

Ecosystemic Diversity in the Atsimo-Andrefana Region (Madagascar): A Strategic Driver for Ecotourism Development

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Abstract: The Atsimo-Andrefana region in southwestern Madagascar presents exceptional ecological and cultural diversity, making it a strategic area for sustainable ecotourism development. Its coral reefs, dry forests, savannahs, and mangroves support high levels of endemism and host emblematic species such as lemurs, flamingos, and giant baobabs. The world's second-largest coral barrier contributes to both ecological balance and local livelihoods through artisanal fishing and emerging marine ecotourism initiatives. This study examines how the region's natural and cultural resources can be mobilized to strengthen ecotourism while ensuring biodiversity conservation and inclusive community participation. A qualitative approach combining field observations, document review, and semi-structured interviews with local actors was used to analyze ecotourism practices, governance mechanisms, and sustainability challenges in the region. Despite its strong potential, ecotourism in Atsimo-Andrefana remains constrained by poor infrastructure, limited professional training, and weak institutional coordination. Anthropogenic pressures such as deforestation, overfishing, and coral extraction continue to degrade fragile ecosystems. Community-based regulations like the *Dina be* play a significant role in resource protection, but their integration into formal tourism policies remains limited. Strengthening infrastructure, professional capacity, and governance frameworks, alongside the valorization of cultural heritage, is essential for sustainable ecotourism development. Balancing conservation objectives with socio-economic opportunities could transform Atsimo-Andrefana's ecological and cultural capital into a sustainable driver of regional growth.

Keywords: ecotourism, biodiversity, Atsimo-Andrefana, sustainable conservation, cultural heritage, community governance

1. INTRODUCTION

The Atsimo-Andrefana region in southwestern Madagascar is distinguished by its exceptional biodiversity and high levels of endemism, encompassing a variety of habitats such as dry forests, spiny thickets, and riparian zones that collectively contribute to its ecological richness (Antonelli et al., 2022); (Hanes et al., 2022).

This region supports numerous endemic species, including eight lemur species, some of which are restricted to specific habitats like riparian forests, highlighting its critical ecological significance (Gardner et al., 2009). In addition, the dry forests harbor a

diverse arthropod community, with 24 orders identified across multiple sites, reflecting complex ecosystem interactions and habitat variability (Faliarivola et al., 2022).

The combination of habitat heterogeneity and species endemism underscores the Atsimo-Andrefana region as a global biodiversity hotspot, yet these ecosystems face escalating threats from habitat loss and overexploitation. These pressures imperil both the unique flora and fauna and the ecological functions they support, emphasizing the urgent need for targeted conservation strategies that integrate biodiversity preservation with sustainable management (Antonelli et al., 2022; Hanes et al., 2022).

Madagascar's global reputation for endemism finds a striking illustration in the Atsimo-Andrefana region. Among the most remarkable examples are the blind fish inhabiting the limestone caves of lake systems, including Lake Tsimanampesotse. The latter also hosts large colonies of flamingos, making it a uniquely distinctive ecological attraction. At the same time, marine mammals such as dolphins and dugongs inhabit the calm coastal waters, although they are increasingly exposed to human-induced pressures, including illegal hunting and accidental entanglement in fishing nets.

From an ornithological perspective, the region is equally remarkable, standing out as a major destination for birdwatching-oriented ecotourism. Several rare species, such as the *Subdesert Mesite* and the Lesser Flamingo, enhance the ecological appeal of this area, which also encompasses multiple Important Bird and Biodiversity Areas (IBAs) identified by BirdLife International in 2013. These characteristics highlight the strategic importance of promoting and investing in sustainable ecotourism approaches capable of supporting both species conservation and local economic development.

Furthermore, the natural landscapes of Atsimo-Andrefana are enriched by diverse geological formations, such as the arid sand dunes along the coastal areas, colonized by *spasmophilous* plants, and the gallery forests lining the irrigated valleys. These forests play a vital role in sustaining local communities, alongside the endemic plant species found throughout the region. Notable examples include *Aloe vahombe* and various spiny euphorbia species, which are both integral to local livelihoods and contribute to the aesthetic appeal of the natural environment. The legendary baobab forests in areas such as *Angarazy* in the Morombe district and Ifaty, for instance, provide invaluable ecological value while fulfilling essential functions, including soil stabilization.

The cultural heritage of the Atsimo-Andrefana region further enhances its natural assets. The city of Toliara, the hub of local culture, hosts several educational and tourist-oriented sites, such as the CEDRATOM Museum, which focuses on the arts and traditions of southern Madagascar, and the Sea Museum affiliated with the Institute of Fisheries and Marine Sciences at the University of Toliara. The latter highlights Madagascar's marine wealth through unique collections, including the renowned coelacanth specimen. Additionally, the Garden of the Sea and Culture, inaugurated in 2017, combines ecological awareness with cultural discovery by exhibiting endemic plants and local artisanal objects. These landmarks, together with infrastructure such as the Andranomena livestock market, contribute to the promotion of local traditions while supporting regional tourism and economic exchanges.

