



Ecosystems, Biodiversity and Development in Mozambique: Opportunities and Challenges

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Summary

This article analyzes the interrelationships between ecosystems, biodiversity, and development in Mozambique, highlighting both the challenges and opportunities that arise.

It is argued that biodiversity and ecosystems constitute the vital foundation of sustainable development in Mozambique. The country boasts a vast natural heritage, from tropical forests and mangroves to coral reefs and savannas, which not only sustain the lives of millions of Mozambicans but also perform global ecological functions.

However, the challenges are immense; they include forest degradation, mining, uncontrolled urbanization, overfishing, and poaching, which put ecosystem integrity at risk. Added to these challenges are the impacts of climate change, which make Mozambique one of the most vulnerable countries in the world. To address these challenges, the article suggests that Mozambique (i) adopt coherent and effective public conservation policies; (ii) strengthen community governance; (iii) promote social equity in access to natural resources; (iv) invest in science, innovation, and technology to monitor and protect ecosystems; and (v) mobilize financing and international cooperation to address the global environmental challenges of climate change.

Keywords: Natural resources, ecosystems, biodiversity, development, climate adaptation.

Abstract

This article analyzes the interrelationships between ecosystems, biodiversity and development in Mozambique, highlighting both the challenges and opportunities that arise. It argues that biodiversity and ecosystems constitute the vital foundation of sustainable development in Mozambique. The country boasts a vast natural heritage, from tropical forests and mangroves to coral reefs and savannas, which not only sustain the lives of millions of Mozambicans but also perform global ecological functions. However, the challenges are immense; they include forest degradation, mining, uncontrolled urbanization, overfishing, and poaching, which jeopardize the integrity of ecosystems. Added to these challenges are the impacts of climate change, which make Mozambique one of the most vulnerable countries in the world. To address these challenges, the article suggests that Mozambique (i) adopt coherent and effective public conservation policies; (ii) strengthen community governance; (iii) promote social equity in access to natural resources; (iv) invest in science, innovation and technology to monitor and protect ecosystems; and (v) mobilize financing and international cooperation to address the global environmental challenges of climate change.

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1 Introduction

The growing global ecological crisis has placed ecosystems and biodiversity at the center of the debate on sustainable development. In contexts such as Mozambique, a country

characterized by vast natural resources and a high dependence of communities on relation to nature, the relationship between environmental conservation and economic growth is revealed particularly complex.

Ecosystems provide essential services, from climate regulation to the provision of food, water and energy, being fundamental pillars for the survival of populations. biodiversity, in turn, guarantees ecological resilience, the balance of natural cycles and genetic basis that supports agriculture, fisheries, and human health. However, pressure increasing over natural resources, driven by processes of urbanization, expansion agricultural, mining, logging and infrastructural development, has placed the country's ecological integrity is at risk.

Mozambique presents itself as a paradigmatic case. Located in Southern Africa, it has one of the longest coastlines on the continent, extensive tropical forests, wetlands, savannas and rich marine and terrestrial biodiversity. This natural heritage, in addition to constitute an intrinsic value, it also represents a strategic asset for the national development, contributing to sectors such as tourism, agriculture, energy and fishing.

This study seeks to analyze the interrelationships between ecosystems, biodiversity and development in Mozambique, highlighting both the challenges and opportunities that are placed. The text is organized into eight sections: after this introduction, section 2 discusses the concepts and theoretical frameworks; section 3 characterizes the ecosystems and biodiversity in Mozambique; the fourth section examines the interactions between biodiversity and development, while the fifth addresses challenges and threats. On the sixth section, national policies and initiatives are analyzed. The seventh section proposes ways to the integration of conservation into the development agenda and, finally, the eighth presents the main conclusions and recommendations.

Thus, it is argued that, in Mozambique, the sustainability of development depends a balanced and integrative approach, where the preservation of ecosystems and biodiversity is not seen as an obstacle, but rather as a strategic pillar of economic and social progress.



