International Journal of Research Studies on Environment, Earth, and Allied Sciences (IJRSEAS)
| *Volume-2 Issue-3* |*June-2025* | *ISSN: 3066-0637* | *Website:* https://eesrd.us

Manuscript ID:
IJRSEAS-2025-020311

OPEN ACCESS

Quick Response Code:

Website: https://eesrd.us

DOI: 10.5281/zenodo.17707748

DOI Link:
https://doi.org/10.5281/zenodo.17707748

Volume: 2

Issue: 3

Pp. 64-68

Month: June

Year: 2025

E-ISSN: 3066-0637

Submitted: 05 May 2025

Revised: 15 May 2025

Accepted: 10 June 2025

Published: 30 June 2025

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How to cite this article:
Kumar, R. (2025). Protected Areas and Biodiversity Conservation in Kyrgyzstan and Tajikistan. International Journal of Research Studies on Environment, Earth, and Allied Sciences, 2(3), 64–68.
https://doi.org/10.5281/zenodo.17707748

Protected Areas and Biodiversity Conservation in Kyrgyzstan and Tajikistan

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Abstract

Kyrgyzstan and Tajikistan, two landlocked and mountainous republics of Central Asia, but also two very important biodiversity hotspots within the Tian Shan and the Pamirs. Both areas are important for global biodiversity because they are populated by a relatively high number of species, including many endemics and wild relatives of crop plants that are important for the future of global food security and the resilience of ecosystems, respectively. A thorough study has been made of the legacy of their protected area networks in combination with their general conservation strategies. A comparative analysis of the plans and strategies has been undertaken. The methodology for the research is mainly based on the usage of secondary data derived from relevant databases of known international repute, the various national conservation strategies and, most recently, various scientific reports published. The main findings are mainly directed towards the different trends found in both countries now: one, Tajikistan, has a relatively large area under protection amounting to about 25% of its total national territory with an emphasis on national parks Tajik National Park being one of the largest in the world and the major area of protection. The other, Kyrgyzstan, has a percentage of between 6 - 10% of its total area at this moment under protection, but has recently extended its efforts, (and is going to do so further) to include ecological corridors which have when carried through, will help to maintain the area under protection and extend it. Both countries have major environmental problems in common: the effects of climate change, over-grazing, fragmentation of habitat, etc. However, while the major emphasis in Tajikistan is placed on in situ protection, by means of the extensive areas now protected from human encroachment, Kyrgyzstan emphasizes other approaches with some success especially community-based conservation projects that encourage local participation. The recommendations from the study emphasize the necessity for effective transboundary joint approaches to the series of problems facing both areas: these are of a geographical nature and mainly environment related i.e. the effects of the melting of local glaciers and the ecosystems of the river basins which are so important e.g. to promote ecological resilience and new terrestrial ecosystems and thus fulfil the international biodiversity targets so much needed.

Keywords*: Kyrgyzstan, Tajikistan, Protected Areas, Biodiversity, Comparative Analysis, Kyrgyzstan*

Introduction

Central Asia is characterized by high mountain systems, with Kyrgyzstan and Tajikistan sharing the Tian Shan and Pamir-Alai ecosystems which provide a unique biodiversity amidst arid and semi-arid conditions (Lemenkova, 2014). These two landlocked and predominately mountainous countries face similar environmental problems such as glacial recession, water shortages, and land degradation, which are exacerbated by climate change (Siegfried et al., 2024). Protected areas act as important mechanisms to protect biodiversity as they provide protection for endemic species, genetic resources, and vital ecosystem services including water regulation. Therefore, this comparative study addresses the spatial distribution, governance, and effectiveness of protected areas in each country, with a special focus on the geographical factors that influence conservation outcome. In addition, it thus addresses the large gap in protected area, the major threats facing these countries, and the planning process to date, and aims to provide an insight into transboundary conservation issues in mountainous ecosystems (Ly et al., 2023). This even though the success of protected area in both countries is undermined by many features such as scarce resources both in terms of finance, legislation, enforcement of the laws already in place, together with the increasing impacts of human influences such as over-grazing and infrastructure development leading to habitat fragmentation and reduction of the ecological health of these areas. Furthermore, whilst some countries in Asia have seen considerable increases in the area hopefully to increase satisfactory area coverage, others such as Kuwait have seen declines in area, pointing towards the different national methods of conservation (Farhadinia et al. 2022).

