



Short Communication

Ex-Situ Conservation of Wild Ungulates in Khyber Pakhtunkhwa Province, Pakistan

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ABSTRACT

Human activities have primarily destroyed natural habitats, due to which captive breeding has become an important conservation tool. Besides conservation, it also provides opportunities for education, research, and recreational activities. In Khyber Pakhtunkhwa province, several wild ungulate species are raised in captivity. However, there is a lack of detailed information about the *ex-situ* conservation status of these species. The present study gives a piece of benchmark information on wild ungulate species, breeding practices and the challenges that exist in captive breeding in Khyber Pakhtunkhwa Province of Pakistan.

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Authors' Contribution

RHK collected data and wrote manuscript. ZL assisted in write-up and review before submission. LT designed the study and redrafted the manuscript.

Key words

Ungulates, Captive breeding, Khyber Pakhtunkhwa, Genetic diversity, Welfare

Due to the continuous and increasing human pressure on the environment, captive breeding has become an integral part of conservation across the world. Due to anthropogenic activities, extinction rates are rising 100-1000 folds higher than natural rates, vanishing 150 species from the world in a single day (Ahmed, 2007). The natural habitats have been abridged, taken over and transformed by human to such a level that the fate of many species has become reliant on captive breeding. Captive breeding is a comprehensive term that encompasses a wide range of circumstances, from laboratory to animals in close incarcerations (zoo's indoor enclosure) and semi-free ranging states (outdoor enclosures) (Krikwood, 1996; Kleiman *et al.*, 1998).

Pakistan is home to 195 mammal species belonging to 10 orders (Roberts, 1997, 2005). Out of the total 195 species, 44 are declared as critically endangered or near-threatened, several are regionally extinct, and many species are still data deficient. Khyber Pakhtunkhwa (KP) province of Pakistan, formerly known as the North-West Frontier Province, harbors rich wildlife fauna having affinities to both Palearctic and oriental regions. The wild artiodactyls of KP includes markhor (*Capra falconeri*) Himalayan ibex (*Capra ibex sibirica*), urial (*Ovis vignei*), grey goral (*Naemorhedus goral*), Indian chinkara (*Gazella bennettii*), hog deer (*Axis porcinus*),

barking deer (*Muntiacus muntjak*), musk deer (*Moschus moschiferus*) and wild boar (*Sus scrofa*) (Malik, 1987).

The aforementioned species were once abundant, however now most of them are either threatened or endangered. The major demolition and species loss is caused by man. With exception to wild boar, the population of other wild ungulates of KP is alarmingly declining. Policies to involve communities in the conservation has proved promising. As a result of such strategies, some of the endangered species like Markhor populations are magnificently thriving in their natural habitat. Besides, several species are raised in captivity with the aim of reintroduction under the auspices of Wildlife Department KP. Captive breeding is likely to play an essential role in the conservation of endangered species, thus to evaluate the status of captive breeding wild ungulates and management practices in KP is the main focus of this article.

Materials and methods

The current study was conducted in 2019 at breeding facilities located in different districts of KP. These districts include Nowshera, Kohat and Dera Ismail Khan. In order to obtain information about the species under captive breeding, we used the records maintained by the wildlife department. We also paid visits to different breeding facilities to assess the existing challenges.

Results and discussion

The following species are under captive breeding (Supplementary Fig. 1).

1. Urial: We found urial breeding in captivity at multiple

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locations throughout KP, including Manglot Wildlife Park (MWP) and Cherat Wildlife Park (CWP) district Nowshera, Togh Mangara Safari Park (TMSP) and Boraka wildlife sanctuary district Kohat, Dera Ismail Khan (D.I. Khan) and Bannu, respectively. Urial has been declared as endangered in Pakistan (Sheikh and Molur, 2004). According to Malik (1987) this species was once abundant throughout its range from Peshawar and its nearby areas like Nizampur, Cherat up to the southern belt of Dera Ismail Khan, and adjacent tribal areas. In recent years urial showed an initial fast growth at CWP, proving its capability to thrive in captivity. Yet many factors like clumping of animals, disease, and interactions with livestock are responsible for drastic downfall in urial captive populations (Khattak *et al.*, 2020).

2. Mouflon sheep (*Ovis orientalis*): It is distinct species, is more or less like urial in appearance. Urial has 58 chromosomes, while Mouflon, which inhabits western Iran and Turkey has 54 chromosomes (Nadler *et al.*, 1973). This species is breeding in captivity at MWP and Kotal Wildlife Park district Kohat.

