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Vertebrate diversity at Margalla Hills National Park, Pakistan

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Abstract

Vertebrate diversity at Margalla Hills National Park, Pakistan. The Margalla Hills National Park (MHNP) in Islamabad, Pakistan, is an important site for the conservation of many plants and animals. The present study aimed to determine the status of fauna diversity and richness, and environmental threats to the animals. A field study was conducted and the point count method was used to determine vertebrate diversity. The survey showed that the MHNP is home to 117 species of birds, 27 reptiles (including species such as the saw–scaled viper, Russell's viper and the Indian cobra) and 30 mammalian species, such as barking deer, wild boar, golden jackal, red fox, Asiatic leopards, monkeys, fruit bats, and pangolins. The results showed a maximum count of 9,076 birds of 117 species belonging to 48 families. According to the Islamabad wildlife management board, one of the unique species, the grey goral (*Nemorhaedus goral*), has become extinct at the MHNP as no single specimen has been recorded since 2018. It was also been observed, however, that the numbers of the endangered species of common leopard (*Panthera pardus*) and pangolin (*Manis crassicaudata*) have increased, possibly due to the wildlife management board's strategy for conservation. Nevertheless, greater conservation and protection of wild fauna at the MHNP is still needed. During the visits, threats such as habitat degradation, climate change, and over hunting were recorded, but focus on the implementation of approved legislation and better managerial practices to protect the unique diversity was observed.

Checklist dataset published through GBIF (Doi: 10.15470/hf1s9i)

Key words: Biodiversity, Margalla Hills, Habitat, Threats, National Park

Resumen

Estudio de la diversidad de vertebrados en el Margalla Hills National Park. El Margalla Hills National Park de Islamabad (Pakistán) es un importante emplazamiento por el número de plantas y animales que se conservan en el mismo. Este estudio se inició para determinar el estatus de la fauna presente en el parque nacional, su diversidad y las amenazas ambientales que pueden afectar a la protección de los animales. Se desarrolló un estudio de campo utilizando un método de conteo por puntos de observación para determinar la diversidad de vertebrados en el Margalla Hills National Park (MHNP) de Islamabad, resultando que el MHNP

está habitado aproximadamente por 117 especies de aves, 27 reptiles enigmáticos como la gariba, la víbora de Russell y la cobra india, así como 30 especies de mamíferos como el muntíaco, el jabalí común, el chacal dorado, el zorro rojo, leopardos asiáticos, monos, murciélagos frugívoros y pangolines. Los resultados del estudio mostraron un recuento máximo de 9.076 aves de 117 especies pertenecientes a 48 familias. Según la Dirección del Órgano Gestor de Fauna Salvaje de Islamabad, el goral de cola larga (*Nemorhaedus goral*), una de las especies únicas del parque, está extinto en el MHNP puesto que no se registra la presencia de ningún ejemplar desde 2018. Por otra parte, el aumento de ejemplares de las especies amenazadas leopardo común (*Panthera pardus*) y pangolín (*Manis crassicaudata*) se considera satisfactorio y podría deberse a una mejor aplicación del plan de gestión de la fauna salvaje por parte del Órgano Gestor, si bien es necesario centrarse en mayor medida en la conservación y protección de la fauna salvaje del MHNP. Durante las visitas también se señalaron amenazas como la degradación del hábitat, el cambio climático y la caza excesiva. No obstante, se constata un mayor rigor en la implementación de las legislaciones aprobadas y en la aplicación de los métodos de gestión de los parques nacionales en pro de la diversidad única del Margalla Hills National Park.

Lista de datos publicados en GBIF (Doi: 10.15470/hf1s9i)

Palabras clave: Biodiversidad, Margalla Hills, Hábitat, Peligros, Parque Nacional

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Resum

Estudi de la diversitat de vertebrats al Margalla Hills National Park. El Margalla Hills National Park d'Islamabad (Pakistan) és un important emplaçament pel que fa al nombre de plantes i animals que s'hi conserven. Aquest estudi es va iniciar per determinar l'estatus de la fauna present al parc nacional, la diversitat i les amenaces ambientals que poden afectar la protecció dels animals. Es va portar a terme un estudi de camp utilitzant un mètode de comptatge per punts d'observació a fi de determinar la diversitat de vertebrats al Margalla Hills National Park (MHNP) d'Islamabad, que va donar com a resultat que l'MHNP està habitat aproximadament per 117 espècies d'ocells, 27 rèptils enigmàtics com la gariba, l'escurçó de Russell i la cobra índia, així com 30 espècies de mamífers com el muntjac, el senglar comú, el xacal daurat, la guineu vermella, lleopards asiàtics, micos, ratpenats frugívors i pangolins. Els resultats de l'estudi van mostrar un recompte màxim de 9.076 ocells de 117 espècies pertanyents a 48 famílies. Segons la Direcció de l'Òrgan Gestor de Fauna Salvatge d'Islamabad, el gòral de cua llarga (*Nemorhaedus goral*), una de les espècies úniques del parc, està extint a l'MHNP atès que no s'hi registra la presència de cap exemplar des de 2018. D'altra banda, l'augment d'exemplars de les espècies amenaçades lleopard comú (*Panthera pardus*) i pangolí (*Manis crassicaudata*) es considera satisfactori i podria ser degut a una millor aplicació del pla de gestió de la fauna salvatge per part de l'Òrgan Gestor, si bé cal centrar–se més en la conservació i protecció de la fauna salvatge de l'MHNP. Durant les visites també es van assenyalar amenaces com la degradació de l'hàbitat, el canvi climàtic i la caça excessiva. Tanmateix, es constata més rigor en la implementació de les legislacions aprovades i en l'aplicació dels mètodes de gestió dels parcs nacionals en pro de la diversitat única del Margalla Hills National Park.

Llista de dades publicades a GBIF (Doi: 10.15470/hf1s9i)

Paraules clau: Biodiversitat, Margalla Hills, Hàbitat, Perills, Parc Nacional

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Introduction

Biodiversity, which includes fauna, flora, and micro–organisms, is the abundance of living creatures found on earth. In 1992, the United Nations used the term 'biodiversity' extensively, to include aspects such as genetics, species, and ecosystem diversity. Biodiversity is important for humans for income, and for educational, cultural, scientific, and aesthetic values (Meduna et al., 2009; Chanie and Tesfaye, 2015).

