THE IMPACT OF ECOTOURISM ON THE DIVERSITY AND ECOLOGICAL CONDITION OF THE ECOSYSTEMS OF THE PROTECTED AREAS OF ADJARA

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Abstract

The impact of ecological tourism on the ecological conditions and ecosystem diversity within Adjara's protected areas has been thoroughly studied. The focus of these discussions encompasses the protected areas of Kobuleti, Kintrishi, Mtirala, and Machakhela, along with their existing infrastructure and the diverse services they offer.Moreover, a comprehensive analysis of plant diversity has been performed. This analysis indicates that the vegetation cover within these regions is marked by significant floristic diversity.It also highlights the presence of species with considerable conservation importance, particularly an abundance of endemic and relict species, as well as those listed on the Red List. The development of ecotourism has been observed to contribute to the preservation of natural beauty in unique areas, while simultaneously mitigating negative environmental impacts.Moreover, the threats posed by ecotourism to protected areas, including pollution, noise, fire, and the potential invasiveness of alien plant species, have been thoroughly examined. These threats significantly affect the protection and preservation of ecosystem diversity.A comprehensive analysis of the strengths and weaknesses associated with the development of ecotourism in the protected areas of Adjara, including its impact on the diversity of natural vegetation, has been provided. A statistical analysis of the visitor numbers to the protected areas of Adjara from 2018 to 2023 has been conducted.It has been observed that, despite Georgia's rich ecotourism resources, there is a current deficiency in marketable tourist products characterized by relevant properties. Moreover, it has been emphasized that ecotourism in protected areas not only cultivates new market segments and advances the tourism sector but also increases the efficiency of ecotourism and contributes to Georgia's economic development. An analysis of the development of ecological tourism in Adjara, identified as a crucial sector in the modern tourism industry, reveals that this area necessitates support at both the state and regional levels.This perspective is robustly corroborated by the 'Georgian Ecotourism Strategy 2020-2030,' collaboratively formulated by the Agency for Protected Areas of Georgia,the Austrian Development Agency (ADA), and the German Society for International Cooperation (GIZ). Within this strategy, it is acknowledged that ecotourism in Georgia notonly provides tourists with an authentic experience but also markedly boosts the economic well-being of the country. Furthermore, it plays a pivotal role in safeguarding naturaland cultural heritage and in elevating environmental awarenessamong both tourists and local inhabitants.

Keywords: ecotourism, protected areas, diversity, threats, statistical analysis

I. Introduction

Currently, the emphasis on developing ecotourism in protected areas worldwide is significant. Ecotourism in these areas respects ecosystem integrity and encourages nature-based travel. It serves as a pivotal economic driver for our region, fostering infrastructure growth, enhancing tourism-related businesses, thereby boosting local employment. Moreover, it plays a

crucial role in preserving and promoting cultural heritage, traditional crafts and contributes to enhancing the country's international reputation.

Therefore, studying the challenges of ecotourism development in unprotected areas of Adjara is highly relevant, as it can generate substantial profits while maintaining ecological safety.

Given the growth of ecotourism in protected areas and its transformation into a significant socio-economic phenomenon, this research aims to address effective regulation issues in the organization of ecotourism. It also seeks to examine the impact of ecotourism on the ecological condition and biodiversity of Adjara's protected areas. The goal is to propose scientific and methodological recommendations that ensure ecological safety and preserve natural ecosystem diversity, as well as to coordinate the activities of economic entities at the regional level effectively.

To achieve this goal, the following tasks are set:

- Study the existing ecotourism infrastructure in the protected areas of Adjara;
- Investigate the diversity of ecosystems in the protected areas of Adjara;
- Examine the impact of ecotourism on the ecological condition of the protected areas of Adjara;
- Assess the impact of ecotourism on the biodiversity of the protected areas of Adjara.

The study focuses on four protected areas in the Adjara region: Kobuleti and Kintrishi protected areas, and Mtirala and Machakhela national parks.