2 Ecosystems and Biodiversity: Concepts and Theoretical Framework

2.1 Fundamental Concepts

The concept of ecosystem refers to a dynamic ecological system composed of living organisms (fauna and flora) and the physical environment (soil, water, climate) that interact in balance. Biodiversity encompasses the variety of living organisms in all their forms — genetic diversity, species diversity, and ecosystem diversity (Secretariat of the Convention on Biological Diversity, 2009).

According to the Secretariat of the Convention on Biological Diversity, ecosystems offer fundamental ecosystem services, divided into services: provision services (food, timber, fresh water, medicinal resources); regulatory services (climate, pollination, water quality, erosion prevention); cultural services (tourism, identity cultural, spiritual values); and support services (nutrient cycling, soil formation, basic ecological processes) (Secretariat of the Convention on Biological Diversity, 2009). Thus, biodiversity is not only an intrinsic value, but also a factor that sustains human life and economies.

2.2 Political Ecology and Biodiversity

Political Ecology offers a critical lens to analyze how the power relations that shape access, use, and management of natural resources. In Mozambique, exploitation timber and international mining investments often generate conflicts socio-environmental, exposing the tension between local and global interests.

2.3 Ecological Economics and Sustainable Development

Ecological Economics argues that the economy is embedded in the biosphere and depends on its capacity for regeneration. The uncontrolled use of biodiversity generates 'externalities' environmental', often not accounted for in national accounts. In Mozambique, the sector forestry and fishing is a clear example: it contributes to GDP, but suffers significant losses due to overexploitation and degradation.

2.4 Biodiversity and Human Well-Being

Biodiversity ensures food security, health, and climate resilience. The loss of it reduces the adaptive capacity of communities, especially in rural areas



Mozambicans, where livelihoods are closely linked to land, water and forest.

3 Overview of Ecosystems and Biodiversity in Mozambique

3.1 Ecosystem Diversity

Mozambique has one of the greatest ecological diversities in Southern Africa, a result of its geographical location, tropical climate and extensive coastline of approximately 2,700 km. Among the main ecosystems, the following stand out: (i) tropical and subtropical forests: found mainly in the provinces of Zambézia, Cabo Delgado and Niassa, include forests of miombo, mopane and mangroves. Miombo is particularly important as a source of energy (firewood and charcoal), in addition to providing timber, wild fruits and honey; (ii) savannah: covers a large part of the territory and constitutes the main habitat of mammal species of large animals, such as elephants, buffaloes and antelopes; (iii) wetlands: Mozambique has extensive river systems and deltas, such as the Zambezi, Púnguè, Save, and Limpopo. These areas are crucial for artisanal and industrial fishing, in addition to playing a fundamental role in flood control and fertilization of agricultural soils; (iv) coastal and marine areas: encompass coral reefs, seagrass meadows, mangroves, and sandy beaches. These ecosystems of high productivity, of vital importance for fishing, tourism and coastal protection against cyclones; and (v) mountains and plateaus: such as Mount Namuli (Zambezia) and the Serra da Gorongosa (Sofala), which have endemic species of flora and fauna, functioning as 'ecological islands' (Government of Mozambique, 2015; FAO, 2020).

3.2 Terrestrial Biodiversity

Mozambique is home to a remarkable diversity of terrestrial species, including (i) about 5,500 species of vascular plants, of which approximately 250 are endemic; (ii) more than 220 species of mammals, including lions, leopards, rhinos and elephants, fundamental for safari tourism; (iii) approximately 740 bird species, including migratory species and birds endemic to southern Africa; and (iv) significant diversity of reptiles and amphibians, some restricted to specific ecosystems, such as mountain forests (Government of Mozambique, 2015; FAO, 2020).

3.3 Marine and Coastal Biodiversity

The Mozambique Sea is one of the richest areas in marine biodiversity in Africa. Eastern, highlighting (i) coral reefs: essential for fishing and tourism, but vulnerable to acidification and rising water temperatures; (ii) mangroves: about 400 thousand hectares, essential for coastal protection and as a natural nursery for species marine mammals; (iii) marine mammals: including dugongs (endangered species), dolphins and whales; and (iv) fish and crustaceans: such as shrimp, crab and tuna, which constitute the basis important part of the national fishing economy (Government of Mozambique, 2015).

