

# Utilization Practices and Conservation Impacts of Endangered Wildlife in Asian Countries

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**Abstract.** The Asian region is globally renowned for its unparalleled biodiversity, rich ecosystems, and unique cultural heritage. However, the delicate equilibrium between human societies and the diverse flora and fauna faces increasing challenges due to the region's rich biodiversity and escalating utilization of wildlife resources. Hence, this paper aims to document the utilization of endangered wildlife across Asian countries and to report the existing conservation measures and recommendations for sustainable wildlife management over the years. We employed prominent academic databases, specifically SCOPUS, to explore the dynamics of wildlife utilization and its associated implications. From the findings, 9,989 records were successfully identified. However, only 65 articles were included in the review after the screening process. A total of 61 species, comprising 30 mammals, 22 reptiles, one amphibian, and eight birds, all endangered, were identified as subjects of wildlife utilization in 16 Asian countries. China possessed the highest count for wildlife utilization across all categories, including 15 species used for trading purposes. In conclusion, this research underscores the critical need for integrated approaches that balance human needs and conservation imperatives to ensure a sustainable future for Asia's wildlife biodiversity.

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## 1 Introduction

Wildlife has long served as an essential source of food, medicine, livelihood, and cultural significance for human populations [1]. When managed sustainably, wildlife can function as a replenishable natural resource, ensuring a consistent supply of nourishment and income, particularly in rural regions [2]. However, unsustainable levels of wildlife exploitation have been linked to species extinctions [3, 4], and present a significant global biodiversity threat [5]. This is due to hunting of wildlife for subsistence and trade is a widespread phenomenon, especially across tropical Southeast Asia [6, 7]. Hussain and Khan [8] reported that wildlife has changed its dimension in recent years from subsistence to commercial trade and Southeast Asia is the epicenter of wildlife trade. This results in large quantities of wild animals are now on the brink of extinction, such as Chinese pangolin (*Manis pentadactyla*) and tiger (*Panthera tigris*) [9, 10]. Additionally, Indonesia is one of the countries with a high prevalence of illegal and unsustainable wildlife trade [11].

Asia, renowned for its rich biodiversity and global ecological significance, has become a central area of concern for scientists and conservationists on a global scale [12]. This diverse continent spans tropical rainforests, towering mountain ranges, and a spectrum of species, ranging from charismatic megafauna to the tiniest organisms [13]. Nevertheless, within this natural grandeur lies a complex interplay involving human activities, the utilization of wildlife, and conservation endeavors. Grasping the profound repercussions of wildlife exploitation on conservation is vital to address urgent challenges, which include zoonotic diseases and illegal wildlife trade. These issues present severe threats to ecosystems and human health [14].

This paper specifically directs its focus toward Asian countries where wildlife utilization is particularly high. These nations are known for their diverse ecological landscapes, which are home to a wide range of wildlife, ranging from elusive tigers to graceful cranes. However, this biodiversity richness is accompanied by numerous challenges, including human-wildlife conflicts and the vulnerable status of many species. Therefore, the primary objective of this review is to document the utilization of endangered wildlife across Asian countries, in addition to reporting existing conservation measures and recommendations for sustainable wildlife management over the years. By meticulously examining the existing literature, this review seeks to bridge the gap between knowledge and the practical aspects of wildlife utilization in Asian countries. It also aims to provide researchers and stakeholders with the necessary information to work toward biodiversity conservation collaboratively.

## 2 Materials and Methods

### 2.1 Database selection and search strategy

Our data collection primarily focused on the SCOPUS database, renowned for its extensive repository of scholarly articles and research across disciplines, ensuring comprehensive coverage. To refine our search, we combined different keywords using Boolean operators such as “AND” and “OR”. During our search strategy development, a preliminary scoping exercise was conducted to identify the most relevant keywords and phrases related to wildlife utilization.

The following search terms were used:

1. (“Wildlife”) AND (“Utilization” OR “Utilisation”)
2. (“Wildlife”) AND (“Consumption” OR “Consume”)

3. (“Wildlife”) AND (“Usage” OR “Use”)
4. (“Wildlife”) AND (“Trading” OR “Trade”)
5. (“Wildlife”) AND (“Exploitation”)
6. (“Wildlife”) AND (“Ethnozoology” OR “Ethnozoological”)
7. (“Wildlife”) AND (“Ethnobiology” OR “Ethnobiological”)

## 2.2 Inclusion and exclusion criteria

Throughout the sorting process, our inclusive criteria centered on wildlife species with endangered (EN) and critically endangered (CR) status, as defined by The International Union for Conservation of Nature Red List of Threatened Species (IUCN) from 48 Asian countries. This selection aimed to examine species facing severe conservation threats, aligning with our study's focus on endangered wildlife utilization practices. Additionally, exclusive criteria were applied to restrict the study to peer-reviewed articles published in English, narrowing the scope to maintain a consistent and scholarly perspective.

