Conserving the Green and Wild: Collaborative Approaches to Forest and Wildlife Preservation

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Abstract

Forests and wildlife are vital to the health of our planet, providing critical ecological, economic, and cultural benefits. However, rapid urbanization, deforestation, climate change, and poaching have led to alarming rates of habitat loss and a decline in biodiversity. This chapter examines collaborative approaches to forest and wildlife preservation, highlighting the significance of partnerships among governments, conservation organizations, local communities, and scientific researchers. The study highlights successful strategies, such as community-based conservation programs, integrating indigenous knowledge, and implementing innovative technologies like remote sensing and artificial intelligence for monitoring ecosystems. It also examines policy frameworks that support sustainable land use and biodiversity conservation. This chapter advocates for inclusive and adaptive solutions, underscoring the need for shared responsibility in fostering resilient ecosystems. Collaborative efforts are key to reversing ecological degradation and essential for ensuring the long-term coexistence of humans and nature.

Keywords: Conservation, Biodiversity, Wildlife, Green, Satellite, Poaching, Logging

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Introduction

Wildlife and forests are the most crucial components that maintain the earth by stabilizing the ecosystem (Oguh et al., 2021). Wild animals constitute a component of the food chain system. They are liable for keeping the ecology in balance. To ensure the natural equilibrium, wildlife must be protected (Basilashvili, 2021). The forests supply a variety of resources, including wood, fiber, timber, and additional raw materials for residential and commercial use. They absorb toxic CO_2 and regulate the Earth's atmosphere and temperature. They also help to keep soil in place and prevent erosion (Islam, 2024). Despite the importance of forests, we must acknowledge the most crucial factor of forests, which is playing the role of the planet's lungs, which purify all the toxicants and provide the toxicant-free air to breathe (Sharma et al., 2023).

Besides all these vulnerable assets, they decrease gradually because of the human activities that are done very bluntly and harshly (Ryser et al., 2021). If these situations remain the same, no doubt, within the next few years, we will run out of these natural resources and remain empty-handed (Sathvara et al., 2024). As the threats increase toward the existence of green and wild, the methods to conserve them must be adapted, and for this, new, innovative, and up-to-date techniques are required (Banaduc et al., 2022). Conservation initiatives are shifting from top-down techniques to more sustainable tactics, including local people. Wildlife advocacy groups are adopting collaborative tactics that promote a commonality of cooperation and shared responsibility, acknowledging the significant impact that residents may have on their ecosystem (McIntyre and Schultz, 2020).

Working with local communities (Collaborative Approaches) is one of the most promising strategies. The preservation of their ecological assets is important to the local population (Lomaeva et al., 2024). They have a thorough awareness of the surrounding environment and frequently depend on these natural assets for their livelihoods. Wildlife organizations can create more sustainable and successful conservation plans by collaborating with local communities (Bennett et al., 2021). Wildlife organizations have been collaborating with local communities in recognition of the importance of local expertise and community involvement in effectively addressing environmental issues (Nkansah, 2023).

Wildlife is now at the forefront of our attention due to the status of the world (Fletcher et al., 2023). Destroying biodiversity is a reflection of issues that affect our planet's biodiversity, whereas wildlife and green conservation provide a forum for the importance of protecting their surroundings and the diversity of the species, whether it be plants or animals (Upreti, 2023).

This chapter relays how many innovative ways are used nowadays to restore biodiversity (plants and animals) and greenery from extinction. This will highlight the role of the NGOs, the local communities, and the surrounding localities in the preservation of wildlife. The role of government and the use of Indigenous knowledge to conserve biodiversity is described in the chapter

1. The State of Global Forests and Wildlife

i. Current Trends in Deforestation and Habitat Loss

The main reason for deforestation is the loss of trees (Bodo et al., 2021). Almost 24% of global tree loss was calculated in 2023, which is 21% more than in 2022 (Vacek et al., 2023). Not only does the reduction in trees cause deforestation, but certain other reasons cause deforestation, which might include: Poor infrastructure (construction of roads) (Miyamoto, 2020) and agricultural land (livestock farming and the artifact of palm and soy oil) (Brown and Pearce, 2023). Habitat loss is due to human activities (urbanization), and climate change (temperature-specific creatures, i.e., fish). Here's an interesting fact: There is a direct relationship between deforestation and habitat loss (Puttker et al., 2020).

