



Assessment of diversity and threats to mammalian species in Sudhnoti, Azad Jammu and Kashmir, Pakistan

Asma Shaheen¹ and Syeda Maria Bashir^{1*}

1. Department of Zoology, Women University of Azad Jammu and Kashmir, Pakistan

*Corresponding author e-mail: mariazoology361@gmail.com

SUMMARY

Before 1947, significant material related to the mammalian species of the Indian subcontinent had been collected. Azad Jammu and Kashmir is situated adjacent with Gilgit Baltistan, Khyber Pakhtunkhwa, Punjab and Jammu and Kashmir. The main objectives of the study were to know the diversity and threats to mammalian species in Sudhnoti, Azad Jammu and Kashmir, Pakistan. The data have collected from district Sudhnoti and from 2016 to 2018. During present study total 14 mammalian species were recorded and Shannon-Wiener Diversity Index was 1.05. During current research threats is observed that, habitat is losing due to deforestation and urbanization, while agriculture intensification also impacted the habitat in some context. Habitat loss is impacting in mammalian diversity. Hunting of mammalian species (for food, folklore medicine, skin, fur and other body parts) are also directly impacting the species richness and diversity.

Keywords: Mammals, Kashmir, Diversity, Species

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INTRODUCTION

Pakistan came into existence in 1947; and consists of 310403 miles², about equal to area of Britain, France and Belgium. Pakistan forms a connection between the Orient and Middle East and, extending in the Western part of Baluchistan from longitude 60°52 toward longitude 75°22 in the North-eastern part of Punjab. It extends from 24° latitude on cliffs of Arabian Sea coast up to 37° latitude in the North, while the frontiers reach the prominent snow landscape of Pamir-Wakhan (Roberts, 1997).

Animals are very important (Heyer *et al.*, 2014) because they are used socially (Cilliers, 2010), medicine (Zainab, 2021), Nanomedicine (Nazir, 2021), Industrial use (Adil and Tariq, 2020), ethnomedicinally (Muhammad *et al.*, 2017; Mughal *et al.*, 2020; Altaf and Faiz, 2021; Ijaz and Iftikhar, 2021; Saleem *et al.*, 2021), food (Aslam and Faiz, 2020; Tariq, 2020), educationally (Caro *et al.*, 2003), economically (McNeely, 1988), culturally (Maffi, 2005; Altaf *et al.*, 2017), clinical trial use, biological control (Saba *et al.*, 2020), bio-indicator (Sidra *et al.*, 2019; Babar and Kanwal, 2021; Khan *et al.*, 2021) and aesthetically (Lindemann-Matthies *et al.*, 2010). The mammalian population, mostly the higher kinds of oriental faunal beginning, have degenerated theatrically as outcome of damage of appropriate territory and enlarged human disturbance. Even in the hilly area to the west of Indus

and the outlying northern parts, here is plain competition for wild goat and sheep classes for accessible forage from domestic cropping herds (Roberts, 1997; Roberts, 2005b, a).

Anthropogenic impacts are by far the biggest reason of loss of habitat (Umair, 2018; Fatima *et al.*, 2019; Ali *et al.*, 2020; Altaf *et al.*, 2021). The population of human has doubled since 1970 and the pressure to feed and house more than seven billion people has observed invasion into previously immaculate natural habitats increase noticeably (WWF, 2017). Simultaneously, anthropogenic impacts on the climate of Earth are drastically changing patterns of weather and, impact on the diversity and density of mammals (Morrison *et al.*, 2007; Altaf, 2018; O'Connell and Hallett, 2019; Afsheen *et al.*, 2020; Ijaz *et al.*, 2020). The primary individual cause of loss of habitat is the clearing of land for agriculture and it's not just forest clearing that leads to habitat loss (Maron and Fitzsimons, 2007; WWF, 2017). The loss of wetlands (Hu *et al.*, 2017), plains, lakes, and other natural environments all destroy or degrade habitat, as do other human activities such as introducing invasive species (Khan *et al.*, 2011), polluting, trading in wildlife (Khan *et al.*, 2020b), and engaging in wars. This destruction of habitat also involves urbanization (Elmqvist *et al.*, 2016), industrialization (Agarwal *et al.*, 2010) and tourism all affecting habitats in natural areas (Aloysius *et al.*, 2020; Khan *et al.*, 2020a). With such significant destruction of habitat started, the effects on wildlife and ecosystems are significant. The IUCN suggest approximately 2,000 mammalian species around the world are impacted by loss of habitat. It is the primary threat to 85% of species on the IUCN Red List which lists organisms whose existence is either vulnerable, endangered, or critically endangered (WWF, 2017). We have kept these points in mind a study was designed to know the diversity and threats to mammalian species of Sudhnoti, Azad Jammu and Kashmir, Pakistan.

MATERIALS AND METHODS

STUDY AREA

We have collected the data from district Sudhnoti (Figure 1). The total area of district Sudhnoti is about 569 km. The total population of Sudhnoti is about 297,584. Data collected from study area of selected people of village of Kallar, Jandabagla and Baitran. The data were collected from 2016 to 2018.

