

Animal Diversity in Uttarakhand, India

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(Received 9 July, 2022; Accepted 16 December, 2022)

ABSTRACT

Uttarakhand state is well known for its biodiversity, especially for its animal diversity. The great animal diversity includes about 102 classes of mammals, 69 classes of cold-blooded animals and 19 classes of cold blooded vertebrates. The unique animal diversity of the state attracts tourists from all across the world at large number. In order to protect the animal diversity, wildlife management department of government of Uttarakhand made many strategies and policies. Human activities and loss of habitat, desertification and deforestation and wildlife trade and climate change are the major barriers to the animal diversity in the Uttarakhand state. This paper discussed an overview of animal diversity status in Uttarakhand, focused on biodiversity in Uttarakhand, threats to biodiversity, wildlife management and faunal diversity in Uttarakhand state. Climate change is the major issue in front of the animal diversity. In this regard, it is necessary to take responsibility by everyone to protect the nature that will protect the biodiversity of the state as well as of the world and also help to understand that in future animal diversity the major part of the world.

Key words : Animal Diversity, Biodiversity, Ecosystem, Species, Wildlife.

Introduction

The Himalayas is a bio-diversity destination, with a wide variety of flora and fauna that differ greatly depending on climate. Initially, it is problematic to characterize the iron variety of the forests belong to Himalayan region if an effort is prepared to separate the sorts of forests grounded on the traditional cataloging of tropical as well as sub-tropical and pleasant and mountainous. However, widespread commercial forest felling has been recorded in this region, particularly in recent decades, when urbanization has started to develop in regions close to forestry. While the Himalayan region's forestry, agricultural lands as well as pampas are essential to the agripastoral economy, the other resources based

on renewable energy, water, is been critical for densely occupied plain extends south as well as east (Pullaiah, 2018). The Himalayas is the single largest water capacities in the world and comprises three of the most powerful rivers in the world - namely. Brahmaputra and Indus. In addition, the water supplies, wide expanses of grassland and thick forests have unique advantages such as a great tourism opportunity in some highlands and Himalayan foothills. However, extremely differences in climatic conditions and inaccessible land render exploration and use of all the rich natural resources of the Himalayas challenging.

Uttarakhand is separated into two administrative zones: Kumaun as well as Garhwal, and is situated in India's region of central Himalayan. The state of

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Uttarakhand is noted for its diverse biodiversity and is known as India's natural reservoir. Uttarakhand has a rich range of floral, and faunal, as well as microbial wealth, comprising infrequent and endangered plant and animal species. Uttarakhand is a reservoir of 4907 faunal species of which 3948 species are invertebrates and rest of the 959 species are vertebrates (Negi, 2012). Different endangered and threatened species can be found in the state. Subalpine area residents are Goral, Himalayan black bear, Kakar, Langur, and Leopard, etc., while blue sheep, musk deer, snow leopard, etc. are present at higher altitudes. Peacock, Whistling-thrush and Chakor and other colorful bird species have also been recorded from the state. Wildlife management department of the Uttarakhand make many strategies and policies in order to conserve the faunal diversity of the state. Apart from conservation strategies and policies, there are many reasons which cause threat to faunal diversity of the state such as human activities and loss of habitat, desertification and deforestation, wildlife trade and climate change. Climate change is dominating factor which widely affects the biodiversity of the state. If the world warms, animals in both hemispheres can migrate to higher latitudes and altitudes. CO₂ levels in the environment have an effect on plant physiological activity and species composition. Additionally, marine environments are susceptible to change in climate, specifically coral reefs as well as coastal wetlands (Singh *et al.*, 2008). This paper aimed to discuss about the animal diversity in the Uttarakhand state. In the following sections, biodiversity in Uttarakhand, importance of biodiversity and threats to the biodiversity topics will be discuss. In the last section, animal diversity in Uttarakhand will be discussed.

