JOJ Wildlife and Biodiversity
ISSN: 2688-3856

Juniper Publishers
key to the Researchers

Mini review
Volume 5 Issue 1, December 2023
DOI: 10.19080/JOJWB.2023.05.5555652

JOJ Wildl Biodivers


# Commentary: A Look at the Wild Buffalo (Bubalus Arnee) Translocation Project in Nepal, and Why it Likely Failed

**Joel T Heinen[1], Ramchandra Kandel[2] and Prakash K. Paudel[3]**

[1]*Professor of Earth and Environment, Florida International University, Miami FL, USA*

[2]*Joint Secretary, Ministry of Forestry and Environment, Kathmandu, Nepal*

[3]*Center for Biodiversity, Kathmandu Institute of Applied Sciences, Nepal*

**Submission:** October 19,2023; **Published:** December 11,2023

***Corresponding author:** Joel T Heinen, Professor of Earth and Environment, Florida International University, Miami FL, USA Email: heinenj@fiu.edu

**Keywords:** Environmental awareness; Habitats; Monsoonal floods; Translocation; Backcrosses

**Abbreviations:** DNPWC: Department of National Parks and Wildlife Conservation; MoFE: Ministry of Forests and Environment; WWF: World Wildlife Fund Nepal; USAID: United States Agency for International Development

## Mini Review

The Himalayan nation of Nepal has had many conservation successes since it first embarked on modern conservation programs beginning in the 1970s. Over 20% of its landmass is now covered in protected areas and many wildlife populations are recovering [1]. The Department of National Parks and Wildlife Conservation (DNPWC) and the Ministry of Forests and Environment (MoFE), in concert with various non-governmental organizations such as World Wildlife Fund Nepal (WWF) and IUCN Nepal continue to promote conservation practices and a great deal of research has been accomplished [2]. Given the high biodiversity and the dearth of research in many remote districts, a good deal remains to be discovered [3], but a growing cadre of capable Nepali researchers and national NGOs devoted to conservation science bodes well for the future [4]. Much of this success has been attributed to the importance of wildlife and the protected area system for tourism [5], a major source of foreign exchange, as well as to the growing environmental awareness worldwide and the recognition that conservation and development can be compatible.

Among many rare species, Nepal has performed some translocations to restore animals to former habitats. This has included some success with rhino (Rhinoceros unicornis) translocations and mixed results with some other species [6]. The country also has a remnant population of Asiatic wild buffalo in Koshi Tappu Wildlife Reserve in the eastern lowlands. Other isolated populations are known from India, Bhutan, Myanmar, Thailand and Cambodia with known feral populations of domestic origin in many parts of tropical Asia and Australia [7]. Asian wild buffalo are the progenitors of domestic water buffalo [8] and they are endangered throughout their range [9]. The population in Koshi Tappu has been studied periodically since 1976 beginning with Dahmer [10] and continuing with Heinen intermittently from 1986 to 2004, summarized by Heinen and Kandel [11]. Kandel spent several years in 2010s completing his dissertation on these animals [12]. His studies were the most extensive and involved aspects of demography [13], habitat use [14] and genetics [15]. Throughout this period, the population grew despite the many threats in Koshi Tappu including conflicts with local villagers, vehicle strikes, and poaching [16]. Since Koshi Tappu is located entirely within a major floodplain, buffalo must leave the reserve during peak monsoonal floods and flooding has been documented as a major mortality source in the population [11]. For these reasons, many have called for a translocation of wild buffalo to safer habitat [17].

In the mid-2010s, the United States Agency for International Development (USAID) announced a major multi-million conservation initiative for Nepal: The Haryo Ban (Green Forest) Project, to be administered by WWF, the MoFS and the DNPWC. Translocations of several species were proposed, and it was widely accepted that buffalo were a very high priority for several reasons [16,18]: The population in Koshi Tappu is globally important and not viable, and the species was known to occur in Chitwan National Park as recently as the 1950s and in Bardia National Park historically. Both parks are much larger than Koshi Tappu, have an abundance of preferred riverine habitats as well as upland forests to serve as flood refugia, and are better protected. Habitat studies [19] were undertaken to explore the feasibility of translocation [20] and a translocation plan was published in 2017. Chitwan was chosen as the translocation site due to its relative proximity to Koshi Tappu [21].