II. Methods

The research methods used in this paper include:

- Route-expeditionary reconnaissance method
- Interview method: Engaging with visitor service specialists and rangers in the protected areas.
- Economic analysis and statistical methods (utilizing official statistical data for quantitative assessment)
- Analysis and synthesis methods
- Comparative analysis method: Comparing analytical and statistical data.

III. Results

The study examines the impact of ecotourism on the ecological condition and plant diversity of the protected areas in Kobuleti, Kintrishi, Mtirala and Machakhela. It also addresses the threats posed by ecotourism to these areas. Scientific and methodological recommendations have been developed, which, according to the authors, will aid in the formation and growth of the market for ecological tourism products, enhance ecological safety in protected areas, preserve vegetation diversity, and address the challenges hindering ecotourism development in the Adjara region.

In the process of implementing ecotourism activities in the unprotected areas of Adjara, the following observations were made:

- Ecotourism activities lead to both direct and indirect environmental changes, which can have positive and negative effects on wildlife.
- In the protected areas of Adjara, positive impact is reflected in responsible travel by visitors which promotes the protection and preservation of the natural environment.
- The adverse effects of ecotourism are most pronounced in the Kobuleti Nature Reserve and Mtirala National Park.
- Ecotourism negatively impacts the unique sphagnum habitat in Kobuleti Nature Reserve, causing artificial drainage and the introduction of invasive species. Rare species such as white moss (Sphagnum austinii) and globally red-listed species like the Colchian water-lilly (Nymphaea colchica) and water vine (Potamogeton natans) are at risk.
- Massive tourism in Mtirala National Park is endangering certain plant species listed on the

Red List of the Caucasus and Georgia.

- Visitor services in Kintrishi and Machakhela Protected Areas are managed with minimal negative impact on the environment, considering the capacity of natural ecosystems and national park zoning. Negative impacts include trampling of vegetation, pollution, noise, invasion of alien species, and, in rare cases, fires.

IV. Discussion

Ecotourism is emerging as a significant new sector in Georgia's tourism industry. Renowned for its natural beauty; diverse landscapes; Georgia offers attractions such as the Caucasus Range (with 668 glaciers); the subtropical Black Sea coastline (320 kilometers); rivers, lakes and waterfalls (25000 rivers and 860 lakes); mineral waters (1,400 mineral springs, most of them are thermal); cities carved into rocks, historical landmarks, traditional hospitality, and renowned Georgian cuisine, all contributing to its appeal as a tourist destination [1].

As of 2023, Georgia has designated 100 protected areas under six different categories based on IUCN criteria. These include 14 state reserves, 14 national parks, 40 natural monuments, 26 restricted areas, 5 protected landscapes, and one multi-use area. A total area of protected territory covers 912,862 hectares, which represents approximately 13% of Georgia's territory [2].

Today, Georgia faces the imperative of defining clear priority directions for regional development that ensure sustainable and stable regional growth. Concurrently, there is potential to cultivate new industries that can stimulate positive multiplier effects within the regions. One such priority direction identified is the development of ecotourism, seen as a pivotal component of Georgia's regional economic development strategy [3].

Considering that the Adjara region is one of the largest and most naturally diverse regions of Georgia, it is pertinent to examine the challenges and prospects of ecotourism development in Georgia today. Additionally, it is crucial to assess its impact on the ecosystem diversity and ecological condition of protected areas, using the Adjara region as a case study.

There are following protected areas in the A/R of Adjara [2]:

- Kintrishi Protected Areas (Kintrishi Nature Reserve 3 108 Ha; Kintrishi National Park with 20 406 Ha);
- Machakhela National Park, total area 7 333 Ha;
- Mtirala National Park, with total area 15 580 Ha;
- Kobuleti Protected Areas (Kobuleti Reserve with 316 Ha; Kobuleti Managed Reserve with 466 Ha).

The following table (Table 1) presents visitor statistics for the unprotected areas of Adjara from 2018 to 2023.

In recent years, (up to 2020 before the COVID-19 pandemic), Georgia experienced a consistent rise in both visitors and tourism revenue. The National Tourism Agency of Georgia identified 2019 as the peak year for the tourism industry's growth. This trend was particularly evident in ecotourism, with a record (109,800) visitors reported in the protected areas of Adjara in 2019.

