, 2023, p. 12). The bond attracted domestic institutional investors, thanks to support from the International Finance Corporation (IFC), which offered technical assistance, and a robust legal framework for green finance (World Bank, 2020, p. 4). Several projects under this issuance, such as afforestation and ecosystem conservation, also generate tradable carbon credits, creating dual revenue streams and boosting financial sustainability. Kenya's strategic combination of public issuance, legal clarity, and international backing provides relevant lessons for Mozambique.

Country Case – Nigeria

Nigeria launched its first sovereign green bond in 2017, raising funds for solar power installations, energy-efficient buildings, and solid waste management projects (IMF, 2022, p. 10). Despite initial market hesitation, the issuance was oversubscribed, reflecting strong investor demand once credibility was assured. Key enablers included early stakeholder engagement, transparency on project impacts, and risk-sharing mechanisms provided by development finance institutions like the AfDB and World Bank (World Bank, 2020, p. 6). Mozambique could replicate these features by aligning green bond proceeds with its NDC priorities - such as rural electrification, sustainable forestry, and coastal protection - and seeking blended co-financing structures.

Strategic Integration

Taken together, these cases and supporting literature underscore that combining multiple financial instruments can unlock synergistic benefits. Debt-for-climate swaps can relieve fiscal space, while green bonds mobilize fresh capital and carbon credits monetize environmental services. This creates a virtuous cycle, wherein instruments reinforce one another and reduce overall investment risk (IMF, 2023, p. 15). International donors increasingly favor such holistic approaches over single-mechanism projects.

For instance, the IMF argues that an ecosystem of sustainable finance instruments - ranging from green bonds to climate-focused PPPs - constitutes a "*comprehensive toolkit*" for Sub-Saharan Africa's just transition (IMF, 2023, p. 16). Mozambique, facing multiple constraints but also strategic potential, should thus focus on mobilizing an integrated climate finance package, with coordinated policy actions, institutional innovation, and international partnerships.

Regulatory, Financial, and Institutional Barriers and Opportunities

Barriers

Despite its vulnerability and strategic potential, Mozambique faces significant structural barriers to developing a robust climate finance market. The FSDMozambique Roadmap (2021) highlights persistent constraints, including the lack of awareness and technical capacity across key stakeholders - regulators, financial intermediaries, and potential project sponsors (FSDMozambique & EED Advisory, 2021, pp. 24–25). The roadmap also cites the absence of enabling regulatory frameworks, a shallow domestic capital market, and limited pipelines of bankable green projects as central impediments (FSDMozambique & EED Advisory, 2021, p. 28).

Investor-side constraints are equally pressing: high domestic interest rates (often above 10%), exchange rate volatility of the Metical, and general macroeconomic instability raise the cost of capital and discourage long-term investment in green assets. Moreover, government institutions such as the Ministry of Finance suffer from limited internal capacity in green finance policy and implementation (FSDMozambique & EED Advisory, 2021, p. 29). This institutional thinness hinders coordination and undermines investor confidence.

Opportunities

On the opportunity side, Mozambique benefits from strong international support and regional initiatives that can catalyze green investment. Development partners such as FSDMozambique, EED Advisory, and bilateral agencies (e.g. the French Development Agency – AFD) are actively engaged in technical assistance and capacity building (FSDMozambique & EED Advisory, 2021, p. 33). Multilateral institutions, notably the AfDB and World Bank, have financed adaptation and infrastructure programs, and are increasingly redirecting resources towards blended climate finance instruments.

For example, in 2023, the African Development Bank announced a *USD 20 million* investment into a pan-African blended finance infrastructure fund, aiming to de-risk private capital in climate-aligned infrastructure (NEPAD, 2023). Such platforms offer Mozambique a viable model to pool donor and private funds, especially for renewable energy or climate-resilient transport.

Mozambique is also positioned to benefit from regional frameworks. The SADC Green Bond Programme (launched in 2021 with FSD Africa) provides technical templates and training for green bond issuance in Southern Africa (FSD Africa, 2023). Similarly, the Africa Carbon Markets Initiative (ACMI) offers support on MRV protocols, credit integrity, and market access - elements crucial for scaling voluntary carbon projects (PMI Climate, 2023).