With its extraordinary nature, extensive latitudinal spread, and colossal altitudinal range, Pakistan sustains a notable number of the world's environmental zones. These range from the coastal mangrove forests of the Arabian Sea to the majestic Karakorum peaks of the Western Himalayas and the Hindu Kush mountain range (Khan, 2002). These habitats support a large variety of species, such as fish, amphibians, reptiles, birds, mammals, plants, and invertebrates, all of which play a substantial role in the biodiversity of the Indian subcontinent and Pakistan (Shannon, 1948; Grimmett et al., 2008, 2016). Pakistan's unique fauna includes 198 freshwater fish (29 endemic, 1 threatened), 668 avifauna (25 threatened), 177 reptiles (13 endemic, 6 threatened), and 174 mammals (6 endemic, 20 threatened) (Khan and Mirza, 1977; Anonymous, 2003). It also has some of the world's unique and enigmatic species, such as the Indus dolphin, the western tragopan, the snow leopard, and the markhor (Anonymous, 2003). Endemic species and subspecies include the Punjabi urial, the Indus dolphin, the woolly flying squirrel, and the black bear. These species are undergoing a gradual decline due to habitat degradation, overhunting, and abuse of natural resources (Anonymous, 2003). The biodiversity of Pakistan is currently facing these and other serious threats such as deforestation, pollution, and species migration (Qasim et al., 2017). Various methods have been established to preserve biodiversity at a national and international level. For all such methods, protected areas play a pivotal role in conserving biodiversity. National parks provide habitat and natural environments for wildlife (Austin, 2007). They are areas of natural magnificence and provide a great opportunity for outdoor pleasure as visitors can observe and enjoy the beauty of nature (Muhumuza and Balkwill, 2013). The Margalla Hills National Park (MHNP) is an important protected natural area in Pakistan. According to various reports in the literature, however, the diversity of MHNP has not been fully studied. Several parameters, such as habitat degradation, overhunting, climate change, have not yet been investigated and their effects on species diversity are unknown. The main purpose of this study was to identify the factors directly affecting species' abundance and their decline in the park. This study covers the areas of the park that have not been considered previously. The aim of the study was to estimate vertebrate diversity and abundance in the MHNP in order to provide biodiversity researchers with updated data concerning the threats faced by vertebrate species therein.

Material and methods

Study site

The study was carried out in Margalla Hills National Park (MHNP), Islamabad, from December 2019 to March 2021. The MHNP is located between 33º 43' N and 72º 55' E and has a total area of 17,386 hectares. The landscape is mainly comprised of slopes and gullies and limestone rocks. MHNP altitude ranges from 450 to 1,580 m a.s.l. (Jabeen et al., 2009).

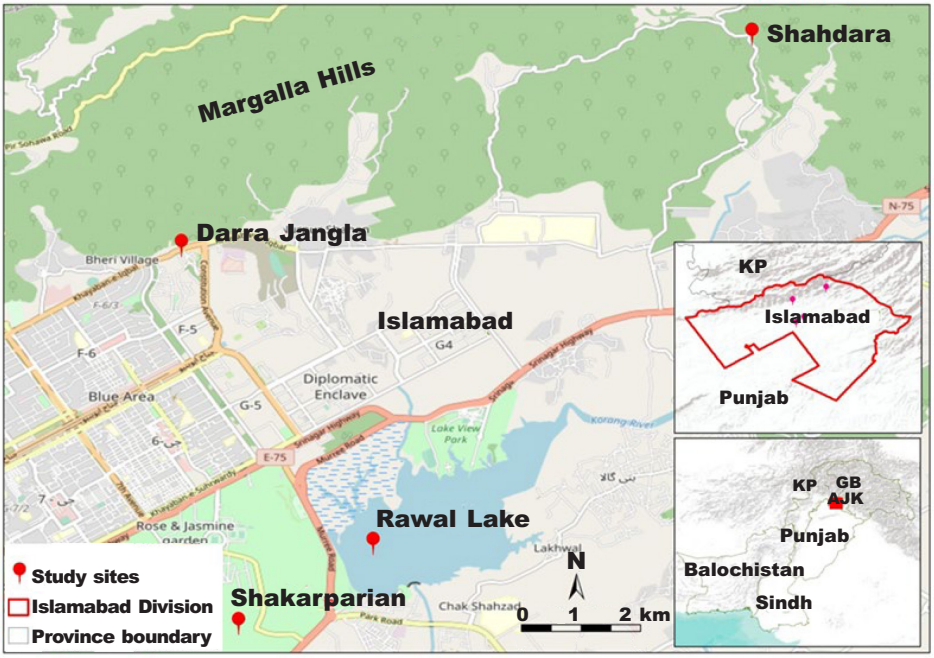

Fig. 1. Map showing the locations of study sites.

Fig. 1. Mapa en el que se muestra la localización de los puntos de estudio.

Sampling sites

The study area was divided into four sampling sites (fig. 1):

Site 1: Rawal Lake, lies south east of Islamabad (PEPA, 2004). It has an area of 19.02 km^2 with a sustained zone of 2 km^2. Annual precipitation is about 1,000 mm and temperature ranges between 1–15 ºC in winter and 20–40 ºC in summer

Site 2: Darra Jangla, situated half a kilometer from trail 3. It is the most wooded and quiet gorge in the park. The stream alongside the trail makes the area an ideal home range for several unique birds and animals.

Site 3: Shakarparian, the core part of the park. It is ecologically dense and it is the most diversified area of the park. The Shakarparian has an area of 1,376 ha (Jabeen et al., 2009). Its latitude and longitude are 73º 9' N and 33º 44' E. It is considered the most vital part of the park because its thick vegetation provides ideal conditions for numerous animals.

Site 4: Shahdara, a small town on the fringes of the MHNP. It is seven kilometers from Bara Kahu, and fifteen kilometers from Islamabad. The town is renowned for its animals and water falls. Its dense vegetation provides habitat for many animal species and the town plays a valuable role in conserving biodiversity in the park.

Each site was visited frequently to observe the microhabitats (such as rotting logs, leaf litter, flotsam, and water channels) of vertebrates. In winter, surveys were conducted before the onset of the hibernation period of amphibians and reptiles, mostly in October and November. Most studies in winter were carried out before sunset as low evening temperatures limit the movement of most species, including reptiles. We also used hiding places, fecal matter, body impressions, tail drags or footprints, tracks, dens, and egg laying excavations to estimate local distribution and population density of all the classes of vertebrates. Surveys and in summer were conducted early in the morning and late in the afternoon.

The sampling of the fish species was carried out from three different points of Rawal Lake in the pre–monsoon (June and July 2020) and post–monsoon (November and December 2020) seasons. Fish data were collected from local fishermen in the area and identified by their local or common names.