## 2.3 Data extraction and processing

In this study, we employed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram as a guiding framework to document the systematic review process, encompassing identification, screening, eligibility, and inclusion of studies [15]. The time frame for our data collection spanned up to September 2023, ensuring the inclusion of the most recent and relevant literature. The extracted data were organized using Microsoft Excel spreadsheets and visually represented in tables or graph bars for effective presentation.

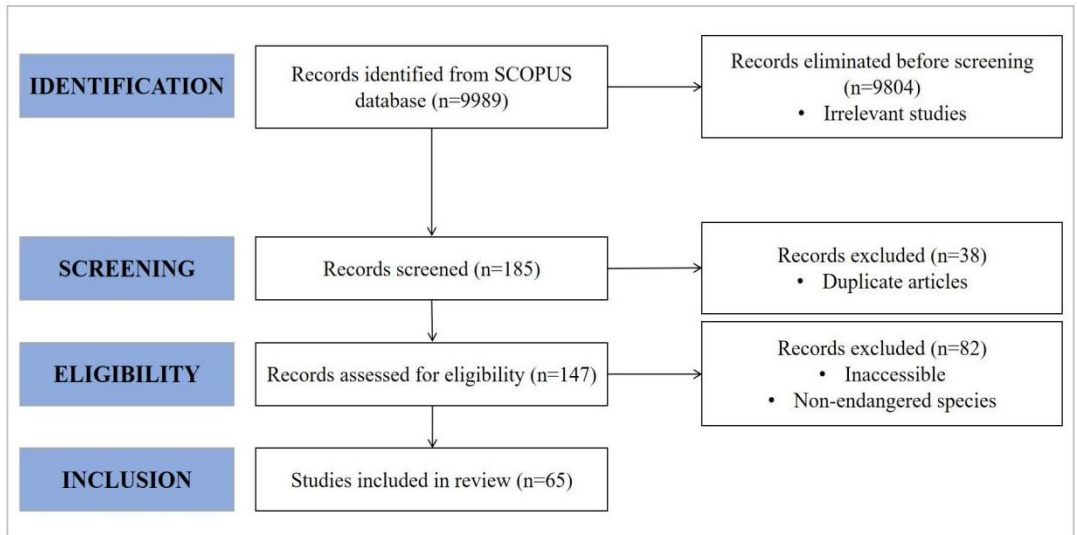
## 3 Results and Discussion

Our analysis showed keywords involving “Wildlife” alongside utilization-related terms were among the most frequently used. Table 1 showcases the prevalence of specific keywords within the academic literature, revealing varying degrees of emphasis on different aspects of wildlife utilization. The keywords “Trading” or “Trade” appear most frequently, featuring in 4,064 articles, followed by “Consumption” or “Consume” present in 2,659 articles, and another prominent keyword, “Utilization” or “Utilisation” is appeared in 1,332 articles. Additionally, “Exploitation” is featured in 1,146 articles and “Usage” or “Use” is found in 612 articles. Finally, keywords related to “Ethnobiology” or “Ethnobiological” and “Ethnozoology” or “Ethnozoological” appeared in 89, and 87 articles, respectively.

