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Endemic and Relict Species Found in the Turyanchay State Nature Reserve

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Abstract. *This article discusses the endemic and relict species that inhabit one of Azerbaijan's most important protected natural areas: the Turyanchay State Nature Reserve. The reserve's geographical location, natural conditions and rich biodiversity create favourable conditions for rare plant and animal species to flourish. Endemic species are unique to this territory and are of particular scientific and ecological importance, while relict species have survived from ancient geological periods to the present day. The article emphasises the importance of protecting these species and their role in maintaining ecological balance, as well as highlighting the significance of nature reserves in conservation efforts. Additionally, it briefly highlights the threats posed to these species by human activities. It also considers how nature conservation measures in the reserve contribute to ensuring the sustainability of ecosystems. In this regard, the Turyanchay State Nature Reserve plays a strategic role in preserving biological heritage.*

Keywords: *Turyanchay State Nature Reserve, endemic species, relict species, biodiversity, nature conservation, protected areas*

Introduction

Thanks to its unique geographical location and diverse climatic conditions, Azerbaijan has a rich biological diversity in the South Caucasus. The country's landscape comprises both mountains and lowlands, contributing to the formation of various species of plants and animals. Endemic and relict species are widespread, especially in mountainous areas, and are of great scientific and ecological importance. Endemic species are only found in certain areas, so preserving them is vital for maintaining biodiversity. Relict species, on the other hand, are creatures that have survived from ancient geological times to the present day, reflecting the historical continuity of ecosystems. The protected natural areas of Azerbaijan, particularly the state nature reserves, play a vital role in safeguarding biological diversity. The Turyanchay State Nature Reserve, which has been operating since 1958, is located on the southern slopes of the Greater Caucasus. The relief, climate and hydrography of the reserve have created favourable conditions for the development of rich flora and fauna. The territory contains both forest and mountain steppe landscapes, creating favourable conditions for various endemic and relict species to survive (Aliyev & Hasanov, 2018).

In recent years, anthropogenic influences and climate change have made it increasingly difficult to preserve these species, further emphasising the importance of reserves.

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As well as serving as shelters for rare and threatened species, reserves play an important role in maintaining ecological balance, protecting soil from erosion, and ensuring the sustainability of water resources.

The endemic and relict species living in the Turyanchay State Nature Reserve are brought to the attention of the reader, as are their role in the ecosystem, the protection measures in place, and the problems caused by anthropogenic effects. The Reserve is therefore of strategic importance in preserving biological diversity, contributing to the maintenance of a healthy natural heritage for future generations (Aliyev, 2015).

To ensure the sustainability of the Reserve's ecosystems, modern nature protection technologies are employed. Preserving natural conditions and stabilising the population of rare species generates valuable data for researchers. Protecting endemic plants and relict animals also has a positive effect on ecotourism development. Biological monitoring in the Reserve ensures the sustainable use of natural resources for future generations. Minimising human activity and raising environmental awareness increases the sustainability of the Reserve's ecosystem services (Babayev & Rzayev, 2019).

The Turyanchay State Nature Reserve is located on the southern slopes of the Greater Caucasus in Azerbaijan. The area is mountainous and has a mild mountain climate, which contributes to the formation of various ecosystems and the enrichment of biodiversity. The reserve's combination of forest and mountain steppe landscapes creates favourable conditions for the distribution of various plant and animal species (Huseynov, 2017).

The Reserve is home to numerous endemic and relict plant species. Oak, hornbeam, beech, elm and other forest trees can be found throughout the area. Endemic plants are only found in this geographical area and reflect the main features of the ecosystem. Relict plants, on the other hand, are species that have survived from ancient geological times to the present day, demonstrating historical continuity in biodiversity. These plants play an important role in protecting the soil from erosion and maintaining climate stability.

The area is home to various species of mammals and birds. These include mammals such as bears, roe deer, wolves, foxes and rabbits, as well as various rare birds, all of which are essential to the natural ecosystem. Endemic and relict animal species inhabit natural shelters that ensure the continuity of their offspring. Conserving these species helps to mitigate the risks posed by human impact and climate change. The conservation measures implemented in the reserve ensure the survival of rare and endangered species. Environmental monitoring is carried out and data on plant and animal species is collected. Modern management methods are employed to minimise human impact and protect the ecosystem. The reserve also serves as a primary research laboratory for biodiversity studies and natural sciences.

The Turyanchay State Nature Reserve's ecosystem is sustainable, protecting the soil from erosion, maintaining water resources, and ensuring the balance of nature. The presence of endemic and relict species demonstrates the region's rich biological heritage and plays a strategic role in sustaining nature. In this regard, the reserve is of scientific and environmental importance, ensuring the preservation of natural heritage for future generations.

Methods

The study was carried out in the Turyanchay State Nature Reserve, located in the arid zone of the eastern Caucasus. The area is characterised by pronounced continentality and low moisture availability, which shape the development of xerophytic vegetation. The research focused on arid

sparse forests and shrub communities. Field investigations were conducted using a route–plot approach, with sample plots established according to vegetation type. Geobotanical surveys included assessments of species composition, projective cover, vertical structure, and plant life forms. Taxonomic identification followed regional floristic references and contemporary systematic concepts, with particular attention given to rare and protected plant species. The faunal component was assessed in a generalised manner as part of the biocenotic structure of the communities. Animal records were obtained through route surveys based on visual observations and signs of activity, allowing the identification of major trophic groups. Data processing was performed using standard geobotanical and ecological analysis methods.