Field data collection methods

To evaluate the vertebrate diversity we used the direct count method as described by Haldin and Ulfvens (1987). Species of vertebrate classes such as fish, amphibians, reptiles, birds, and mammals were considered. The GPS (GARMIN, GPS map 76CS x) was also used for the point coordinates. The equipment used included binoculars (magnification 10 × 50) and spotting scope (magnification 20 × 40 × 60) with a tripod and digital camera. Birds and animals were identified using field guides and reference books (Roberts, 1991, 1992, 1997; Khan and Mirza, 1977; Mirza et al., 1998; Mirza and Wasiq, 2007; Grimmett et al., 2008, 2016). A bimonthly survey of study area was carried out over one year (7–8 days in each survey).

Interactions with local communities were a significant source to collect conventional knowledge regarding biodiversity. Meetings with the concerned departments were also helpful to determine their strategies and policies for the conservation of biodiversity. Photos were used to identify animals. Informants were given photographs for animal recognition. Data gathered in this manner was incorporated into the determination of the relative abundance of the species, based on total frequencies of reported sightings.

Proposed analysis of collected data

Various types of analysis were conducted to establish the diversity index, such as species richness as described by Jost (2006):

The Shannon–Wiener Index (Shannon, 1948), calculated as follows:

$$H' = -\sum_{i=1}^{k} p_i \log p_i$$

where p_i is the probability of encountering species and it is calculated by the formula: $p_i = n_i/N$ where n_i is the number of species' individuals i; and N is the total number of individuals.

The Simpson Index (D), used to evaluate the probability of an individual to belong to species of the chosen samples (Simpson, 1949). The formula for Simpson Index used in this study was:

$$D = \sum n\,(n-1)/N(N-1)$$

where n is the total number of birds of a particular species; N, the entire number of individuals of all species.

The Evenness (E) is the virtual abundance calculation of different species in figuring out the richness of sampling of site. The formula of evenness is listed as follows:

$$E = H'/\ln (\log \text{natural}) \text{ of total population}$$

Species Richness (R), among the widely–used indices of diversity in ecology. It is a simple measure but richness data are often unavailable for the datasets of concern (Jost, 2006).

Results

The Margalla Hills National Park is a wildlife sanctuary that was upgraded to the status of national park in 1980 under the wildlife act. It is a habitat of diverse flora and fauna, including some migrant birds. The park provides thick vegetation cover for animals. During the

present study, it was divided into four study sites to explore animal diversity (see checklist dataset published trogouth GBIF (Doi: 10.15470/hf1s9i).

Mammals

Thirty species of mammals belonging to eight orders were recorded during the study period (annex 1 and dataset published through GBIF, Doi: 10.15470/hf1s9i). The major orders reported were Rodentia and Carnivora. A mammalian species of grey goral (*Naemorhedus goral*) was present in the recent past but now seems to be in decline as locals have not seen a single individual in the park since 2018, suggesting this unique species might now be extinct here. Extinction of such a vital species is a huge loss to the diversity in the park. The numbers of the common leopard (*Panthera pardus*), however, have increased, possibly due to less human interference. Leopards were observed in trail 6, Daman–e–Koh and surrounding areas. There were possibly three families of common leopards inhabiting the park. An increase in Indian pangolin (*Manis crassicaudata*) was also noticed, possibly the result of the better management practices of the wildlife management board. The Islamabad wildlife management board rescued pangolins from various areas of Islamabad and released them into MHNP. During the present study, pangolin presence was mainly observed in trail 6, Shah Allah Ditta, and Shahdara. Flagship species were also reported, such as the Asiatic jackal, barking deer, rhesus monkeys, and wild boar.

Bird fauna

We observed a total of 9,076 birds from 117 species belonging to 48 families (annex 2 and dataset published through GBIF, Doi: 10.15470/hf1s9i). The major order was passerines, with 27 families. The park contains unique bird species, such as the jungle babbler, the white cheeked bulbul, the rusty cheeked scimitar babbler, and the white–throated kingfisher (table 1) The maximum values of diversity indices were also documented The Shannon–Weiner Diversity Index was 3.83; Census Index was 6.1/hectare, Simpson's Diversity Index was 0.44, species evenness was 0.42, and species richness was 117. These overall indices showed that the MHNP is rich in avian diversity.

Herpetofauna

Seven species of amphibians belonging to Dicroglossidae, Microhylidae, and Bufonidae families and 27 species of reptiles were recorded (annex 3 and dataset published through GBIF, Doi: 10.15470/hf1s9i). These species were mostly witnessed during summer. Twenty–seven reptilian species belonging to 11 families were reported. Four snake families, Typhlopidae, Colubridae, Elapidae, and Viperidae, were documented. They were mainly reported from trail 3, Shahdara, Bari Imam and Quaid–e–Azam University and adjoining areas.

Table 1. Major bird species.

Tabla 1. Principales especies de aves.

Bird species	Total	Relative abundance
Common quail	1,200	0.1323
Common myna	700	0.7721
White–throated kingfisher	700	0.7721

Fish fauna

Five species belonging to two orders were recorded during the visits: *Tor putitora* (Mahseer), *Cirrhinus mrigala*, *Labeo calbasu, Channa punctatus* and *Catla catla* (annex 4 and dataset published through GBIF, Doi: 10.15470/hf1s9i). Fish fauna were studied during pre–monsoon and post–monsoon. Visitors to the park were banned and the data set obtained was only possible thanks to the help of fishermen.

Discussion

Thirty–eight mammal species belonging to eight orders were documented by Roberts in 1997. One of the mammalian species, the unique grey goral (*Naemorhedus goral*), had been observed in recent years but now seems to be in decline as according to locals not a single individual of this species has been seen in the vicinity of the MHNP since 2018. This suggests the species may be extinct from the park. Extinction of such vital species of the ecosystem is a huge loss to the diversity within the MHNP. A few studies have showed *Naemorhedus goral* is in danger of extinction and have indicated the need to adopt steps for its protection (Abbas et al., 2012, 2015).

Regarding the common leopard (*Panthera pardus*), numbers have increased in the MHNP in recent years, possibly due to less human interference. Asad et al. (2019) reported a decline of this species but more recent news has mentioned an increase due to better managerial practices (https://www.dawn.com/news/1605144). Common leopards were observed in trail 6, Daman–e–Koh, and surrounding areas. Three families of common leopards possibly inhabit the MHNP. The MHNP was recently declared a leopard reserve due to the high number of leopards.