The COVID-19 pandemic has dramatically altered global lifestyles and triggered a crisis across all parts of life and sectors. In 2020, the tourism industry in Georgia, like worldwide, experienced a significant downturn. As shown in Table 1, the number of visitors to unprotected areas of Adjara dropped drastically by 81.8% compared to 2019, falling from 109.8 thousand to just 20.2 thousand.

Despite the disruptions caused by the pandemic, life and nature continue their cycles and everything has its begining and ending. From late 2021 into 2022, ecotourism began to rebound. By 2022, the number of visitors to unprotected areas of Adjara had risen to 85,700, marking an increase of 65,500 visitors (a 324.3% rise) compared to 2020. In 2023, ecotourism almost fully recovered, with visitor numbers reaching 104,300 in the protected areas of Adjara, which is 95.0% of the record high of 109,800 set in 2019 [2].

Table 1: *Number of visitor for the unprotected areas of Adjara 2018 – 2023*

Protected Areas		Number of visitor for the unprotected areas of Adjara 2018 – 2023, thousand persons					
		2018	2019	2020	2021	2022	2023
Total in Ajara A/R		88,8	109,8	20,2	56,3	85,7	104,3
Including	Kintrishi Reserve and National Park	6,6	7,0	1,2	1,8	2,9	3,1
	Machakhela National Park	10,1	11,3	0,8	0,5	0,9	1,4
	Mtirala National Park	57,8	77,3	15,4	51,1	78,1	95,3
	Kobuleti Reserve and Managed Reserve	14,3	14,2	2,8	2,9	3,8	4,5

Source: The table was created by the authors based on the reports from the Agency of Protected Areas of Georgia for the years 2018-2023

Today, as the COVID-19 pandemic subsides globally, many mass tourism destinations have implemented social distancing measures and established visitor thresholds based on the lessons learned during the pandemic. These practices may become a permanent aspect of tourism management, as ecotourism—particularly in protected areas—already required such restrictions to ensure sustainability and protect natural environments.

People are increasingly seeking destinations where they can feel safe and maintain social distancing, opting for less crowded places. Georgia's tourism sector faces the challenge of actively promoting ecotourism, which involves harmonizing tourism with natural resource conservation. Ecotourism can attract investment not only for environmental protection but also for the region's economic and socio-cultural development. Furthermore, advancing ecotourism provides local communities with the opportunity to generate additional income through tourism-related services.

Currently, Georgia possesses numerous ecotourism resources, but lacks a well-developed tourist product with defined market characteristics [4]. It is important to recognize that while ecotourism can create new market segments and expand the tourism sector, it also has the potential to significantly impact Georgian agriculture. By integrating ecotourism with agriculture, Georgia can enhance the efficiency of its ecotourism industry and contribute to overall economic growth.

A key factor for developing ecotourism in Adjara is its location within the Caucasus eco-region, known for its rich terrestrial biodiversity. The International Union for Conservation of Nature (IUCN) has listed this area as one of the world's biodiversity hotspots for its high levels of biological diversity and the presence of endangered terrestrial species. Adjara, with its varied ecosystems and unique geographical features, is recognized among the 200 global eco-regions for its species abundance, endemism, taxonomic uniqueness, and distinctive habitats in the southwestern corridor of the Lesser Caucasus [5].

Additionally, it is important to highlight that the World Wildlife Fund (WWF) initiative, "About 100 Hotspots of European Forests," which identifies approximately 100 critical protected forest areas in need of conservation, places a high priority on the unique Kolkheti forest ecosystems in Adjara [6].

Currently, Adjara's wild flora is estimated to consist of 1,837 species. According to literary sources, the endemic flora of Adjara includes 174 species, which belong to 43 families and 109 genera. This represents 9.47% of the total floristic composition of the region. These endemic species are distributed across the geographical regions of the Caucasus, Georgia, Kolkheti, Adjara-Lazeti, and Adjara [7].