At the domestic level, institutions like the National Conservation Areas Administration (ANAC) can play a central role in identifying credible, nature-based investment opportunities, particularly in reforestation, protected area co-management, and blue economy projects (FSDMozambique & EED Advisory, 2021, p. 34).

Finally, Mozambique's participation in the G20 Common Framework for debt restructuring may generate fiscal space and goodwill from creditors, providing a window to negotiate climate-linked financial instruments such as debt-for-climate swaps and green restructuring clauses (IMF, 2023, p. 13).

Regulatory Actions Needed

To operationalize green finance, Mozambique's government must accelerate regulatory reforms. A key first step is finalizing and enacting the sustainable bonds decree, which is currently under consideration. This decree should establish clear eligibility and disclosure rules, ensuring that proceeds align with climate objectives and investor expectations (FSDMozambique & EED Advisory, 2021, pp. 28–31). However, a broader legal framework may be warranted. A green finance law could authorize tax incentives for certified green bond investors, require state-owned enterprises (SOEs) to disclose climate-related risks, and formally adopt a national taxonomy aligned with international standards but tailored to local priorities like drought resilience and climate-smart agriculture (FSDMozambique & EED Advisory, 2021, p. 35).

Additionally, enhancing contract enforcement mechanisms and credit information systems could help reduce perceived risk in climate projects - lowering required yields and increasing issuer participation in green capital markets.

Capacity Building

Capacity deficits remain a major hurdle. Both regulators (e.g., Bank of Mozambique, BVM) and financial institutions lack experience in assessing environmental, social, and governance (ESG) risks. The Roadmap explicitly recommends sector-wide training, as well as awareness-raising campaigns to build literacy on green finance among public officials, banks, and project developers (FSDMozambique & EED Advisory, 2021, p. 36).

Mozambique can learn from South Africa, where the National Treasury's Green Finance Taskforce coordinated a national strategy to integrate green standards into budgeting, procurement, and regulation. Over time, mandatory climate risk disclosure for financial institutions - especially commercial banks - would help internalize environmental risks and align with IMF advice for Sub-Saharan Africa (IMF, 2023, p. 17).

Transparency and Governance

Investor trust hinges on transparency. Mozambique must adopt international disclosure norms to signal credibility. These include:

- Annual reporting on the use of proceeds and climate impacts of green bonds;
- Public registries for carbon credits;
- Independent audits of savings and results from debt-for-climate swaps.

The Republic of Benin offers a compelling precedent. After issuing a sustainability-linked SDG bond, it swiftly published impact allocation reports, attracting strong interest from both donors and commercial investors (IMF, 2023, p. 14). Mozambique could replicate this approach, institutionalizing transparency to attract private and concessional capital.

Macroeconomic Policies

Underlying all green finance efforts is the need for sound macroeconomic governance. According to the IMF, countries must ensure policy predictability, low inflation, and responsible debt management to attract long-term climate capital (IMF, 2023, pp. 11–13). In recent years, Mozambique has taken steps to improve macro-stability through inflation control, exchange rate flexibility, and tighter fiscal monitoring. These policies must be sustained.

Critically, effective governance of swap proceeds - including ring-fencing and transparency - will determine the credibility of climate-linked instruments. If Mozambique improves its sovereign credit rating, it will reduce borrowing costs and enable more viable green bond issuances. Over time, this creates a virtuous cycle of stability, access, and investment.

Conclusion

As developing countries confront the dual challenges of climate vulnerability and financing constraints, instruments like green bonds and carbon markets emerge as key pillars for sustainable development. Our analysis demonstrates that, when strategically combined, these tools can significantly scale investment in low-carbon infrastructure, particularly in Mozambique's climate-fragile economy.

- Green bonds attract domestic and international capital into clean projects;
- Carbon markets monetize emission reductions;
- Debt-for-climate swaps reallocate budgetary space toward climate goals;
- Blended finance mechanisms reduce investor risk and mobilize private capital.