Despite this exceptional natural and cultural framework, the region faces major structural challenges. Tourism-related infrastructure is often inadequate, limiting the potential for sector optimization. Moreover, balancing visitor access with ecological preservation remains a critical issue for sustainable development. In this context, the implementation of sustainable infrastructure, such as environmentally friendly accommodations and responsible ecotourism circuits, emerges as a strategic solution. It is also crucial to empower local communities to showcase their traditional knowledge while engaging in alternative activities that respect local ecosystems¹.

The Atsimo-Andrefana region of Madagascar, though rich in natural and cultural heritage, faces persistent structural constraints that hinder its development. Key challenges include insecure land tenure, resource degradation, recurrent droughts, and socio-economic instability. Precarious access to land, shaped by national policies, perpetuates poverty and fuels local tensions (Pronk & Evers, 2007).

¹<https://www.lechodusud.com/post/bilan-de-l-ann%C3%A9e-2023-une-ann%C3%A9e-difficile-pour-madagascar-selon-craad-oi>

Unsustainable practices such as slash-and-burn cultivation, bushfires, and illegal logging accelerate ecosystem degradation (Ravaoarline, 2024), while recurrent mild to extreme droughts—identified through the Standard Precipitation Index—exacerbate food insecurity and water scarcity (Rakotoarimanana et al., 2024). These environmental stresses, combined with drought-induced migration and structural socio-economic crises, further strain community stability (Canavesio, 2015). Nevertheless, the region's ecological and cultural assets offer pathways for sustainable development through improved land governance, community-based resource management, and inclusive adaptation strategies that empower local populations, particularly women, to strengthen resilience and promote equitable growth.

The central challenge in the region consists in promoting ecotourism that effectively reconciles ecosystem conservation with local economic development. This study aims to explore strategies for strengthening ecotourism in Atsimo-Andrefana responsibly and sustainably. To address this issue, the text is structured into several sections: first, a contextual analysis of the region's natural and cultural assets; second, an assessment of existing ecotourism initiatives highlighting local examples; and finally, a presentation of strategic proposals based on previous findings to integrate ecotourism into regional sustainable development.

2. NATURAL AND CULTURAL RICHNESS OF ATSIMO-ANDREFANA

2.1 Ecotourism and Biodiversity

The Atsimo-Andrefana region, located in southwestern Madagascar, is distinguished by the remarkable diversity of its natural landscapes and rich ecosystems, ranging from dry forests to coral formations. These unique geographical features contribute significantly to the region's appeal as a leading ecotourism destination. Notably, it is home to centuries-old baobabs, particularly in areas such as Morombe. Beyond their vital ecological role in arid ecosystems, these majestic trees have become iconic symbols of Madagascar's natural wealth, attracting a wide range of visitors, both local and international. Their longevity and unique adaptations underscore the importance of preserving these natural resources to maintain ecological and tourism value.

In terms of marine biodiversity, the region stands out for its coral reefs, which rank among the most diverse globally. Located in the clear waters of the Indian Ocean, these reefs represent not only invaluable conservation ecosystems but also key resources for tourism activities such as scuba diving and sustainable fishing. Adventure tourists find ideal opportunities here, while those seeking leisure and exploration can experience well-preserved marine environments. These reefs also play a critical role in protecting coastlines from erosion, further highlighting their ecological and economic importance.

Recognizing the ecotourism potential of Atsimo-Andrefana, the Malagasy government, in partnership with local and international organizations, has initiated several pilot projects aimed at preserving and enhancing these resources. These initiatives focus on raising awareness among local populations, training them to become custodians of natural heritage, and actively involving them in sustainable tourism activities. Programs also include professional training to guide communities toward occupations such as handicrafts or tour guiding, thereby promoting local economic integration while reducing pressure on sensitive ecosystems.

Although endowed with exceptional natural and cultural heritage, the Atsimo-Andrefana region faces several major challenges in positioning itself as a leading ecotourism destination in East Africa. One of the primary obstacles is the lack of adequate infrastructure to support large-scale, responsible tourism. This deficit hinders the optimal development of the region's tourism potential and limits its visibility on the international stage. Moreover, the insufficient awareness among local communities regarding the principles and benefits of ecotourism complicates their full participation, thereby slowing sustainable development in the sector.

Another critical issue concerns the increasing anthropogenic pressures on natural ecosystems. Urbanization, deforestation, and unsustainable fishing practices are all factors that compromise the environmental assets upon which ecotourism depends. Consequently, the long-term viability of the sector is closely linked to the implementation of effective management strategies aimed at protecting and restoring these fragile ecosystems while ensuring their responsible use.

Equally important is ensuring the equitable distribution of revenues generated by the tourism industry. Ideally, these funds should be reinvested in conservation and local development programs, thereby maximizing the positive impact of tourism on both communities and natural environments. This requires the establishment of transparent governance mechanisms and participatory management approaches, actively engaging local stakeholders at every stage—from strategic decision-making to field-level actions.

To address these gaps, additional efforts must be directed toward environmental education. Integrating formal educational programs in schools, alongside alternative formats such as adult workshops or parent education initiatives, could play a key role in transforming local attitudes and practices (Lebigre et al., 1997). Such initiatives would help embed ecological awareness in daily life while providing viable economic opportunities within the tourism sector.