ii. Biodiversity Under Threat: Key Species at Risk

Biodiversity is deteriorating at an unprecedented rate worldwide, with around 1 million plant species, animals, and fungi potentially facing extinction in the coming decades (Halder & Jha, 2023). The factors that play a pivotal role in the loss of biodiversity are: overgrazing, soil erosion, water logging, over-harvesting, desertification, chemical pollution, alien invasive species, and salinization. The species that are at risk of extinction are as follows:

Table 1: List of Endangered Species

Name	Kingdom	Population status	Habitat	Threats	Example Study
Sun Bear	Animalia	Vulnerable (VU)	Terrestrial (Forest, Shrubland)	Agriculture, Mining, and Urbanization	Kunde et al., 2020
Otter Civet	Animalia	Endangered (EN)	Terrestrial (Forest, Wetland)	Pollution, Hunting, and industrialization	Moßbrucker et al., 2020
Maned Wolf	Animalia	Near Threatened (NT)	Terrestrial (Shrubland, Savana, Wetland)	Agriculture, Urbanization, Hunting	Kasper et al., 2024
Malay Tapir	Animalia	Endangered (EN)	Terrestrial (wetland, Grassland)	Mining, Human Intrusion Trapping	Donny et al., 2020
Voanioala gerardii	Plantae	Critically Endangered (CR)	Terrestrial (Forest)	Uses as local food, Agriculture	Rakotoarinivo et al., 2020
Uebal mannia	Plantae	Critically Endangered (CR)	Terrestrial (Savana)	Livestock Farming, Fire, and Ranching	Zappi et al., 2024

iii. The Ecological, Social, and Economic Value of Forests and Wildlife

Forests and wildlife have ecological aspects, including water, carbon storage, oxygen, biodiversity, and soil (Gao et al., 2022). However, they also provide social benefits, including health, food, grazing, culture, and tourism (Koing et al., 2021). In addition to the social and ecological benefits, forests and wildlife generate economic profits, such as ecosystem services, national development, poverty reduction, non-timber products, employment, and raw materials (Lazaridou et al., 2021).

2. Conservation Policies and Framework

i. International Agreement

Certain agreements exist, but we discussed the most renowned ones, which include the Ramsar Convention on Wetland, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Convention on Biological Diversity (CBD). CBD was adopted in 1992 in Rio de Janeiro by the United Nations Conference on Environment and Development (UNCED) (Jordan & Brown, 2021). The main focus of CBD is to preserve and utilize biological diversity sustainably at the species, genetic, and ecological levels. CITES plays the utmost role in regulating rules and laws in the international trading of fauna and flora to prevent them from being brushed aside (Volanska, 2023).

Table 2: National Parks in Pakistan for the Conservation of Wildlife

Name of National Park	Territory	Area (Hectares)	Year of Declaration	Characteristics	Study Example
Toli Pir	AJK	5,045	2005	For wildlife conservation	Ullah et al., 2022
Pir Lasora	AJK	5,625	2005	Provides a natural habitat for biodiversity	Ahmad et al., 2021
Ghamot	AJK	27,934	2004	Provides a natural habitat for wildlife	Jahangeer et al., 2024
Lake Saiful Muluk	KPK	4,867	2003	For Natural and Cultural Biodiversity	Tanee et al., 2021
Lake Lulu Sar	KPK	30,375	2003	For the protection of wildlife	Inam et al., 2021
Central Karakorum	GB	13,90,100	1995	Comprises on Hispar and Biafo glaciers and their tributary glacier	Baig et al., 2022
Chinji	Punjab	6,095	1987	For wildlife conservation	Kanwal & Ashraf, 2021
Lal Sohanra	Punjab	87,426	1972	Provides natural habitat	Asif et al., 2024