The translocation plan [22] and supporting documents in the feasibility study included a great deal of information on the logistics of capture and transport, veterinary drugs to be used, dimensions of the enclosure to house buffalo in Chitwan (30 ha total area) and feeding protocols while they were enclosed, but little concern about the demography, behavior or herd structure of wild buffalo. We feel this was a critical flaw (below). In the winter of 2017, 16 buffalo were translocated, of which 13 were from Koshi Tappu (10 females and 3 males) and 3 were from the Central Zoo in Kathmandu (2 females and 1 male). The data showed that, within a month or so of translocation, 3 individuals had died likely from the stress of the move itself. Some mortality is expected with any translocation, which typically results in plans to relocate more individuals to account for it. Several other animals died due to floods during the monsoon of 2017 indicating that the enclosure, although quite large (30 sq km), was not large enough to include ample upland forest. This is a known major mortality source in Koshi Tappu that translocation to Chitwan was supposed to avoid. The data showed that several other buffalo died of dietary issues that should have also been better accounted-for given that their feed was supplemented. The plan called for buffalo to be released from the enclosure when the population reached 22 individuals. However, it never reached that number; the last animal died in 2021 despite 8 live births having been recorded over time in Chitwan. Other sources of mortality included several attacks by tigers and one by a python in a (supposedly) predator-proof enclosure.

Heinen and Paudel [23] had published a translocation proposal prior to the events described above and we feel the translocation would have likely gone better had that proposal been heeded. Firstly, female buffalo remain in their natal herd throughout their lives and, like many other large bovids, will engage in group defense of themselves and their offspring. Enclosing animals together that are unrelated and unacquainted is thus problematic. At the time of translocation there were three mixed (female and dependent offspring) herds in Koshi Tappu. Two were the wild herds first identified by Dahmer [10] and followed by Heinen in his work in the 1980s and 2000's [11] and one was a herd of domestic origin that had been released in the area in the early 1960s and continued to backcross with wild males, well known to those researchers. For all intents and purposes, they were wild, and they considered them eligible for translocation given the generations of backcrossing [23]. In any case, they could no longer be identified visually as backcrosses and each animal would have to be genetically tested to separate them from fully wild stock [24].

Koshi Tappu lacks any mammalian buffalo predators (tigers and possibly dholes and leopards), while Chitwan has all three, thus maintaining natural herd structure of paramount importance for defense [23]. Both wild and domestic buffalo in Asia have been documented to defend against tiger attacks, as have African buffalo in dealing with lions [25,26], but only in groups large enough to provide for strong defense. For these reasons, Heinen and Paudel [23] recommended that a minimum of 8, and up to 10 females from each of the three mixed (female plus offspring) herds should be housed in three separate enclosures to maintain their herd structure. They also recommended that one dominant male be kept enclosed with each of those mixed herds and another 8-10 bachelor males housed in a separate enclosure, for a total of 40+ animals. These criteria mimic actual demographic structures of herds in Koshi Tappu. Furthermore, they recommended that the animals only be kept in enclosures for several months and released before monsoon starts in late May [23]. This would allow them to form home ranges before monsoon and travel freely uphill during floods.

In cases in which ungulates are translocated to areas devoid of predators, it is likely that translocating small numbers would suffice. This was true for some North American elk [27], Arabian oryx [28] and muskox [29] translocations to areas that had few or no natural predators, but not the case here. Another consideration in translocation proposals is the potential for disease or parasite transmission [30] but we concluded that the bigger threat for disease is in Koshi Tappu where residents regularly graze cattle and domestic buffalo illegally. In addition, the release of zoo animals is suspected of establishing wild populations unless kept in near-natural conditions for limited time periods [31] which was not the case with the 3 individuals taken from the Central Zoo. Detailed habitat assessments are also required to evaluate the appropriateness of release sites, which was accomplished in this case [32]. We therefore feel that these are the reasons for the failure of Nepal's buffalo translocation, and the Heinen and Paudel [23] recommendations would have had a far greater chance of success. However, we also acknowledge that a good deal of uncertainty is inherent to all translocation proposals and Heinen and Paudel's [23] proposal would have been much costlier than what was attempted. It is thus possible that it also could have failed and/or that the Haryo Ban project simply didn't have enough funding to devote to a larger buffalo translocation effort given that the project addressed many other important conservation issues. Lastly, we


How to cite this article: Joel T Heinen, Ramchandra K, Prakash K P. Commentary: A Look at the Wild Buffalo (Bubalus Arnee) Translocation Project in Nepal, and Why it Likely Failed. JOJ Wild Biodivers. 2023: 5(1): 555652 DOI: 10.19080/JOJWB.2023.05.555652

agree with Sedon et al. [33], Akcakaya et al. [34] and Grace et al. [35] that all translocation attempts, whether they succeed, should be published in accessible outlets so that we may arrive at better recommendations based on sound science in the future.