**Table 1.** Keywords analysis in SCOPUS database.

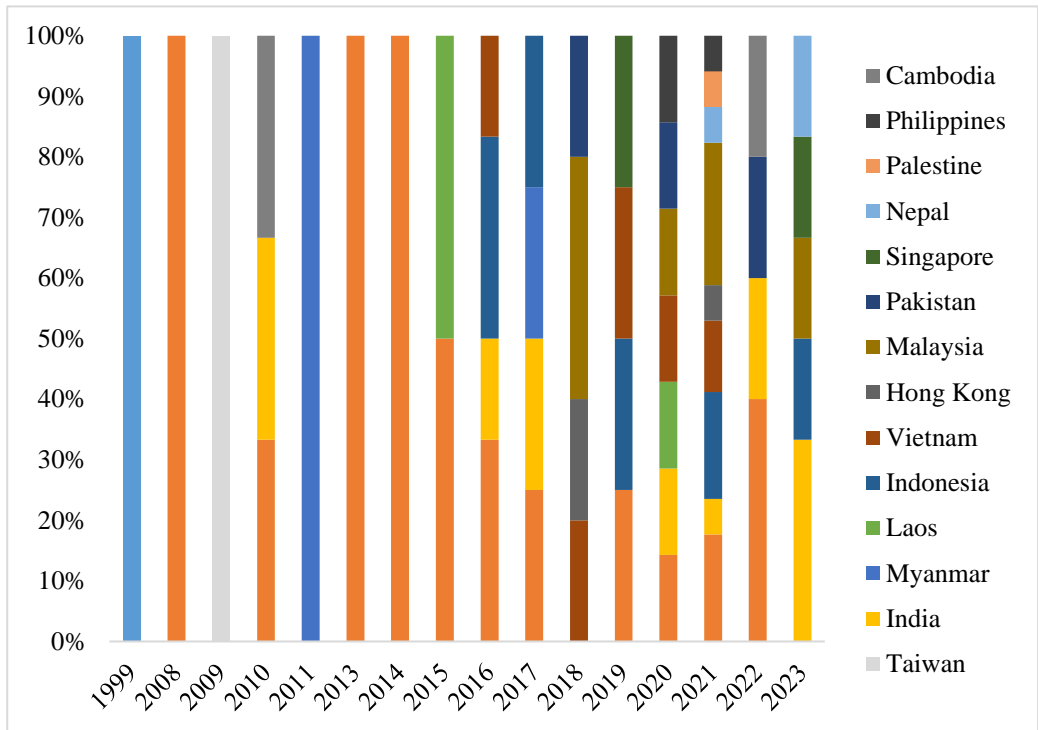
Keywords	SCOPUS
(“Wildlife”) AND (“Trading” OR “Trade”)	4,064
(“Wildlife”) AND (“Consumption” OR “Consume”)	2,659
(“Wildlife”) AND (“Utilization” OR “Utilisation”)	1,332
(“Wildlife”) AND (“Exploitation”)	1,146
(“Wildlife”) AND (“Usage” OR “Use”)	612
(“Wildlife”) AND (“Ethnobiology” OR “Ethnobiological”)	89
(“Wildlife”) AND (“Ethnozoology” OR “Ethnozoological”)	87
<b>Total</b>	<b>9,989</b>

In Figure 1, the PRISMA diagram analysis illustrates the comprehensive data selection and inclusion process for this review. A total of 9,989 records were initially identified in the SCOPUS database. Subsequently, these records underwent a rigorous screening process, where 185 records were screened. This assessment led to the exclusion of 120 records for various reasons, including irrelevance to the study's focus, duplicate articles, and inaccessibility. Articles that did not include information on endangered species were also excluded. Ultimately, this screening process resulted in 65 studies being included in the review.



**Fig. 1.** Data was recorded using the SCOPUS database by PRISMA diagram analysis.

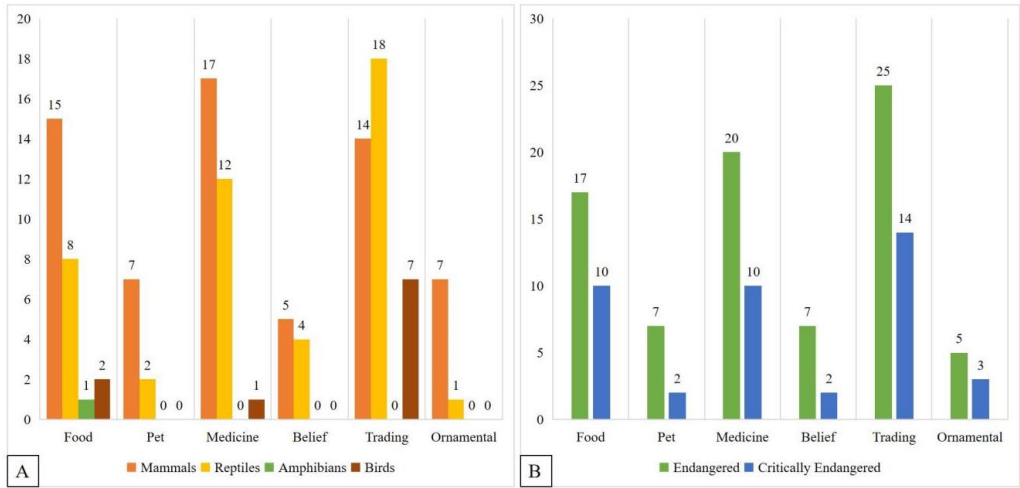
Figure 2 visually summarizes the research conducted on the utilization of endangered wildlife across 16 Asian countries over several years. China consistently emerges as the primary contributor to this field, publishing the highest number of research records, with totaling 16 articles. India, Indonesia, and Malaysia closely follow suit, each with eight articles, occasionally surpassing other nations. Vietnam (6 articles) and Pakistan (3 articles) also demonstrate sustained engagement in research activities. However, countries like Singapore, Laos, Myanmar, Nepal, the Philippines, Cambodia, Hong Kong, Palestine, Taiwan, and Sri Lanka show minimal involvement in studying endangered wildlife utilization, with only one or two publications over the years. In 1999, only one publication on wildlife utilization was recorded, focusing on the Asian elephant ivory trade and published by Sri Lanka. The trend of research on this topic started to increase notably from 2016, coinciding with heightened awareness of wildlife use. The COVID-19 pandemic's onset in 2020 led to a significant surge in publications on this topic, with 17 articles published in 2021. However, the trend seemed to stabilize after 2021, resembling previous years' patterns.