Furthermore, the development of environmentally friendly infrastructure, including sustainable camping lodges utilizing local materials and renewable energy sources, could attract more visitors to Atsimo-Andrefana (Sarrasin, 2007). For instance, combining eco-friendly accommodations with educational tourism circuits and appropriate technologies for resource preservation could significantly enhance the region’s image as a model of sustainable ecotourism.

Thus, despite its unmatched tourism potential, the Atsimo-Andrefana region still faces significant hurdles before it can fully realize this potential. Strengthened coordination among governmental agencies, non-governmental organizations, and local communities is essential to ensure that ecotourism can continue to develop without compromising the ecological balances that form its cornerstone.

2.2 Evolution of Tourist Composition

The table below highlights the proportions of tourists’ nationalities visiting Atsimo-Andrefana from 1995 to 2024.

Table 1: Nationalities of Tourists Visiting Atsimo-Andrefana from 1995 to 2024

Year	Malagasy (%)	European (%)	Asian (%)	American (%)	Other Nationalities (%)
1995	50	30	10	5	5
2000	55	25	10	5	5
2005	60	20	10	5	5
2010	65	20	8	4	3
2015	70	18	7	3	2
2019	75	15	6	3	1
2020	60	20	10	6	4
2021	65	18	9	5	3
2022	70	16	8	4	2
2023	75	15	7	3	2
2024*	78	13	6	2.5	0.5

Source : INSTAT and ORTU

➤ *Increasing Dominance of Malagasy Tourists*

A steady increase in the proportion of domestic tourists is observed, rising from 50% in 1995 to 78% in 2024. This trend is attributed to initiatives implemented by local authorities aimed at promoting domestic tourism focused on exploring the nation's cultural and natural heritage.

➤ *Steady Decline of European Tourists*

Representing 30% of visitors in 1995, their proportion declined to 13% in 2024. Possible factors include logistical challenges (air connectivity, availability of infrastructure) and increased competition from other better-served international destinations.

➤ *Stability of Asian and American Tourist Segments*

Although modest in number, visitors from Asia and the Americas help maintain an international presence in the region. Asian tourists are particularly drawn to its unique marine biodiversity, while Americans are often involved as strategic partners in regional conservation efforts.

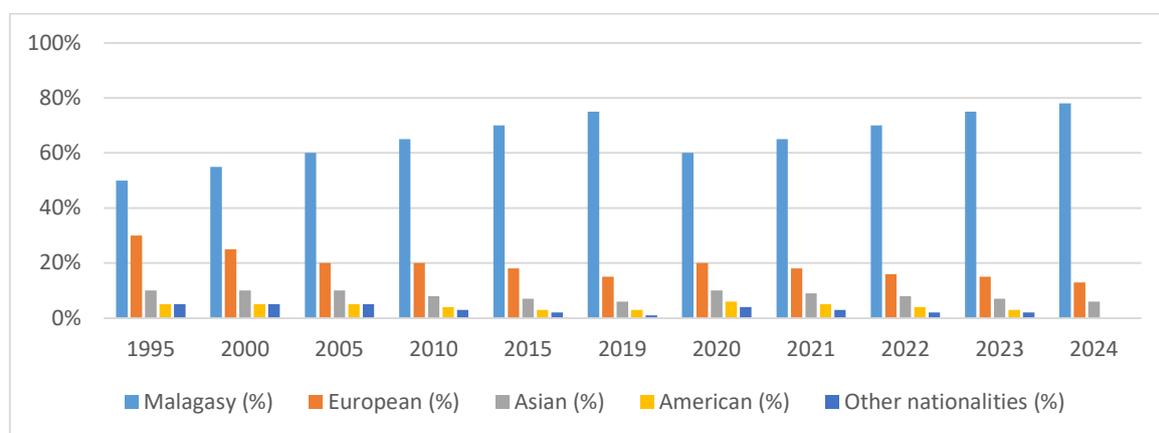


Figure 1: Tourist Nationalities

➤ *Decline of Other Nationalities*

The “*Other Nationalities*” category has virtually disappeared, dropping to 0.5% in 2024, indicating a highly targeted marketing strategy and insufficient efforts to diversify the sources of international visitors.

➤ *Potential and Prospects*

With its unique natural assets (beaches, coral reefs, endemic forests) and cultural traditions (Vezo lifestyle, local handicrafts, folklore), the Atsimo-Andrefana region holds considerable untapped potential to become a leading global ecotourism destination.

However, significant structural constraints persist:

- Insufficient and outdated tourism infrastructure;
- Weak international promotion;
- Fragile mechanisms for ensuring community inclusion in tourism benefits.

Initiatives led by organizations such as *WWF*, *ReefCheck Madagascar*, and the NGO *Blue Ventures* offer viable examples of integrating ecosystem conservation with socio-economic benefits. Accelerating these collaborative efforts could transform this delicate balance into a genuine driver of sustainable development.

➤ *Analysis of Tourist Preferences*

Survey data reveal the most popular sites among visitors in the Atsimo-Andrefana region.