AJK: Azad Jammu Kashmir; KPK: Khyber Pakhtunkhwa; GB: Gilgit Baltistan

ii. National and Regional Conservation Law

Every country has laws and regulations for protecting and conserving wildlife and forests. Likewise, Pakistan has a law to prevent biodiversity from extinction (Javed et al., 2024). The rules followed in Pakistan are the West Pakistan Wildlife Conservation Act of 1959 and the West Pakistan Wildlife Conservation Act of 1960 (Hussain et al., 2021).

iii. Protected Areas and Wildlife Reserves

Certain wildlife reserves, such as parks and sanctuaries, are in Pakistan, and almost all are under the jurisdiction of the Pakistan Environmental Protection Agency (Pak-EPA) (Raaq and Ali, 2023). The most applicable policy is EPA-1997(Creager, 2021).

3. Collaborative Approaches to Conservation

i. Role of Government in Forest and Wildlife Protection

One of the major roles that the government can play is implementing the Forest Conservation Act (Borner et al., 2020). In addition to implementing the act, the government can create protected areas like biosphere reservoirs, national parks, and wildlife sanctuaries (Kelkar, 2023). In particular, in Pakistan, certain provincial policies and legislation like the Punjab Wildlife Act, 1974, and the Sindh Wildlife Ordinance, 1972 (Hussain et al., 2021).

ii. NGOs And Conservative Partnership

The NGOs making a global impact include: a) World Wildlife Fund, b) Conservation International, c) Greenpeace, and d) The Natural Conservancy (McCormick, 2023). All of these play the most important role in the preservation by raising the voice (conducting seminars, and campaigns, awarding the people about the importance of species reliability), Fundraiser (establishing the protected area on a small scale) (Gali and Schechter, 2020), protecting the land (from deforestation, soil erosion, habitat fragmentation). Many NGOs collaborate to address the locals to preserve biodiversity with the slogan 'Save Tree Save Earth' (Raimi et al., 2022).

4. Community-Driven Conservation Modes

i. Community-Based Forest Management Success Story

One of the most successful stories is about the mangrove forest (Jadin and Rousseau, 2022). The mangrove forest is important because it is an extremely valuable tropical wood that sustains various living forms, including humans, aquatic life, and terrestrial life. It offers vital habitats for numerous sources of food and material, stores enormous amounts of carbon, and shields the town from storms (Buncag, 2021).

ii. Empowering Indigenous Communities for Wildlife Protection

One of the efficient ways to empower the indigenous community is to give legal rights and legislative recognition to their land, as they are the key to preserving wildlife (Goolmeer et al., 2022). Empowering Indigenous people is necessary because they have all the old and valuable knowledge to conserve biodiversity and the information regarding their habitat or the alternative where biodiversity feels safe (Parveen, 2021). As they know about wildlife biodiversity, it is worthwhile to listen to their concerns and use them to guide their surrounding localities (Su et al., 2020).

iii. Eco-Tourism as A Tool for Conservation

Tourism is a wide industry that can generate more than 1481 billion $ alone (UNWTO, 2019; Mataranyika and Espectato, 2022). Eco-tourism is also one type of tourism that is considered the pivotal way to legitimate development, particularly in developing countries comprising manifest hotspots (biodiversity hotspots) (Coronado et al., 2018; De, 2022). According to reports, ecotourism promotes forest regeneration, especially in rural areas, when linked with conservative strategies, including Payment for Ecosystem Services (PES), Protected Areas, enforcement, and monitoring (Rafa et al., 2021).

5. Addressing the challenges: Deforestation, Poaching, and Climate Change

i. Tracking Illegal Logging and Poaching Through Collaboration

Targeting animals without legislative permission is termed poaching (Dalpane and Baideldinova, 2022), and the smuggling of wood is known as logging (Nikooy et al., 2022). Various organizations collaborate with the government to tackle this illegal poaching. This can be done through a) Technology Solutions (Jiao et al., 2021), b) Education and Awareness campaigns, c) strengthening law enforcement, and d) Community-Based Conservation Programs (Wilson and Rio, 2021). Despite all these factors, a special team is trained to determine the dealers directly involved in the poaching (Costa et al., 2023).