The Indian pangolin (*Manis crassicaudata*) is one of four surviving pangolin species found in Asia (IUCN, 2008). The scaly anteater is considered 'Endangered' according to the Red List of IUCN of threatened species (Baillie et al., 2014). In the past few years, the Indian pangolin has been in decline in Pakistan. Local medical practitioners (hakims) used the scaly anteater as a valuable source of traditional medicines (Roberts, 1997). Mahmood et al. (2012) reported that pangolin were poached on a massive scale and trafficked to various parts of the world for their sale, body parts, or pangolin–derived products on the black market. Such practices supposedly account for their alarming decline. Irshad et al. (2015) reported that pangolin in Potohar and Margalla hills regions also face the threat of severe poaching. However, in recent years their number has shown an increase in Pakistan, particularly in the MHNP, possibly due to the better management plan of the wildlife management board. The Islamabad wildlife management board rescues pangolins from various areas of Islamabad and releases them in the MHNP. In the present study, Pangolin presence was detected on trail 6, Shah Allah Ditta, and Shahdara.

The Margalla Hill is an important stopover on the migratory route for birds from temperate countries. Thick vegetation cover and food availability at the park provides good breeding grounds for resident and migrant birds. The thick vegetation cover and abundant food availability forms a major element of its inhabitations, accounting for the distribution and abundance of numerous species of birds (Lee and Rotenberry, 2005).

Within the park there are at least 250 species of birds, including 24 families of birds of prey (Roberts, 1997). Malik et al. (2014) reported the presence of one hundred and four bird species in the MHNP. Roberts (1997) also mentioned that passerines are the largest family therein. According to the Islamabad wildlife management board, a few species have changed their behavior and shifted from permanent residents of the park to migrant residents, possibly due to changing climatic conditions and less availability of breeding sites.

The Phasianidae family is sensitive to human misuse of the environment (Nawaz et al., 2000; Fuller et al., 2003). These birds are used as indicators of the success or failure of wildlife conservation actions (McGowan et al., 2009). The MHNP is a home range for a variety

of unique birds, especially those of the pheasant family. The Kalij and Monal pheasant are rare and enigmatic species that are permanent residents of the park. Kalij pheasant were mainly observed in trail 5 and its adjoining area around the running streams of the MHNP. They are found here around steep, grass–covered hill areas with scattered trees, especially those with rocky crags. Monal and Kalij pheasants are large birds, sexually dimorphic, and reported from the forested areas of the park (Gaston et al., 1981; Ridley and Hill, 1987). Grazing pressure has a negative impact on pheasant abundance and they are also affected by human interference in their habitat (Bhattacharya et al., 2007).

Rais et al. (2021) recorded seven species of amphibian and 15 species of reptiles in the MHNP while Masroor (2011) reported 41 species of herpetofauna. Mostly herpetofauna were observed in summer and late spring. They hibernate in winter (Khan, 2006). Various tadpoles from water bodies mainly around trail 3 and Rawal Lake were collected. Amphibian fauna were observed around the small streams and waterways passing through the park. Amphibia were often identified by their vocal calls as some float in water and some sit on the wet ground might burrow themselves (Khan, 2002, 2004, 2006). Several types of toads and frogs inhabit the park. During the study frogs such as the Indus Valley bullfrog and the common frog, were identified by their vocal calls. The breeding activity of frogs here begins as early summer water temperature rises to 10–12º and frogs emerge from hibernation (Khan and Malik, 1987). Toads like the Indus valley toad and the Hazara toad were often seen during the study. Reptilian fauna of Pakistan consists of 195 species grouped into 23 families. Thirteen of these species are endemic to Pakistan (Khan, 2004). Of the 195 species, 27 belonging to 11 families were observed in the park during the present study. Malik et al. (2014), however, reported 22 species of reptiles and six species of amphibians in the park. Four snake families were observed: Typhlopidae, Colubridae, Elapidae, and Viperidae, but Masroor (2011) reported five families of snakes. Snakes were mainly encountered in trail 3, Shahdara, Bari Imam and Quaid–e–Azam University, and adjoining areas. Reptiles are ectotherms so they are mostly observed during summer and spring, undergoing hibernation in winter (Khan, 2006). Venomous snakes are grouped in the Elapidae family that has fixed front fangs. Common krait or Indian krait, Russell viper and saw–scaled viper were also reported during the present study. Lizards were the second most dominant group of the reptilian fauna. Indus valley spiny–tailed ground lizard and the blue–tailed sand lizard were commonly recorded during the study, and are noted from Western Balochistan and along the Makran coast, Daphar forest sanctuary and Chakwal, Punjab (Khan, 2002; Rais et al., 2015) Masroor, (2011) also reported these species from the Margalla Hills park. Our study revealed that the Indian flap–shelled turtle and the soft shell turtle were often observed in the study area. These species have been documented previously from various districts of Punjab and the Daphar forest sanctuary as well as in the MHNP (Rais et al., 1997; Akbar and Mushtaq–ul–Hassan, 2006; Khan, 2006; Rais et al., 2015). To improve conservation of animals, targeted efforts are required. Detailed data of species distribution, ecology, and other possible threats, such as habitat degradation, must be effectively addressed (Ring et al., 2010).

Aquatic bodies in Pakistan harbor diverse groups of fish. Afzal et al. (1995) reported 15 species belonging to 11 genera in Rawal Lake, but a recent appraisal with the help of local fishermen found only five species. The decrease in numbers in this lake is likely due to the use of pesticides, gasoline pollution, and overfishing (Ahad et al., 2006; Malik et al., 2014).

For optimal conservation and management of wildlife in the MHNP, the management plan needs to be consistent with the General Policy for National Parks (Fisher et al., 2011). Animals' habitats should be conserved and illegal means of hunting should be strongly prohibited through strict legislation and penalties. Current findings from this study have showed that the diversity of MHNP is rich, but they have also shown that the park faces serious threats from overgrazing, illegal hunting, habitat degradation, over–use of forest land by locals, climate change, pollution, non–norganized tourism and forest fires. Similar observations have been reported in the literature (Rasheed et al., 2005; Khan et al., 2020;

Rais et al., 2021). There is a need to chalk out a comprehensive strategy to cope with these threats so as to protect the diversity and vegetation of the Margalla Hills National Park.

Conclusions

Margalla Hills National Park has a rich biodiversity of avifauna along with various important species of amphibians, reptiles, and mammals. An increased number of the endangered common leopard (*Pantera pardus*) and pangolin (*Manis crassicaudata*) was observed, indicating that better managerial practices have been adopted in recent years. However, one endangered species, the grey goral, has not been observed in the park since 2018, emphasizing the need for stricter implementation of the national park's regulations. The public should be made more aware of the wildlife of MHNP through print and electronic media, and more educational, recreational and research facilities should be made available. There is also a need to collect and update data annually.

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Annex 1. Mammalian fauna diversity at Margalla Hills National Park: LC, least concern; EN, endangered; VU, vulnerable.

Anexo 1. Diversidad de mamíferos del Margalla Hills National Park: LC, preocupación menor, EN, en peligro; VU, vulnerable.