Table 2: Favorite Tourist Sites of Visitors

<i>Sites</i>	<i>Number</i>	<i>Percentage (%)</i>
CEDRATOM Museum	35	15,3
<i>Musée de la Mer</i>	40	17,5
<i>Jardin de la Mer et de la culture</i>	20	8,7
Tsimanampesotse Lake	45	19,6
Baobab Forest	60	26,2
Mangroves Forest	15	6,6
Antsokay Arboretum	10	4,4
Anakao	4	1,7

The Baobab Forest emerges as the most frequented site, accounting for 26.2% of respondents' preferences. This popularity can be attributed to the distinctiveness of its landscapes, the presence of emblematic species such as the giant baobabs—iconic symbols of Madagascar—and the site's relative accessibility. Lake Tsimanampesotse ranks second with 19.6%, reflecting its critical role in avian biodiversity, notably hosting flamingos that attract birdwatching enthusiasts. The regional museums, including the Sea Museum and CEDRATOM Museum, collectively account for 33% of visitor interest, underscoring the educational and cultural significance of the local tourism offerings. Conversely, despite their ecological value, the Mangrove Forest and the Antsokay Arboretum receive comparatively lower visitation rates, with 6.6% and 4.4%, respectively. Finally, Anakao, representing only 1.7% of preferences, appears to be an underexploited site, likely constrained by limited accessibility and insufficient promotional efforts.

➤ *Entertainment Preferences*

Visitors' entertainment preferences demonstrate a wide range of interests. The table below presents a detailed summary of the findings.

Table 3: Favorite Entertainment Activities of Visitors

<i>Entertainment</i>	<i>Number of Responses</i>	<i>Percentage (%)</i>
Marine Activities	80	34,9
Birdwatching	95	41,5
Swimming	55	23,6

Birdwatching emerges as the most favored activity among visitors, accounting for 41.5% of responses, highlighting the significance of ornithological zones such as Lake Tsimanampesotse. This finding also underscores the need for further investment in birdwatching infrastructure (e.g., observation towers or specialized trails). Marine events, including activities related to marine fauna (mammals and coral reefs), attract 34.9% of participants, reflecting a growing interest in environmentally oriented marine

experiences such as educational excursions and eco-responsible diving. Swimming, though less popular at 23.6%, remains a noteworthy activity in coastal areas like Ifaty and Anakao, where beaches provide an ideal setting for aquatic recreation.

3. MATERIALS AND METHODS

3.1 Geographical Location

The Atsimo-Andrefana region is located in the southwestern part of Madagascar, covering an extensive area of 66,687 km², which represents approximately 11.36% of the national territory. This vast region is delineated by distinct geographical boundaries: to the north by the Mangoky River, to the east by the ruiniform massif of Isalo and part of the Anosy region, to the south by the Menarandra River, and to the west by the Mozambique Channel. These natural limits endow the region with a remarkable ecological diversity, encompassing arid zones, brackish lakes, and a coastline rich in coral reefs (Battistini & Hoerner, 1986).

The regional capital, Toliara (also spelled Tuléar), is located just north of the Tropic of Capricorn, approximately 960 km from the national capital, Antananarivo. Formerly a *Vezo* fishing village, Toliara has evolved significantly since being recognized as a town in 1897 and it now serves as the political, administrative, and economic hub of the region. With a moderate population density of 11.14 inhabitants per square kilometer, Atsimo-Andrefana had an estimated population exceeding 1.797.894 inhabitants according to the 2018 census².

Nicknamed the “*City of the Sun*” Toliara enjoys a semi-arid climate characterized by an average annual temperature of 28°C and low rainfall, ranging between 300 and 600 mm per year³. The dominant wind, known as *Tsiokatimo*, blows steadily from the southwest, shaping local climatic conditions and influencing terrestrial ecosystems such as dry forests, mangroves, and savannas. This diverse ecological setting forms the foundation of the region’s natural wealth and provides significant potential for the development of sustainable ecotourism.

3.2 Methodological Framework

This research aims to assess the ecotourism potential and challenges of the Atsimo-Andrefana region by integrating several parameters such as environmental conservation, community development, and existing tourism infrastructure. The study encompasses various aspects of the interconnection between local natural resources and tourism dynamics. It is based on a mixed-methods approach combining both quantitative and qualitative analytical tools.

The methodology includes:

- *Statistical Analysis*: Data were collected from the National Institute of Statistics of Madagascar (INSTAT) for the period from 2015 to 2020. These data include economic and social indicators related to tourist inflows and revenues generated by the tourism sector.
- *Field Survey*: Semi-structured interviews were conducted with local communities, tourism stakeholders (guides, hoteliers, artisans), and local authorities. These interviews helped explore stakeholder perceptions regarding the impacts of tourism on ecosystems and socio-economic conditions.
- *Direct Observations*: The study relied on field observations carried out at major ecotourism sites, including Tsimanampesotse National Park, nearby coral islands (e.g., Nosy Ve), and other specific environments such as baobab forests and coral reefs around Salary and Ifaty. These site visits enabled the documentation of current conditions and the identification of needs in terms of infrastructure development and sustainable management.

3.3 The Study Area

² <https://www.instat.mg/p/resultats-definitifs-du-rghp-3-2018-troisieme-recensement-general-de-la-population-et-de-lhabitation> visited on 2nd November 2025.