**Fig. 2.** Research on the endangered wildlife utilization in Asian countries.

Figure 3A presents the breakdown of wildlife utilization across different taxonomic groups, including mammals, reptiles, amphibians, and birds. In terms of food, mammals have the highest number of species utilized (15), followed by reptiles (8). Amphibians and birds have comparatively fewer species utilized for food, with one and two, respectively. Mammals again lead the count with seven species for pets, while reptiles have two species utilized as pets. In the context of traditional medicine, mammals are the most commonly used taxon, with 17 species being utilized. Reptiles follow closely with 12 species. Meanwhile, for belief-based practices, mammals and reptiles both have five and four species, respectively. In the ornamental category, reptiles are predominantly utilized, with seven species being used for ornamental purposes. Mammals have one species in this category, while amphibians and birds are not notably represented. Lastly, reptiles are predominantly utilized in the ornamental category, with seven species used for ornamental purposes. While mammals have only one species in this category.

There are 17 endangered species and 10 critically endangered species being utilized for food (Figure 3B). Next, seven endangered species and two critically endangered species are being kept as pets. As for medicine practices, it exhibits the utilization of 20 endangered species and 10 critically endangered species. While in the in belief category, seven endangered species and two critically endangered species are utilized and in trading, there are 25 endangered species and 14 critically endangered species involved. Finally, the ornamental category comprises five endangered species and three critically endangered species.



**Fig. 3.** A- Number of wildlife species utilized according to taxonomic groups, B- Number of endangered and critically endangered wildlife species utilized according to type of utilization.

Table 2 illustrates the heatmap utilization of wildlife in various categories across different Asian countries. In the “Ornamental” category, some countries like China and India show relatively higher utilization, with four species each, and Pakistan and Malaysia with one species each. Trading, which involves the exchange and sale of wildlife, has China that is significantly involved with 15 species utilized. Other countries like Indonesia, Vietnam, Malaysia, Pakistan, Singapore, and Cambodia also contribute to wildlife trading practices. Under the belief category, multiple countries including India, Myanmar, Cambodia, and Nepal have documented wildlife utilization for cultural and traditional beliefs, with four species from Nepal showing a noteworthy presence. Medicine purposes shows varied utilization across several countries where Indonesia has the highest number of species utilized, with nine species, followed by China with six species. While for wildlife as pets, is observed in countries like Vietnam, Indonesia, Malaysia, and Singapore. Food is particularly prominent in Malaysia, with 11 species utilized, and China and Vietnam each having five species used as a food source.

**Table 2.** Heatmap of utilization of endangered wildlife species in Asian countries according to type of utilization

Type of wildlife utilization	Ornamental	Trading	Belief	Medicine	Pet	Food
Sri Lanka	0	1	0	0	0	0
China	4	15	2	6	3	5
Taiwan	0	0	0	4	0	0
India	4	3	1	7	0	3
Myanmar	0	1	0	3	0	0
Laos	0	1	0	0	1	1
Indonesia	0	8	1	9	1	1
Vietnam	0	8	1	2	3	2
Hong Kong	0	2	0	0	0	0
Malaysia	1	5	0	2	4	11
Pakistan	0	5	4	4	0	4
Singapore	0	2	0	1	0	0
Nepal	0	2	0	0	0	0
Palestine	0	1	0	1	0	1