Types of Ecosystem

A so-called ecosystem is a natural part of living as well as non-living components that interrelate to create a steady system. In addition, biodiversity is an integral component of such an ecosystem. There are primarily two parts of the ecosystem, such as the terrestrial and aquatic ecosystems. Ecosystem can be broadly categorized in two types:

Terrestrial or land Ecosystem

The terrestrial ecosystem is a terrestrial population of animals and relationships between biotic and abiotic ingredients. For instance, terrestrial ecosystems consisting tundra forestry as well as taigas forestry

and temperate deciduous forest, rain forests and tropical moors. The temperature range, annual rainfall, soil type and obtained light determines the type of terrestrial environment in a given region (Stuart Chapin *et al.*, 2012).

Aquatic or water Ecosystem

Freshwater ecosystems such as lakes, ponds, rivers, seas, and streams, as well as wetlands and swamps, are all part of the aquatic ecosystem. Oceans, intertidal areas, beaches, and the seabed are examples of marine ecosystems. In addition, for water-dependent organisms including animals, plants, and microbes, the aquatic environment is the habitat.

Characteristics such as nutrient concentrations, temperature, water flow, and shelter all have an effect on living organisms in a given climate. Furthermore, only those species that can exist in the conditions of a specific ecosystem and use the available resources will be able to survive. The types of species which can be found in an aquatic environment are also influenced by interactions between living organisms. As a result, a greater understanding of aquatic ecosystems' fundamental components and their interactions will lead to better management of human impacts on these environments.

Biodiversity in Uttarakhand

Uttarakhand has a rare and rich array of habitats. The state offers a rich biodiversity, which supports a wide spectrum of flora as well as fauna, forms, from the snow-capped Himalayas to humid mountainous scrub, sub-Mountainous forests; dry as well as humid temperate forests and humid leaf forests. Almost 4048 species of Angiosperm and Gymnosperm from 192 families in 1198 genera are present in the state. Among these are almost 116 species, i.e. their area is restricted to state frontiers, which is unique to Uttarakhand (Rais *et al.*, 2009). According to the International Union for Conservation of Nature's classification scheme, 161 species of flora present in Uttarakhand are mentioned as rare or threatened International Union for Conservation of Nature (IUCN). Over 150 species of Orchids have been recorded from the North Western Himalayas, out of a total of 223 species.

A large range of faunal types are also supported by this great floral diversity. It includes about 102 mammal species, 623 bird species, 124 fish species, 69 reptile species, and 19 amphibian species. Extremely endangered animals including the Snow

Leopard, Tiger, Asian Elephant, Bharal, Himalayan Monal, Cheer Pheasant and King Cobra are ideal habitats in the forestry of state of Uttarakhand. These valuable usual resource is our communalin heritance. For conserving this legacy, the Uttarakhand State has set up 12 "Protected" zones, including six National Parks as well as six Preserves of Wildlife. Almost 65% of State's geographic territory is covered by vegetation, with over 12% covered by the network of the Dwindling Range. This strokes the national mediocre by a fair fringe and tests the government's contribution to conservation (Uttarakhand Tourism Board, 2020). The Corbett National Park was established in 1936 and is Asia's first national park. The Nandadevi Biosphere Reserve, established under UNESCO's "Man and Biosphere" programme, has the honor of being the only Biosphere Reserve in Uttarakhand and the second in the world. This abundance of biodiversity is Uttarakhand's pride.

Threats to Biodiversity

Since Uttarakhand is a newly established state, the government has proposed or will propose several developmental and planning projects in the near

future. It would be a significant danger to the state's biodiversity if the potential impacts of these projects were not taken into account. The main potential biodiversity problems for the regions are set out below:

- Habitat degradation for illegal, commercial and developmental purposes
- Deliberate forest fires
- Overgrazing of grass that also leads to soil degradation
- Diversion of forest land for non-forest purposes
- Exotic species and weed infestation that is not suitable for indigenous species
- Over exploitation of the flora for medicinal purposes, or for timber has le to the extinction of flora and loss of habitat of fauna.
- Faulty agricultural practices and indiscriminate use of fertilizers and pesticides
- Mining
- Introduction of hydroelectric projects
- Pollution in water bodies
- Mismanagement of water resources leading to loss of aquatic biodiversity
- Tourism is the major cause of pollution
- Road and railway construction leads to loss of