³ <https://www.urlaub-auf-madagaskar.com/en/toliara-or-tulear-the-city-where-the-sun-always-shines/> visited on 2nd November 2025.

Atsimo-Andrefana ranks among the most sought-after destinations for ecotourism in Madagascar, distinguished by the exceptional richness of its natural and cultural resources. The region's diversity encompasses:

- *Ancient forests* that host numerous endemic and endangered species, offering a remarkable attraction for biologists and nature enthusiasts.
- *Coral reefs* characterized by high marine biodiversity, ideally suited for diving and underwater observation. These reefs also constitute crucial resources for sustainable fishing, fostering tourism initiatives while ensuring environmental preservation. (n'est pas mentionné dans le résultat)
- *Iconic species* such as the giant baobabs, often described as "upside-down trees," which captivate visitors seeking unique and memorable experiences.

The Tsimanampesotse National Park, recognized as a protected area and designated as a *Ramsar site*, represents one of the main ecotourism hubs of the region. It shelters rare species such as blind fish, pink flamingos, and several mammals adapted to arid conditions. The immediate proximity of numerous coral islands—particularly the protected marine site of Nosy Ve—further enhances the ecological and touristic potential of the area.

In parallel, the cultural practices of local communities provide a harmonious complement to the region's natural attractions. Traditional craftsmanship, ancestral ceremonies, and local gastronomy add a vibrant human dimension to tourism in Atsimo-Andrefana. However, the study identified that the overall tourism potential remains underexploited, mainly due to inadequate transportation, accommodation, and recreational infrastructure.

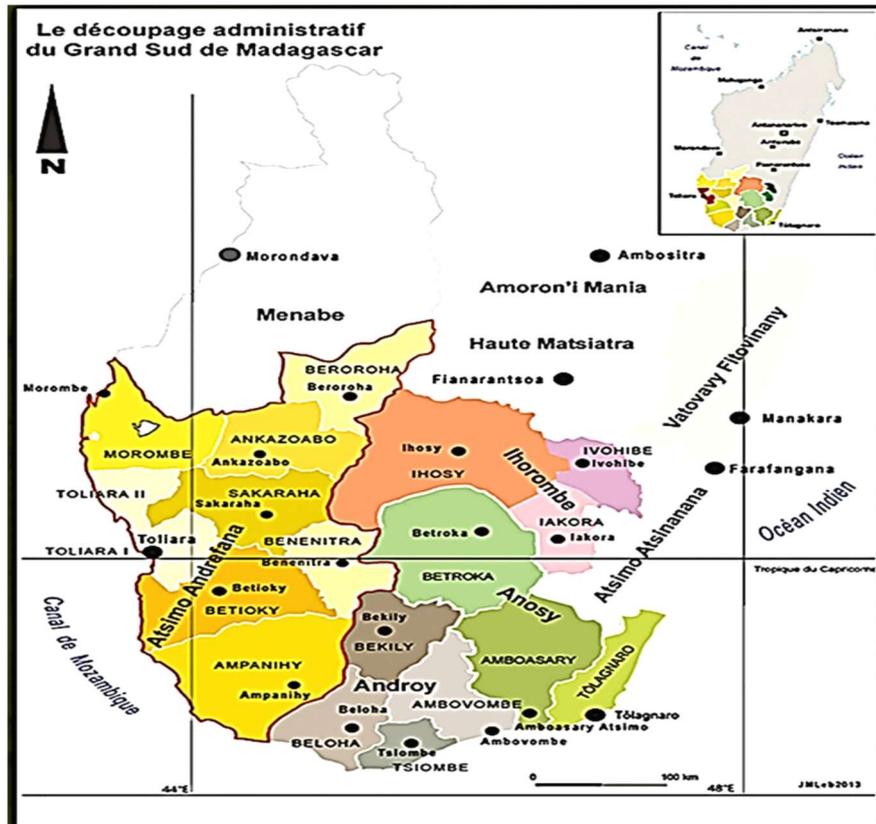


Figure 2: Location of the Study Area

4. FINDINGS (ne reflète pas la méthodologie)

4.1 Terrestrial and Marine Ecosystems

Table 4: Natural Ecosystem of the Region

Natural Ecosystem	Occupation Percentage (%)
Savanna	77
Forests	22
Mangroves	1

Total area: 6,236,574 ha (source)

The region exhibits an extraordinary ecological diversity, largely composed of natural ecosystems covering approximately 6,236,574 hectares, representing 93% of its territory. Among these areas, savannas dominate with an impressive coverage of 77%, while forests account for 22%. Although mangroves occupy a relatively modest area, they play a crucial ecological role as essential habitats for marine species. This diversity is particularly pronounced in districts such as Morombe, Sakaraha, and Ampanihy, which host a mosaic of terrestrial and marine biodiversity.

The marine ecosystems of Atsimo-Andrefana are equally remarkable. Its coral reef, extending 18 km, is the second largest in the world and serves as a breeding and protective ground for numerous fish species. Additionally, the region contains 13,820 hectares of mangrove forests, critical nursery areas for various marine species utilized in both traditional and commercial fishing. These marine resources represent key ecotourism assets while significantly contributing to ecosystem balance.

