JRSR
JOURNAL OF REGIONAL STUDIES REVIEW

Journal of Regional Studies Review (JRSR)
Volume 3, Issue 1 (2024) | Pages: 87-102
ISSN (Online): 3006-6646
Digital Object Identifier (DOI): 10.62843/jrsr/2024.3a032
Correspondence should be addressed to Sardar Ali Shah; sardar.shah@usindh.edu.pk

RESEARCH ARTICLE

Protecting Endangered Species: The Role of International Environmental Law in Pakistan

Sardar Ali Shah [a] Saba Karim [b] Amir Latif Bhatti [c] Ramesh Kumar [d]

Abstract: The protection of endangered species is one of the significant and emergent issues in the global community and international environmental law provides for the protection of this segment of the environment. This article discusses of some of the indispensable principles of International Environmental law treaties and conventions this include; Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), The Convention on Biological Diversity (CBD), Ramsar Convention on wetlands of International Importance, The Convention on Migratory Species (CMS), The International Union for Conservation of Nature (IUCN), and The World Wildlife Fund (WWF). It also investigates the Pakistan national law and present status of the endangered species in Pakistan. In the article, the role of international environmental law regarding endangered species in Pakistan has been described along with the issues. Lastly, recommendations on how endangered species may be protected in Pakistan using international environmental law is given. This article endeavors to add his ideas to the process of preservation of the endangered biological population and furthering the purposes of effective development in the territory of Pakistan.

Keywords: International Environmental Law, Endangered Species in Pakistan, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), CBD (Convention on Biological Diversity), Biodiversity Conservation

Introduction

With global concerns experiencing a devastating decline in the biological diversity of the earth, the issue of the protection of endangered species in Pakistan is the focus on legal systems and enforcement of international environmental law at the national level. International environmental law is the branch of law that is responsible for the regulation and protection of the environment internationally and supports sustainable development (Ibrahim et al., 2021). They include environmental related challenges like global warming, loss of species, and poor management of resources, and more to it, it has concepts like the stewardship of environment and management of the earth's resources considering the fact that human beings and environment are inseparable. Pakistan as a country is inhabited with certain species of wildlife that are on the brink of extinction and which are in danger from factors such as habitat destruction, poaching, and conflict between wildlife and human beings (Waseem et al., 2019). There are many species in Pakistan which are endangered for example, Snow Leopard and the Indus River Dolphin are examples of endangered fauna which reveal the severity of the problems of fauna in Pakistan in terms of possible extinction.

The conservation of endangered species is essential because species have various roles, Including ecological, economical, and cultural values (Mahmood et al., 2021). Habitat is as important to them as food supply is; thus, it is marked by a conservation of endangered species that regulate prey population, preserve other species and contribute to human-oriented ecosystem services. Ecologically, the endangered species

[a] Assistant Professor, Institute of Law, University of Sindh, Jamshoro, Sindh, Pakistan. Email: sardar.shah@usindh.edu.pk
[b] LLM Scholar, Institute of Law, University of Sindh, Jamshoro, Sindh, Pakistan. Email: karimsaba12345@gmail.com
[c] Assistant Sessions Judge, Karachi South, Pakistan. Email: judge.aamir@gmail.com
[d] Investigation Officer, FIA Cybercrimes Wing, HQs, Islamabad, Pakistan. Email: peaceloving2015@gmail.com

Cite this Article: Shah, S. A., Karim, S., Bhatti, A. L., & Kumar, R. (2024). Protecting Endangered Species: The Role of International Environmental Law in Pakistan. *Journal of Regional Studies Review, 3*(1), 87-102. https://doi.org/10.62843/jrsr/2024.3a032

can be valuable for tourism related to sighting endangered species, and for researches in the form of bioprospecting. In terms of social, endangered species are also significant to the indigenous people as they are key to their culture practices and beliefs implying the rights of the species.

Conserving species such as the Indian Pangolin in Pakistan is important since the species is endangered and faces many threats from factors such as illegal killing and trade. It is on this basis that national policies and legislation, which seek to protect these species, should be instated in order to avoid the worsening situation. However, the wild food preferences of particular species like the Indian Pangolin in a specific area like the *Margalla* Hills National Park, prove that there is a need to understand and conserve certain areas that are vital for the existence of endangered species (Mahmood et al., 2021). Since it is possible to find such areas, one can allocate resources for the protection of endangered species efficiently.

Conservation of endangered species in Pakistan involves all those wildlife such as carnivores that are suffering from habitat deterioration and anthropogenic pressures like the Steppe Eagle (Ahmad et al., 2022). The management plan suggesting protection of habitats and reducing impacts of human activities is used to enhance the survival of these species. Likewise, genetic variation of wild native deer species in Pakistan and phylogenetic analysis tells us about consequences of human interference, hunting, and environmental press on the native wild deer species(Abbas et al., 2024). This has presented the following challenges for which integrated conservation approaches are required to solve with an aim of protecting wild populations from extinction.

This article aims to address the importance of international environmental law for the protection of endangered species and the case of Pakistan to particularize it. It will explore the international picture focusing on the treaties and conventions such as CITES and CBD, then analyze Pakistani national laws and identify the extent to which Pakistan conserve its biological diversity. It also presents the drawbacks and difficulties encountered in the intended protection of endangered species, and proposes measures that will enhance the protective framework of species in Pakistan.

International Environmental Law Framework

Convention on International Trade in Endangered Species of Wild Fauna and Flora (Cites)

CITES which stands for the Convention on International Trade in Endangered Species of Wild Fauna and Flora is an international agreement that regulates sale of wildlife. Established in 1975, and designated as an intergovernmental treaty, CITES has received the signature of more than one hundred and eighty countries thus making it probably the most known international environmental agreement. The convention controls the trade of endangered species by permits and certificates aimed at regulating trade harmlessly for the species and their habitats (Aguilar, 2013). There are several appendices in CITES listed species some of these appendices include the following: CITES Appendix I which contains species that are considered endangered species CITES Appendix III which contains species that are considered endangered or threatened in their natural habitats in their own countries.

The principal organ of CITES is the Conference of the Parties, COP, which makes management decisions and adopts policies concerning species listing and regulation of trade. The COP convenes biennially or at most triennially to review the effectiveness and take decisions on the exercise of the convention (Kuunal et al., 2020). Scientific Committees have advisory roles with regard to the listings and trade measures and NationalAuthorities are the customs within their particular countries implementing CITES and issuing permits and certificates for trade in endangered species (Unerman & O'Dwyer, 2006). Overall, there are certain weaknesses of CITES, though it remains a useful means of regulating and developing the wildlife trade, the process of its application dealing with these issues varies and develops with time.

