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Review Article

Diversity and habitat preferences of amphibians and reptiles in Pakistan: a review

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ABSTRACT

Geographical position of Pakistan is unique, and country harbors two out of six zoogeographical regions. The country can be divided into 15 habitat types in three major divisions: the mountainous region, foothills, and Indus plains. Overall, 219 species including 24 amphibians and 195 reptiles have been reported so far. Out of these, nine amphibian and 13 reptilian species are endemic to Pakistan. Despite this richness, there is paucity of knowledge regarding diversity of amphibians and reptiles as very few species have been thoroughly studied and very small area has been explored. This has led to the uncertainties regarding distribution and taxonomy of these taxa in the country. The herpetofauna is not protected by law in the country, and their conservation status is yet to be evaluated. Furthermore, distribution ranges of amphibians and reptiles have been changed and systemized survey work is required to update baseline information in the country.

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Introduction

Herpetiles are cold-blooded animals and distributed world-wide except poles. They are about one-fourth of all known vertebrate species and have economic, esthetic, and cultural values (Zug et al 2001). Diversity and distribution of herpetiles is co-dependent with climatic conditions and geographical position of any region. Herpetiles are bioindicators, important component of healthy ecosystem, and play vital role in food pyramid. They maintain the balance of food web as they consume many insects and themselves are source of food for many avian and mammalian species. Moreover, they recycle nutrients between aquatic to terrestrial environments, and removal of these creatures from any ecosystem will lead to disturbances in predator–prey dynamics, invertebrate populations, algae communities, leaf litter decompositions, and nutrient cycling, but their population is depleting day by day because of many anthropogenic activities. Furthermore, change of scientific researches for sake of human

needs to meet the demands also put pressure on these taxa (Baig et al 2006; Petrov 2004).

It is difficult to exactly assess what portion of herpetiles' populations are experiencing significant decline. That is why baseline studies are necessary to declare conservation status of these taxa in any region. Of 1678 amphibian species, 470 (28%) and 1895 out of 6285 (30%) species of reptiles are globally threatened (IUCN 2009a,b). The rate of their decline is the matter of concern not only for scientific community but also famous in media (Collins and Storfer 2003; Gibbons and Stangel 1999).

Herpetiles are considered fearsome creatures and have taken less concern of scientific communities. Many ecosystems support high population of herpetiles as compared to warm-blooded vertebrates as they make efficient use of energy (Pough 1980; Wyman 1998). The assessment of herpetiles' diversity in any ecosystem is very difficult as climatic factors, cryptic nature, camouflage, hibernation, and activity patterns make their capture difficult (Conant and Collins 1998). As a result, many sampling methods have been developed such as pitfall traps with drift fences, funnel traps, and noose traps to increase capturing rate of these taxa (Engel 2001; Gibbons and Semlitsch 1982). Furthermore, inappropriate applications of drift fence and pitfall traps can be time intensive which results in low capture rates of some species or high mortality of captured animals. Documenting the presence of all species

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occurring in a given area is difficult and can be particularly time intensive in systems with many rare species (Dodd 1991).

Materials and methods

The purpose of the literature review was to collect and document all published empirical information about amphibian and reptilian diversity in Pakistan. The data is mostly collected from authentic literature: Minton (1962), Minton and Anderson (1965), Mertens (1969, 1970, 1971, 1972, 1974), Cherlin (1983), Szczerbak (1991), Baig (1988, 1989, 1998, 1999), Dubois and Khan (1979), Akram and Qureshi (1995, 1997), Rastegar-Pouyani (1999) and Khan (1987, 2006, 2010)

Results

Altogether, 24 amphibian and 195 reptiles species are reported from Pakistan. Of these nine amphibian and 13 reptiles species are endemic to the country.

Geographical position of Pakistan

Pakistan has an area of 796,096 km² between 24° and 37° N latitude and between 61° and 78° E longitude (Figure 1). Of six zoogeographical regions, the country falls into Palearctic and Oriental regions (Boulenger 1890; Darlington 1957; Smith 1931, 1935,

1943). The climate is continental with extreme variations during winter and summer temperatures. The monsoon season ranges from July to October, and rainfall varies throughout the year with frequent floods and droughts (Khan 1999).

Topography of Pakistan

Pakistan is arid to semi-arid and forest-poor country as only 3.8% area of the country is covered with forest (Figure 2). Forests are degrading day by day because of water logging, dry conditions, and increasing desert area as a result of deforestation (Khan 2006). The distribution of flora and fauna depends on change in elevation from sea level toward the mountainous ranges and climate from plain areas to the mountains (Figure 3). West part of Indo-Gangetic Plain extends into Pakistan namely the Indus Valley and consists of the northern Punjab and southern Sind Plain (Khan 1996; Khan 1980).

Hydrology

Countries including Pakistan, India, China, and Nepal in the Indian subcontinent are dependent on the Western Himalayas for freshwater (Pomeranz 2009). The five rivers namely the Indus, Jhelum, Chenab, Ravi, and Sutlej run through the Indus Valley and finally drain into Arabian Sea (Figure 4). Almost entire Indus Valley is affected by floods during monsoon season in Punjab, and the flood water fills most of Ramsar sites in the province.



Figure 1. Map of Pakistan showing its geographical position as India lies to the east, Afghanistan to the west, and Iran to the southwest while China borders the country in the northeast.

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