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Short Communication

Biodiversity of Arunachal Pradesh and its Conservation

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***Abstract*:** The Northeast States of India and Arunachal Pradesh, in particular, are blessed with large numbers of rare and endemic species, for which region is recognized as a biodiversity hotspot. The region nurtures 5000 species of flowering plants, seven primates out of 16 found in the world, 770 species of birds etc. Due to various reasons, the species' wide variety and variability and habitat are deteriorating with time: deforestation, encroachment, forest fire, illegal hunting and extraction, and rapid urbanization.

Keywords: Arunachal Pradesh, Biodiversity, Endemic, Hotspot, Species.

Introduction

Biodiversity may be defined as variety in life forms or "the variety of life on Earth at all its levels, from genes to ecosystems, and the ecological and evolutionary processes that sustain it." (Bynum,2022). The north eastern region has been recognized on the world map for its rich biodiversity in flora and fauna. This region has been a priority for leading conservation agencies of the world. At the same time, WWF has identified the entire Eastern Himalayas as a priority. Globally important 200 Ecoregion. In contrast, Conservation International has upscaled the Eastern Himalaya Hotspot, which initially covered the states of Arunachal Pradesh, Sikkim, Darjeeling Hills, Bhutan, and Southern China, to the Indo Burma Hotspot, which now comprises all the eight states of North-East India, along with the neighbouring nations of Bhutan, southern China and Myanmar (Roy et al. 2015). Because of its many endemic species, North-East India has been recognized as a biodiversity hotspot (Chatterjee et al. 2006). Still, biodiversity is getting damaged due to anthropogenic activities and interference with nature. Still, we need to remember that the only key to our survival and existence is the conservation and preservation of this biodiversity.

Biodiversity in Arunachal Pradesh

Arunachal Pradesh is positioned between 26.28°N and 29.30°N latitude and 91.20°E and 97.30° E longitude. It has 83,743square km, which is about 2.6% of India's land and is the largest state amongst the North-eastern states of the country, with a forest cover of 79.33% covering 66431 square km (ISFR- 2021). The state falls within the Eastern Himalaya biodiversity hotspot supported by diverse habitats and wide topographical

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variation with considerable faunal and floral endemicity. The land topography forms four distinct physiographical divisions of the state: the Himalayan Ranges, the Mishmi Hills, the Naga-Patkoi Ranges, and the Brahmaputra plains. Therefore, the elevation ranges from 120m above sea level on the edge of the foothill to above 7000 m above sea level on its northern border (Himalayan Ranges), forming its physiography predominantly mountainous with river valleys, dense forests and hilly rugged terrain. This unique geographical extent of Arunachal Pradesh is blessed with rich floral and faunal diversity. The state is estimated that over 5000 species of flowering plants occur in this territory (of both vascular and non-vascular origin) (Bhatnagar et al. (2017). Out of which 238 are pervasive in the state, 600 species of orchids, 89 species of bamboos, 18 species of canes, 400 ferns, 24 species of gymnosperms and equally high numbers of fungi, lichens and bryophytes. The vegetation/forests are classified under six categories, i.e. tropical, subtropical, temperate, subalpine and alpine vegetation, secondary forests and aquatic vegetation; each comprises subtypes primarily based on altitude and climatic factors. Out of 16 primates in the world, seven are found in Arunachal Pradesh. The state has astonishingly rich avifauna with over 770 bird species. The form is unique in having traditional rights of various tribes over land, water and forest within their jurisdiction. Around 26 major tribes in Arunachal Pradesh with more than 100 sub-tribes inhabit different parts of the state, with an intricate lifestyle dependent on forest resources, making the entire region a cultural landscape. Each tribe as a community movements control over the natural resources within their surroundings and sustainable use of the resources for shelter, cultivation, food, and other day-to-day multifarious services.