Convention on Biological Diversity (CBD)

CBD stands for the Convention on Biological Diversity, an international instrument adopted in 1993 to conserve and use bio-diversity and share fair rewards from genetic resources (Schlaepfer 2018). Currently, CBD has 196 parties that seek to protect and sustainably exploit bio diversity, and fairly share benefits from utilization of genetic resources (Petrou et al., 2015). The convention aims at achieving objectives originating from the understanding of biological diversity as the foundation for sustainable development, improved conditions for people and animals, and a healthy environment. However, there are some issues of getting it right, such as: extending coverage of protected spaces inside large areas and increasing biological quality to protect species from threats (Kearney et al., 2018).

In CBD'S Strategic Plan for Biodiversity 2011-2020, effective are important in the protection of species through the conception of protected areas. However, much research exists that should continue to explicate the effectiveness of protected areas in conserving global biological diversity. The CBD has recorded tremendous progress in the cause of conserving ecosystems; the protected areas now cover about 15% of the global land area (Kearney et el., 2018). These buffers areas are important; currently sixty percent of threatened species are located in these areas.

Ramsar Convention on Wetlands

The Ramsar Convention on Wetlands was signed in 1971 and is an intergovernmental treaty whose main overall goal is the conservation of wetlands especially those that support populations of water birds, their wise use (Finlayson et al., 2017). Since its adoption, the convention has been ratified by more than 170 countries which makes it possibly the most ratified international environmental treaty. There are five main classes of wetlands; marine, estuarine, lacustrine, riverine and palustrine wetlands and the classification assists in identifying the specific ecosystems they contain (Mandishona & Knight, 2022). The Ramsar convention assists countries to nominate and conserve priority sites as wetlands and the wise use concept highlights the need to retain the wetland characteristics.

The Ramsar convention is vital in the preservation its species in that it emphasizes the importance of wetlands as vital life-supporting systems on biological diversity and services provision (Da Silva et al., 2019). The procedures used in the convention can effectively minimize the protection of unnecessary wetlands as only an important Wetlands of International Importance are recognized. However, due to climate change, human interferences and other villains, the Ramsar Convention enables the mitigation of these risks by

that the Ramsar Convention has produced a favorable impact in the world to comment on the conservation of wetlands, and that efforts to persistently continue the implementation will be important for the future security of the wetland populations.

Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The Convention on the Conservation of Migratory Species of Wild Animals commonly referred to as CMS is a key instrument, that fosters regional cooperation for the protection of migratory species. The global instruments include the Convention on Biological Diversity, Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Ramsar Convention and many others to manage various aspects of species protection (Khanal et al., 2020). The issue of climate change implicates multiple dangers to the migratory species underlining the need to enhance the existing international instruments such as the CMS. Trouwborst (2012), further explains the importance of the CMS in the provision of climate change adaptation besides the prevention of species extinction.

Conservation of the habitat is vital and applies to migratory kinds of animals in the terrestrial environment as well as the aquatic environment. Bentley et al. (2024) when discussing challenge 3 said that natural sciences are tasked with determining sites that are critical for species replenishment, calling for

trans-boundary management of habitats and migration corridors. López-Hoffman et al. (2017) stress the need for spatial location information in species' movements and ecosystem services for the purpose of conservation. Conservation of such species needs biological, sociological, and policy reviews, and trans-habitat and trans-geographical approaches (Agrawal et al., 2019).

International Union for Conservation of Nature (IUCN)

The International Union for Conservation of Nature (IUCN) is the largest global organization in nature conservation, and the most frequently used instrument for assessing the risk level of thousands of species worldwide is the IUCN Red List of Threatened Species (Campagna et al., 2011). The Red List gathers the threat level, range, habitat, and elevation, and offers a broad perspective about the level of endangerment of a given species. The oldest and most widely used list is IUCN Red List, which rates species based on the questioned estimates of IUCN starting in 1964. The list is updated from time to time based on scientists and research standards to define aspects causing extinction risks in different areas.

Due to its importance in species and habitat evaluation, as well as in identification of conservation areas and species and habitats protection, the IUCN Red List remain a crucial element of global conservation efforts (McCay & Lacher, 2021). Maps of range offered by the IUCN help make correct estimations of species location, which is important for developing proper conservancy measures. The Red List provides a process for designing programmes for conservation of endangered species and for biological diversity. Any implementation of a conservation target, for instance the Aichi Biodiversity Target, requires tools towards measuring implementation progress where IUCN's Biodiversity and Conservation knowledge products including the Red List are invaluable.

The World Wildlife Fund WWF

The World Wildlife Fund organization is an internationally recognized non-governmental organisation acting in the field of nature and the environment. Since the focus is on unhealthy and unlawful wildlife trade, status quo deprioritises extant species outcomes post habitat loss; the aforementioned is identified as the second deadly force (Kanthaswamy, 2023). WWF plays a significant role in the protection and perpetuation of the names of threatened species around the globe and entire biota, including certain species of listed endangered animals like the Javan Rhino. This is because Wonders of the Wild life Fund's species conservation methodology is unique as it tends to gravitate towards individual animals/plants allowing it to be on the ground making a physical difference with the aim of bringing species back from the dead or on the brink of it.

WWF supports and participates in worldwide campaigns on species and species diversity sustainment as well as sustainable ecosystems. WWF works with most important international organizations such as IUCN that guarantees conservation has a clear and effectual blueprint (Ramaano, 2024). This partnership serves as useful for WWF's extension and knowledge, for achieving more vast conservation goals. Another WWF methods of conservation include habitat conservation, conservation of landscapes, and the FLR which stands for Forest Landscape Restoration (James et al., 2018). It addresses the challenges by rehabilitating the affected ecosystems and supporting conservation of efficient land use by society.

Strategic directions include the consideration of the eco-regional views at work towards the conservation regime, as this facilitate the formulation of the conservation strategies (Jepson & Whittaker, 2002). Self-highlighting, the organisation engages IGOs and emphasizes that conventional wisdom must be employed during cooperation to progress conserved's programmes (Bala et al., 2020). Like any organisation, WWF undergoes annual evaluation of its work: arguably the particular method used by WWF is more sensitive to actual conservation needs by first determining where much can be accomplished for little money (Gamba

et al., 2022). As a consequence, WWF only implements activities rooted in science and conservation impact estimates, all guaranteeing results that address causes instead of symptoms (Scholtz & Twidwell, 2022).

Principles of International Environmental Law

Many species of animals and plants are threatened in the contemporary society due to factors such as deforestation, climate change among others. For proper protection of these species the international environmental law has developed certain principles regarding conservation of species. Sustainable development is another obvious principle that is aimed at the enhancement of the importance of both environmental protection and socio-economic reform (Wang, 2011). This principle supposes that people's actions must be performed in such a way that all current and future generations, and environment can thrive.