3.4 Conservation Areas

The country has a vast system of conservation areas, which cover around 25% of the national territory. Among the most relevant are:

- Gorongosa National Park (Sofala): an emblematic example of restoration ecological and community co-management.
- Niassa National Reserve: largest conservation area in the country (42,000 km²), habitat of elephants, lions and African wild dogs.
- Quirimbas National Park (Cabo Delgado): includes marine ecosystems and terrestrial, with coral reefs of great importance.
- Limpopo National Park (Gaza): part of the Great Limpopo Transfrontier Park, which includes areas of Mozambique, South Africa and Zimbabwe.
- the Community Conservation Area (Tchuma Tchato and others): management models participatory approach in which local communities benefit from the sustainable exploitation of fauna and flora (INE, 2024; FAO, 2020).

3.5 Socioeconomic Importance

Mozambique's ecosystems and biodiversity play a central role in the development of country. First, subsistence agriculture depends on soil fertility, pollination, and the availability of water guaranteed by ecosystems; second, artisanal and industrial fishing support millions of people in coastal areas and generate foreign exchange through the export of shrimp and actum; third, nature tourism (safaris, diving, ecotourism) constitutes a

of the sectors with the greatest potential for economic diversification; and finally, medicine traditional: a large part of the population depends on medicinal plants taken from the forests. In short, Mozambican ecosystems are not only reserves of biodiversity, but also sources of survival, cultural identity and opportunity for growth economic. Its preservation is therefore a strategic priority for the sustainable development of the country.

4 Ecosystems and Development in Mozambique

4.1 The Centrality of Biodiversity for Livelihoods

In Mozambique, more than 65% of the population lives in rural areas and depends directly on natural resources for their survival. Small-scale agriculture, based on traditional farming systems, depends on soil fertility, climate regulation and water provided by healthy ecosystems. In addition, the collection of firewood, medicinal plants and wild fruits constitute an essential part of the family economy. Artisanal fishing, practiced along the coast and in the main rivers and lakes, guarantees food security for millions of Mozambicans. Mangroves and coral reefs are nurseries of marine species, sustaining fishing productivity. Thus, the health of ecosystems is directly proportional to food security and resilience of communities.

4.2 Contribution to the National Economy

Ecosystems and biodiversity have a significant weight in the Mozambican economy: agriculture: accounts for about 25% of the Gross Domestic Product (GDP) and employs approximately 70% of the active population (INE, 2024). Agricultural productivity is closely linked to the quality of ecosystem services; fishing: the sector contributes about 4% of GDP, with shrimp being one of the main export products. The sector artisanal, although informal, supports more than 300 thousand fishermen and their families; forests: provide timber, charcoal and other non-timber products, but suffer from exploitation illegal and deforestation, compromising its long-term potential; and tourism: with highlighting nature tourism (safaris, diving and ecotourism), which is based on existence of national parks and nature reserves. Before the COVID-19 pandemic, the



tourism contributed about 7% of GDP, with strong potential for sustainable growth (FAO, 2020; INE, 2024).

4.3 Ecosystem Services as a Basis for Local Development

Ecosystem services play an irreplaceable role in development community including (i) provision services: provision of food, water and resources energy; (ii) regulatory services: mitigation of natural disasters (cyclones, floods), local climate regulation, coastal protection through mangroves; (iii) cultural services: spiritual and cultural practices linked to nature (e.g., sacred forests, rivers as symbols community identity); and (iv) support services: such as pollination, essential for agriculture and food diversity (Secretariat of the Convention on Biological Diversity, 2009).

Without these services, the country's socioeconomic vulnerability would increase exponentially, especially in climate risk areas such as the Zambezi Valley and the Búzi Basin.

4.4 The Role of Local Communities

The management of natural resources in Mozambique depends heavily on the involvement of local communities. Initiatives like Tchuma Tchato, in Tete province, demonstrate that Community co-management can generate economic benefits through controlled hunting, ecotourism, and conservation. Community Conservation Area models have been replicated in several provinces, with positive results, although they still face challenges governance, fair sharing of benefits and technical capacity building.