Philippines	0	5	0	0	0	0
Cambodia	0	0	0	5	0	0

According to Table 3, a total of 61 species comprising of 30, 22, one, and eight endangered species of mammals, reptiles, amphibian, and birds, respectively were identified in the review of wildlife utilization in Asian countries. Among mammals, the Asian elephant (*Elephas maximus*) stands out as a widely utilized species. This utilization is spread across India, China, Myanmar, Sri Lanka, Singapore, Vietnam, Malaysia, and Cambodia. Its utilization involving various parts such as molars, ivory, skin, soles of feet, and leg bones. Similarly, tigers (*Panthera tigris*) are subject to utilization for a range of body parts, including paws, claws, teeth, bones, and skin, mainly in India, China, Myanmar, Malaysia, and Cambodia. Both of these species are classified as Endangered (EN) in IUCN. Other notable species identified include the critically endangered Sumatran rhinoceros (*Dicerorhinus sumatrensis*), which is utilized for medicine in China and Indonesia. Additionally, pangolins, such as the Indian pangolin (*Manis crassicaudata*), Philippine pangolin (*M. culionensis*), Sunda pangolin (*M. javanica*) and Chinese pangolin (*M. pentadactyla*), are extensively utilized for various parts, including meat, scales, and more in India, Myanmar, Nepal, Philippines, Pakistan, and other Asian countries.

Among reptiles, the most utilized species by countries are Malayan box turtle (*Cuora amboinensis*), Hawksbill turtle (*Eretmochelys imbricata*), and Spiny hill turtle (*Heosemys spinosa*). These species falling under the Endangered (EN) and Critically Endangered (CR) category, which mainly used as food, medicine, and trading. However, only one CR species recorded under amphibian, Chinese giant salamander (*Andrias davidianus*), is solely consumed as food in China. As for birds taxa, the most utilized species is the Helmeted Hornbill (*Rhinoplax vigil*) which is used in Indonesia, China, and Malaysia.

### 3.1 Categories and Utilization of Wildlife in Asian Countries

Our results reveal that various categories of wildlife utilization have fairly well documented in several Asian countries, encompassing food, pet-keeping, traditional medicine, belief-based practices, trading, and ornamental use [16, 17, 18]. In Malaysia, the consumption of wildlife as food has a rich history spanning over centuries [19]. For example, the critically endangered (CR) brown Asian giant tortoise has been consumed by the Semoq Beri indigenous people in Pahang [19]. However, this species has also been utilized in Indonesia for wildlife trading and traditional medicine, where it is believed to aid in musculoskeletal health [20, 21]. Additionally, primate species, including the dusky leaf monkey and white-handed gibbon, have been reported as a source of food among the Semoq Beri and Temuan people in Peninsular Malaysia [22, 23]. Conversely, the endemic primate species, the black snub-nosed monkey, holds significance in Tibetan Buddhism, where it is protected as it is believed to inhabit sacred mountains and must not be killed [24]. China demonstrates the high consumption of species as food, such as the Chinese pangolin, Malayan tiger, and François' langur, all known for their meat [16, 25, 26]. Bird species, like the helmeted hornbill, are also consumed in China and Malaysia, where wild birds are considered a delicacy [27]. Remarkably, the Helmeted Hornbill serves as both food and traditional medicine in Indonesia, particularly for digestive issues [28]. However, its casques, beaks, bills, and ivory are also involved in wildlife trafficking in China [29]. In Pakistan, a considerable number of reptile species are consumed as food, including the Indian softshell plaiter, Indian narrow-headed softshell turtle, peacock softshell turtle, and yellow-spotted turtle [30]. These reptile species are also utilized in wildlife trading and traditional medicine, with their shells, fat, and oil believed to have curative properties for conditions like psoriasis, joint pain, backbone pain, and paralysis [30]. Additionally, eggs from the painted terrapin

and green sea turtle are used to treat fever, increase stamina, and boost the body's immunity [20]. Notably, our review includes the only amphibian, the Chinese giant salamander (*Andrias davidianus*), consumed as food in China despite the toxins in their skin [31].