The first principle key to international environmental law is the principle of prevention, which requires that provisions be made to avoid the risk of accident or damage in the matter (Yin & Zou, 2021). This principle applies best when the regulators' actions are aimed at the preservation of endangered species which permits regulatory actions in cases where the harm might not have been determined fully. This way the precautionary principle can be used in an effort to contain the loss of endangered species populations through conservation measures.

Common but differentiated responsibilities is also crucial to international environmental law with respect to endangered species (Anastasia, 2021). This principle analyses that countries do have disparity in their endowment and efforts in environmental depletion. Thus, it categorizes the commitments in accordance with these criteria so that developed states would be to assume more liability in the preservation of endangered species and the ecosystems which they inhabit.

Furthermore, the ecosystem approach is one of the principles that are applied in the management of natural resources for the sustenance of ecosystems services (Wang & Xing, 2024). This approach appreciates the idea that species in ecosystems are interrelated, and they pose that relationship should be preserved to protect endangered species. Explaining the ecosystem approach, it should be underlined that it allows the effective conservation of a particular species and the surrounding environment simultaneously.

In the ocean affairs case, the precautionary principle is applied and received much attention and has integrated into the IOEL (International Ocean Environmental Law) system (Eze & Eze, 2019). The concepts of the principle have been applied various shapes illustrating it utility and relevance in managing decisions to address ecological concerns and species' plight.

Moreover, the precautionary principle has been established as one of the ways of enhancing the international environmental legal instruments and sustainable development (Murphy, 2009). Thus, invoking this principle, activity of legal systems in relation to the identified environmental problems can be more effectively carried out, as well as the development of solutions that could serve to achieve the goals of environmental protection and sustainable development.

The specific example of the nuclear safety regulation as an example of the implementation of the precautionary principle also outlines the difficulties encountered, as well as the prospects regarding the application of this principle in various spheres explored by various authors . This case study shows that cautionary approach should be applied taking into consideration characteristics of separate types of economic activities and notifications. Thus from the environmental protection point of view the restrictions concerning the use of force at sea area is more focused where the humanitarian laws need more convergence with the principles of international environmental laws in relation to the fundamental principles of international environmental laws (Trouwborst, 2007). With regard to the protection of endangered species and marine

ecosystems, integrating environmental considerations in conventional law as a subset of uses of force on the sea can afford the beings further protection against harm.

National Law in Pakistan

Pakistan has conducted several international legal measures for the conservation of endangered species within its geographical territory. Currently, it has implemented the basic national legislation and policies of the wildlife acts and policies including the Wildlife Act of 1974, The Wildlife Trade Act of 2017, National Conservation Strategy of 2013, Pakistan Biodiversity Action Plan of 2015 etc., to provide rigorous legal requirements for wildlife conservation and Environmental protection (Abbas, 2015). The following legislative executors could be deemed as the groundwork for Pakistan's pledge of maintaining its bio-diverse living treasure. Besides the above national laws, Pakistan has also incorporated the provisions of CITES in to its national legislations and policies (Challender et al., 2014). The country of Pakistan has also ratified the Convention on the Conservation of Migratory Species of Wild Animals and also signed several sites under the *Ramsar* Convention to preserve the most important wetland ecosystems.

There are specific conservation actions from Pakistan that has been done targeting emblematic species which include snow leopard, Indus river dolphin, and Asiatic cheetah, where Pakistan has partnered with conventional bodies for the protection of endangered species (Abbas, 2015). Unlike in many other countries, the legal practices that are in place to support environmental conservation in Pakistan comprehend more than just wildlife. The Pakistan Environmental Protection Act of 1997 is another law dealing with challenges of the environment; in this law, provisions concerning the wildlife conservation and environmental protection have been made. There are provincial and federal laws that aim at protecting the wildlife further emphasizing a structure feature of the countries conservation approach. The National Biodiversity Strategy and Action Plan also supports the protection of Pakistan's commitment with measures corresponding to international regulation. Various organizations and departments in Pakistan like Ministry of Climate Change, Provincial Wildlife Departments, Pakistan Environmental Protection Agency (EPA) etc. stands as main actors involved in the processes of executing and enforcing environmental legislation and conservation programs (Unar et al., 2022).

Endangered Species in Pakistan

Current situation of endangered species throughout the Pakistan has found several problems such as loss of habitat, human interaction, wildlife trade, and climate change. Some of these include the; Gray wolf which is endemic in Pakistan and is categorized as endangered on the IUCN Red List in Pakistan (Zaman et al., 2024). Though has been categorized under the "Least Concern" in the global market, the situation concerning the gray wolves in Pakistan suggests that the species deserves conservation. Moreover, *Urial* of *Punjab* and *Indian* Gazelle (*Chinkara*) are endangered by the assessment of the local population, which aims to implement programs of captive breeding with future prospects of reintroduction (Khattak et al., 2021).

Some of the fauna endemic to the Pakistan and listed as species threatened include the snow leopard, Siberian ibex, Himalayan brown bear, Himalayan black bear, and others, mainly in the Northern part of the county (Rashid et al., 2021). These species are threatened by human activities hence infringement of their natural habitats and therefore the resultant increased cases of human-wildlife conflicts. Moreover, endearment of vulture population in Pakistan including Red-headed Vulture, White-rumpled Vulture, Long billed Vulture join the vulnerable list for exigent reasons like habitat destruction and poisoning (Zangi et al., 2019). Some measures should be taken in order to enhance the number of vultures as their populations continue to decrease.

The snow leopard population in Pakistan is 250-400, which is the population shared status third rank within its extent range India (Khan et al., 2021). How these habitats are being protected can be seen in plans which have been outlined by conservationists and the identification of new protected areas in *Chitral* and

Gilgit Biltistan. Nevertheless, the species is still under a high level of threat and poaching and trade emerged as the threats noted towards the snow leopards in Pakistan (Din et al., 2022). Measures against such threats are important in ensuring the continuation of the species in the region.