This impeachment of the general purpose is an important one, and all region conservation methods should be looked at in a wider global perspective, in order to note those methods that work satisfactorily and those that present a problem (Farhadinia et al. 2022). In this study we intend to establish a detailed comparative analysis of the conservation networks in Kyrgystan and Tajikistan, outlining the deficiencies and making comments suggesting an outline of how to reduce the differences and enhance transboundary initiatives and modes of conservation to bring about greater success.

Literature Review

The scholarly literature on the biodiversity of Central Asia indicates its importance as a biodiversity hotspot for the world, with more than 5,000 species of vascular plants and important mammals like the snow leopard (Prodanova et al., 2020). The studies also indicate the need for conservation to be imposed in respect to the mountainous areas in the east where high biodiversity areas coincide with anthropogenic redevelopments but where protected area coverage is still under 15% of these important areas (Kotru et al., 2020). The studies in Kyrgyzstan are directed toward the walnuts-fruit tree forests and community conservancies where illegal hunting is present (Hardy et al., 2018). In the literature for Tajikistan an important percentage of the land is cited as being given over to protected areas, and that much ex situ conservation is being considered for endangered species like the Bokharan deer. The comparative studies indicate the larger area given over to protection in Tajikistan, but that both states have in common the results of such problems as overgrazing and population growth. The recent studies have advocated integrated spatial planning to fill in the conservation voids (Dear et al., 2013), but the shortcoming of these protected areas is that they are threatened with loss of value through faults such as lack of funds, ineffective enforcement of regulations and human factors which result in overgrazing and transportation raw material construction which will cut-up habitats and lower the ecological value of these land areas. Data that will need enhancement will be the renewed assessments scheme indicated after the 2025 initiatives, which includes the ecological corridor in Kyrgyzstan. Additional studies will also be needed involving the long-term trials of the new conservation models which essentially feature the transboundary protected areas, centred in the preservation of regional biodiversity in prevailing transferral periods of which the pressure of Man and climate factors are the leading components and, in many cases, still un trespassed areas of the vast ecosystems of southern Asia (Nowak et al., 2024) (Farhadinia et al., 2022).

Methodology

This qualitative comparative study uses secondary data from web searches, official profiles and summaries. The sources are one: World Database on Protected Areas (WDPA), country profiles of the Convention on Biological Diversity (CBD), ecosystem assessments from CEPF and UNEP. The data are analysed in terms of type such as coverage, type of land, type of threat, type of implementation strategy, and type of theme in terms of geographical terms such as topography and transnational dynamics. In terms of limitations, there are the reliance on English language sources and possible outdated measures that have been alleviated by including updates to 2025.

Comparative Analysis

Protected Areas and Biodiversity in Kyrgyzstan

Kyrgyzstan has a total of 35 protected areas, all of which are terrestrial. This amounts to an area of approximately 6% of the country but with plans for the area devoted to protected lands to grow much larger to a target of about 10% by the year 2024 (Akhmatov et al., 2021). There are various types of protected area, including the national parks, nature reserves, and biosphere reserves, the largest of which is the Ysyk-Köl, the lakes area in the east part of the country. Biodiversity is enhanced by 53 species of birds under threat, 26 species of mammals and unique walnut-fruit forests to be found providing gene resources (Hardy et al., 2018). The ecological corridor entitled Ak Ilbirs 2025 amounts to an area of 800,000 ha., that connects these areas into one region, of an extent of over 1.2 million ha. The purpose of this corridor is to help migration of the species against climate change. The necessary conservation efforts needed to achieve this are of three kinds, these being (a) pollution prevention, (b) climate change modifications, and (c) community awareness and involvement, the latter being performed by community conservancies, which tend to help reduce poaching for illegal meat hunting. There are various problems still to be faced, such as small human occupancy in areas of protection, and lack of funds for full and effective management and following up of laws passed (Gillingham et al., 2023).