Level of Biodiversity

a) The genetic diversity: The total of all the genes is called the gene pool. Genetic diversity refers to the distinction of genes within a species. The closer a species is to one another, the more genetic information the two species will share. The genetic diversity or variation enables the population to adapt to its environment and respond to natural selection, which ultimately leads to speciation or the origin of a new species. It has a crucial role in maintaining diversity at the species and community levels. Genetic diversity within a species often surges with environmental inconsistency.

b) Species diversity: A wide variety of species exists in an environment, and species diversity refers to the combination of species within a region. The most straightforward measure of species diversity is species richness, i.e. the number of species per unit area. Generally, the greater the species' prosperity, the greater the species diversity. The over-all number of species in the world is in between 10 to 100 million, however, only 1.75 million species have been named scientifically to date (Pott. R 2016).

c) Ecosystem diversity: Ecosystem diversity is the variety of ecosystems in an area. It includes the complex network of various species present plus all the abiotic factors characteristic of a region. For example, an ecosystem can cover a small area, like a pond or a large area like a desert; an ecosystem has soil, temperature, rainfall patterns, and solar radiation that affect not only what species occur there but also the morphology, behaviour, interactions among those species and flow of energy. Ecosystem diversity describes the number of niches, trophic levels, and various ecological processes that sustain energy flow, food webs, and nutrient recycling.

Values of Biodiversity

- Biodiversity provides excellent conditions for and drives the processes that sustain species' survival.
- Biodiversity provides ecological, economic and cultural values to the world's community.
- Climate change is changing species distribution through shifting habitat, changing life cycles, and the development of new physical traits.
- People need ecosystems for adaptation, and ecosystems need people.
- Biodiversity plays a significant role in meeting human needs in the form of food, drugs, fibre pulp, fuel, and wood directly while maintaining the ecological processes upon which our survival depends.
- Biodiversity is a national asset and a mighty contributor to economic development, natural resource provision, ecological processes, and improving human wellbeing.

Threats to biodiversity

a) Continuous increases in the human population and rapid urbanization lead to the escalating demand for our natural resources.
b) The rise in demand for food led to the conversion of forested land to agriculture like jhum cultivation.
c) Loss of habitat to grazing land, mass felling of timber, construction of roads and town.
d) The conversion of the primary forest into secondary or degraded forest mainly due to jhuming (shifting cultivation) (ToI, 2011)
e) Habitat loss leads to the formation of isolated, small, scattered populations.
f) These small populations are increasingly vulnerable to inbreeding, which causes loss of gene pool, high infant mortality, and susceptibility to environmental changes, which may lead to the extinction of the species.
g) Encroachment of forestland is a severe threat to forests and its resources degradation. This has caused loss of forest area and resources and has created human and wildlife conflict. The situation is alarming in our states and needs a strong political will to address the problem.

h) Hunting for various body parts of animals.

i) Illegal trade of skins, tusks, hair, horns

j) Many animals fall prey to indiscriminate hunting using modern guns or various types of traps.

k) Natural climatic like soil erosion, flood, forest fire etc., also play a significant role in biodiversity loss.

Biodiversity Conservation

Biodiversity conservation refers to the protection, preservation, and management of ecosystem and natural habitats, which form the foundation for sustainable development. However, the various types of anthropogenic activities rapidly degrade biological diversity in genes, species, and ecosystems. The scale of human impact on biological diversity has been increasing exponentially primarily because of worldwide patterns of consumption, production, trade, agricultural, industrial and settlement development, and human population growth. Neither the economic nor the ecosystem value of biodiversity is as yet well understood. There is insufficient knowledge of the interdependence of species in the ecosystems and the impact of the extinction of one species on another. Hence, reducing the rate of biodiversity loss and conserving still existing biodiversity as the basis of sustainable development remains a major global challenge. There are two types of methods in biodiversity conservation:

- In-situ conservation (at the place)

In situ conservation refers to species preservation in their natural habitats and ecosystems where organisms naturally occur, i.e., on-site protection. It involves protecting and maintaining the natural habitat or environment of the species by eliminating all the factors that may endanger the species' existence. The conservation of organisms in

- Biosphere Reserves (terrestrial and marine)
- National parks
- Wildlife sanctuaries
- Sacred groves
- Biodiversity hotspots are all examples of in-situ conservation.
- Ex-situ conservation (out of place)