The Snow Leopard which resides in the *Himalayan* ranges of the Pakistan has been on the decline due to reasons including but not limited to hunting and loss of habitat. From 2019, the Snow Leopard Conservation Program entails protection of habitats, surveys and stimulates participation of the local community in conservation (Ghoshal et al., 2017). Measures for conserving the species should factor issues such as the grazing of cattle to minimize conflicts between humans and animals. Thus, investigating the rationale behind conflicts with snow leopards requires analysis of the ecological and social context of such conflicts (Bagchi & Mishra, 2006). Snow leopard, being the famous species of the *Himalayan* region, puts emphasis on the conservation of this territory (Koju et al., 2020). For instance, Jones (2015) notes that at least half of the parts where snow leopards live could possibly undergo an alteration soon, thus calling for protection of the species

Bhulan or the *Indus River dolphin* is an aggressively endangered freshwater cetacean based in the Indus River of Pakistan. The species inhabitant a population of around 2000 people now and are one of the oldest river dolphins known; they are recognized as National Heritage Animal of Pakistan (World Wildlife Fund Pakistan, 2023). But, the species is seriously endangered in the teeth of these threats; such as, habitat loss and degradation due to construction of barrages and canals, by-catching operation and entanglement in fishing gears, siltation, chemical pollution, noise pollution, over fishing and climate change (Aggarwal et al., 2020). To counter these threats, there has been an effort by both the international organizations and the Pakistani government in the form of habitat restoration and protection, legal means, awareness, monitoring and research, and national and international cooperation (National Oceanic and Atmospheric Administration, 2021). *Ramsar* Convention on Wetlands and Key Biodiversity Area also known as the Key Biodiversity Area (KBA) is implemented and that the Indus Dolphin Reserve is one of the protected areas (Khan, 2006). Further, the Sindh Wildlife Department and *Engro* Foundation are also greatly involved in safeguarding the main habitat of Indus dolphins; on the same lines, the WWF-Pakistan similarly collaborates with the Sindh Wildlife Department in a mission to save the dolphin strangled in canals of Sindh before transferring the same to the Indus rivers (Rafi, 2022). It is due to these conservation measures that there is improvement on the numbers of Indus dolphins in the river and these conservation measures should be continued to prevent extinction of this species.

The *Markhor,* which is the national animal of Pakistan, had a huge threat to its existence; however, due to the conservation methods, its number has also been raised. However, the *Markhor* population had risen for the last 10 years with 2% annual growth rate after 2014 considering it was once on the verge of extinction. The IUCN had earlier categorized the *Markhor* as 'Endangered' but revised it to 'Near Threatened' in the year 2014 when its population crossed the mark of 2,500. But some of the challenges that are witnessed in the species include; habitat destruction, hunting and human interferences. Sustainable use of trophy hunting and community participation has also played a role towards the population increment with the incentive from the communities to protect the *Markhor*. The current estimated population is ranging around 3,500 to 5,000 the majority of them are resides in Khyber Pakhtunkhwa, *Gilgit Baltistan* and *Baluchistan* (Latif, 2023).

The report showed that the Sindh Ibex (*Capra aegagrus blythii*) is grazing species of Balochistan, Pakistan and the impact of climate change and habitat fragmentation is severe on the species. A contemporary study evaluated the status, distribution, and population pattern of Sindh ibex in *Khuzdar* and *Lasbela* districts of *Balochistan* in 2019-2022. The investigation of the study reveals that the number of ibex has a change in the population for the four years starting from 2019 to 2022 of 720, 700, 663, and 548

respectively. The ratio between male and female students also differed, similar to the enrollment status where it reached its highest of 1:1. 35 in 2021 (Ullah et al., 2024).

Among the marine species, the cetaceans in Pakistan such as the blue whale, Arabian sea humpback whale, and the Indian Ocean humpback dolphin are critically endangered. On the threats facing these marine mammals, bycatch and habitat degradation are some of the serious concerns facing them. Likewise, the blind dolphin of the *Indus River*, *Platanista gangetica* minor, is an endangered species in Pakistan threatened by the challenges emerging from habitat change and pollution (Mahessar, 2021). There is need to apply various conservation measures in order to preserve these interesting and special species of water habitats.

The flora of Pakistan also includes endangered species such as; *Podophyllum hexandrum* which is an endangered medicinal plant threatened by overexploitation through out the world (Chaudhari, 2014). Moreover, the Indian Pangolin which is listed as 'Endangered' and is affected by the poaching for its scales and meat, demonstrate the effect of wildlife smuggling on endangered species. Awareness for conservation must be shifted towards fighting the black markets to protect faced out plant and animal species in Pakistan. In addition, the conservation status of the *Kashmir Markhor* as a mountain ungulate in Pakistan is still a sensitive subject since its conservation is being achieved through trophy hunting programs and community members' participation in conservation projects (Khattak et al., 2022). Therefore the conservation of critical habitats, for example, for the endangered species such as the Steppe Eagle in Pakistan, becomes paramount. There are still many occurrences like deforestation and hunting that act as a menace to the endangered species in Pakistan

Role of International Environmental Law in Protecting Endangered Species

International environmental law has a very significant role in protection of endangered species in Pakistan through following ways. One is the control of international trafficking specifically in endangered species which is controlled by CITES convention. CITES supports the sustainable use of endangered species by controlling their trade across the borders and therefore eliminating the excessive use of the species. Pakistan has incorporated its domestic laws the Wildlife Trade Act 2017 into compliance to the provisions of CITES in the regulation and trade in species of fauna (Wyatt et al., 2021). This alignment assists to reduce the cases of unlawful business and the protection of endangered animals.

In addition, there are International Treaties of environmental importance for instance the *Ramsar* Convention and the UNESCO World Heritage conventions, which help protect the habitats and ecosystems important for the species listed as endangered. These agreements are set towards the protection of wetlands and other natural areas that are crucial in supporting the world's biological diversity. Pakistan also has some *Ramsar* sites and World Heritage sites within its geographical boundary; the country's authorities recognize the importance of these sites to the conservation of endangered species and their homes (Samy-Kamal et al., 2023). To some of these sites, Pakistan has given the listed legal protection which evidences the country's concern for conserving ecosystems for the mutual survival of threatened species.

Hence in the endeavor of species population conservation and management, global treaties that may be employed include CITES and the convention on the conservation of migratory species of wild animals also known as CMS. These agreements make preservation and proper utilization of species populations in the world. Pakistan has recently come up with species-specific conservation strategies in relation to the endangered species in the country including the snow leopard and the Indus river dolphin among others (Wyatt et al., 2021). This paper provides the needed focus on the part of the Pakistani government to employ specific measures for the proper conservation of these species and their abodes for the benefit of future generations.

About enforcing this policy, a couple of vital elements that drive endangered species preservation involve research and monitoring, especially through international collaboration. Conservation with global

institutions makes it possible for countries such as Pakistan to conduct research initiatives that are part of the observation and survey of dwindling species' populations. For example, Pakistan has collaborated with the global bodies on the snow leopard conservation program which entails studies that determine the population dynamics and needs of this vulnerable species (Wyatt et al., 2021). These research collaborations offer useful information for enhancing strategies in the conservation management procedures.