Another significant species widely utilized across Asian countries is the slow loris. In Cambodia, the Bengal slow loris gall bladder was historically used as ink for tattoos by the elderly [43, 49]. In the same location, the species is considered unattractive and is not kept as a pet due to its painful bite [49]. However, in Vietnam, the Bengal slow loris is kept as a pet [50]. In belief-based practices, the Sunda slow loris is associated with bad luck [41]. The Karangwangi people in Indonesia believe that land affected by the blood of this species will suffer from drought, yet it is also believed to be beneficial for the digestive system [28]. Apart from being kept as a pet, in Vietnam, the boiled blood of pygmy loris is believed to help stop bleeding, treat mental illness, heal broken bones, ligaments, and joints, prevent stomach aches, and cure conjunctivitis [50]. However, consuming slow loris meat is associated with bad luck and financial difficulties in Vietnam [50]. The EN species *Panthera tigris* is widely utilized in India, China, Myanmar, Malaysia, and Cambodia. Its body parts, including paws, claws, teeth, bones, and skin, are used in India for belief-based practices and ornamental purposes [46, 51]. In China, tiger bones are processed into tiger bone wine, which is consumed as a tonic, medicine, and symbol of wealth [52]. In Myanmar, tiger bone is believed to treat aching joints [33]. Furthermore, horns from species like the Sumatran rhinoceros, Nilgiri tahr, Javan rhinoceros, and saiga are often used as traditional medicine. For instance, in Myanmar, the horn of the Javan rhinoceros is believed to aid body detoxification and treat hangovers [53]. In Vietnam, rhinoceros horn is used to treat various conditions, including high fevers, convulsions, hemorrhaging, epilepsy, high blood pressure, allergies, measles, stroke, and long-term sleeping disorders [54]. Additionally, consumers use rhinoceros horn to display economic wealth, acquire social status, and initiate business and political relationships [53]. The saiga antelope horn has also been used to treat fever and heatiness in Singapore [55].

### 3.2 Impact of Wildlife Utilization on Biodiversity and Conservation

Understanding the profound consequence of wildlife utilization on biodiversity is significant in the face of increasing pressures on our planet's ecosystems. The diverse ways in which wildlife is harvested, traded, and consumed across Asian countries can have far-reaching effect for the survival of many species. In general, wildlife utilization can result in detrimental impacts on biodiversity, including decreasing species' populations, by-catch of non-target species, and introducing harmful invasive species [56-58]. The International Union for Conservation of Nature (IUCN) defines conservation as the 'protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence. Wildlife harvesting for international trade can have positive and negative impacts on conservation. These largely depend on whether harvest is consistent with 'sustainable use', that is 'the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity', and thereby maintains their contribution to present and future generations [59]. According to Dai and Zhang [60], numerous markets for trading wildlife were found in Guangxi and Yunnan, leading to a severe scenario where the wildlife resources have been impacted significantly. For example, wild populations of the birds captured may be the parent birds, which may lead to the death of their offspring [60]. Asian countries such as Malaysia, Vietnam, Indonesia and China are the major exporters of wild-caught animals and a biodiversity hotspot for a region with large amounts of wildlife trade. Meanwhile the European Union and Japan are the most significant importers [61]. From this interaction, human-wildlife conflict will be



arised and contribute to decreasing endangered wildlife species. This can be such an impactful phenomenon, such as the case in Florida, United States where alien species *Python bivittatus* was introduced and lead to the spread of pathogens and threaten local wildlife [62, 63].

### **3.3 Conservation Strategies, Challenges and Future Directions**

Efforts to combat the wildlife trade in Asian countries have evolved over the years. The rise of online wildlife trading, notably in Indonesia, poses a significant challenge [62]. To address this, strict monitoring and enhanced online trade regulations are essential as mere confiscation from physical markets or animal shops is insufficient [54, 62]. Various factors, including economic limitations, livelihood needs, and access to alternative meat sources drive hunting activities [64]. For instance, the poaching of sea turtles offers an additional income stream for impoverished coastal communities, especially in regions like Semporna, where a large portion of the population lacks official state status [65]. Also, harvesting hawksbill turtles in their foraging areas poses a threat to nesting populations [65]. One mitigation strategy involves expanding job opportunities for both professional hunters and local communities. However, success hinges on behavioral changes that ultimately reduce hunting pressures [64, 66]. Additionally, hunting and consumption of wildlife resources are deeply rooted in cultural practices, especially in countries like India and Malaysia [19, 34, 44].

Sustainable exploitation can be promoted through collaboration with local communities to manage resource use at different diversity levels in specific zones [64, 67]. As such, public education on the prohibition of trading protected wildlife and importance of endemic species is crucial [66, 68]. Campaigns on public awareness are needed to inform local residents about the status and challenges facing these species, with the government, conservationists, animal traders, and hobbyists working in tandem [62]. Such initiatives aim to foster responsible and sustainable use of wildlife resources. Besides, regulations are vital for potentially dangerous species, such as venomous snakes, large snakes, and crocodiles. These measures help mitigate risks of injuries or fatalities within communities, thereby reducing human-wildlife conflicts. Education also plays a key role in reducing reliance on forest products [64, 69-71]. Within protected areas like National Parks and Nature Reserves, management initiatives must include regular annual monitoring to maintain stable wildlife populations [66]. Considering the extensive illegal capture and trade of wild birds and their potential impact, there's an urgent need to implement control measures. While complete bans on the bird trade have been proposed, conservation biologists argue that indiscriminate bans may be ineffective [57, 60]. Enforcing measures during breeding seasons is crucial, as individual species produced during this period can be prime targets for wildlife trading [60]. For long-term monitoring, molecular techniques like mitochondrial DNA analysis can be employed to combat wildlife utilization, especially concerning food, medicine, and the wildlife trade. The genetic data obtained can serve as a valuable baseline for monitoring species populations [65].