ASSESSMENT OF MAMMALIAN DIVERSITY

The linear count method was applied and mammalian diversity was assessed through direct and indirect counts. The direct count includes physical presence (Altaf *et al.*, 2014) and voices (Altaf, 2016) while indirect count viz. presence of scats (Wemmer *et al.*, 1996), foot-prints/pug marks (Shrestha and Basnet, 2005), marks on trees, and group questionnaire survey (Altaf, 2016). Binoculars (32x50) were used to identify mammalian species and the field guides "mammals of Pakistan" (Roberts, 2005a, b) were consulted to correctly identify the species.

STATISTICAL ANALYSIS

The diversity in study area was calculated through Shannon-wiener index (Shannon and Weaver, 1949) using following formula;

$$‘H’ = - [\sum P_i \ln P_i]’$$

Where, H' = Shannon-wiener diversity index

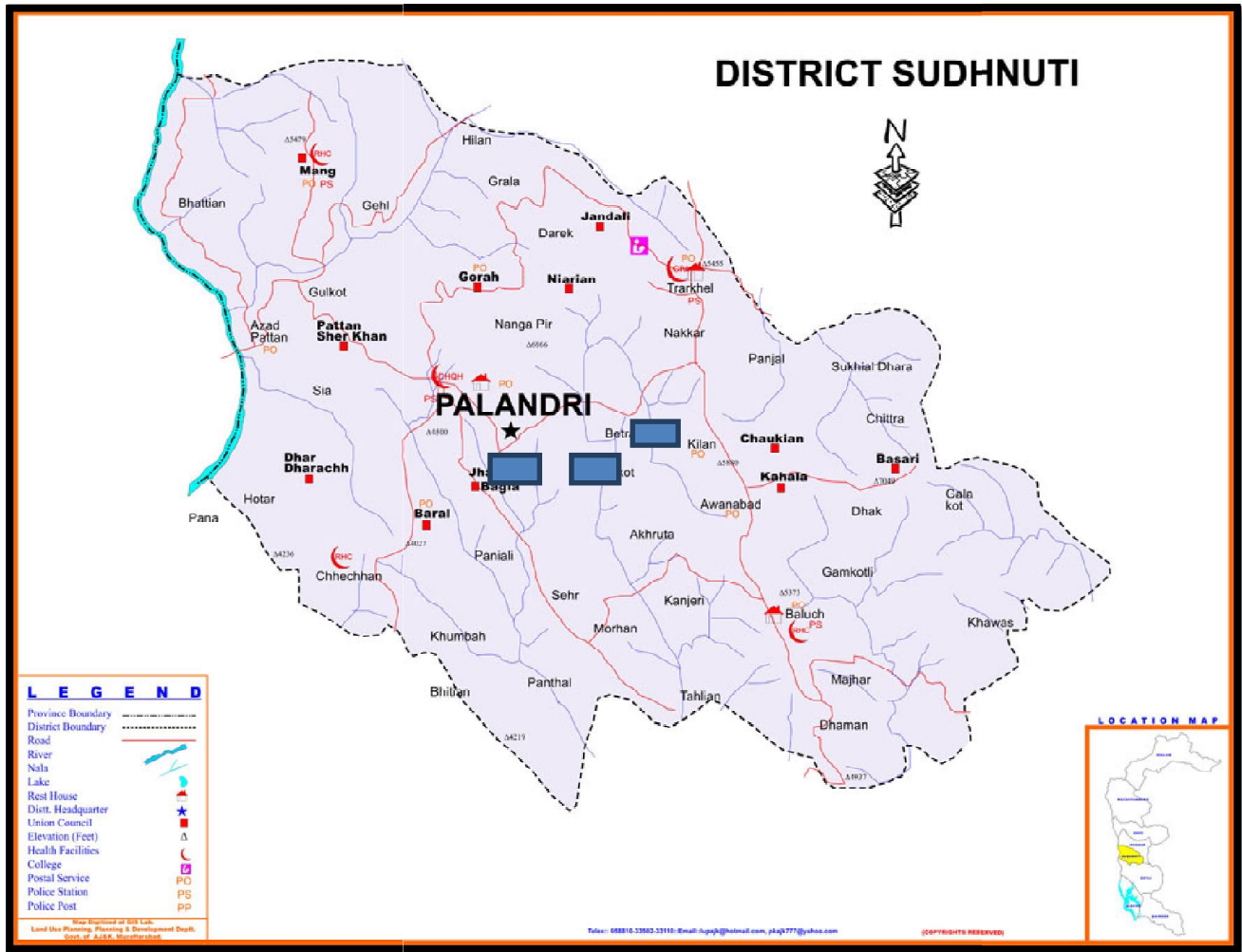


Figure 1: Map of district Sudhnuti.