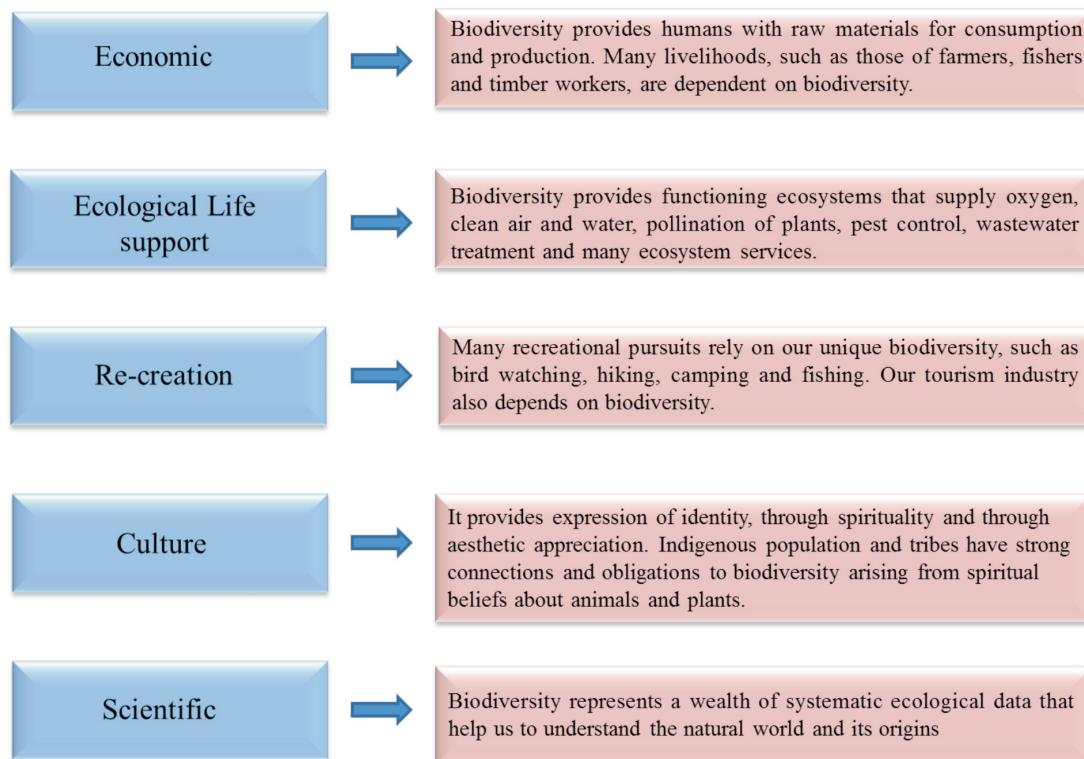


Fig. 1. Schematic Representation of the Importance of Biodiversity.

natural forests as well as of animals (due to accidents)

- Poaching and illegal trading of wildlife products
- Climate change

Importance of Biodiversity

Biodiversity is called the number of different organisms and their relative frequencies in the environment. It also represents the composition of organisms at different stages. Biodiversity has ecological and economic value. It offers us food, shelter, fuel, clothing and a range of other requirements. It also benefits from tourism's financial profits. Therefore, a good understanding of biodiversity is very important for a balanced lifestyle. Biodiversity and its preservation are very necessary in order to preserve life on earth. A few of the reasons explaining the importance of biodiversity is shown in the Figure 1.

Conservation Strategies and Policies

Biodiversity is crucial for our survival as well as the well-being of any given area because it provides the fundamental building blocks for the many goods and services that allow us to live in a healthy environment. It is also our responsibility to look after biodiversity so that it remains protected. But sadly, because of a person's malpractices, biodiversity has been adversely affected. The government has taken a variety of steps to conserve it, as well as several public awareness campaigns to educate people about its significance. The Uttarakhand government is also aware of the challenges faced by biodiversity loss, and as a result, several significant measures to preserve biodiversity have been proposed, including the establishment of endangered region networks, national parks, wildlife spans, Medicinal Plant Conservation Areas (MPCAS), herbal grounds, arboretums as well as parks, and menageries. Six National Parks, 6 Biodiversity Preserves, a Biosphere conserve, 1 site of World Heritage, 2 Elephant Varieties and 2 Conservation Reserves are in Uttarakhand and occupy an area of 0.73 million hectares (Uttarakhand Tourism Board, 2020). The different priorities of environmental policies are as follows:

- Conservancies of state's heritage of nature, consisting the rare rich biodiversity as well as delicate habitats, such as the trees, lakes, wetlands and mountains; wild and domesticated biodiversity. Giving priority to in situ preservation of biological as well as traditional diversity

of the Uttarakhand state positioned both inside as well as outside restricted regions of the state.

- Ex situ conservation of flora, fauna, and floral and faunal genetic resources.
- Developing policies and activities for the preservation of sector of agriculture, as well as livestock, provender and ethnobotanical diversity.
- Using biodiversity and natural resources sustainably.

Wildlife Management in Uttarakhand

The recently established Uttarakhand state is known for its exceptional biodiversity. In various regions of state various forestry sorts ranging from Himalayas to Terai are found because of the geographical and climate diversity. Because of the ecology of the Province, 12 percent of the entire geographical region includes six national parks, seven nature shrines, four natural reserves, and one sanctuary for the biosphere. In Uttarakhand there live rare plant and animal species, many of them endangered by nature preserve as well as reserves. Jim Corbett national park in Ramnagar, in the Nainital district and in Chamoli national park of the Gorge of Flowers are the National Park of the Jim Corbett National Park, which is a UNESCO World Patrimony site in Uttarakhand (Haleem *et al.*, 2014). Various species of plants in the valley, including those not recorded elsewhere in Uttarakhand, are endangered from around the world. Rajaji National Park in the District of Haridwar and Govind Pashu Vihar National Park and Sanctuary in the District of Uttarkashi as well as Gangotri National Park in the District of Uttarkashi are also state protected areas. Scientific surveys have shown that in this state there are 102 mammals as well as 600 birds and 19 amphibians, 70 reptiles and 124 classes. The Tigers (*Panthera tigris*), Asian Elephants (*Elephas maximus*), Guldar (*Panthera pardus*), Snow leopards (*Panthera uncial*), Musk deer (*Moschus chrysogaster*), Monal (*Lophophorus impejanus*), and others are all endangered species worldwide. The conservation of nature is largely responsible for the preservation of habitats in Uttarakhand's protected areas.

Animal Diversity in Uttarakhand

Uttarakhand is a state in northern India, surrounded by greenery on the foothills of the snow-capped Himalayas. The flora as well as fauna in the state is diverse. Uttarakhand has a gorgeous and varied range of flora, fauna and microbial together within

frequent, endangered classes of plants as well as animals. In the past the mountains were covered with moist lamb forest in Uttarakhand's lower regions. Natural vegetation dominates between 1,500 and 3,000 meters between Fir, Oak, Rhododendron, Walnut and Larch (Nicolaysen *et al.*, 2014). The underneath snowline is covered by Spruce, Fir, Cypress, Juniper and Birch trees, while moose, Lichen and a variety of wild plant including Blue-Poppies as well as Edelweiss are above the snowline (at the higher altitude of the state). Much of unique fauna in the Himalayas is constrained as a result of deforestation to protected areas and shrines. Himalayan Bears, Musk Deer, Ghoral wild goat, Bharal or Blue goat, Wolves and Snow Leopards are among the most common animals in the area, as are Barking Deer (Elmqvist *et al.*, 2013). The avifauna in the area, with over 500 classes of birds, is considered one of the unlikeliest on the sub-continent.

A total of 4907 animal species, including 3948 invertebrate fauna and 959 vertebrate fauna, have been recorded. There is an admixture of Oriental, Palaerectic, and IndoMalayan components in the fauna. It is home to several species of vertebrates and invertebrates, both endemic and endangered. Table 1 show the status of the faunal diversity and Table 2 represents the different animal found in Uttarakhand.