Successful examples from Kenya, Nigeria, Seychelles, and Belize confirm this model. In Sub-Saharan Africa, the expansion of climate-focused sovereign bonds and pilot debt swaps (e.g., Benin, Seychelles) shows that innovation is possible even in low-income contexts (IMF, 2023, pp. 11–14).

Mozambique, however, must address several structural barriers, notably the absence of regulatory frameworks, low investor awareness, and a shallow pipeline of bankable green projects (FSD Africa, 2025, p. 16).

To overcome these constraints, the Mozambican Roadmap for Green Finance (FSDMozambique & EED Advisory, 2021) outlines a four-pillar strategy:

- Awareness-raising: building climate literacy among stakeholders;
- Institutional capacity: establishing dedicated coordination units (e.g. a Green Finance Unit within the Ministry of Finance);
- Policy and regulation; enacting the sustainable bonds decree and drafting national taxonomies;
- Innovative instruments: piloting green/blue bonds, swaps, and carbon trading schemes.

Mozambique should also consider joining regional carbon initiatives like the Africa Carbon Markets Initiative (ACMI) and advancing sovereign debt restructuring to create swap opportunities (AMAN Alliance, 2025).

Crucially, green bonds and carbon markets are not standalone solutions, but must be embedded in a coherent and comprehensive climate finance strategy. We recommend the Mozambican government:

- Integrate these tools into its Nationally Determined Contributions (NDCs);
- Include climate investment priorities in its public investment programs;
- Set transparent eligibility and reporting standards aligned with ICMA's Green Bond Principles and the GCF's Monitoring Framework;

- Strengthen partnerships with Development Finance Institutions (DFIs) such as the IFC, AfDB, and the World Bank, to de-risk pilot projects;
- Leverage multilateral climate funds (e.g. GCF, Adaptation Fund) to crowd-in capital.

There is global momentum: as of Q1 2024, cumulative sustainable debt issuance surpassed *USD 4.7 trillion*, with *USD 272.7 billion* added that quarter alone (Climate Bonds Initiative, 2024). Carbon pricing instruments generated nearly *USD 100 billion* in revenue in 2022, covering ~23% of global GHG emissions (World Bank, 2023, pp. 6–7). Mozambique’s opportunity is to tap this capital through institutional reforms, transparency, and strategic policy alignment. Done well, green finance can help the country close its infrastructure gap, diversify its economy, and meet its Sustainable Development Goals (SDGs).

Recommendations

To unlock Mozambique’s climate finance potential, the government must urgently approve the Sustainable Bonds Decree and adopt a national green finance strategy. A central Green Finance Unit should be established within the Ministry of Economy and Finance to coordinate policies, define eligible projects, and align with international standards such as the ICMA Green Bond Principles. Developing a national green taxonomy - tailored to local priorities like drought resilience and climate-smart agriculture - is essential to ensure transparency and avoid greenwashing.

Mozambique should pilot a sovereign green bond, backed by multilateral guarantees, to finance critical infrastructure (solar, water, coastal protection) and send a strong market signal. In parallel, the country must advance debt-for-climate swaps, building on current negotiations with Belgium to redirect external debt into adaptation projects. Creating a blended finance facility - mixing donor capital with local banks and pension funds - can de-risk private investment and accelerate financing for small-scale, high-impact projects.

Participation in voluntary carbon markets should be expanded through the registration of high-quality offset projects, supported by robust MRV systems and credit registries. Mozambique should leverage platforms like the Africa Carbon Markets Initiative (ACMI) for technical assistance. To strengthen the ecosystem, regulators and financial institutions need capacity building on ESG standards, climate risk analysis, and green disclosure. The Maputo Stock Exchange must be enabled to list and monitor sustainable bonds, while government coordination is reinforced to prevent institutional fragmentation.

Transparency is key. All green finance instruments should be backed by impact reports, independent audits, and clear use-of-proceeds tracking. Macroeconomic stability remains foundational - continued efforts to control inflation, manage debt, and improve sovereign ratings will reduce financing costs and build investor confidence. Together, these steps can position Mozambique as a regional leader in green finance.

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