RESULTS AND DISCUSSION

During present study total 14 mammalian species were recorded and Shannon-Wiener Diversity Index was 1.05 as shown in table 1. House shrew (*Suncus murinus*) is recorded from the study area and relative abundance (RA) as 0.041 (Table 1); *S. murinus* is documented from Khyber Pakhtunkhwa, Punjab and Sindh (Roberts, 1997; Awan *et al.*, 2004; Rais *et al.*, 2011; Altaf *et al.*, 2014; Khan *et al.*, 2015). *House rat* (*Rattus rattus*) is recorded from the study area as 0.041 (Table 1). *Rattus rattus* is documented from Punjab, Khyber Pakhtunkhwa, Sindh and Balochistan (Roberts, 1997; Altaf *et al.*, 2012; Altaf *et al.*, 2014; Iqbal *et al.*, 2018). House mouse (*Mus musculus*) is recorded from the study area as (0.111); *Mus musculus* is previously noted from all provinces of Pakistan (Roberts, 1997; Rais *et al.*, 2011; Altaf *et al.*, 2012; Altaf *et al.*, 2014; Iqbal *et al.*, 2018; Manzoor *et al.*, 2018).

Cape hare (*Lepus capensis*) is recorded from the study area as (0.021) (Table 1); This species was previously reported Sindh, Khyber and Pakhtunkhwa Punjab (i.e.

Dera Ghazi Khan, Multan, river Chenab, Jhelum, Indus), (i.e. Mahban and Malka valley) (Roberts, 1997; Altaf *et al.*, 2014; Khan *et al.*, 2015; Akhtar *et al.*, 2018).

Giant red Himalayan flying squirrel (*Petaurista petaurista albiventer*) is recorded from the study area as 0.062 (Table 1). Small Kashmir flying squirrel (*Holopetes fimriatus*) and Himalayan palm civet (*Paguma larvata*) are recorded from the study area as RA=0.082; Northern palm squirrel (*Funnambulus pennantii*) is recorded from the study area (0.008); this species is previously reported from Punjab, Sindh, Balochistan, and Khyber Pakhtunkhwa (Rais *et al.*, 2011; Altaf *et al.*, 2012; Altaf *et al.*, 2014; Khan *et al.*, 2015).

Indian crested porcupine (*Hystrix indica*) is recorded from the study area as 0.103 (Table 1); Rhesus monkey (*Maccaca multatta*) is recorded from the study area as 0.119; Asiatic jackal (*Canis aureus*) is recorded from the study area as 0.152 (Table 1); *C. aureus* is previously noted in whole Pakistan (Roberts, 1997; Ghalib *et al.*, 2007; Rais *et al.*, 2011; Altaf *et al.*, 2014; Khan *et al.*, 2015; Iqbal *et al.*, 2018; Younus *et al.*, 2018; Rasheed *et al.*, 2020).

Red fox is recorded from the study area (0.045); Indian wild boar (*Sus scrofa*) is recorded from the study area as (0.082); Indian wild boar is previously reported from Punjab, Sindh, Khyber Pakhtunkhwa and Azad Jammu and Kashmir (Roberts, 1997; Rais *et al.*, 2011; Altaf *et al.*, 2014; Chughtai *et al.*, 2018; Rasheed *et al.*, 2020). And small Indian Mongoose (*Herpestes auropunctatus*) is recorded from the study area as (0.123); *H. auropunctatus* is previously reported from (Roberts, 1997; Ghalib *et al.*, 2007; Altaf *et al.*, 2012; Altaf *et al.*, 2014; Khan *et al.*, 2015; Altaf *et al.*, 2018).

Table 1: Mammalian diversity in study area.

Sr.	Common name	Scientific name	RA/Pi	LogPi	PiLogPi
1	House Shrew	<i>Suncus murinus</i>	0.041	-1.39	-0.06
2	Cape hare	<i>Lepus Capensis</i>	0.021	-1.69	-0.03
3	Giant Red Himalayan Flying Squirrel	<i>Petaurista petaurista albiventer</i>	0.062	-1.21	-0.07
4	Small Kashmir Flying Squirrel	<i>Holopetes fimriatus</i>	0.082	-1.08	-0.09
5	Northern Palm Squirrel	<i>Funnambulus Pennantii</i>	0.008	-2.08	-0.02
6	Indian Crested Porcupine	<i>Hystrix indica</i>	0.103	-0.99	-0.10
7	House Rat	<i>Rattus rattus</i>	0.041	-1.39	-0.06
8	House Mouse	<i>Mus musculus</i>	0.111	-0.95	-0.11
9	Rhesus Monkey	<i>Maccaca multatta</i>	0.119	-0.92	-0.11
10	Asiatic Jackal	<i>Canis aureus</i>	0.152	-0.82	-0.12
11	Indian Wild Boar	<i>Sus scrofa</i>	0.082	-1.08	-0.09
12	Small Indian Mongoose	<i>Herpestes auropunctatus</i>	0.123	-0.91	-0.11
13	Himalayan Palm civet	<i>Paguma larvata</i>	0.008	-2.08	-0.02
14	Red Fox	<i>Vulpes vulpes</i>	0.045	-1.34	-0.06
Shannon-Wiener Diversity Index					1.05

THREATS

During current research threats is observed that, habitat is losing due to deforestation and urbanization, while agriculture intensification also impacted the habitat in some context. Habitat loss is impacting in mammalian diversity. Hunting of mammalian species (for food, folklore medicine, skin, fur and other body parts) are also directly impacting the species richness and diversity.

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