The varied terrain and diverse climatic and soil conditions in the protected areas of Adjara contribute to a wide range of landscapes and ecosystems. In this relatively small region, one can find an array of ecosystems, from the lush mixed-leaved forests of the Kolkheti plain to the unique

ecosystems of the high mountains with their more challenging climates. This results in a rich and intriguing vegetation profile [8].

In recent decades, Adjara's biodiversity has significantly declined due to various anthropogenic and natural factors, including habitat loss, fragmentation, degradation, illegal hunting and fishing, the introduction of alien species and unsustainable use of biological resources.

Protected areas in the Adjara region are crucial for tourism development. Kintrishi, Ispani, Machakhela Valley protected areas, Mtirala National Park, and the Botanical Garden have the most ecotourism potential. These areas offer exceptional and memorable experiences for ecotourism enthusiasts.

However, implementing ecotourism in these protected areas brings about changes in environmental conditions, influenced by both direct and indirect effects of tourism activities having positive and negative effect on wild nature as well. Studies have indicated that while ecotourism aims to offer nature-based tourism and recreation without harming natural ecosystems and promotes environmental protection, it inevitably impacts the environment. Research into protected areas has demonstrated that with effective management and well-defined planning, it is possible to mitigate negative environmental impacts and enhance the positive effects of ecotourism.

To evaluate the environmental damage caused by ecotourism in the protected areas of Adjara, interviews with visitor service specialists and rangers, along with observations on ecotourist routes, have revealed several issues. The pollution of both terrestrial areas and water bodies, such as rivers, ponds, and lakes, with food and household waste is a significant problem. Additionally, noise from entertainment facilities disrupts the ecological balance, frightening birds and other wildlife. There are also instances of visitors violating reserve regulations and causing damage to plants and animals. These issues represent only a portion of the negative impacts associated with ecotourism in these protected areas. It is crucial to recognize that preventing environmental damage is far easier than attempting to repair it once it has occurred.

Based on interviews with visitor service specialists and rangers in Adjara's protected areas, it is clear that those responsible for managing these areas are dedicated to organizing tourism activities while adhering to established rules and considerations. They have implemented measures such as creating ecological trails and installing informational boards. Additionally, they have developed designated walking and educational routes to enhance visitors' ecological awareness and improve recreational services.

Ecological trails have been established to manage tourist flow effectively in Adjara's protected areas. One significant issue is the trampling of these areas, which can damage important vegetation. Rangers focus on ensuring that tourists stay on designated routes to help preserve and protect these vital habitats. Currently, all four protected areas in Adjara have specialized routes for small groups, designed to avoid disrupting the integrity of natural environments while allowing for proper monitoring. These routes are carefully planned to prevent environmental damage. Additionally, the protected areas are equipped with facilities for travelers, including designated spots for resting, camping, lighting fires, and waste disposal. These amenities help minimize fire risks, maintain cleanliness in resting areas, and prevent uncontrolled trampling of the terrain.

The establishment of ecological paths in protected areas is crucial as it helps manage tourist traffic, reduces vegetation trampling, and thus aids in its preservation.

Informational stands with ecological content, including designated spots for resting and stopping, are strategically placed along tourist trails. These stands help minimize the creation of unauthorized parking areas and fire hazards, while also enhancing visitors' ecological education.

Ecotourism plays a vital role in protected areas by addressing various ecological challenges and contributing to their overall management and conservation.

Many plant species in the protected areas of Adjara are listed on international or Georgian red lists. The national park is notable for its rare diversity of endemic and relict plants. Among the rare relict endemics featured on Georgia's red list are the Pontic oak (*Quercus pontica*), Medvedevi birch

(*Betula medwedewii*), Ungern's rhododendron (*Rhododendron ungernii*), and Epigea (*Epigaea gaultherioides*). The latter two evergreen shrubs, along with Medvedevi birch, are found exclusively in Adjara and nearby regions of Turkey.

Although the tourist trails and ecotourism infrastructure in the protected areas of Adjara are generally well-maintained, there remain ongoing threats to the protection and preservation of biodiversity within these areas.

The main threats to the protection and preservation of biodiversity in the protected areas of Adjara, resulting from the development of ecotourism, are summarized in Table 2.