4.5 Integrating Biodiversity into Development Plans

Despite its importance, biodiversity is not yet fully integrated into economic development strategies. Many infrastructure projects (roads, ports, mining, dams) are designed without adequately considering the impacts environmental. This approach creates conflicts between the objectives of rapid growth and sustainability.

On the other hand, the opportunities to reconcile conservation and development are vast. Strengthening sustainable tourism, investing in climate-resilient agriculture and

valorization of non-timber forest products are examples of how biodiversity can be an engine of social inclusion and income generation.

5 Challenges and Threats to Biodiversity

Despite its ecological richness, Mozambique faces growing challenges in conserving its ecosystems and biodiversity. These challenges arise from a combination of factors internal and external, including demographic pressures, intensive exploitation of resources natural resources, extraction-oriented development policies and the effects of changes climate.

5.1 Deforestation and Forest Degradation

Deforestation is one of the greatest threats to Mozambican biodiversity. It is estimated the country is estimated to lose approximately 219,000 hectares of forest annually (FAO, 2020). Among the The main causes include the expansion of subsistence agriculture through burning, the production of charcoal and firewood for urban consumption and legal logging and illegal, often destined for international markets (e.g., China). The loss of forest cover compromises biodiversity, accelerates soil erosion and reduces the capacity for climate regulation.

5.2 Mining and Exploration of Natural Resources

The expansion of mining, especially coal (Tete), natural gas (Cabo Delgado), titanium (Nampula and Gaza) and rubies (Montepuez), has generated significant impacts such as the destruction of natural habitats, pollution of air, water and soil, conflicts between local communities and multinational companies and the pressure on sensitive areas near parks and reserves. Despite contributing to GDP and generating foreign exchange, mining intensifies vulnerability ecological and social, thus putting long-term sustainability at risk.

5.3 Urbanization and Infrastructure

Urban growth, especially in Maputo, Beira, Nampula and Pemba, has led to disorderly expansion of housing and infrastructure. This results in the conversion of areas agricultural and forestry in urban areas, causing water and air pollution and pressure

over mangroves and coastal areas, which are occupied for the construction of ports, hotels and roads.

Large-scale projects, such as hydroelectric dams and roads, often ignore environmental impact assessment studies or do not implement adequate environmental impact assessment plans. mitigation.

5.4 Poaching and Species Trafficking

Illegal hunting continues to be a serious threat to iconic species such as elephants and rhinos. International trafficking in ivory and horn feeds criminal networks transboundary, which operate in reserves such as Niassa and Limpopo. In addition to the large mammals, rare birds, pangolins and sea turtles are also targets of illegal capture. Local communities, often in extreme poverty, participate in this process due to lack of economic alternatives.

5.5 Predatory Fishing and Marine Degradation

Marine biodiversity is under increasing pressure due to industrial and semi-industrial fishing trawling; unreported illegal fishing, often carried out by foreign fleets; and degradation of coral reefs caused by global warming and coastal pollution; and destruction of mangroves for salt production and urban expansion. These factors compromise the food security and income of thousands of fishermen. handmade.

5.6 Climate Change

Mozambique is among the countries most vulnerable to the effects of climate change. last 20 years, the country has been repeatedly hit by cyclones (Idai, Kenneth, Gombe, Freddy), droughts and floods. These events have direct effects on biodiversity: destruction of natural habitats; increased salinization of soils and groundwater; alteration of migratory patterns of birds and fish; and reduced ecosystem resilience (FAO, 2020). Climate change, coupled with environmental degradation, increases the risk of collapse of essential ecosystems such as mangroves and coral reefs.

5.7 Conflict between Conservation and Development

The dominant economic model in Mozambique still favors extraction projects intensive, to the detriment of sustainable development strategies. There is often a perception that environmental conservation constitutes an obstacle to progress, leading to the marginalization of ecological concerns in development plans development.