Order	Family	Common name	Scientific name	Authorship	IUCN
Primates	Cercopithecidae	Rhesus monkey	*Macaca mulatta*	Zimmermann, 1780	LC
Artiodactyla	Suidae	Wild boar	*Sus scrofa*	Linnaeus, 1758	LC
Artiodactyla	Cervidae	Barking deer	*Muntiacus muntjak*	Zimmermann, 1780	LC
Artiodactyla	Bovidae	Chinkara gazelle	*Gazella bennettii*	Sykes, 1831	LC
Pholidata	Manidae	Indian pangolin	*Manis crassicaudata*	Geoffroy, 1803	EN
Chiroptera	Pteropodidae	Indian flying fox	*Pteropus giganteus*	Temminck, 1825	LC
Eulipotyphla	Erinaceidae	Long–eared hedgehog	*Hemiechinus auritus*	Gmelin, 1770	LC
Carnivora	Felidae	Jungle cat	*Felis chaus*	Schreber, 1777	LC
Carnivora	Canidae	Indian wolf	*Canis lupus pallipes*	Sykes, 1831	LC
Carnivora	Mustelidae	Yellow throated marten	*Martes flavigula*	Boddaert, 1785	LC
Carnivora	Canidae	Asiatic jackal	*Canis aureus*	Linnaeus, 1758	LC
Carnivora	Veverridae	Palm civet	*Paradoxurus hermaphroditus*	Pallas, 1777	LC
Carnivora	Felidae	Common leopard	*Panthera pardus*	Linnaeus, 1758	VU
Carnivora	Veverridae	Indian civet	*Viverra zibetha*	Linnaeus, 1758	LC
Carnivora	Canidae	Red fox	*Vulpes vulpes*	Linnaeus, 1758	LC
Carnivora	Herpestidae	Small Asian mongoose	*Herpestes javanicus*	(Hodgson, 1836)	LC
Carnivora	Herpestidae	Indian grey mongoose	*Herpestes edwardsii*	Geoffroy Saint–Hilaire, 1818	LC
Lagomorpha	Leporidae	Cape hare	*Lepus capensis*	Linnaeus, 1758	LC
Lagomorpha	Leporidae	Desert hare	*Lepus californicus*	Gray, 1837	LC

Annex 1. (Cont.)

Order	Family	Common name	Scientific name	Authorship	IUCN
Rodentia	Hystricidae	Indian crested porcupine	*Hystrix indica*	Kerr, 1792	LC
Rodentia	Muridae	Field rat	*Rattus argentiventer*	(Miller, 1900	LC
Rodentia	Muridae	House rat	*Rattus rattus*	(Linnaeus, 1758)	LC
Rodentia	Muridae	Turkestani rat	*Rattus pyctoris*	Hodgson, 1845	LC
Rodentia	Muridae	Hose moongose	*Herpestes brachyurus hosei*	Jentink, 1903	LC
Rodentia	Muridae	Little Indian field mouse	*Mus booduga*	Gray, 1837	LC
Rodentia	Muridae	Bush rat	*Rattus fuscipes*	Waterhouse, 1839	LC
Rodentia	Muridae	Indian mole rat	*Bandicota bengalensis*	Gray, 1835	LC
Rodentia	Muridae	Indian gerbil	*Tatera indica*	Hardwicke, 1807	LC
Rodentia	Muridae	Indian desert jird	*Meriones hurrianae*	Jordon, 1867	LC
Rodentia	Sciuridae	Palm squirrel	*Funambulus palmarum*	Linnaeus, 1766	LC

Annex 2. Diversity of avian fauna at Margalla Hills National Park: RA, relative abundance; CI, census index; LC, least concern.

Anexo 2. Diversidad de aves del Margalla Hills National Park: RA, abundancia relativa; CI, índice censal; LC, preocupación menor.

Order	Family	Common name	Scientific name	Authorship	IUCN	n	RA	CI
Pelecaniformes	Ardeidae	Grey heron	*Ardea cinerea*	Linnaeus, 1758	LC	50	0.0551	0.02875
Pelecaniformes	Ardeidae	Night heron	*Nycticorax nycticorax*	Ogilvie–Grant, 1899	LC	5	0.0055	0.00287
Pelecaniformes	Ardeidae	Cattle egret	*Bubulcus ibis*	Linnaeus, 1758	LC	15	0.0165	0.00886
Pelecaniformes	Ardeidae	Little egret	*Egretta garzetta*	Linnaeus, 1766	LC	12	0.0132	0.0069
Pelecaniformes	Ardeidae	Intermediate egret	*Ardea intermedia*	Wagler, 1827	LC	13	0.0143	0.00747
Pelecaniformes	Ardeidae	Indian pond heron	*Ardeola grayii*	Sykes, 1832	LC	50	0.0551	0.02875
Accipitriformes	Accipitridae	Black winged kite	*Elanus caeruleus*	Desfontaines, 1789	LC	100	0.1103	0.05751
Accipitriformes	Accipitridae	Estern marsh harier	*Circus aeruginosus*	Kaup, 1847	LC	26	0.0286	0.01495
Galliformes	Phaslanldlae	Black patridge	*Melanoperdix niger*	Vigors, 1829	LC	45	0.0496	0.02588
Galliformes	Phasinaidae	Indian grey patridge	*Francolinus pondicerianus*	Gmelin, 1789	LC	25	0.0275	0.01437
Galliformes	Phasinaidae	Common quail	*Coturnix coturnix*	Linnaeus, 1758	LC	1200	0.1323	0.69021
Gruiformes	Rallidae	White breasted waterhen	*Amaurornis phoenicurus*	Pennant, 1769	LC	40	0.0441	0.0023
Gruiformes	Rallidae	Moorhen water hen	*Gallinula chloropus*	Linnaeus, 1758	LC	17	0.0187	0.00977
Charadriiformes	Recurvirostridae	Black winged stilt	*Himantopus himantopus*	Linnaeus, 1758	LC	12	0.0132	0.0069
Charadriiformes	Charadridae	Red walted lapwing	*Vanellus indicus*	Boddaert, 1783	LC	16	0.0176	0.0092
Charadriiformes	Charadridae	Little ring ploover	*Charadrius dubius*	Scopoli, 1786	LC	11	0.0121	0.00632
Charadriiformes	Scolopacidae	Common sandpiper	*Actitis hypoleucos*	Linnaeus, 1758	LC	19	0.0209	0.0109
Charadriiformes	Lairdae	Black headed gull	*Chroicocephalus ridibundus*	Linnaeus, 1766	LC	35	0.0386	0.02013
Charadriiformes	Laridae	Whiskered tern	*Chlidonias hybrida*	Pallas, 1811	LC	15	0.0165	0.00862
Anseriformes	Anatidae	Common teal	*Anas crecca*	Linnaeus, 1758	LC	5	0.0055	0.00287

Annex 2. (Cont.)