Survey question posed to 229 visitors of the region: *Which of the following areas would you prefer to visit?*

4.1 Biodiversity and Iconic Species (n'est pas mentionné dans la méthodologie)

The Atsimo-Andrefana region is a reservoir of exceptional biodiversity, encompassing both flora and fauna. Characteristic plant species include endemics such as Fony (*Adansonia rubrostipa*), Katrafay (*Cedrelopsis grevei*), and *Aloe divaricata*. These plants, some of which have traditional and medicinal uses, enhance the scientific and cultural value of the ecosystems.

Regarding fauna, the region hosts emblematic and often threatened species, including:

- *Radiated Tortoise (Astrochelys radiata)*, whose presence serves as an indicator of the ecological health of habitats.
- *Malagasy Giant Chameleon (Furcifer verrucosus)*, which constitutes an integral part of forest ecosystems.
- *The legendary Coelacanth (Latimeria chalumnae)*, a rare marine species highlighting the global significance of the region for biological conservation.

4.3 Cultural Resources and Socio-Economic Dimensions (pas dans la méthodologie)

The natural ecosystems in the region are closely intertwined with the lives of local communities, particularly the Vezo, Masikoro, and Mahafaly ethnic groups. These populations have deeply embedded their cultural, economic, and social practices within the surrounding natural wealth, thereby enhancing the region's tourism appeal through a living heritage. The economic sector is largely dominated by subsistence activities, including agriculture, cattle raising, and traditional fishing, which employ approximately 90.4% of the active population. The region contributes significantly to the national economy, holding around 11.7% of Madagascar's cattle herd, while also benefiting from complementary sectors such as handicrafts and mining.

Cultural and historical sites, such as Saint Augustin Bay and the Vezo fishing villages, provide an important human dimension to the ecotourism potential, enriching visitors' experiences through direct interactions with local customs and artisanal knowledge.

Table 5: Tourist Sites by Geographic Zones

Geographic Zone	Main Sites	Key Assets
South of Tuléar	Community Area of Tsinjoriake, Sarodrano, Antsokay Arboretum	Participatory conservation, Environmental awareness
East of Tuléar	Zombitse-Vohibasia National Park, Miary Village	Forest biodiversity, historical heritage
North of Tuléar	Mikea Forest, Ifaty Beaches, Ihotry Lake	Marine diving, local cultures, wetlands protecting migratory birds

4.4 Conservation initiatives and local actions

The sustainable management of these sites is supported by several conservation initiatives overseen by Madagascar National Parks and the Ministry of Environment and Sustainable Development. These include:

- Reforestation programs aimed at addressing forest degradation.
- Significant efforts to regulate fishing in sensitive areas such as Salary Bay and Nosy Ve.

These actions also incorporate educational programs for local communities to encourage their direct participation in the preservation of natural resources. Notably, Vezo fishing associations play a crucial role in adopting sustainable practices, such as establishing regulated fishing zones, which promote the regeneration of fish stocks and secure the economic future of these communities.



Figure 3: Sacred Cave of Sarodrano

Source: Rabemanantsoa, 2010

Conservation and restoration initiatives in the region are overseen by Madagascar National Parks and the Ministry of Environment and Sustainable Development. One flagship project focuses on reforestation of vegetative cover and the regulation of fishing in the coral reefs of Salary Bay and Nosy Ve. These efforts, combined with community education programs, aim to actively involve local populations in the sustainable management of resources. For instance, Vezo fishing associations play a crucial role in implementing regulated fishing zones to ensure the regeneration of fish stocks.

4.5 Socio-economic Challenges

One of the main issues concerns the uneven distribution of economic benefits derived from tourism. Only about 5% of the revenue generated in the region directly benefits local communities, despite the fact that the majority of them (67%) still rely on traditional fishing, and another 22% depend on subsistence agriculture. Madagascar saw a sharp decline in tourism stemming from the COVID-19 pandemic. The sector struggled in its recovery through 2023⁴.

5. DISCUSSION

5.1 Analysis of Tourism Development in Atsimo-Andrefana

The region holds significant tourism potential, rooted in its rich biodiversity, unique cultural heritage, and natural beauty. Besides, it is home to endemic species, including various lemurs, which serve as major attractions for eco-tourists (Christie, 2005). Its

⁴ <https://www.trade.gov/country-commercial-guides/madagascar-travel-and-tourism-sector> visited on 30 October 2025.

extensive coastline provides opportunities for resort-based tourism, complementing eco-tourism initiatives and diversifying visitor experiences (Christie, 2005).

Tourism positively influences economic growth in Madagascar, suggesting that strategic development of this sector could substantially benefit local communities (Josué et al., 2024). Despite this potential, only around 60,000 of the 200,000 annual visitors currently come for tourism, indicating a significant opportunity for growth through targeted marketing and improved services (Christie & Crompton, 2003).

Effective tourism development requires enhanced infrastructure, including roads, transportation, and digital services, to facilitate visitor access and improve overall experiences (Josué et al., 2024). Simultaneously, implementing sustainable tourism practices is essential to minimize environmental impacts, such as increased carbon emissions, and to ensure that natural and cultural resources are preserved for future generations (Josué et al., 2024). Balancing development with environmental sustainability and active community participation is crucial to maximize tourism benefits while protecting the ecological and cultural assets that define Atsimo-Andrefana.