6 Policies, Strategies and Initiatives in Mozambique

Biodiversity governance in Mozambique has been consolidated over the last 25 years, combining environmental legislation, national strategies and public-private partnerships and community policies. The current framework results from the confluence of: (i) internal policies and laws; (ii) international commitments; (iii) institutional arrangements (central, provincial and local); and (iv) financing initiatives and co-management of conservation areas.

Despite progress, gaps in implementation, monitoring and coordination persist. intersectoral and predictable financing.

6.1 Legal and Institutional Framework

In Mozambique, there is an environmental legal basis: a set of laws and regulations that structure the protection of ecosystems (environmental framework law, forestry legislation and wildlife, land use planning, water resources, fishing and conservation areas).

Environmental Licensing and Environmental Impact Studies (EIA) are instruments-prevention key, including environmental management plans and measures mitigation/compensation.

In institutional terms, the Ministry of Land and Environment (MTA): coordinates environmental policy, conservation, and land use planning. The National Administration of Conservation Areas (ANAC): manages the National System of Conservation Areas (SNAC) and

promoting co-management models. The Foundation for Biodiversity Conservation

(BIOFUND): national financing mechanism for conservation areas, including trust funds and thematic windows (e.g., 'Conservation Areas for Climate'). The Fund

National Sustainable Development Fund (FNDS): operationalizes programs

rural development (e.g. REDD+, integrated landscape management, forest restoration).

Sectoral Institutions (Agriculture and Rural Development, Sea and Inland Waters, Energy and Mineral Resources, Public Works, Tourism): are responsible for the integration of environmental safeguards in their projects.

Local Governance: Local councils, natural resource management committees and DUATs (right to community land use and benefit) anchor social participation, but require training, means of oversight and clearer benefit-sharing instruments and predictable.

6.2 National Strategies and Plans

Biodiversity Strategy and Action Plan (ENAB/NBSAP): sets targets for *in situ* and *ex situ* conservation, ecosystem restoration, pressure reduction and integration of biodiversity in productive sectors.

Sectoral Plans

The main sectoral plans include the following: (i) Forests and Wildlife: sustainable management, combating illegal exploitation, traceability, strengthening concessions certified forestry and promotion of NTFPs (non-timber forest products). (ii) Fishing and Marine Resources: fleet management, quotas and closed seasons; fishing control; protection of mangroves and reefs; locally managed marine areas. (iii) Climate: adaptation strategies and mitigation, integration of climate risk into local planning, REDD+ and restoration of landscapes (reforestation, agroforestry, nature-based solutions). (iv) Planning of the Territory: ecological-economic zoning, identification of ecological corridors and definition of sensitive areas to guide investments. (v) Cross-cutting integration: 'green and inclusive' growth, blue economy, and '30x30' targets of the Global Framework Biodiversity (protect 30% of land and seas by 2030), linked to the SDGs.

6.3 National System of Conservation Areas (SNAC) and Co-Management

Mozambique protects about a quarter of its territory made up of parks, reserves, environmental protection areas and community conservation areas. Co-management has been a decisive innovation in the following areas:



• Gorongosa National Park: a model for ecological restoration and development integrated human (health, education, livelihoods, citizen science).

• Niassa Reserve and Limpopo National Park: partnerships with specialized organizations (e.g.: Peace Parks) to strengthen surveillance, combat poaching and development community.

• Quirimbas National Park and other coastal/marine areas: integration of marine conservation, sustainable tourism, reef and mangrove management.

• Community Conservation: initiatives such as Tchuma Tchato and wildlife concessions community, with revenue sharing from tourism, controlled hunting and taxes use, reinforcing incentives for conservation (Government of Mozambique, 2015).

6.4 Thematic Programs and Initiatives

Several thematic initiatives operate in Mozambique, the following standing out.