Information and education are core components of the internal environmental law dealing with the conservation of endangered species. Thus, through educating people about the laws and encouraging them to participate in the conservation of the natural environment, these laws can successfully involve locals and stakeholders. Many awareness programs and drives have been initiated by Pakistan to spread awareness about the species' conservation and reducing conflicts of human-animal (Wyatt et al., 2021). These programs aim at raising awareness on the need to conserve the arising environment and thus help in the preservation of endangered species in the country.

Challenges in Protecting Endangered Species

The conservation of endangered species of Pakistan faces a variety of issues legal, socio-economic, political and environmental. In regard to legal and institutional challenges, lack of appropriate implementation of laws for various reasons including lack of capacity and legal gaps hampers conservation. Furthermore, due to scarcity of resources, funding becomes a major problem; this greatly affects the funding of conservation programs and measures (Carter et al., 2019). These factors require the improvement of enforcement instruments as well as enhanced financial contributions towards the enhancement of conservation efforts in Pakistan.

Other issues add to the protection of endangered species in the country include socio-economic issues. Conflicts occur between the human and the wildlife mainly due to competition for living space and resources. Also, poverty and livelihood's dependence such as those based on natural resources make it worse since people directly affect the ongoing deficiency of endangered species (Banerjee & Sharma, 2022). Solving these socio-economic issues is not simple and must be done while taking into account the objectives of conservation as well as the welfare of the people.

Political and administrative factors are also essential in the determination of endangered species mostly because of their influence in decision making. The absence of political will is another major barrier since political obstacles could slow development and put in jeopardy the formulation and executive conservation policies. Moreover, the governments' structuring and distribution ports of the federal and provincial are crucial but not often effective, resulting in gaps in intergovernmental cooperation that are pivotal for a better global approach to conservation (Czech & Borkhataria, 2001). Eradicating such political and administrative hindrances is imperative to create an environment that paves the way to the conservation of species' in Pakistan.

Other challenges that are also compounding the problem of endangered species in Pakistan include climate change, habitat destruction and the unlawful trade in endangered animal products. Climate change effects as observed in this case with regards to the habitats and the ability of the species to survive are a clear call for the congregation to embrace an adaptive conservation strategy. Loss and fragmentation of habitats through various factors remain a direct menace to the survival of biome inhabitants, especially the endangered ones. However, the factor of the scale and effect further compounds the issues experienced while protecting the endangered species through its influence on the poaching business of wildlife, namely the unlawful wildlife trade (Jones, 2006).

When dealing with these complex issues, it is essential to look at the findings related to human-wildlife relationships and conservation measures in other areas. Discussing human-wildlife conflicts in various settings, it is crucial to notice the versatile nature of interactions between the two and the desire to find a

compromise that will provide the comfort of both people and animals (Cassidy & Salerno, 2020). Also, the political ecology of wildlife conservation captures a vantage angle at the socio-political factors that affect conservation (Peterson et al., 2013). Since there are numerous approaches to conservation from different research findings, conservation approaches in Pakistan should be improved through a more credible strategy.

Similarly, figuring out the prospects of stakeholders and governance principles to assist the conservation of wildlife of Pakistan can be helpful for the better strategy of wildlife conservation. It is critical to comprehend the support to the funding policies among stakeholders for increased appreciation of conservation in securing increased support for conservation causes (Branch et al., 2022). Literature on corporate governance that focuses on the internal and external accountability, reporting transparency, and stakeholder participation can improve the realization of the objectives of the conservation strategies (Bond & Mkutu, 2018). With the implementation of these principles within the conservation practices, the protection of the endangered species in Pakistan will improve.

Conclusion

The issue of preserving endangered species in Pakistan can be considered one of the urgent and important problems that needs the solution. The country possesses a rich biome, including a great many of the endangered species, is under threat from habitat loss, poaching and human/wildlife conflict. Some of the species that are on the verge of extinction include; The Snow Leopard, Indus River Dolphin, Indian Pangolin, etc. People and particularly the government, non-governmental organizations, and the local people must endeavor to protect these species and areas.

International environmental laws and conventions like CITES and CBD also equal a great part in protecting endangered species in the Pakistan. Others aim to regulate the utilization and conservation of biologic diversity and give direction on the conservation and use of protected regions. But the successful strengthening of these laws depends on the intensity of political will, sufficient resources, and participation of all parties. Therefore, there is need for Pakistan to follow through on these laws and to ensure that with such laws, the survival of these species should form part of the country's development blueprint.

It Is high time that the people of Pakistan along with the Government should be concerned about survival of endangered species anywhere in the world including in Pakistan, is not only a question of ethics, but it's also the matter of great economic importance. This country has enormous opportunity to earn revenues through certifications of revenue generating segments such as tourism, environmentally friendly products and carbon credits coming from its mighty bio-diversity. Furthermore, natural habitats conserve acts can endorse actions to reduce the effects of climate change, protect water sources and promote agricultural production. Thus, through investment in the sphere of conservation, the program gives Pakistan an opportunity to gain more tangible financial value added to protect natural resources for the benefit of its people and global citizens.

The measures for the protection of the endangered species in Pakistan should be carried out as the continuous and joint initiative aimed at the preservation of the country's wildlife. It requires the participation from local as well as central and state governments, NGOs and local communities and people to protect and manage the protected areas and environment conservation and use sustainable practices and policy. In this way we equally have a chance to save the endangered species of Pakistan and maintain the beauty of Pakistani natural environment. Now is the time for action, for to do otherwise is to prepare for disaster. It is high time to unite for the conservation of endangered species of Pakistan to secure the coming generations for our Earth.

Recommendations

1. Strengthen the legal frameworks in regard to endangered species conservation and boost their enforcement in the context of the Pakistani nation-state.

2. Create and increase the coverage of regions where animals threatened with extinction are protected, for example, national parks, protected areas, etc.
3. Undertake special survey and monitoring activities to determine the changes of population sizes and habitat status of endangered species.
4. Incorporate the local communities in the conservation and management process through awareness, carry out awareness and sensitization, encourage them to participate in management and consideration of incentives should be made.
5. Strengthen the establishment of anti-poaching and anti-trafficking legislations, improve legal frameworks to deal with the situation, and increase capacity of law enforcement agencies to fight wildlife crime.
6. Encourage conventional farming systems which do not harm the environment that include agro forestry and permaculture to ensure that the habitats of the animals and plants are not fragmented.
7. Promote science-based long-term programs on species breeding for use especially for the Snow Leopard and the Indus River Dolphin that are facing critical extinction.
8. Obtain technical cooperation from the international community in order to exchange information, ideas, and materials in connection with endangered species in Pakistan and how to conserve the species as well as tackling transboundary conservation issues.