Order	Family	Common name	Scientific name	Authorship	IUCN	n	RA	CI
Anseriformes	Anatidae	Graganey teal	*Spatula querquedula*	Linnaeus, 1758	LC	6	0.0066	0.00345
Anseriformes	Anatidae	Northern pintail	*Anas acuta*	Linnaeus, 1758	LC	3	0.0033	0.00172
Anseriformes	Anatidae	Northern shovelar	*Spatula clypeata*	Linnaeus, 1758	LC	9	0.0099	0.00517
Anseriformes	Anatidae	Mallard	*Anas platyrhynchos*	Linnaeus, 1758	LC	10	0.011	0.00575
Columbiformes	Columbidae	Common pigeon	*Columba livia*	Gmelin, 1789	LC	110	0.1213	0.06326
Columbiformes	Columbidae	Indian ring dove	*Streptopelia decaocto*	Sundevall, 1857	LC	35	0.386	0.02013
Columbiformes	Columbidae	Chinese spotted dove	*Streptopelia orientalis*	Scopoli, 1768	LC	90	0.0992	0.05176
Columbiformes	Columbidae	Red turtle dove	*Streptopelia tranquebarica*	Hermann, 1804	LC	12	0.0132	0.0069
Columbiformes	Columbidae	Laughing dove	*Spilopelia senegalensis*	Linnaeus, 1766	LC	25	0.0275	0.01437
Psittaciformes	Psittaculidae	Large Indian parakeet	*Psittacula eupatria*	Linnaeus, 1766	LC	500	0.5515	0.28758
Psittaciformes	Psittaculidae	Rose ringed parakeet	*Psittacula krameri*	Bechstein, 1800	LC	100	0.1103	0.05751
Psittaciformes	Psittaculidae	Blossom head parakeet	*Psittacula roseata*	Biswas, 1951	LC	120	0.1323	0.06902
Cuculiformes	Cuculidae	Pied cuckoo	*Clamator jacobinus*	Boddaert, 1783	LC	25	0.0275	0.01437
Cuculiformes	Cuculidae	Hawk cuckoo	*Hierococcyx varius*	Vahl, 1797	LC	30	0.033	0.01725
Cuculiformes	Cuculidae	Common pheasant	*Phasianus colchicus*	Linnaeus, 1758	LC	35	0.0386	0.02013
Cuculiformes	Cuculidae	Planitive cuckoo	*Cacomantis merulinus*	Scopoli, 1786	LC	20	0.022	0.0115
Cuculiformes	Cuculidae	Eurasian cuckoo	*Cuculus canorus*	Linnaeus, 1758	LC	17	0.0187	0.00977
Strgiformes	Strigldae	Spotted little owl	*Athene brama*	Temminck, 1821	LC	30	0.033	0.01725
Caprimulgiformes	Caprimulggidae	Long tailed nightjar	*Caprimulgus macrurus*	Horsfield, 1821	LC	23	0.0253	0.01322
Apodiformes	Apodidae	Indian house swift	*Apus nipalensis*	Hodgson, 1837	LC	45	0.0496	0.02588
Coraciiformes	Alcedinidae	White throated kingfisher	*Halcyon smyrnensis*	Linnaeus, 1758	LC	700	0.7721	0.40262

Annex 2. (Cont.)

Order	Family	Common name	Scientific name	Authorship	IUCN	n	RA	CI
Coraciiformes	Alcedinidae	Small pied kingfisher	*Ceryle rudis*	Linnaeus, 1758	LC	100	0.1103	0.05751
Coraciiformes	Alcedinidae	Eurasian kingfisher	*Alcedo atthis*	Linnaeus, 1758	LC	100	0.1103	0.05751
Coraciiformes	Alcedinidae	Crested kingfisher	*Megaceryle lugubris*	Temminck, 1834	LC	60	0.0661	0.03451
Coraciiformes	Meropidae	Little green bee eater	*Merops orientalis*	Latham, 1801	LC	35	0.0386	0.02013
Bucerotiformes	Upupidae	Hoopoe	*Upupa* sp.	Linnaeus, 1758	LC	100	0.1103	0.05751
Passeriformes	Coracidae	Blue jay	*Cyanocitta cristata*	Linnaeus, 1758	LC	35	0.0386	0.02013
Passeriformes	Muscicapidae	Pied bushchat	*Saxicola caprata*	Linnaeus, 1766	LC	44	0.0485	0.0253
Passeriformes	Pycnonotidae	Red vented bulbul	*Pycnonotus cafer*	Linnaeus, 1766	LC	60	0.0661	0.03451
Passeriformes	Pycnonotidae	White cheeked bulbul	*Pycnonotus leucotis*	Gould, 1836	LC	60	0.0661	0.03451
Passeriformes	Paridae	Blue tit	*Cyanistes caeruleus*	Linnaeus, 1758	LC	70	0.0772	0.04026
Passeriformes	Timaliidae	Rusty cheeked scimitar babbler	*Erythrogenys erythrogenys*	Vigors, 1832	LC	45	0.0496	0.02588
Passeriformes	Corvidae	Blue magpie	*Urocissa erythroryncha*	Boddaert, 1783	LC	130	0.1433	0.07477
Passeriformes	Pycnonotidae	Bulbul	Pycnonotidae	Gray, GR, 1840	LC	600	0.6618	0.3451
Passeriformes	Pittidae	Fairy pita	*Pitta nympha*	Temminck & Schlegel, 1850	LC	20	0.022	0.00115
Passeriformes	Pittidae	Blue winged pitta	*Pitta moluccensis*	Statius Müller, 1776	LC	20	0.022	0.00115
Passeriformes	Alaudidae	Crested lark	*Galerida cristata*	Linnaeus, 1758	LC	25	0.0275	0.00143
Passeriformes	Alaudidae	Oriental skylark	*Alauda gulgula*	Franklin, 1831	LC	15	0.1654	0.00862
Passeriformes	Hirundidae	Common barn swallow	*Hirundo rustica*	Linnaeus, 1758	LC	12	0.0132	0.00692
Passeriformes	Hirundidae	White tailed swallow	*Hirundo megaensis*	Benson, 1942	LC	16	0.0176	0.0092
Passeriformes	Hirundidae	Red rumped swallow	*Cecropis daurica*	Laxmann, 1769	LC	25	0.0275	0.00143

Annex 2. (Cont.)