Table 3. Overview of wildlife utilization in Asian countries

Taxon	Species Name	Common Name	Type of Utilization	Parts Used	IUCN Status	Countries of Utilization
Mammals	<i>Axis porcinus</i>	Hog Deer	f	antlers	EN	India
	<i>Cervus hanglu ssp. hanglu</i>	Kashmir Stag/ Hangul	a, c, f	flesh, antlers	CR	India
	<i>Canis alpinus</i>	Asiatic Wild Dog	c	tongue	EN	India
	<i>Dicerorhinus sumatrensis</i>	Sumatran Rhinoceros	c	horn	CR	China, Indonesia
	<i>Elephas maximus</i>	Asian Elephant	a, c, e, f	molars, skin, soles of feet, leg bones, ivory	EN	India, China, Myanmar, Sri Lanka, Singapore, Vietnam, Malaysia, Cambodia
	<i>Gazella gazella</i>	Mountain Gazelle	a, c, e	meat	EN	Palestine
	<i>Hylobates lar</i>	White-Handed Gibbon	a, b	meat	EN	Malaysia
	<i>Loxodonta africana</i>	African Savanna Elephant	e	ivory	EN	China
	<i>Loxodonta cyclotis</i>	African Forest Elephant	e	tusk	CR	Hong Kong
	<i>Macaca fascicularis</i>	Long-Tailed Macaque	b, e	-	EN	China, Malaysia, Indonesia
	<i>Macaca nemestrina</i>	Pig-Tailed Macaque	b	-	EN	China, Vietnam, Malaysia
	<i>Macaca silenus</i>	Lion-Tailed Macaque	c	meat	EN	India
	<i>Manis crassicaudata</i>	Indian Pangolin	a, c, e, f	meat, skin, scales, nails, fat tissue	EN	India, Nepal, Pakistan
	<i>Manis culionensis</i>	Philippine Pangolin	e	-	CR	Philippines
	<i>Manis javanica</i>	Sunda Pangolin	a, c, d, e	meat, scale, skin, tongue, bile	CR	Myanmar, Indonesia, Vietnam, Malaysia, Cambodia
	<i>Manis pentadactyla</i>	Chinese Pangolin	a, c, e, f	meat, scale	CR	India, China, Myanmar, Nepal, Vietnam
	<i>Nilgiritragus hylocrius</i>	Nilgiri Tahr	a, c	horn	EN	India
	<i>Nycticebus bengalensis</i>	Bengal Slow Loris	a, b, c, e	whole body, stomach, gall bladder	EN	Vietnam, Cambodia
	<i>Nycticebus coucang</i>	Sunda Slow Loris	b, c, d	blood	EN	China, Indonesia
	<i>Nycticebus javanicus</i>	Javan Slow Loris	b	-	CR	Indonesia
	<i>Nycticebus pygmaeus</i>	Pygmy Loris	a, b, c, e	whole body, stomach, blood	EN	Vietnam, Cambodia
	<i>Panthera tigris</i>	Tiger	a, c, d, e, f	paws, claws, teeth, bones, skin, gall bladder	EN	India, China, Myanmar, Malaysia, Cambodia
	<i>Pionathururus planiceps</i>	Flat-Headed Cat	a	meat	EN	Malaysia
	<i>Pteropus vampyrus</i>	Large Flying Fox	c, e	-	EN	Philippines, Indonesia
	<i>Rhinoceros sondaicus</i>	Javan Rhinoceros	c, d, e	horn	CR	China, Vietnam, Indonesia
	<i>Rhinopithecus bieti</i>	Black Snub-Nosed Monkey	d	-	EN	China