References

Abbas, G., Nadeem, A., Babar, M. E., Bi, Y., Saleem, A. H., & Muner, R. (2024). Exploring genetic diversity and phylogenetic analysis of four native wild deer species of Pakistan using a combined effect of cytochrome B, C and D-loop DNA markers. *Research Square (Research Square)*. https://doi.org/10.21203/rs.3.rs-3488599/v1

Abbas, Y. (2015). Exploring the Socio-Ecological characteristics of Gahkuch Marshland: a unique wetlands ecosystem in Hindukush mountain ranges. *Journal of Water Resources and Ocean Science, 4*(6), 92. https://doi.org/10.11648/j.wros.20150406.13

Aggarwal, D., Kumar, N., & Dutta, V. (2020). Impact on endangered Gangetic dolphins due to construction of waterways on the river Ganga, India: an overview. *Environmental Sustainability, 3*(2), 123–138. https://doi.org/10.1007/s42398-020-00104-2

Agrawal, A. A., Altizer, S., Hunter, D., Marra, P. P., & Wolf, S. A. (2019). Conservation of declining migratory animals: An interdisciplinary analysis of biology, sociology, and policy. https://doi.org/10.31219/osf.io/35htj

Aguilar, S. (2013). Regulatory Tools for the Management of Fish and Timber Species through CITES. *Review of European Comparative & International Environmental Law, 22*(3), 281–290. https://doi.org/10.1111/reel.12043

Ahmad, S., Khattak, R. H., Teng, L., Kaneez, K., & Liu, Z. (2022). Factors Affecting Habitat Selection of Endangered Steppe Eagle (Aquila nipalensis) in Pakistan: Implications for Raptors Conservation. *Diversity, 14*(12), 1135. https://doi.org/10.3390/d14121135

Anastasia, P. (2021). Some aspects of the environmental rights protection. *Access to Justice in Eastern Europe, 4*(3), 198–204. https://doi.org/10.33327/ajee-18-4.3-n000079

Bagchi, S., & Mishra, C. (2006). Living with large carnivores: predation on livestock by the snow leopard (Uncia uncia). *Journal of Zoology, 268*(3), 217–224. https://doi.org/10.1111/j.1469-7998.2005.00030.x

Bala, P., Ramaiyer, N. K., & Harris, R. W. (2020). FROM THE MARGINS TO THE MAINSTREAM: INDIGENISED DEVELOPMENT IN BORNEO WITH INFORMATION AND COMMUNICATION TECHNOLOGIES AND ITS CONTRIBUTION TO GLOBAL SUSTAINABLE DEVELOPMENT. *Journal of Borneo-Kalimantan, 6(*2), 19–35. https://doi.org/10.33736/jbk.2898.2020

Banerjee, S., & Sharma, S. (2022). En-gendering human-wildlife interactions in Northeast India: towards decolonized conservation. *Journal of Political Ecology, 28*(1). https://doi.org/10.2458/jpe.5217

Bond, J., & Mkutu, K. (2018). Exploring the hidden costs of Human–Wildlife conflict in northern Kenya. *African Studies Review, 61*(1), 33–54. https://doi.org/10.1017/asr.2017.134

Branch, J. V., Karlen, J., Organ, J., Bishop, C., Mitchell, M., Regan, R., & Millspaugh, J. J. (2022). Echoes of 1937: Recovering America's Wildlife Act would bring wildlife conservation funding full circle. *Conservation Letters, 15*(5). https://doi.org/10.1111/conl.12890

Campagna, C., Short, F. T., Polidoro, B. A., McManus, R., Collette, B. B., Pilcher, N. J., De Mitcheson, Y. S., Stuart, S. N., & Carpenter, K. E. (2011). Gulf of Mexico oil blowout increases risks to globally threatened species. *BioScience, 61*(5), 393–397. https://doi.org/10.1525/bio.2011.61.5.8

Carter, N., Williamson, M. A., Gilbert, S., Lischka, S. A., Prugh, L. R., Lawler, J. J., Metcalf, A. L., Jacob, A. L., Beltrán, B. J., Castro, A. J., Sage, A., & Burnham, M. (2019). Integrated spatial analysis for human–wildlife coexistence in the American West. *Environmental Research Letters, 15*(2), 021001. https://doi.org/10.1088/1748-9326/ab60e1

Cassidy, L., & Salerno, J. (2020). The need for a more inclusive science of elephant conservation. *Conservation Letters, 13*(5). https://doi.org/10.1111/conl.12717

Chairunnisa, E. (2018). PERANAN WORLD WIDE FUND FOR NATURE (WWF) DALAM UPAYA KONSERVASI POPULASI BADAK JAWA DI INDONESIA. *Global Political Studies Journal, 2*(1), 72–87. https://doi.org/10.34010/gpsjournal.v2i1.2012

Challender, D. W., Harrop, S. R., & MacMillan, D. C. (2014). Towards informed and multi-faceted wildlife trade interventions. *Global Ecology and Conservation, 3*, 129–148. https://doi.org/10.1016/j.gecco.2014.11.010

Chaudhari, S. K. (2014). Podophyllum hexandrum: An endangered medicinal plant from Pakistan. *Pure and Applied Biology, 3*(1), 19–24. https://doi.org/10.19045/bsp

Czech, B., & Borkhataria, R. (2001). The relationship of political party affiliation to wildlife conservation attitudes. *Politics and the Life Sciences, 20*(1), 3–12. https://doi.org/10.1017/s073093840000513x

Da Silva, F. L., Stefani, M. S., Smith, W. S., Da Cunha-Santino, M. B., & Bianchini, I., Jr. (2019). The municipality role in Brazilian wetlands conservation: establishment of connections among the Master Plan, the National Hydric Resources Policy and two international strategic plans. *Revista Brasileira De Geografia Física, 12*(6), 2193. https://doi.org/10.26848/rbgf.v12.6.p2193-2203

Din, J. U., Bari, F., Ali, H., Rehman, E. U., Adli, D. S. H., Abdullah, N. A., Norma-Rashid, Y., Kabir, M., Hameed, S., Nawaz, D. A., & Nawaz, M. A. (2022). Drivers of snow leopard poaching and trade in Pakistan and implications for management. *Nature Conservation, 46*, 49–62. https://doi.org/10.3897/natureconservation.46.76036

Eze, M. A., & Eze, I. S. (2019). An analysis of the precautionary principles and its adaptation in international, regional and national laws. *International Journal of Energy and Environmental Science, 4*(3), 47. https://doi.org/10.11648/j.ijees.20190403.12

Finlayson, C. M., Capon, S. J., Rissik, D., Pittock, J., Fisk, G., Davidson, N. C., Bodmin, K. A., Papas, P., Robertson, H. A., Schallenberg, M., Saintilan, N., Edyvane, K., & Bino, G. (2017). Policy considerations for managing wetlands under a changing climate. *Marine and Freshwater Research, 68*(10), 1803. https://doi.org/10.1071/mf16244