Ex-situ conservation is biodiversity conservation outside their natural habitat, environment, or ecosystem. It involves relocating a target species away from its native habitat to a place of safety. Its principal objective is to support conservation by ensuring the survival of threatened species and the maintenance of associated genetic diversity. Ex-situ conservation preserves a target species' genetic or reproductive material or takes care of the species for reintroduction. Example of ex situ conservation;

- Zoological garden

- Botanical garden
- Seed bank

Existing Protected areas in Arunachal Pradesh

Sl.No	National Park/Sanctuaries/ Biosphere Reserve	District	Area (in Sq. Kms)	Major Animals
1.	DihangDebang BiosphereReserve	Upper Siang and Dibang Valley	5112.00	Clouded/Snow Leopard, Musk Deer, Takin, Elephant, Bison, Deer Macaques and Rare Birds and Snakes
2.	Namadapha National Park	Changlang	1985.00	Hoolock Gibbon, Tiger, Clouded/Snow Leopard, Musk Deer, Takin, Capped Langur and Rare Birds.
3.	Mouling National Park	Upper Siang	483.00	Takin, Serow, Red Panda, Goral Leopard, Black Bear, Pheasants Etc
4.	Pakhui Wildlife Sanctuary	East Kameng	861.95	Elephant, Tiger, Gaur, Sambar, Barking Deer, Bintorong, Leopard, Pheasants, etc.
5.	Itanagar Wildlife Sanctuary	Papumpare	140.30	Elephant, Tiger, Leopard, Serow, Barking Deer and Birds
6	D'Ering wildlife Sanctuary	East Siang	190.00	Hog Deer, Hispid Hare, Bengal Pelican, Reptiles and Migratory Birds
7.	Mehao Wildlife Sanctuary	Dibang Valley	281.50	Elephant, Tiger, leopard, Red Panda, Hoolock Gibbon etc
8.	Kamlang Wildlife Sanctuary	Lohit	783.00	Tiger, Takin, Leopard, Red Panda, Hoolock Gibbon etc
9.	Eaglenest Wildlife Sanctuary	West Kameng	217.00	Elephant, Serow, Red Panda, Sambar, Black Bear, Goral etc
10.	Kane Wildlife Sanctuary	East Siang	55.00	Elephant, Deers and small cats
11	Dibang Wildlife Sanctuary	Dibang Valley	4149.00	Takin, Sero, Leopard, Red Panda, Goral, Monal, Tragopan, Black Bear, KalijPhesant, rare birds etc
12	Sessa Orchid	West Kameng	100.00	Orchids, Red Panda, Goral etc
13	Tale Valley wildlife sanctuary	Lower Subansiri	337	Temperate Flora and Fauna

Source: Arunachal Pradesh State Biodiversity Strategy and Action Plan, 2002

Proposed Protected Areas in Arunachal Pradesh, India

Sl.No	Proposed Protected Area	District
1	Tawang Wildlife Sanctuary	Tawang
2	Tawang National Park	Tawang
3	Kalaktang Wildlife Sanctuary	West Kameng
4	Palin Wildlife Sanctuary	KurungKume
5	Karsinganala Wildlife Sanctuary	Papumpare
6	Raneghat Wildlife Sanctuary	East Siang
7	Walong Wildlife Sanctuary	Anjaw
8	Walong Wildlife Sanctuary	Anjaw
9	Tirap Evergreen National Park	Tirap

Source: Biodiversity Significance of North East India, 2006

Discussion

The Arunachal Pradesh is bestowed and blessed with varied flora and fauna. Many of which are rare and endemic to the state. The unique geographical features of the state, predominantly mountainous with river valleys, dense forests and hilly rugged terrain, are best suited for the growth of species that enhance the diversity and species richness of the country. Due to its richness of biodiversity, the region has been recognized as a biodiversity hotspot. Still, biodiversity is getting damaged due to anthropogenic activities and interference with nature. Still, we need to remember that the only key to our survival, existence, and flourishing of biodiversity is conservation and preservation. Awareness among the general public is the most important for the continuation of biodiversity.

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