5.2 Human Settlement and Traditional Practices

Although the region does not benefit from as extensive historical documentation as major river deltas, archaeological remains and historical accounts reveal a human presence dating back to the Iron Age. Characterized by diverse ecosystems and arid to semi-arid climates, the region provides a crucial context for understanding the intricate relationship between human communities and their natural environment (Heland & Folke, 2014; Davis et al., 2024). Since those early periods, local populations—particularly the Mikea—have developed subsistence practices well adapted to the semi-arid conditions of their environment. These communities have successfully utilized the region's natural resources while maintaining a degree of ecological balance, as evidenced by their sustainable use of forested areas, arid lands, and coastal zones.

Coral reefs and mangroves, beyond their critical ecological roles, have historically underpinned traditional economic activities such as fishing and, to a lesser extent, maritime trade. These coastal ecosystems thus constitute major heritage assets, alongside local knowledge and skills associated with their sustainable exploitation.

5.3 Opportunities Offered by Ecotourism

Ecotourism in the Atsimo-Andrefana presents an important opportunity to align biodiversity conservation and local development, leveraging the region's unique ecosystems, coastal scenery and cultural heritage. For instance, the region's rich coastal and inland biodiversity offers a compelling product for eco tourists seeking authentic nature experiences. At the same time, studies in Madagascar more broadly show that ecotourism can provide income to rural communities and strengthen local participation in conservation (Ormsby & Mannle, 2006; Ravinala et al. 2024). However, evidence also cautions that benefits are often limited and poorly distributed unless carefully managed (Peters 1998; Sarrasin 2013 as cited in CEPF 2014). Therefore, fully realising ecotourism's promise in Atsimo-Andrefana will require strategic investment in infrastructure, marketing, capacity-building and equitable benefit sharing, to ensure both ecological integrity and community wellbeing.

Visitors can engage in unique experiences through traditional activities that reflect the region's cultural heritage. Vezo dances, ritual ceremonies linked to fishing, and artisanal crafts such as wooden canoe construction and mohair weaving contribute to the authenticity of the tourism offering (Langley, 2006); (Carter et al., 2023). Moreover, ecotourism events, such as excursions in the Mikea forest or traditional canoe fishing trips, allow tourists to fully immerse themselves in an environmentally respectful way of life (Seddon et al., 2000). These experiences provide a unique opportunity to showcase local biodiversity while promoting conservation education and enhancing cultural pride within local communities (Fritz-Vietta et al., 2011).

From an ecological perspective, the development of ecotourism in the region could provide an alternative source of income, thereby encouraging local populations to adopt more sustainable practices and reduce dependence on intensive exploitation of natural resources. The expansion of this sector also offers significant potential for strengthening the protection of sensitive ecosystems, such as coral reefs, through increased awareness among local stakeholders and international visitors (Rafidimanantsoa et al., 2018).

However, despite its considerable potential, the region faces structural and organizational constraints that limit the development of truly sustainable ecotourism. One major obstacle is the insufficiency of infrastructure. For instance, the road connecting Toliara to Tsimanampetse National Park—essential for accessing several emblematic tourist sites—is in poor condition, often discouraging visitors and complicating tourism logistics.

Another challenge concerns the lack of qualified professionals in the tourism sector. The absence of trained guides specialized in ecotourism, capable of interpreting the region's natural and cultural assets, limits the quality of visitor experiences (Newsome et al., 2012). The lack of organized reception centers and structured tourism platforms also complicates the integration of ecotourism activities into a sustainable management framework.

Finally, anthropogenic pressures on the environment, such as deforestation from slash-and-burn agriculture, overfishing in lagoons, and excessive extraction of natural resources (e.g., corals and valuable timber), threaten the ecosystems that form the foundation of the region's tourist appeal (Rafidimanantsoa et al., 2018). These impacts are exacerbated by the absence of an integrated natural resource management strategy, which could coordinate conservation efforts and the promotion of ecotourism⁵.

To address these challenges and fully harness the region's potential; several priorities should be integrated into future strategies:

- *Infrastructure enhancement*: Improving roads and transportation between major tourist centers and remote sites is crucial to ensure safe and comfortable access;
- *Capacity building for local actors*: Developing training programs for guides, with a particular focus on environmental and cultural interpretation, will enrich tourist experiences while promoting local employment;
- *Stakeholder collaboration*: Conservation initiatives, coupled with ecotourism efforts, must actively involve local communities, public authorities, and international partners to ensure collaborative resource management;

⁵ <https://www.worldbank.org/ext/en/home> visited on 29 October 2025.

- *Establishment of a legal and institutional framework:* Clear regulation of tourist activities and protected areas is essential to balance ecosystem conservation with economic utilization. Initiatives such as controlled tourism zones or ecological fees can support this transition.