Order	Family	Common name	Scientific name	Authorship	IUCN	n	RA	CI
Passeriformes	Leiothrichidae	Jungle babbler	*Argya striata*	Dumont, 1823	LC	300	0.3309	0.17255
Passeriformes	Sturnidae	Common myna	*Acridotheres tristis*	Linnaeus, 1766	LC	700	0.7721	0.40262
Passeriformes	Pycnonotidae	Yellow vented bulbul	*Pycnonotus goiavier*	Scopoli, 1786	LC	44	0.0485	0.00253
Passeriformes	Motacillidae	Blue headed wagtail	*Motacilla flava*	Linnaeus, 1758	LC	23	0.0253	0.00132
Passeriformes	Motacillidae	Citrine wagtail	*Motacilla citreola*	Pallas, 1776	LC	40	0.0441	0.00203
Passeriformes	Motacillidae	Grey wagtail	*Motacilla cinerea*	Tunstall, 1771	LC	42	0.0463	0.00204
Passeriformes	Motacillidae	Large pied wagtail	*Motacilla maderaspatensis*	Gmelin, 1789	LC	55	0.0606	0.00316
Passeriformes	Motacillidae	White wagtail	*Motacilla alba*	Linnaeus, 1758	LC	25	0.0275	0.00143
Passeriformes	Turdidae	Magpie robin	*Copsychus saularis*	Linnaeus, 1758	LC	30	0.033	0.00172
Passeriformes	Turdidae	Pied stone chat	*Saxicola caprata*	(Linnaeus, 1766	LC	22	0.0242	0.00126
Passeriformes	Turdidae	Himalayan whistling thrush	*Myophonus coeruleus temmincki*	Scopoli, 1786	LC	15	0.0165	0.00862
Passeriformes	Muscicapidae	Common stone patridge	*Ptilopachus petrosus*	Gmelin, 1789	LC	33	0.0363	0.00189
Passeriformes	Muscicapidae	Indian stonechat	*Saxicola maurus*	Pallas, 1773	LC	29	0.0319	0.00166
Passeriformes	Muscicapidae	Water redstart	*Phoenicurus fuliginosus*	Vigors, 1831	LC	12	0.0132	0.0069
Passeriformes	Sylvidae	Fain–tailed warbler	*Basileuterus lachrymosus*	Bonaparte, 1850	LC	35	0.0386	0.00201
Passeriformes	Sylvidae	Indian wren warbler	*Ashy prinia*	Sykes, 1832	LC	40	0.0441	0.0023
Passeriformes	Sylvidae	Indian tailor bird	*Orthotomus sutorius*	Pennant, 1769	LC	15	0.0165	0.00862
Passeriformes	Sylvidae	Yellow browed leaf warbler	*Phylloscopus inornatus*	Blyth, 1842	LC	32	0.0352	0.00184
Passeriformes	Sylvidae	Blyths reed warbler	*Acrocephalus dumetorum*	Blyth, 1849	LC	14	0.0154	0.00805
Passeriformes	Sylvidae	Southern great leaf warbler	*Phylloscopus proregulus*	Pallas, 1811	LC	16	0.0176	0.0092

Annex 2. (Cont.)

Order	Family	Common name	Scientific name	Authorship	IUCN	n	RA	CI
Passeriformes	Monarchidae	Asian paradise flycatcher	*Terpsiphone pardisi*	Linnaeus, 1758	LC	60	0.0661	0.03451
Passeriformes	Stenostiridae	Yellow bellied fantail	*Chelidorhynx hypoxanthus*	Blyth, 1843	LC	70	0.0772	0.04026
Passeriformes	Timilida	Rusty cheek babbler	*Erythrogenys erythrogenys*	Vigors, 1832	LC	80	0.0882	0.04601
Passeriformes	Leiothrichidae	Common babbler	*Turdoides caudata*	Dumont, 1823	LC	250	0.2757	0.14379
Passeriformes	Paridae	Spot winged black tit	*Periparus ater melanolophus*	Vigors, 1831	LC	50	0.0551	0.02875
Passeriformes	Nectaranidae	Purple sun bird	*Cinnyris asiaticus*	Latham, 1790	LC	24	0.0264	0.00138
Passeriformes	Laniidae	Oriental white eyed	*Zosterops palpebrosus*	Temminck, 1824	LC	23	0.0253	0.00138
Passeriformes	Oriolidae	Golden oriole	*Oriolus oriolus*	Linnaeus, 1758	LC	15	0.0165	0.00862
Passeriformes	Oriolidae	Rufous backed shrike or long–tailed shrike	*Lanius schach*	Linnaeus, 1758	LC	12	0.0132	0.00862
Passeriformes	Oriolidae	Bay packed shrike	*Lanius vittatus*	Valenciennes, 1826	LC	6	0.0066	0.00345
Passeriformes	Dicuridae	Black drongo	*Dicrurus macrocercus*	Vieillot, 1817	LC	20	0.022	0.00112
Passeriformes	Dicuridae	Ashy drongo	*Dicrurus leucophaeus*	Drongos,1816	LC	13	0.0143	0.00742
Passeriformes	Corvidae	Indian treepie	*Dendrocitta vagabunda*	Latham, 1790	LC	36	0.0397	0.00207
Passeriformes	Corvidae	Common crow	*Corvus brachyrhynchos*	Vieillot, 1817	LC	300	0.3309	0.17255
Passeriformes	Corvidae	Himalayan treepie	*Dendrocitta formosae*	Swinhoe, 1863	LC	35	0.0386	0.00201
Passeriformes	Sturnidae	Brahminy myna	*Sturnia pagodarum*	Gmelin, 1789	LC	40	0.0441	0.0023
Passeriformes	Sturnidae	Bank mayna	*Acridotheres ginginianus*	Latham, 1790	LC	100	0.1103	0.05751
Passeriformes	Passeridae	House sparrow	*Passer domesticus*	Linnaeus, 1758	LC	350	0.386	0.20213
Passeriformes	Passeridae	Yellow throated sparrow	*Gymnoris xanthocollis*	Burton, 1838	LC	150	0.1654	0.05751
Passeriformes	Ploceidae	Baya weaver	*Ploceus philippinus*	Linnaeus, 1766	LC	17	0.0187	0.00977

Annex 2. (Cont.)