Not only poaching, illegal logging is the most disturbing factor. To overcome this problem, there are certain methods: a) Brand hammer (Mahmood et al., 2021), b) chemical paint marketing, c) Barcodes, d) QR Codes, e) DNA Fingerprinting (Potter and Underkoffler, 2021), and f) Radio Frequency Identification Tags (RFID). Certain innovative methods are used nowadays, such as a) Ground Video Surveillance Camera, and b) Automatic Cameras (LANDSAT 7 and EOS TERRA) (Amusa et al., 2021).

ii. Climate Change Impact on Forests and Wildlife

The impact on the forests is as follows (Figure 1) (Abbass et al., 2022):

The impacts on wildlife are as follows (Figure 2) (Sattar et al., 2021):

iii. Innovative Solutions to Combat Deforestation and Wildlife

There are several examples of successful initiatives: a) Eco-friendly infrastructures, b) waste management, c) sustainable forest management, d) renewable resources, and e) carbon capture and storage (Celestine et al., 2024).

6. Case Studies: Successful Conservation Initiation

i. Amazon Rainforest

Amazon Conservation Association (ACA) plays a vital role in conserving Amazon's territory (Perz et al., 2021). ACA introduced programs

such as Monitoring of the Andean Amazon Project (MAAP), The Brail Nut Project, Los Amigos Conservation Concession, Wayqecha Cloud Forest, and Pample del Health. These programs have the same motto prevent the forest from deforestation and conserve wildlife. They established the protected areas and conducted various sessions to educate the people. Afterward, proper monitoring is done to check the progress.

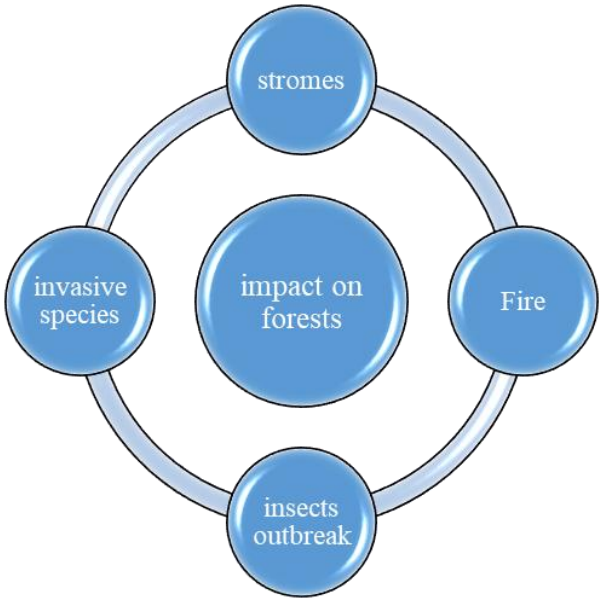

Fig. 1: Impacts on Forests

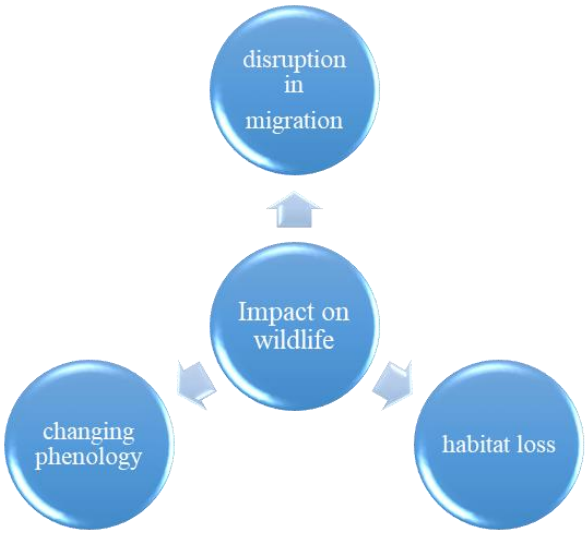

Fig. 2: Impact on wildlife

Fig. 3: The Giant Panda (Swaisgood et al., 2023)