The shift toward responsible and sustainable ecotourism cannot be achieved without a clear vision and coordinated mobilization of stakeholders. By integrating environmental, social, and economic dimensions into tourism development strategies, it will be possible to valorize the region's exceptional natural and cultural heritage while ensuring its preservation for future generations. Experiences from other countries prioritizing sustainable tourism, such as Costa Rica, demonstrate that a balance between resource protection and economic development can be achieved through inclusive and transparent policies. With its multiple assets, Atsimo-Andrefana is well-positioned to become a benchmark for ecotourism in Africa and the Indian Ocean region, provided these challenges are addressed proactively.

5.4 Cultural Resources

Atsimo-Andrefana region serves as an ethnic crossroads where different local communities coexist harmoniously, notably the Vezo, Masikoro, Tagnalagna, and Mahafaly peoples (Langley, 2006). Each ethnic group contributes a unique cultural richness and human dimension to the region, thereby enhancing its tourism value. These communities have preserved their traditions over generations, offering visitors an authentic immersion into Malagasy customs.

- *Traditional dances and rituals: unique opportunities for ecotourism*

Vezo and Mahafaly cultures provide unforgettable cultural experiences. Visitors can witness traditional Vezo dances, such as the Kinetsanetsa, which illustrates the intimate relationship of this people with the sea (Langley, 2006; Blue Ventures, 2021). Other traditional events, such as the Bilo rituals, involve ceremonies of healing and spirituality, immersing participants in the depth of local beliefs (Mare, 2024). Savatse and Fitampoha, ancestral rites accompanied by songs and solemn ceremonies, represent major moments in community life⁶. These cultural elements offer tourists exceptional opportunities to share and experience moments of spirituality and harmony with local populations. They also represent a unique chance to leverage cultural tourism by promoting traditions while respecting their sacred nature.

- *Natural phenomena: a spectacular ecological display*

Alongside cultural wealth, the region hosts exceptional natural phenomena that attract eco-tourists. Whale watching along the coasts of Tsifota and Fiheregamasay is a highlight for nature enthusiasts. These majestic marine creatures, offering an impressive spectacle between June and September, come to mate and give birth, turning this site into a key location for observation and learning about marine fauna. These ecological events, combined with the richness of local traditions, demonstrate the role ecotourism can play in raising conservation awareness while generating income for coastal communities.

- *Cultural and environmental protection governed by the Dina be*

To ensure harmony between development and ecological conservation, local societies have implemented a community regulation known as *Dina be* (McLain et al., 2021). This regional law reflects the importance given to environmental management. For example, it provides strict sanctions against those who damage the environment, whether through illegal logging, overfishing, or other activities harmful to ecosystems. This legal framework, grounded in local traditional values, plays a crucial role in biodiversity protection while strengthening community involvement in natural resource management. Through initiatives like the *Dina be*, local populations become key actors in environmental preservation while serving as a model for well-structured and ethical ecotourism.

6. CONCLUSION

⁶ https://www.madagascartravel.com/the-vezo-2c-nomads-of-the-sea-3a-a-genealogy-spanning-ten-generations?utm_source=chatgpt.com visited on 2nd November 2025.

The Atsimo-Andrefana region represents a space where human and natural dynamics intersect in striking ways. Ecological phenomena such as coastal erosion, beach retreat, and the regeneration of the Mikea forests reflect the vitality of an ecosystem subjected to intense anthropogenic pressures, yet still capable of resilience. This exceptional environment, combining biological diversity with cultural richness, endows the region with remarkable ecotourism potential. Sites such as Nosy Ve and Nosy Satrana islands, the Andavadoaka caves, coral reefs, and the Tsimanampetse National Park, designated a Ramsar site, underscore the patrimonial and scientific value of this territory.

However, this wealth remains fragile. The lack of infrastructure, weak institutional coordination, and insufficient local governance hinder the implementation of truly sustainable ecotourism. These structural limitations restrict the valorization of natural and cultural resources while exacerbating social and economic disparities. Yet, community-based initiatives are emerging: reforestation, fisheries management through Vezo fisher networks, and programs led by NGOs such as *Blue Ventures*, *WWF*, and *ReefCheck* reflect a local commitment to reconcile conservation and development. These participatory approaches not only support ecosystem protection but also empower rural populations, often marginalized in conventional economic circuits.

Atsimo-Andrefana thus stands out as a genuine laboratory for integrated practices, where innovative natural resource management strategies are tested. By fostering close cooperation among communities, researchers, public institutions, and international partners, the region could become a regional reference for sustainable ecotourism. However, the success of this model requires appropriate public policies, robust institutional support, and a shared development vision that balances social equity, economic efficiency, and environmental sustainability.

In this perspective, the central question remains how to balance tourism development with the preservation of natural environments. The challenge lies in transforming ecotourism into a catalyst for local development without compromising the ecological and cultural richness of the region. Consequently, it is necessary to reflect on the conditions under which ecotourism can genuinely contribute to sustainability within the specific context of southwestern Madagascar. It thus becomes essential to reconsider governance mechanisms and tourism valorization strategies to ensure balanced territorial management. This reflection highlights an important research avenue: *how to design and implement, in Atsimo-Andrefana, a truly inclusive and sustainable ecotourism model that integrates local community aspirations while ensuring the long-term preservation of natural and cultural resources.*

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