Protected Areas and Biodiversity in Tajikistan

Tajikistan contains 27 protected regions, or 25% of the landmass, within which is located the huge Tajik National Park. These protected areas are comprised of nature reserves and Ramsar areas (Kotowski et al., 2022). The biodiversity constitutes 1,132 endemic species of plants including 81 mammal species and 385 bird species, with 226 plant species and 162 animals being threatened (Haslinger et al., 2007). Conservation matters in Tajikistan include both in situ and ex situ activities including the National Biodiversity Strategy and Action Plan which seeks to produce ecological networks and a strategy to exploit species in a sustainable fashion. Noteworthy recent events include Tajikistan's prospective membership of the IUCN by 2025 and a commitment to rehabilitate 66,000 hectares of forested areas by 2030. There are significant geographical impediments caused by the rapid population growth and the accompanying spread of agricultural practices in the valley areas (Austen et al., 2022). The success of these protected areas is undermined by a variety of reasons, including insufficient financing, inadequate enforcement of regulations, and the increasing effects of human interference such as overgrazing and infrastructural developments, all of which contributes to the fragmentation of habitats and loss of ecological soundness. These problems notwithstanding, the Pamir Mountains, which are in part situated in Tajikistan, are recognized as a world centre of

biodiversity that must be dealt with in totality of conservation measures across the borders of nations (Cunha, 2018; Kotowski et al., 2022).

Cross-Country Comparison

Both countries place a high priority on mountainous regions, although Tajikistan's large protected area is due to larger, contiguous parks, while Kyrgyzstan seeks to develop ecological corridors. Tajikistan's conservation policies take both an in-situ approach and an ex-situ strategy, underpinned by its National Biodiversity Strategy and Action Plan (known as the BSAP), which seeks to create ecological networks and promote the sustainable use of natural resources. Recent major initiatives include Tajikistan's proposed accession to the IUCN by 2025 and a firm commitment to restore 66,000 hectares of forests by 2030. Nevertheless, significant geographical impediments remain, principally because of myopic population growth and the simultaneous expansion of agriculture in the valleys (Austen et al., 2022). The effectiveness of these protected areas is compounded by several weaknesses with regard to finance, poor enforcement of the regulations and the increasing impact of anthropogenic pressures such as overgrazing and infrastructure development, which all lead to fragmentation of habitats and diminish ecological integrity. Nevertheless, these problems are compounded, and the Pamirs extending into Tajikistan are now considered one of the significant global hotspots for biodiversity requiring comprehensive conservation policies crossing international boundaries (Kotowski et al., 2022).