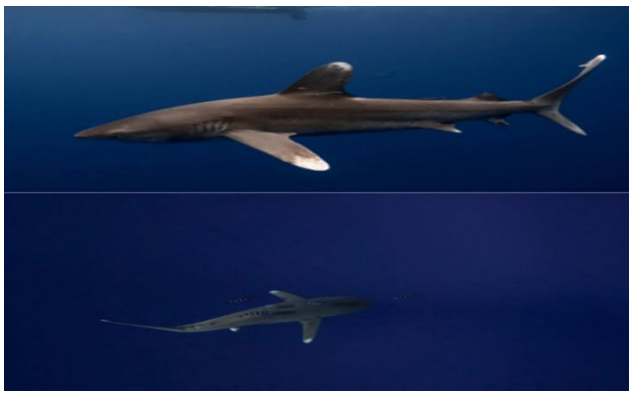

Fig. 4: Whitetip Shark (Young and Carlson, 2020)

ii. Conservation of the Giant Panda

The Giant Panda (*Ailuropoda melanoleuca*) (Figure 3) is a species that lives in China. The utmost reason for the status of pandas as an endangered species is habitat loss, which occurs due to urbanization. The government noticed the gradual decrease in the pandemic and created the Protected Area (PA). Under proper supervision and strict monitoring, the pandas' ratio increases with time (Swaisgood et al., 2023).

iii. Conservation of White Tip Sharks

Oceanic Whitetip Shark (*Carcharhinus longimanus*), (Figure 4) the Epipelagic Species is mostly found in tropical and sub-tropical waters. The main reason for the extinction is the hunting of the shark. Over time, the exploitation of the Sharks got worse. Then, the actions were taken by the Indian Ocean Tuna Commission (IOTC), Western and Central Pacific Fisheries Commission (WCPFC), and International Commission for the Conservation of Atlantic Tunas (ICCAT). They make regulations that apply to every person, and with the help of sessions, they educate the people of the surrounding localities (Young and Carlson, 2020).

7. Future Direction in Forest and Wildlife Conservation

As the population rises and encroaches on natural ecosystems, wildlife management has grown in importance in the modern world (Beebee, 2022). It involves keeping an eye on, safeguarding, and conserving animal species, their habitats, and the ecosystem to which they belong (Jagerbrand and Bouroussis, 2021). However, there are fresh potential and problems for future wildlife management due to the constantly shifting social and natural landscape (Manfredo et al., 2021).

Future wildlife must adopt a comprehensive, multidisciplinary strategy (Hoque et al., 2022). Wildlife management has historically operated independently of other industries, including tourism, forestry, and agriculture. We must acknowledge, though, that these industries are interrelated and significantly affect species and their environment. The wildlife sector must collaborate with other sectors to conserve

wildlife to meet their future needs (Gross et al., 2021).

The use of technology in wildlife management is another area that will need greater focus in the future (Tuia et al., 2022). New technology includes satellite photography and DNA collection, drones are now used to navigate wildlife. All these techniques are used in wildlife management (Delplanque et al., 2024). For tracing illegal wildlife trading and identification of unrecognized species, DNA sampling can be helpful (Dipita et al., 2022).

Conclusion

Humanity relies on wildlife and forests for its existence, as they are correlated and necessary for survival. Certain strategies, like sustainable environments, collaborative approaches, and action, are required to conserve the green and wild for the planet's future. The method that leads to biodiversity extinction is abrupt increments in deforestation for the sake of land and timber. Through collaborative approaches, we can save the forest from deforestation by introducing programs like laws and legislation, afforestation, and controlling forest fires. Not only forests, but also wildlife can be prevented from extinction. Despite the role of wildlife in the food chain, they also play a vital role in the maintenance of the ecosystem. Irrespective of the use of wildlife as ecological maintainers, they are also of utmost in an economic perspective as wildlife is used in the manufacturing of pharmaceutical products. It is a harmonious pivotal duty to safeguard the green and wildlife for their and future generations, and can be done through a sense of responsibility.

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