Gamba, F. B., Falcon, G. B., Simoncini, M. S., Balestra, R. a. M., & Malvasio, A. (2022). Priority areas and integrated actions for the conservation of Amazonian turtle populations historically over-exploited by humans. *Ethnobiology and Conservation, 11*. https://doi.org/10.15451/ec2022-08-11.19-1-19

Ghoshal, A., Bhatnagar, Y. V., Pandav, B., Sharma, K., Mishra, C., Raghunath, R., & Suryawanshi, K. R. (2017). Assessing changes in distribution of the Endangered snow leopardPanthera unciaand its wild prey over 2 decades in the Indian Himalaya through interview-based occupancy surveys. *Oryx, 53*(4), 620–632. https://doi.org/10.1017/s0030605317001107

Hoe, L. I., & Lian, C. J. (2021). LEGAL FRAMEWORK ON THE CONSERVATION ISSUE OF PULAU KUKUP NATIONAL PARK IN JOHOR, MALAYSIA. *Journal of Sustainability Science and Management, 16*(5), 115–123. https://doi.org/10.46754/jssm.2021.07.009

Ibrahim, A., Chen, B., Ali, I., Ali, H., Qadir, A., & Yang, G. (2021). Diversity and Conservation of Cetaceans in Pakistan. https://doi.org/10.3897/arphapreprints.e75384

James, S. A., Soltis, P. S., Belbin, L., Chapman, A. D., Nelson, G., Paul, D. L., & Collins, M. (2018). Herbarium data: Global biodiversity and societal botanical needs for novel research. *Applications in Plant Sciences, 6*(2). https://doi.org/10.1002/aps3.1024

Jepson, P., & Whittaker, R. J. (2002). Ecoregions in Context: a Critique with Special Reference to Indonesia. *Conservation Biology, 16*(1), 42–57. https://doi.org/10.1046/j.1523-1739.2002.01143.x

Jones, A. (2015). Impacts and Assessment of the Endangered Snow Leopard: A conservational approach. *Earth Common Journal, 5*(1), 51–60. https://doi.org/10.31542/j.ecj.273

Jones, S. (2006). A political ecology of wildlife conservation in Africa. *Review of African Political Economy, 33*(109). https://doi.org/10.1080/03056240601000911

Kanthaswamy, S. (2023). Review: Wildlife forensic genetics—Biological evidence, DNA markers, analytical approaches, and challenges. *Animal Genetics, 55*(2), 177–192. https://doi.org/10.1111/age.13390

Kasper, K., Schweikhard, J., Lehmann, M., Ebert, C. L., Erbe, P., Wayakone, S., Nguyen, T. Q., Le, M. D., & Ziegler, T. (2020). The extent of the illegal trade with terrestrial vertebrates in markets and

households in Khammouane Province, Lao PDR. *Nature Conservation, 41*, 25–45. https://doi.org/10.3897/natureconservation.41.51888

Kearney, S. G., Adams, V. M., Fuller, R. A., Possingham, H. P., & Watson, J. E. M. (2018). Estimating the benefit of well-managed protected areas for threatened species conservation. *Oryx, 54*(2), 276–284. https://doi.org/10.1017/s0030605317001739

Khan, M. Z. (2006). *Current status and biodiversity of Indus Dolphin Reserve and Indus Delta Wetlands (Ramsar Sites)*. https://www.semanticscholar.org/paper/Current-Status-and-Biodiversity-of-Indus-Dolphin-(-Khan/eaf88f53ae839272626ca2ccbdc2e2f773b05b10

Khan, T. U., Mannan, A., Hacker, C. E., Ahmad, S., Siddique, M. A., Khan, B. U., Din, E. U., Chen, M., Zhang, C., Nizami, M., & Luan, X. (2021). Use of GIS and Remote Sensing Data to Understand the Impacts of Land Use/Land Cover Changes (LULCC) on Snow Leopard (Panthera uncia) Habitat in Pakistan. *Sustainability, 13*(7), 3590. https://doi.org/10.3390/su13073590

Khattak, R. H., Teng, L., Ahmad, S., Bari, F., Rehman, E. U., Shah, A. A., & Liu, Z. (2022). In Pursuit of New Spaces for Threatened Mammals: Assessing Habitat Suitability for Kashmir Markhor (Capra falconeri cashmeriensis) in the Hindukush Range. *Sustainability, 14*(3), 1544. https://doi.org/10.3390/su14031544

Khattak, R. H., Teng, L., Mehmood, T., Rehman, E. U., Zhang, Z., & Liu, Z. (2021). Hostile Interactions of Punjab Urial (Ovis vignei punjabiensis) towards Indian Gazelle (Gazella bennettii) during Feeding Sessions in Captive Breeding Settings. *Animals, 11*(5), 1274. https://doi.org/10.3390/ani11051274

Koju, N. P., Bashyal, B., Pandey, B. P., Shah, S. N., Thami, S., & Bleisch, W. V. (2020). First camera-trap record of the snow leopard Panthera uncia in Gaurishankar Conservation Area, Nepal. *Oryx, 55*(2), 173–176. https://doi.org/10.1017/s003060532000006x

Kuunal, S., Mair, L., Pattison, Z., & McGowan, P. J. K. (2020). Identifying opportunities for improving the coherence of global agreements for species conservation. *Conservation Science and Practice, 2*(12). https://doi.org/10.1111/csp2.294

Latif. (2023). Markhor: Population of Pakistan's national animal on the rise. https://www.aa.com.tr/en/asia-pacific/markhor-population-of-pakistan-s-national-animal-on-the-rise/3039954

López-Hoffman, L., Chester, C. C., Semmens, D. J., Thogmartin, W. E., Rodríguez-McGoffin, M. S., Merideth, R., & Diffendorfer, J. E. (2017). Ecosystem Services from Transborder Migratory Species: Implications for Conservation Governance. *Annual Review of Environment and Resources, 42*(1), 509–539. https://doi.org/10.1146/annurev-environ-110615-090119

Mahessar, A. A. (2021). Population Assessment and Conservation Strategies of the Indus River Dolphin, Platanista gangetica Minor, in Indus River Sindh, Pakistan. *Egyptian Journal of Aquatic Biology and Fisheries*, *25*(4), 185–200. https://doi.org/10.21608/ejabf.2021.187233

Mahmood, T., Andleeb, S., & Akrim, F. (2021). Habitat preference of the Indian Pangolin Manis crassicaudata inhabiting Margalla Hills National Park, Islamabad, Pakistan. *Journal of Threatened Taxa, 13*(5), 18148–18155. https://doi.org/10.11609/jott.5872.13.5.18148-18155

Mandishona, E., & Knight, J. (2022). Inland wetlands in Africa: A review of their typologies and ecosystem services. *Progress in Physical Geography Earth and Environment, 46*(4), 547–565. https://doi.org/10.1177/03091333221075328

McCay, S. D., & Lacher, T. E. (2021). National level use of International Union for Conservation of Nature knowledge products in American National Biodiversity Strategies and Action Plans and National Reports to the Convention on Biological Diversity. *Conservation Science and Practice, 3*(5). https://doi.org/10.1111/csp2.350

Murphy, K. A. (2009). The Precautionary Principle in Patent Law: A View from Canada. *The Journal of World Intellectual Property, 12*(6), 649–689. https://doi.org/10.1111/j.1747-1796.2009.00376.x

National Oceanic and Atmospheric Administration. (2021). *Indus River Dolphin (Platanista gangetica minor) 5-Year Review: Summary and Evaluation*. National Marine Fisheries Service Office of Protected Resources.