(i) REDD+ and Sustainable Landscapes: jurisdictional (provincial) approaches to reducing deforestation, promote resilient agriculture, community forest management and value chains of NTFP (honey, native fruits, essential oil, value-added crafts). (ii)

Blue Economy: marine conservation, sustainable artisanal fishing, low-income coastal tourism impact, combating illegal fishing and promoting locally managed marine areas and reefs resilient. (iii) Nature-Based Solutions (NbS): mangrove restoration for protection

coastal, recovery of springs and riparian forests for water regulation, agroforestry for income diversification and carbon sequestration. Innovative Financing: funds

fiduciaries (BIOFUND), 'debt-for-nature swaps' when viable, carbon credits

high integrity forest/jurisdictional, biodiversity compensation mechanisms and

partnerships with the private sector (e.g., conservation tourism, certification). (iv) Science and

Monitoring: biodiversity inventories, conservation observatories, use of technologies

(drones, sensors, environmental genetics and open data) for monitoring and decision-making.

All these initiatives contribute to the protection of biodiversity in Mozambique.

6.5 International Cooperation and Global Commitments

Among several options for international cooperation, the following stand out.

Convention on Biological Diversity (CBD) and Global Biodiversity Framework

Kunming–Montréal: conservation, restoration and financing goals.



Paris Agreement: link between biodiversity and climate (REDD+, NBS, climate-based adaptation) in ecosystems).

Agenda 2030/SDGs: SDG 14 (Life Below Water) and SDG 15 (Life on Land), with impacts on SDGs 1, 2, 3, 8 and 13.

ADC/Transborder: peace parks, ecological corridors and regional combat against trafficking species.

Technical and Financial Partnerships: cooperation with universities, international NGOs (WWF, WCS, CI, etc.), multilateral and bilateral banks.

6.6 Advances, Challenges and Lessons

In Mozambique, there has been some progress in terms of expansion and consolidation SNAC; co-management and community involvement; dedicated financing mechanisms; gradual integration of climate and biodiversity; growth of ecotourism and tourism projects restoration.

Challenges

Despite some identified advances, Mozambique faces major challenges in terms of concerns

- insufficient monitoring, poaching and cross-border trafficking;
- deforestation driven by charcoal, agricultural expansion and illegal exploitation;
- land use–infrastructure conflicts (mining, roads, dams) and weak integration safeguards in projects;
- volatile financing and external dependence;
- failures in intersectoral coordination and data for planning;
- the need for fair sharing of benefits and effective inclusion of women and young people in green value chains.

Lessons

In terms of lessons, conservation stands out as being more effective when it generates local income and clear usage rights; co-management with development goals (health, education, means of life) reduces conflicts; and investment in scientific monitoring that improves efficiency and transparency.



7 Ecosystems, Biodiversity and Sustainable Development

Biodiversity conservation and sustainable ecosystem management are pillars fundamental to achieving sustainable development in Mozambique. The Biodiversity should not be understood only as a natural heritage, but also as a strategic resource for human well-being, ecological stability and inclusive economic growth.

7.1 The Relationship between Biodiversity and the Sustainable Development Goals (SDG)

The United Nations 2030 Agenda places biodiversity at the center of multiple SDGs. In Mozambique, the following links stand out:

• SDG 1 (No Poverty): rural communities depend directly on the land, forests and water resources for subsistence.

• SDG 2 (Zero Hunger and Sustainable Agriculture): agricultural biodiversity is essential for food security, offering varieties adapted to climate change.

• SDG 13 (Climate Action): Resilient ecosystems help mitigate and adapt to climate impacts.

• SDG 14 (Life Below Water) and SDG 15 (Life on Land): ecosystem conservation marine, coastal and terrestrial ensures ecological balance.

• SDG 8 (Decent Work and Economic Growth): sustainable ecotourism can generate employment and income, preserving natural resources (United Nations, 2015).

Therefore, investing in biodiversity means investing in multiple objectives development.

7.2 Ecosystem Services and Local Development

Ecosystems provide essential services, often invisible in calculations economic: provision services: food, drinking water, wood, fibers, plants medicinal; regulatory services: carbon sequestration, pollination, water regulation, protection against coastal erosion; and cultural services: spiritual values, tourism, identity cultural of local communities.



Recognizing the economic and social value of these services is crucial to guiding policies sustainable use of natural resources.