## References


1. Baral N, Heinen JT (2020) Regulatory compliance from community-based conservation organizations: Empirical evidence from Annapurna Conservation Area, Nepal. Sustainability 12(22): 9420.
2. Paudel PK, Baniya S, Sharma S, Bhandari S, Pokharel M (2023) Half century in biodiversity and conservation research in Nepal: A review. Biodiversity and Conservation 32: 2611-2636.
3. Paudel PK, Heinen JT (2015) Think globally, act locally: On the status of threatened fauna in the Central Himalaya of Nepal. Geoforum 64: 192-195.
4. Heinen JT, Dahal P (2023) Research priorities for the conservation of Nepal's lesser terrestrial vertebrates. Asian J Conservation Biol 12(1): 90-99.
5. Heinen JT, Thapa BB (1988) A feasibility study of a proposed trekking trail in Chitwan National Park. Kathmandu: Tribhuvan University. Journal of the Forestry Institute 10: 19-28.
6. Aryal CM, Aryal PC (2023) Wildlife restoration in Nepal: Tracking the conservation translocations in the country. Journal of Environmental Sciences 9: 51-66.
7. McKnight TL (1971) Australia's buffalo dilemma. Annals of the Association of American Geographers 61(4): 759-773.
8. Clutton-Brock J (1989) A Natural History of Domesticated Animals. University of Texas Press, Austin, USA.
9. Kaul R, Williams AC, Rithe K (2019) Wild Water Buffalo Bubalus arnee. The IUCN Red List of Threatened Species.
10. Dahmer T (1978) Status and distribution of the wild Asian Buffalo (Bubalus bubalis) in Nepal. MS Thesis, University of Montana, Missoula, USA.
11. Heinen JT, Kandel RC (2006) Threats to a small population: A census and conservation action plan for wild buffalo in Nepal. Oryx 40(3): 324-330.
12. Kandel RC (2018) Ecological and Behavioral Studies on Asian wild buffalo (Bubalus bubalis arnee Linn) at Koshi Tappu Wildlife Reserve, Nepal. PhD Dissertation, Mizoram University, India, pp. 161.
13. Kandel RC, Solanki GS, Chalise MK (2018a) Population and demography of Asian wild buffalo (Bubalus arnee, Kerr, 1792) at Koshi Tappu Wildlife Reserve, Nepal. Journal of Emerging Trends in Economics and Management Sciences 9(4).
14. Kandel RC, Solanki GS, Chalise MK (2018b) Habitat composition of Asian wild buffalo Bubalus bubalis arnee) at Koshi Tappu Wildlife Reserve, Nepal. In. G.S. Solanki (Ed). Biodiversity Conservation: Strategies and Application. Scientific Book Centre, Guwahati, Assam, India, pp. 151-171.
15. Kandel RC, Poudel RC, Sadaula A, Prakriti K, Kamal PG, et al. (2019) Revisiting genetic structure of wild buffalo Bubalus arnee Kerr, 1972 (Mammalia: Artiodactyla: Bovidae) in Koshi Tappu Wildlife Reserve, Nepal: An assessment for translocation programs. Journal of Threatened Taxa 11(15).
16. Khulal R, Neupane B, Dhami B, Siddhartha R, Ganesh Prasad T, et al. (2021) Habitat use and conservation threats to wild water buffalo Bubalus arnee (Mammalia: Artiodactyla: Bovidae) in Koshi Tappu Wildlife Reserve, Nepal. J Threatened Taxa 13(12): 19714-19724.
17. Aryal A, Shrestha TK, Ram A, Wolfgang FREY, Colin G, et al. (2011) A call to save the wild water buffalo (Bubalis arnee) in Nepal. Int J Conservation Sci 2(4): 261-168.
18. Kherwar PK, Bhattarai A (2021) Conservation efforts for Asian Wild water buffalo. J Buffalo Sci 10: 2021.
19. Heinen JT, Mead RA (1984) Simulating the effects of clear cuts on deer habitat in the San Juan National Forest, Colorado. Canadian J Remote Sensing 10(1): 17-24.