Peterson, M. N., Peterson, M. J., Peterson, T. R., & Leong, K. (2013). Why transforming biodiversity conservation conflict is essential and how to begin. *Pacific Conservation Biology, 19*(2), 94. https://doi.org/10.1071/pc130094

Petrou, Z. I., Manakos, I., & Stathaki, T. (2015). Remote sensing for biodiversity monitoring: a review of methods for biodiversity indicator extraction and assessment of progress towards international targets. *Biodiversity and Conservation, 24*(10), 2333–2363. https://doi.org/10.1007/s10531-015-0947-z

Rafi, U. (2022). Blind Indus Dolphin: Its Risk towards Extinction and Protective Measures. *MARKHOR (the Journal of Zoology), 02*. https://doi.org/10.54393/mjz.v3i1.26

Ramaano, A. I. (2024). Sustainable tourism development activities and planning systems in Vhembe district, Limpopo province, South Africa: A comprehensive eco-touristic and sustainability perspective. *Arab Gulf Journal of Scientific Research*. https://doi.org/10.1108/agjsr-04-2023-0140

Rashid, W., Shi, J., Rahim, I. U., Qasim, M., Baloch, M. N., Bohnett, E., Yang, F., Khan, I., & Ahmad, B. (2021). Modelling potential distribution of snow leopards in Pamir, northern Pakistan: Implications for Human–Snow leopard conflicts. *Sustainability, 13*(23), 13229. https://doi.org/10.3390/su132313229

Samy-Kamal, M., Shulezhko, T., & Lisitcyna, N. (2023). Marine Endangered and Threatened Species in Russia: A review of current conservation strategies and management legislative tools. *Fishes, 8*(8), 399. https://doi.org/10.3390/fishes8080399

Schlaepfer, M. A. (2018). Do non-native species contribute to biodiversity? *PloS Biology, 16*(4), e2005568. https://doi.org/10.1371/journal.pbio.2005568

Scholtz, R., & Twidwell, D. (2022). The last continuous grasslands on Earth: Identification and conservation importance. *Conservation Science and Practice, 4*(3). https://doi.org/10.1111/csp2.626

Trouwborst, A. (2007). The precautionary principle in general international law: combating the Babylonian confusion. *Review of European Community & International Environmental Law, 16*(2), 185–195. https://doi.org/10.1111/j.1467-9388.2007.00553.x

Trouwborst, A. (2012). Transboundary wildlife conservation in a Changing climate: adaptation of the Bonn Convention on Migratory Species and its Daughter Instruments to Climate change. *Diversity, 4*(3), 258–300. https://doi.org/10.3390/d4030258

Ullah, N., Basheer, I., Minghai, Z., Rajpar, M. N., Rehan, M., & Khan, M. T. (2024). Spatiotemporal distribution and population trends of Sindh ibex (Capra aegagrus blythii) in Balochistan during 2019–2022. *European Journal of Wildlife Research, 70*(2). https://doi.org/10.1007/s10344-024-01776-5

Unar, N. A., Mirjat, N. H., Aslam, B., Qasmi, M. A., Ansari, M., & Lohana, K. (2022). Modeling and analysis of load growth expected for electric vehicles in Pakistan (2021–2030). *Energies, 15*(15), 5426. https://doi.org/10.3390/en15155426

Unerman, J., & O'Dwyer, B. (2006). On James Bond and the importance of NGO accountability. *Accounting Auditing & Accountability Journal, 19*(3), 305–318. https://doi.org/10.1108/09513570610670316

Wang, K., & Xing, Z. (2024). Study on the Precautionary Principle in Environmental Justice from the Perspective of Kunming Declaration. *Science of Law Journal, 3*(2). https://doi.org/10.23977/law.2024.030209

Wang, R. (2011). The precautionary principle in maritime affairs. *WMU Journal of Maritime Affairs, 10*(2). https://doi.org/10.1007/s13437-011-0009-7

Waseem, M., Raza, A., Aisha, H., Awan, M. N., Ahmad, T., Nazir, R., & Mahmood, T. (2019). Scale of Illegal Killing and Trade Associated with Indian Pangolin (Manis crassicaudata) in Pakistan. *Pakistan Journal of Zoology, 52*(1). https://doi.org/10.17582/journal.pjz/2020.52.1.69.77

Wilkinson, N. I., Hall, J. G., Vickery, J. A., & Buchanan, G. M. (2017). The nature and extent of terrestrial protected area coverage on the UK's Overseas Territories. *Environmental Conservation, 44*(4), 397–404. https://doi.org/10.1017/s0376892917000145

World Wildlife Fund Pakistan. (2023). *Indus Dolphin*. https://www.worldwildlife.org/species/indus-river-dolphin

Wyatt, T., Friedman, K., & Hutchinson, A. (2021). Are fish wild? *Liverpool Law Review, 42*(3), 485–492. https://doi.org/10.1007/s10991-021-09285-0

Yin, M., & Zou, K. (2021). The Implementation of the precautionary Principle in Nuclear Safety Regulation: Challenges and Prospects. *Sustainability, 13*(24), 14033. https://doi.org/10.3390/su132414033

Zaman, M., Riegert, J., Chen, Y., Yu, Y., Guo, C., & Fan, L. (2024). Conservation and mitigation approaches for human–gray wolf (Canis lupus) conflicts in Shigar Valley, Northern Pakistan. *Wildlife Letters, 2*(1), 33–43. https://doi.org/10.1002/wll2.12031

Zangi, I., Mahmood, T., Akrim, F., & Nadeem, M. S. (2019). Spatial distribution and population estimates of three vulture species in and around Pir Lasura National Park, Northeastern Himalayan Region, Pakistan. *Journal of Raptor Research, 53*(2), 164. https://doi.org/10.3356/jrr-18-18