Biodiversity hotspots are essentially in the eastern part where we have shared species, such as snow leopards, which are faced with trans-boundary pressures. Kyrgyzstan is a leader in the involvement of civil society in conservation, while Tajikistan shows strength in ex situ conservation measures. Common threats are overgrazing, and the melting of glaciers due to climate change, which has a strong impact on water resources (Dear et al., 2013). These common ecological problems emphasize the great need for more trans-boundary cooperation and harmonization of conservation policies to ensure the sustainability of biodiversity in the long term across Central Asia (Kotru et al. 2020). For instance, the management of protected areas which were set up during Soviet times in mountainous areas is not good enough and does not match up with modern concepts of richness in plant species and great concern has to be exercised about relatives of crop wild varieties (Kotowski et al., 2022). The changes brought about by rapid developments occurring within Tajikistan, in terms of economy and infrastructure, represent a great threat to the sustainability of traditional land-use practices and disturb a proper balance in local flora (Nowak et al., 2020). Hence, urgent action plans are very important for putting the priorities of hotspots of plant diversity into a practical form and this like so often is well noted with imperilled ecosystems, such as forests and grasslands (Nowak et al., 2020). Further, the eco-representativeness of the existing protected areas is sadly lacking. There are a number of ecoregions particularly showing less than 17% representation in West and South Asia. Thus, there is much increase in efforts required for the creation of protected areas if global conservation targets are to be made (Farhadinia et al., 2022). Also, the effects of human activities such as roads and mining operations are detrimental and continue to have an important effect on plant diversity, note, even within strict nature reserves (Kotowski et al., 2022). However, there is great land cover by protected areas in Tajikistan, and controlling for the acknowledged need for improvement in conservation, this increased activity in ex situ conservation and the ambitious targets in forest restoration effort indicates that there is a solid commitment to biodiversity conservation operating which could blunt to some extent the pressures on biodiversity of human activities and ensure in the long term the sustainability of the special ecosystems (Nowak et al., 2020). This is borne out also by the renewed effort made by the country to have a membership in IUCN in 2025 and its ambitious restoration of forests tells how important such efforts are and how endangered are the important fruit and nut forests of Central Asia which are down to an estimated 90% of their area now destroyed over the last five decades (Kotowski et al., 2022).

Aspect	Kyrgyzstan	Tajikistan
Protected-Area Coverage	6-10% (1.2M ha)	25% (3.7M ha)
Number of Sites	35	27
Key Types	National parks, reserves, corridors	National parks, reserves, ECONET
Biodiversity Highlights	Walnut forests, 53 endangered birds	1,132 endemics, snow leopards
Main Threats	Overgrazing, settlements	Population growth, agriculture
Strategies	Community conservancies, NBSAP 2024	In/ex situ, NBSAP 2020

Discussion

Geographical similarities offer possible opportunities for joint initiatives such as the 2025 Tajikistan-Kyrgyzstan Environmental Cooperation Agreement. Even though there is a system of protected areas in place, significant gaps in this coverage, particularly in particular ecoregions suggest the need for improved spatial planning. The adverse impacts of climate change on the vulnerability of high-altitude areas highlight the need for adaptive mechanisms which will include the expedition of ecological corridors for species immigration and long-term biodiversity resilience. At the same time, the management of existing protected areas in both countries will not be effective in the face of on-going problems such as inadequate financial resources needed for their management,

inadequate planning and enforcement of existing laws and the increasing pressures created by anthropogenic impact such as overgrazing and infrastructure development, both of which cause habitat fragmentation and resulting decline in ecological integrity. Although Tajikistan has a substantial area of their country set aside for protected areas, and a record of biodiversity conservation, an overall evaluation has indicated that only twelve species found in Tajikistan are at present recorded on the IUCN Global Red Data list (Nowak et al., 2020). This indicates a large gap in the biological research on the protected and endangered species of Tajikistan's flora, when compared to other biodiversity hot spots. The extent of this failure illustrates the urgent requirement for more exhaustive floristic surveys and assessment of the red data listing of the national flora to gain an accurate evaluation of the true extinction risk of Tajikistan's rich plant life (Nowak et al., 2020).

Conclusion

Protected areas of Kyrgyzstan and Tajikistan are essential for the conservation of biodiversity of Central Asia, but there are still great differences in the extent of their area and their effectiveness. For enhancing the ecological resilience of the region, a greater transboundary cooperation and a modernization of anthropogenic activities in conservation is called for. Future research efforts should assess the ecological consequences of conservation corridors after 2025 and of National Biodiversity Strategies and Action Plans.

Acknowledgment

I, Rakesh Kumar, Asst. Prof, Dept. of Geography, Murarka College, Sultanganj, TMBU, Bhagalpur do hereby confirm that there has been no financial support extended to me by any institution to carry out these works and also that there has been no Conflict of Interest to carry out these works and get published.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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