Table 1. Status of Faunal Diversity in Uttarakhand state (Uttarakhand Biodiversity Board, 2021)

Faunal Diversity	Number of Species
Thysanura	4
Odonata	163
Plecoptera	20
Orthoptera	116
Dermaptera	43
Isoptera	52
Hemiptera	479
Coleoptera	422
Lepidoptera	567
Trichoptera	60
Hymenoptera	235
Ichneumonidae	302
Diptera	676
Fishes	142
Amphibia	20
Reptiles	75
Aves	622
Mammals	100

Discussion

The highlight of the verdant green state of Uttarakhand is the wealthy wildlife. What appear to be dense oak and deodar forests are actually home to a diverse variety of recognizable and unknown trees and plants. The state is home to a plethora of wild animals, the most famous of which is the tiger. It is definitely one of the best nature tourism destinations in India. The state also has several birds nesting in numerous trees as well as melodic with their sugary squeaks to the unreal environment. The mountainous wilderness is a major part of the abundant and varied biodiversity of Uttarakhand. Uttarakhand has twelve national parks and wildlife reserves, which represent about 13.8 percent of entire land region. In the down lands along with a highest height of 800 meters, in the mountains at 5400 meters, the many parks and preserves are a haven even for nature enthusiasts and lovers of wildlife. The Asan Dam and the Jhilmil Tal are also a Conservational Reserve and both are World Heritage Sites, as well as Nanda Devi Biosphere Reserve and Flowers Valley national parks.

A variety of wildlife are checked in the state by the most common animals Tiger, Black Bear, Indian Elephant, Leopard, Rhesus Monkey, Langur, Ghoral as well as Wild Dog. Uttarakhand, which is also the oldest tiger reservation, is the proud owners of India's oldest national park, Corbett. Black bear as well as snow leopard and musk deer and brown bear and red fox are some unusual and rare species of wild animals. Sheep are wild and wild. Apart from this biodiversity reserve, Binog Wildlife Sanctuary and Gangotri National Park welcome nature lovers, artists and explorers, as well as adventurers and wildlife enthusiasts from all over the country. Binog Wildlife.

Conclusion

The current state of Uttarakhand conforms to a rich patrimonial status supported by animals, trees, forestry, stable and pristine ecosystems and considerable species to genetic and ecological levels conservation efforts. Because of its unique wildlife diversity, the state is also shelter to many rare and imperiled animal species. The state consists of 102 mammals, six hundred birds, 19 amphibians as well as 70 reptiles and one hundred twenty four fish classes.

Table 2. Different Animals found in Uttarakhand.







S.No.	Animal Species	Scientific name	Image
1	Elephant	<i>Elephas</i>	
2	Barking Deer	<i>Muntiacus</i>	
3	Bharal	<i>Pseudois nayaur</i>	
4	Black Bear	<i>Euarctos americanus</i>	
5	Ghoral	<i>Nemorhaedus goral</i>	
6	Musk Deer	<i>Moschus leucogaster</i>	

Table 2. Continued ...








S.No.	Animal Species	Scientific name	Image
7	Serow	<i>Capricornis sumatraensis</i>	
8	Leopard	<i>Panthera Pardus</i>	
9	Sambar	<i>Rusa unicolor</i>	
10	Snow Leopard	<i>Panthera Uncia</i>	
11	Spotted Deer	<i>Axis axis</i>	
12	Swamp Deer	<i>Rucervus Duvaucelii</i>	

Table 2. *Continued ...*

S.No.	Animal Species	Scientific name	Image
13	Tiger	<i>Panthera tigris</i>	

Worldwide endangered classes among the aforementioned species, such as the tiger, Asian elephant, Guldar, Musk deer, snow leopard, Monal, and others. Wildlife conservation is largely responsible for animal diversity conservation in Uttarakhand's protected areas. Continuous efforts of the state government related to biodiversity conservations, protects so many rare species in the state, that makes Uttarakhand center of attraction of many tourists from all across the world. Apart from state government efforts, every individual must take responsibility to protect the environment and nature.

Acknowledgements

Authors acknowledge the immense help received from the scholars whose articles are cited and included in references to this manuscript. The authors are also grateful to authors/ editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

Conflict of interest

Authors are requested to disclose interests that are directly or indirectly related to the work submitted for publication.

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