20. Pokhrel K, Poudel P, Neupane B, Rabin P (2019) Comparative study in habitat suitability analysis of wild water buffalo (Bubalus arnee) in two floodplains of Chitwan National Park, Nepal. Int J Res Stud Zool 5: 1-10.
21. Shah R, Tripathi S, Bhatta B (2017) Translocation of wild Asian buffalo (Bubalus arnee (: A way forward for conservation in Nepal. Proceedings of the International Buffalo Symposium pp. 175-178.
22. Anonymous (2017) Translocation of Swamp Deer from Sukla Phanta Wildlife Reserve and Wild Buffalo from Koshi Tappu Wildlife Reserve to Chitwan National Park. MoFE and DNPWC, Kathmandu, Nepal p. 11.
23. Heinen JT, Paudel PK (2015) On the translocation of wild buffalo Bubalus arnee in Nepal: Are feral backcrosses worth conserving? Conservation Sci 3: 11-21.
24. Flamand JRB, Vankan D, Gairhe KP, Duong H, Barker SF (2003) Genetic identification of wild Asian buffalo in Nepal. Animal Conservation 6(3): 265-270.
25. Tambling CJ, Druce DJ, Hayward MW, Castley JG, Adendorff J, et al. (2012) Spatial and temporal changes in group dynamics and range use enable anti-predator responses in African buffalo. Ecology 93(6): 1297-1304.
26. Sinclair ARE (1998) The African Buffalo: A study of limitations of populations. University of Chicago Press, pp. 355.
27. Heinen JT, Castillo B (2019) Browse-mediated succession by deer and elk 40 Y after a clearcut in northern lower Michigan. American Midland Naturalist 181(1): 81-91.
28. Zafar-ul Islam M, Ismail K, Boug A (2011) Restoration of the endangered Arabian Oryx, Oryx leucoryx, Pallas 1766 in Saudi Arabia: Lessons learnt from the twenty years of re-introduction in arid fenced and unfenced protected areas. Zoology in the Middle East 54(3): 125-140.
29. Olesen CR (1993) Rapid population increase in an introduced muskox population, West Greenland. Rangifer 13(1): 27-32.
30. Vadlejch J, Kyrianova IA, Rylkova K, Krzysztof A (2017) Health risks associated with wild animal translocation: A case of the European Bison and an alien parasite. Biological Invasions 19: 1121-1125.
31. Kleiman DG (1989) Reintroduction of captive mammals for conservation. Bioscience 39(3): 152-161.
32. Dhungel G, Thanet DR (2019) Investigating habitat suitability and conservation issues of re-introduced wild water buffalo in Chitwan National Park, Nepal. Forestry: J Forestry Institute, Nepal 16: 2019.
33. Sedon PJ, Armstrong DP, Maloney RF (2007) Developing the science of reintroduction biology. Conservation Biology 21(2): 303-312.
34. Akcakaya HR, Bennett EL, Brooks TM, Molly KG, Anna H, et al. (2018) Quantifying species recovery and conservation success to develop an IUCN Green List of Species. Conservation Biology 32(5): 1128-1138.
35. Grace MK, Akcakaya HR, Bennett EL, Thomas MB, Anna H, et al. (2021) Testing a global standard for quantifying species recovery and assessing conservation impact. Conservation Biology 35(6): 1833-1849.




**How to cite this article:** Joel T Heinen, Ramchandra K, Prakash K P. Commentary: A Look at the Wild Buffalo (Bubalus Arnee) Translocation Project in Nepal, and Why it Likely Failed. JOJ Wild Biodivers. 2023: 5(1): 555652 DOI: 10.19080/JOJWB.2023.05.555652

DOI:10.19080/JOJWB.2023.04.555652




**How to cite this article:** Joel T Heinen, Ramchandra K, Prakash K P. Commentary: A Look at the Wild Buffalo (Bubalus Arnee) Translocation Project in Nepal, and Why it Likely Failed. JOJ Wild Biodivers. 2023: 5(1): 555652 DOI: 10.19080/JOJWB.2023.05.555652