Order	Family	Common name	Scientific name	Authorship	IUCN	n	RA	CI
Passeriformes	Estrilididae	Red adavat	*Amandava amandava*	Linnaeus, 1758	LC	20	0.022	0.00115
Passeriformes	Estrilididae	Spotted finch	*Lonchura punctulata*	Linnaeus, 1758	LC	35	0.0386	0.00201
Passeriformes	Fringillidae	Common rose finch	*Carpodacus erythrinus*	Pallas, 1770	LC	30	0.33	0.00231
Passeriformes	Emberizidae	Pine bunting	*Emberiza leucocephalos*	Gmelin, 1771	LC	19	0.0209	0.00109
Passeriformes	Campephagidae	Small minivet	*Pericrocotus cinnamomeus*	Linnaeus, 1766	LC	23	0.0253	0.00111
Passeriformes	Phylloscopidae	Yellow–leaf warbler	*Phylloscopus inornatus*	Blyth, 1842	LC	50	0.0551	0.00286
Falconiformes	Falconidae	Peregrine falcon	*Falco peregrinus*	Tunstall, 1771	LC	30	0.33	0.00231
Falconiformes	Falconidae	Red–capped falcon	*Falco pelegrinoides*	Temminck, 1829	LC	20	0.2209	0.0015
Falconiformes	Falconidae	Northern hobby	*Falco subbuteo*	Linnaeus, 1758	LC	7	0.0077	0.00402
Falconiformes	Falconidae	Eurasian kestrel	*Falco tinnunculus*	Linnaeus, 1758	LC	56	0.0617	0.0322
Piciformes	Megalaimidae	Coppersmith barbet	*Megalaima haemacephala*	Statius Muller, 1776	LC	45	0.0496	0.02588
Piciformes	Picidae	Scaly bellied woodpecker	*Picus squamatus*	Vigors, 1831	LC	35	0.0386	0.00201
Cuculiformes	Cuculidae	Asian koel	*Eudynamys scolopaceus*	Linnaeus, 1758	LC	90	0.0992	0.05176
Pangalliformes	Phasianidae	Kalij pheasant	*Lophura leucomelanos*	Latham, 1790	LC	40	0.0441	0.023
Accipitriformes	Accipitridae	Black kite	*Milvus migrans*	Boddaert, 1783	LC	150	0.0165	0.08627
Coraciiformes	Meropidae	Blue tailed bee eater	*Merops philippinus*	Linnaeus, 1766	LC	25	0.0275	0.01437

Annex 3. Herpeto fauna diversity at Margalla Hills National Park: LC, least concern.

Anexo 3. Diversidad de la herpetofauna del Margalla Hills National Park: LC, preocupación menor.

Order	Family	Scientific name	Authorship	IUCN
Anura	Bufonidae	*Duttaphrynus stomaticus*	(Lütken, 1864)	LC
Anura	Bufonidae	*Duttaphrynus melanostictus*	(Schneider, 1799)	LC
Anura	Dicroglossidae	*Hoplobatrachus tigerinus*	(Daudin, 1803)	LC
Anura	Dicroglossidae	*Euphlyctis cyanophlyctis*	(Schneider, 1799)	LC
Anura	Dicroglossidae	*Nanorana vicina*	(Stoliczka, 1872)	LC
Anura	Dicroglossidae	*Sphaerotheca breviceps*	(Schneider, 1799)	LC
Anura	Microhylidae	*Microhyla ornata*	(Duméril and Bibron, 1841)	LC
Anura	Microhylidae	*Uperodon systoma*	(Schneider, 1799)	LC
Geomydidae	Pangshura	*Pangshura smithii*	(Gray, 1863)	LC
Testudines	Trionychoidae	*Nilssonia gangeticus*	(Cuvier, 1825)	LC
Testudines	Trionychoidae	*Lissemys punctata andersoni*	(Lacépède, 1788)	LC
Squamata	Agamidae	*Sara hardwicki*	(Gray, 1827)	LC
Squamata	Agamidae	*Calotes versicolor farooqi*	Auffenberg and Rehmann 1995	LC
Squamata	Gekonidae	*Hemidactylus flaviviridis*	Rüppell, 1835	LC
Squamata	Gekonidae	*Hemidactylus brookii*	Gray, 1845	LC
Squamata	Gekonidae	*Cyrtopodion scabrum*	(Heyden, 1827)	LC
Squamata	Lacetridae	*Ophisops jerdonii*	(Blyth, 1853)	LC
Squamata	Lacetridae	*Acanthodactylus cantoris*	Günter, 1864	LC
Squamata	Scincidae	*Eurylepis taeniolatus*	Blyth, 1854	LC

Annex 3. (Cont.)

Order	Family	Scientific name	Authorship	IUCN
Squamata	Scincidae	*Asymblepharus himalayanus*	(Günther, 1864)	LC
Squamata	Scincidae	*Eutropis dissimilis*	(Hallowell, 1857)	LC
Squamata	Varanidae	*Varanus bengalensis*	(Daudin, 1802)	LC
Squamata	Typhlopidae	*Ramphotyphlops braminus*	(Daudin, 1803)	LC
Squamata	Typhlopidae	*Typhlops porrectus*	Hahn, 1980	LC
Squamata	Colubridae	*Amphiesma stolatum*	(Linnaeus, 1758)	LC
Squamata	Colubridae	*Boiga trigonata*	(Schneider, 1802)	LC
Squamata	Colubridae	*Platyceps rhodorachis*	(Jan, 1865)	LC
Squamata	Colubridae	*Platyceps ventromaculatus*	(Gray, 1834)	LC
Squamata	Colubridae	*Psammophis schokari*	Forskall, 1775	LC
Squamata	Colubridae	*Ptyas mucosa*	(Linnaeus, 1758)	LC
Squamata	Colubridae	*Spalerosophis atriceps*	(Fischer, 1885)	LC
Squamata	Elapidae	*Bungarus caeruleus*	(Schneider, 1801)	LC
Squamata	Elapidae	*Naja naja*	(Linnaeus, 1758)	LC
Squamata	Elapidae	*Naja oxiana*	Eichwald, 1831)	LC
Squamata	Viperidae	*Echis carinatus sochureki*	Stemmler, 1969:	LC
Squamata	Viperidae	*Daboia russelii*	(Shaw and Nodder, 1797)	LC

Annex 4. Fish fauna diversity at Margalla Hills National Park.

Anexo 4. Diversidad de peces del Margalla Hills National Park.

Order	**Family**	**Common name**	**Scientific name**	**Authorship**
Cypriniformes	Cyprinidae	Mahseer	*Tor putitora*	(F. Hamilton, 1822)
Cypriniformes	Cyprinidae	Mrigal carp	*Cirrhinus mrigala*	Hamilton, 1822
Cypriniformes	Cyprinidae	Orangefin labeo	*Labeo calbasu*	F. Hamilton, 1822
Anabantiformes	Channidae	Spotted snakehead	Channa punctata	(Bloch, 1793)
Cypriniformes	Cyprinidae	Thaila fish	*Labeo catla*	(F. Hamilton, 1822)