7.3 Ecotourism as a Vector of Sustainable Development

Mozambique has a unique potential for ecotourism, with emphasis on the National Park Gorongosa National Park, the islands of the Bazaruto Archipelago and the Lago Marine Reserve Niassa. Well-managed ecotourism can create jobs and diversify local economies, encourage communities to protect natural habitats and promote the international image of Mozambique as a sustainable destination.

However, for ecotourism to be inclusive and sustainable, it is necessary to share the resources fairly. benefits with host communities.

7.4 Sustainable Agriculture and Biodiversity Conservation

A large part of the Mozambican population lives off subsistence farming. The integration of sustainable agricultural practices such as agroforestry, crop rotation and use of seeds native species, can increase climate resilience, improve productivity in a sustainable way and reduce pressure on forests and soils.

Rural extension programs should encourage agricultural models that harmonize safety food with the conservation of biodiversity.

7.5 Social Inclusion and Equity in Access to Resources

Sustainable development cannot be achieved without social justice. Communities local people, especially women and young people, must be included in the management of resources natural. This means recognizing customary land rights, strengthening participation community participation in decision-making processes and ensure equitable benefits from the exploitation of resources. Community biodiversity management represents not only a strategy environmental, but also a path to social and economic justice.

8 Future Perspectives and Recommendations for Mozambique

8.1 Future Perspectives

Mozambique finds itself at a historical crossroads: on the one hand, it has one of the largest biodiversity reserves of the African continent; on the other hand, it faces increasing pressures from

environmental degradation, intensive exploitation of natural resources and vulnerability to climate change.

The coming decades will be decisive in ensuring that the country's natural wealth is converted on a solid basis for inclusive and sustainable development.

For all this to happen, Mozambique needs:

• integrating biodiversity into development policies: the future will depend on ability to harmonize economic growth plans with environmental conservation.

Sectors such as mining, energy, agriculture and fishing need to incorporate criteria for sustainability in a transversal way.

• expansion of conservation areas and ecological corridors:

Mozambique is likely to continue expanding its network of protected areas and corridors transboundary (e.g., Transfrontier Conservation Areas), creating opportunities for ecotourism and protection of endangered species.

• energy transition and green economy:

natural gas exploration could generate substantial revenues, but it must be complemented by investments in renewable energy (solar, wind, hydro), reducing dependence on fossil fuels and mitigating environmental impacts.

• valorization of traditional knowledge:

the future of ecosystem management will depend on the recognition of local knowledge, which offers resilient land, water and forest use practices.

• environmental education and citizen participation:

new generations have a strategic role. An educational system that values biodiversity and promote ecological awareness will be essential to consolidate changes in behavior.

8.2 Strategic Recommendations

Based on the challenges and opportunities analyzed, the following are presented: recommendations:

a) Governance and Public Policies:

• strengthen the implementation of the Biodiversity Strategy and Action Plan (ENABIO) with clear and measurable goals;

• integrate biodiversity into national development plans, ensuring that Environmental Impact Studies (EIAs) are rigorous and binding; and

• combat illegal logging, fishing and wildlife exploitation more effectively, through integrated monitoring and application of sanctions.

b) Community Management and Social Inclusion:

• expand and finance community-based natural resource management (CBNRM) programs, ensuring greater autonomy for communities;

• promote models of co-management of protected areas, which reconcile conservation and local socioeconomic benefits; and

• reinforce the role of women and young people in environmental management, ensuring equality of opportunities in accessing resources and benefits.

c) Sustainable Economy and Innovation:

• encourage responsible ecotourism, with mechanisms for fair redistribution of revenues;

• support sustainable agricultural practices (agroecology, agroforestry, conservation); and

• invest in payments for environmental services (PES), stimulating communities and companies to conserve ecosystems.

d) Education, Science and Technology:

• integrate environmental education across the school curriculum;

• strengthen scientific research into biodiversity, prioritizing partnerships between Mozambican and international universities; and

• invest in environmental monitoring technologies, such as drones and systems geographic information (GIS).

e) International Cooperation and Financing:

• mobilize more resources through climate and environmental funds (Green Fund for Climate, Global Environment Facility);

• encourage regional partnerships in SADC to combat environmental crimes cross-border; and

• promote sustainable investments aligned with the SDGs and commitments of the Agreement Paris.