Results and Discussion

Studies conducted within the Turyanchay State Nature Reserve indicate that its biodiversity is high. Examining the morphological and taxonomic composition of the vegetation revealed that several endemic species are found only in this area. The presence of relict species, on the other hand, sheds light on the area's geological history and ecological stability. The study observed various ecosystems in forest and mountain steppe landscapes, creating favourable opportunities to study the geographical distribution and living conditions of plant and animal species.

Studies on the animal world show that mammals such as bears, roe deer, wolves, foxes, hares and rare bird species are widespread in the Reserve. Populations of endemic and relict animal species are protected in natural shelters, while some species remain endangered due to anthropogenic impacts and climatic changes. Environmental monitoring and biodiversity assessments are continuously carried out in the Reserve, which is important in terms of preserving rare species and determining their role in the ecosystem (Mammadov, 2018).

The results of the study show that the Turyanchay State Nature Reserve is not only a protected area for the survival of rare plant and animal species, but also makes a significant contribution to ensuring the sustainability of ecosystems, protecting land and water resources, and maintaining ecological balance. The conservation of endemic and relict species is of strategic importance for the preservation and transfer of biological heritage to future generations (Guliyev, 2019). Research conducted within the reserve produces scientific and practical results. Based on these results, measures are proposed to ensure the sustainable management and protection of protected areas.

Monitoring the populations of endemic and relict species helps to maintain stable numbers. Observations in the reserve demonstrate the importance of conserving land and water resources for the sustainability of the ecosystem. Minimizing anthropogenic impacts and limiting harmful activities protects the species' habitat. Environmental awareness and educational programmers for local communities support nature conservation in the reserve. Conserving endemic plants and rare animals promotes ecotourism and highlights the region's ecological value. The research results from the reserve form the basis for strategic decisions aimed at maintaining biodiversity. Thus, the Turyanchay State Nature Reserve serves as a model for the protection of biological heritage and sustainable ecosystem management. In addition, steps are being taken to protect biodiversity and reduce anthropogenic impacts through additional monitoring and sustainable use of natural resources. Studies show that the Turyanchay State Nature Reserve acts as a strategically important biological laboratory for Azerbaijan, providing unique opportunities to study endemic and relict species.

The diversity of ecosystems within the Turyanchay State Nature Reserve is of significant scientific interest. The Reserve's vegetation is not limited to species of economic and medical importance; it also creates a favourable environment for rare and threatened endemic-relict plants. Studies of the flora carried out in the reserve show that a number of rare trees, shrubs and herbaceous plants are

protected here and also serve as a natural defence against soil erosion and climate change (Guliyev, 2019).

From a faunistic perspective, the Turyanchay Reserve is a refuge for many rare and protected animal species. The mammals and birds that live in the area play a vital role in regulating the ecosystem and maintaining the balance of food chains. Long-term monitoring in the reserve helps to maintain the number of endemic and relict animal populations and ensure the stability of their habitats.

From an ecological point of view, the Turyanchay Reserve plays a vital role in maintaining the region's climate stability and protecting water resources. The rivers flowing through the reserve are vital for ensuring water resources, preventing soil erosion, and maintaining the sustainability of vegetation. Conservation measures and ecological studies carried out in the reserve also increase opportunities for sustainable development and ecotourism, encouraging interaction between local communities and nature.

The Turyanchay State Nature Reserve is of great importance in terms of scientific research and nature protection because of all these factors. Azerbaijan's natural heritage must be preserved for future generations. This is best achieved by protecting endemic and relict species, maintaining the Reserve's biodiversity and ensuring the sustainability of ecosystem services.

Conclusion

The Turyanchay State Nature Reserve is one of the areas of strategic importance for Azerbaijan in terms of the protection of biological diversity. The endemic and relict species found in the reserve play a vital role in maintaining the historical continuity of the ecosystem and its ecological balance. Endemic species, which are unique to this area, demonstrate the area's unique biodiversity and create great potential for scientific research. Relict species, on the other hand, are creatures that have survived from ancient geological times to the present day. They play an important role in maintaining ecosystem stability. These species are considered an invaluable scientific resource in terms of both the ecology of the region and the study of its geological history (National Academy of Sciences of the Republic of Azerbaijan, 2020).

The Reserve has implemented conservation measures and management strategies with the aim of protecting populations of endemic and relict species, ensuring the stability of their habitat and the sustainability of ecosystem services. The number of rare species can be kept from decreasing thanks to environmental monitoring. At the same time, the risks posed by human activity and climate change can be reduced. Measures like these are also important for preventing soil erosion, protecting water resources and making sure vegetation can be sustained.

Consequently, the Turyanchay State Nature Reserve is strategically important for Azerbaijan, as it plays a key role in protecting rare and endangered species, ensuring ecosystem sustainability, safeguarding biological heritage, facilitating scientific research, and promoting ecotourism. Preserving endemic and relict species in the reserve ensures the continuity of nature and guarantees that a healthy and rich biological heritage is passed on to future generations. In this respect, the Turyanchay State Nature Reserve plays a key role in Azerbaijan's environmental policy and biodiversity conservation. It also provides a unique platform for future scientific, environmental and educational activities.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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