	<i>Saiga tatarica</i>	Saiga	c, e	horn, meat	CR	China, Singapore
	<i>Tapirus indicus</i>	Malayan Tapir	a, f	meat	EN	Malaysia
	<i>Trachypitecus francoisi</i>	Francois' Langous	a	meat	EN	China
Reptiles	<i>Trachypitecus obscurus</i>	Dusky Leaf Monkey	a	meat	EN	Malaysia
	<i>Aspideretes gangeticus</i>	Indian Softshell Plather	a, c, d, e	shell, fat, oil	EN	Pakistan
	<i>Aspideretes hurum</i>	Peacock Softshell Turtle	a, c, d, e	shell, fat, oil	EN	Pakistan
	<i>Batagur affinis</i>	River Terrapin	a, b, e		CR	Malaysia
	<i>Batagur borneoensis</i>	Painted Terrapin	c	egg	CR	Indonesia
	<i>Centrochelys sulcata</i>	African Spurred Tortoise	e	-	EN	Hong Kong
	<i>Chelonia mydas</i>	Green Sea Turtle	c, e	egg	EN	Indonesia, Philippines
	<i>Chitra indica</i>	Indian Narrow-Headed Softshell Turtle	a, c, d, e	oil, fat	EN	Pakistan
	<i>Cuora amboinensis</i>	Malayan Box Turtle	c, e	shell	EN	China, Taiwan, Indonesia
	<i>Cuora flavomarginata</i>	Yellow-Margined Box Turtle	c	shell	EN	Taiwan
<i>Cuora galbinifrons</i>	Indochinese Box Turtle	c	shell	CR	Taiwan	
<i>Cuora maoiitii</i>	Keelcd Box Turtle	b, e	-	EN	Laos	
<i>Eremochelys imbricata</i>	Hawksbill Turtle	e, f	-	CR	China, Malaysia, Philippines	
<i>Geoclemys hamiltonii</i>	Yellow-Spotted Turtle	a, c, d, e	fat	EN	Pakistan	
<i>Heosemys grandis</i>	Giant Asian Pond Turtle	e	-	CR	China	
<i>Heosemys spinosa</i>	Spiny Hill Turtle	c, e	shell	EN	China, Taiwan, Malaysia	
<i>Manouria emys</i>	Brown Asian Giant Tortoise	a, c, e	-	CR	Malaysia, Indonesia	
<i>Manuremys reevesii</i>	Golden Turtle	e	-	EN	Vietnam, Indonesia	
<i>Orlitia borneensis</i>	Malayan Giant Turtle	a, e	meat	CR	Malaysia, Indonesia	
<i>Sacalia quadriocellata</i>	Four-Eyed Turtle	a	-	EN	Laos	
<i>Stehanocheila crassicollis</i>	Black Marsh Turtle	e	-	EN	China, Indonesia	
<i>Stehanocheila leytensis</i>	Philippine Forest Turtle	e	-	CR	Philippines	
<i>Vijayachelys sivaica</i>	Cochin Forest Cane Turtle	c	shell	EN	India	
<i>Andrias davidianus</i>	Chinese Giant Salamander	a	-	CR	China	
<i>Arainga solstitialis</i>	Sun Parakeet	e	-	EN	China	
<i>Cacatua alba</i>	White Cockatoo	c	-	EN	China	
<i>Cacatua sulphurea</i>	Yellow-Crested Cockatoo	e	-	CR	China	
<i>Emberiza aureola</i>	Yellow-Breasted Bunting	e	-	EN	China	
<i>Polyplectron kaisumatae</i>	Hainan Peacock Pheasant	e	-	EN	China	
<i>Psittacus erithacus</i>	Grey Parrot	e	-	EN	China	
<i>Pycnonotus zeylanicus</i>	Straw-Headed Bulbul	a	-	CR	Malaysia	
	<i>Rhinoplax vigil</i>	Helmeted Hornbill	a, c, e	whole body	CR	Indonesia, China, Malaysia

a: food, b: pet, c: medicine, d: belief, e: trading, f: ornamental; EN: Endangered, CR: Critically Endangered

## 4 Conclusion

While our study may only represent data for endangered and critically endangered species, it provides a robust foundational overview for future research and conservation efforts, particularly addressing wildlife utilization in Asian countries. There is a promising avenue for further exploration encompassing a broader range of wildlife, including those with different IUCN statuses like Vulnerable, Near Threatened, Least Concern, Data Deficient, and Not Evaluated. The documentation of traditional knowledge, particularly regarding animal-based medicines, is a significant aspect that can significantly contribute to the conservation of bio-resources. As we conclude this study, it is evident that further investigations and collaborative efforts are essential to bridge the gap between knowledge and action, enabling effective conservation measures that harmonize with regional contexts and traditional practices.

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