Table 2: *The main threats to the protection and preservation of biodiversity in the protected areas of Adjara*

Impact of ecotourism on the protected areas of Adjara						
	Threats to habitats and endemic relict species	**Reason**	**Impact level (assessment from 1 to 5)**	**Impact threat**	**Problem solution**	**Note**
1	Pollution	Household waste	3	Unaesthetic	Increase in awareness Fines	Negligence by visitors
2	Noise	Disruption of reserve's regimen by visitors	3	Disturbing birds		Rarely
3	Invasion of alien species	Habitat modification, degradation, drainage effect	4	Displacement of native species and dominance over their distribution	Ongoing monitoring and the development of proactive management strategies in alignment with the management plan.	Constantly

Source: The table was compiled using data from the 2023 report of the National Environmental Protection Agency and personal observations by the authors.

Contamination of protected areas, primarily due to visitor negligence, is largely attributed to solid waste pollution, which has been rated 3 out of 5 points in terms of impact. Addressing this issue could involve increasing visitor awareness and implementing fines. Noise pollution, resulting from visitors disregarding recommended guidelines and disturbing birds, is also rated 3 points for its environmental impact.

In the disturbed and degraded habitats within the protected areas and along adjacent paths, there have been instances of invasive plant species establishing themselves *(Spiraea japonica*, *Paspalum dilatatum*, and *Robinia pseudoacacia)*, particularly in Mtirala National Park and its vicinity. However, the Kolkhi forest remains relatively stable. This situation may represent an early stage of invasive species naturalization. Continuous monitoring and development of effective control measures are essential. The threat posed by invasive species to biodiversity is rated 4 points (see Table 3).

Additionally, the growth of ecological tourism in Georgia, particularly in the Adjara region, faces several challenges. These include inadequate legislation, as the legal status of ecological tourism remains unresolved (relevant laws and regulations are incomplete). There is also a need to define and clarify the concept of ecological tourism development. Furthermore, there is a lack of alignment between cooperation interests and the implementation of economic management

mechanisms. Municipal bodies in the region are not fully leveraging their governance roles, which affects their ability to shape tourism policy and regulate tourism effectively [4].

Additionally, several factors hinder the development of tourism in Georgia, including:

- The seasonal nature of tourism, which results in significant periods of underutilization for a substantial portion of service personnel throughout the year;
- The risk of undermining the existing local cultural environment;
- Low awareness among the local population regarding the opportunities of ecological tourism;
- Underdeveloped road infrastructure;
- Lack of state support at both regional and local levels.

Regarding foreign investments, it is important to note that foreign investors have shown limited interest, largely because they do not view the Georgian market as a significant consumer base due to the relatively low income levels. Consequently, attracting foreign tourists to Georgia seems more promising. However, this also presents challenges: not only is there a lack of adequate infrastructure, but it is also crucial to create incentives to encourage their visit.

From our analysis of ecotourism within the contemporary tourism industry, it is clear that ecological tourism requires primary support at the regional level. Regional tourism business associations should take the lead in organizing the ecotourism sector. In our view, these associations need to address the following tasks to advance ecotourism in the Adjara region:

- Developing information systems to support regional ecotourism development programs and providing methodological guidance;
- Establishing effective mechanisms for creating new ecotourism attractions;
- Training skilled personnel to manage entrepreneurial activities within the tourism sector;
- Creating mechanisms for selecting and implementing promising investment projects aimed at advancing ecotourism.

Regional tourism business associations, alongside local administration, regional funds, labor exchanges, and other relevant organizations, should oversee the development of ecotourism infrastructure. This process should follow a state program designed to support ecotourism, which includes enhancing the legal and regulatory framework, improving methodological support and information networks, and building financial infrastructure through the involvement of funds, specialized banks, insurance companies, and investment institutions. Additionally, the program should engage technological, social and business sectors to ensure a comprehensive and effective development of ecotourism infrastructure.

Ecotourism has the potential to draw funds for enhancing the region's ecological security, as well as for its economic and socio-cultural development. Additionally, the growth of ecotourism helps increase public awareness of environmental issues and promotes ecological education.

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