3. Chinkara is a vulnerable species (Sheikh and Molur, 2004), yet actual population estimates in the wild are scarce. This species is successfully breeding at MWP and TMSP located in district Nowshera and Kohat, respectively (Supplementary Fig. 1). The population in captivity has reached hundreds in both facilities. Some individuals that were raised in captivity at MWP were released into the wild habitats of Nizampur and are now thriving in their ancestral range.

4. Hog deer is bred in captivity at MWP. According to Sheikh and Molur (2004) hog deer is vulnerable in Pakistan. This species has been mostly eliminated by poaching from its natural habitats in KP (Malik, 1987).

5. Blackbuck (*Antelope cervicapra*) and spotted deer (*Axis axis*) are under captive breeding at MWP district Nowshera and TMSP district Kohat. Blackbuck exists in captivity in Pujnab Province of Pakistan. According to Sheikh and Molur (2004) the species is regionally extinct in its distribution range in Pakistan. However, currently blackbuck is flourishing in Lal Suhanra National Park, Punjab, Pakistan where they were bred from 10 blackbuck initially brought from Texas in 1970 (Mirza and Waiz, 1973).

6. Spotted deer is basically found in India, Bangladesh, Nepal and Sri-Lanka, declared as Least Concern globally (IUCN, 2020). This exotic species has recently been introduced in KP by the wildlife department KP and is breeding in captivity at MWP. Their water requirement is comparatively low, and along with grasses, they also feed on twigs as well (Khan and Khan, 2016).

One of the major challenges in captive breeding and conservation of endangered populations is the maintenance

of genetic diversity. Captive populations are usually more prone to inbreeding depressions. In the current study we found that shifting of breeding pairs had not been done regularly at the desired intervals (3-Years). Khattak *et al.* (2019) also reported the same results for urial breeding at CWP. In order to avoid inbreeding depression and consequently, the production of weak progenies, breeding pairs must be shifted between different populations at least after three years (Espinosa *et al.*, 2017). Moreover, the segregation of captive populations into subpopulations also has many advantages and genetic diversity can be maintained at sophisticated levels (Craig, 1994; Khattak *et al.*, 2019).

Another major problem in captive breeding is the prevalence of infectious diseases. Captive animals being restrained in confined places and especially ungulates being gregarious are more prone to contagious diseases. Clumping of animals in captivity provides an ideal environment to the spread of diseases that causes massive mortalities. Khattak *et al.* (2020) reported a drastic downfall in the captive urial population at CWP disease as a result of clumping. Overall at all facilities, there is an urgent need for the proper veterinary facilities and to launch vaccination and deworming programs for captive animals. Khattak *et al.* (2019) also reported that the location of enclosures close to human settlement and livestock movements near to the wildlife enclosures could pose significant threats to the health of captive animals.

Animal welfare protocols for these captive ungulates are lacking. Developing suitable husbandry techniques overcomes major problems that hinder the viability of the populations, but some additional problems often remain. These problems usually seem of lesser concern in sustaining populations, yet they can seriously compromise animal welfare. Problems included in this category are resource based, and husbandry and veterinary care of captive populations. Issues concerning animal welfare are gaining remarkable consideration among wildlife conservation organizations. It is very important to provide such environment to captive animals where they can perform a maximum range of natural behaviour (Khattak *et al.*, 2019). Animal welfare standards vary significantly among countries, yet influenced by financial and cultural factors (Krikwood, 1996). In Pakistan so far only welfare assessment protocol for Punjab urial has been developed (Khattak *et al.*, 2019).

Conclusion and recommendations

Due to fast-growing human impacts and pressures on the environment, captive breeding and management of endangered wild animals are becoming very important. The successful breeding of different ungulate species at

KP proved that the environment is promising for captive breeding and eventual release of animals into the wild. However, some challenges still exist and need urgent attention. These challenges include the lack of welfare assessment protocols and the availability of veterinary facilities. Besides this, we strongly recommend the translocation of breeding pairs among different facilities and sub-populations. In addition, the effects of exotic species on the native species should be strictly monitored.

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Supplementary material

There is supplementary material associated with this article. Access the material online at: <https://dx.doi.org/10.17582/journal.pjz/20200527080500>

Statement of conflict of interest

Authors have declared no conflict of interest

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Supplementary Material

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Supplementary Fig. 1. A, Captive breeding Urial at MWP breeding facility Nizampur Nowshera. B, A male Mouflon sheep along with two females and a yearling at Kotal Wildlife Park, Kohat. C, A herd of Chinkara at Togh Mangara Safari Park, Kohat. D, A female captive Hog deer with its fawn at MWP Nizampur, Nowshera. E, A breeder male blackbuck at Togh Mangara Safari Park, Kohat.

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