Conclusion

Biodiversity and ecosystems constitute the vital basis of sustainable development in Mozambique. The country has a vast natural heritage, from tropical forests and

mangroves to coral reefs and savannas, which not only support the lives of millions of Mozambicans, but also perform global ecological functions.

However, the challenges are immense; they include forest degradation, mining, disorderly urbanization, predatory fishing and poaching that put the integrity of ecosystems. Added to these challenges are the impacts of changes in climate, which make Mozambique one of the most vulnerable countries in the world. Despite these threats, there are also strategic opportunities. The integration of biodiversity in development plans, the promotion of sustainable agricultural practices, strengthening community management of natural resources and inclusive ecotourism represent viable ways to reconcile conservation and economic progress.

Likewise, environmental education and the appreciation of traditional knowledge can consolidate a culture of sustainability.

To achieve a balanced future, it is essential that Mozambique:

- adopt coherent and effective public conservation policies;
- strengthen community governance and promote social equity in access to resources;
- invest in science, innovation and technology to monitor and protect ecosystems; and
- mobilize international financing and cooperation to address environmental challenges globally.

The preservation of biodiversity should not be seen as an obstacle to development, but as its essential condition. A Mozambique that protects its ecosystems is also a Mozambique that guarantees food security, climate resilience, social justice and economic prosperity for future generations.

Thus, it is reaffirmed that conserving biodiversity is investing in the future of Mozambique – a future where development and sustainability go hand in hand.

References

Adams, WM (2020) *Green Development: Environment and Sustainability in a Developing World*. 4th edition. London: Routledge.

Andrade, F. and E. Cuamba (2018) 'Biodiversity, Ecosystems and Climate Change in Mozambique'; *Mozambican Journal of Environmental Studies*; Vol. 12; No. 2; pp. 45–62.

Conservation International (2021) Biodiversity Hotspots: Eastern Afromontane'. Available at: <https://www.conservation.org> (accessed 5 September 2025).

FAO (2020) *Global Forest Resources Assessment 2020: Mozambique Country Report*. Rome: Food and Agriculture Organization of the United Nations.

Government of Mozambique (2018) 'Nationally Determined Contributions (NDCs) Under the Paris Agreement'. Maputo: Government of Mozambique.

Government of Mozambique (GM) (2015) *Mozambique Biodiversity Strategy and Action Plan (2015–2035)*. Maputo: Ministry of Land, Environment and Rural Development.

National Institute of Statistics (INE) (2024) 'Basic Environmental Indicators Mozambique, 2023'. Maputo: INE.

IPBES (2019) *Global Assessment Report on Biodiversity and Ecosystem Services*. New York: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

IPCC (2022) *Climate change 2022: Impacts, Adaptation, and Vulnerability*. Geneva: Intergovernmental Panel on Climate Change.

Ministry of Land and Environment (2021) *State of the Environment Report in Mozambique*. Maputo: Government of Mozambique.

Myers, N., RA Mittermeier, CG Mittermeier, GAB da Fonseca and J. Kent (2000) 'Biodiversity Hotspots for Conservation Priorities'; *Nature*; Vol. 403; No. 6772; pp. 853–858.

UNDP (2021) *Human Development Report: Mozambique 2021*. Maputo: United Nations Development Programme.

Secretariat of the Convention on Biological Diversity (2009) *Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change*. Montreal, Canada: Secretariat of the Convention on Biological Diversity.

United Nations (2015) 'Transforming Our World: The 2030 Agenda for Sustainable Development'. New York: UN Secretariat.

WWF (2020) *Living Planet Report 2020: Bending the Curve of Biodiversity Loss*. New York: Worldwide Fund for Nature.

Yaron, G., R. Mangani, J. Mlava, P. Kambewa, S. Makungwa, A. Mtethiwa, S. Munthali and M. Chikoko (2011) *Economic Valuation of Sustainable Natural Resource Use in Mozambique*. Washington, DC: World Bank.