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Are we sinking African cheetahs in India?

Significance:

The current initiative to export African cheetahs to India has a limited scientific basis, placing the Asian subspecies and the translocated animals at risk. There is no evidence that this will benefit African cheetah conservation. We call for a globally coordinated approach to cheetah conservation, based on sound science.

Failed conservation actions waste money and can result in sink populations where species decline and ultimately may go extinct. We, therefore, cannot afford any failed conservation efforts, and poor conservation decisions should be avoided. The recent translocation of 20 African cheetahs, *Acinonyx jubatus jubatus* – 8 from Namibia and 12 from South Africa – to a reserve in India, with the aim to establish a free-ranging population of cheetahs in and around the release site, and with further multiple translocations planned from South Africa, raises concerns regarding the scientific basis of these translocations and their contribution to conservation. Recent statements by project scientific advisory members that it is actually an "experimental reintroduction of cheetahs into India"[1], suggesting that the outcome is uncertain, raises additional ethical concerns.

We clarify these concerns and suggest future actions in the context that this initiative may serve as a sink for African cheetahs.

1. Is it good science?

The Asiatic cheetah, *A. j. venaticus,* is extinct in India and should not be replaced, without appropriate scientific consideration, by the African cheetah. The relict population of the Asiatic cheetah in Iran holds the only extant members of the subspecies with an estimate of 50 mature individuals.[2] Genetic evidence points to historical translocations of African cheetahs to India[3], and others even suggest that the cheetah was never indigenous to India[4]. This makes the Iranian population even more valuable, as it does not appear to have been hybridised through anthropogenic contact with the African cheetah.[3] The genetic integrity of the African and Asian cheetah lineages should therefore be maintained.[5] The current translocation to India carries the risk of future outbreeding, ultimately swamping the Asian lineage if African cheetahs were to come into contact with Asiatic cheetahs through uncoordinated translocations or even natural dispersal from future introduced populations.

Numerically, the founder African cheetah population in India (20 individuals[6]) is smaller than the relict *A. j. venaticus* population in Iran. Therefore, we argue that the recovery of the Iranian population could, in the long term, with concerted conservation and political investment, provide more appropriate animals for the Indian restoration project, with direct conservation value to the subspecies and a low risk of compromising genetic integrity.

As the founder population (20 cheetahs) and the maximum number of cheetahs (36 cheetahs)[6] that can be supported at the Indian introduction site are too small to avoid breeding between related individuals, they will be highly vulnerable to stochastic demographic risks[7]. Related cheetahs will need to be removed from the Indian population on an ongoing basis to ensure that inbreeding does not occur, and to allow for demographic management of the population. Clearly, this introduced population is, therefore, not viable and will need recurring supplementation, representing an ongoing drain on African cheetah populations and scarce conservation resources.

The estimated 21–36 cheetahs that can be sustained at the release site was determined through prey-base calculations.[6] This is a well-tested and commonly utilised method for evaluating reintroduction viability. However, in a contradictory statement, the lead author of the Action Plan for Introduction of Cheetah in India has claimed that the release area can probably only sustain 15 cheetahs.[8] This raises concerns about the quality of the data and the analyses thereof on which the Action Plan is based, and supports concerns around the prey and space requirements of cheetahs in India.[9] With 20 cheetahs already introduced, two subsequent deaths[10], the birth of four cubs and another possible pregnancy[11], the population of more than 23 cheetahs could likely be exceeding the capacity of the prey base.

The viability analysis, risk assessment and data on which these are based for this project are not available for scientific scrutiny. As such, it is impossible to evaluate what risks were identified and how they were mitigated against. This is particularly important in this scenario in which the animals are likely to come into contact with novel pathogens, unknown and unpredictable ecological interactions (including predator–prey and interspecific carnivore guild interactions), a high poaching threat[12] and undefined conflict with humans. Many of these uncertainties could be reduced and proactively mitigated against by using published science on the biology of the species, e.g. cheetah spatial ecology has been used to predict the long-distance post-release movements exhibited by particular cheetahs in India.[13]

No clear exit strategy, as required by the IUCN Guidelines for Reintroductions, has been defined should the project not succeed or cause unpredicted harm to other wildlife or humans. Cheetahs are expected to be returned to Africa for demographic management[14] or through experimental failure and the African cheetah population will be exposed to unknown risks from these returned animals.

In South Africa, there is no formal, peer-reviewed metapopulation management plan for cheetahs in fenced reserves. Management of these cheetahs is fragmented and not formally goal-driven at a national level. Data for the metapopulation, upon which the sustainability of the India project is assessed, remain unpublished[6], including population size, growth rates, sex ratios, demand for cheetahs in South Africa and the number of cheetahs needed

to maintain the metapopulation. No modelling or sensitivity analysis has been published using recent data on the possible long-term impact of removals on the South African population.

Claims of South Africa having 'excess cheetahs' in the metapopulation are used to support the Indian reintroduction[6], yet there are no data to support this. Simultaneously, captive cheetahs are being used to supplement the metapopulation within South Africa.[15] About 9% of the total metapopulation has been supplemented with 39 captive animals (~66% of these since January 2019).[14] This indicates the opposite scenario to an excess in the metapopulation.

Despite claims to the contrary[1], we hold that this project has not made the best use of available science or used best scientific practice in its planning.

2. Does it support cheetah conservation?

Conservation projects should not compete by consuming funds or redirecting the limited funding available. The Indian cheetah project will cost approximately USD50–60 million to create three small populations.[6] This funding could be used for *in situ* projects that directly benefit the conservation of extant Indian wildlife, e.g. tiger *Panthera tigris* and Gir lion *Panthera leo leo* conservation or cheetahs in Africa.

Scarce conservation habitat should be allocated to the conservation of indigenous species and not be occupied by exotics, as per the tiger 'conservation' projects in South Africa (e.g. Tiger Canyon and Save China Tigers) and the proposal to take rhinos to Australia.[16] There is also evidence that progress on a long-standing critical Gir lion conservation project has been disrupted due to the cheetah reintroduction at the same site and may even be halted by legal action as a result.[17] Clearly, these translocated African cheetahs will be displacing indigenous conservation opportunities.

Sending African cheetahs to India on an experimental basis generates the perception of an excess of African cheetahs and, by extension, that African populations no longer need conservation. Yet, at a continental scale, the cheetah is in decline.[18] Furthermore, there are areas in Mozambique, Malawi, Zambia, Angola, and several West African countries of sufficient size, with sufficient prey, that could be restored for cheetahs within 10 years, either naturally or through assisted recovery if effective conservation action is taken.[19] There have been several successful reintroductions into such areas, where cheetahs sourced from South Africa were reintroduced into well-protected parks.[1,20] Restoration projects in these countries directly benefit cheetah conservation and local ecosystems in the African subspecies' historical range. They indicate a growing need for African cheetahs within Africa, rather than an excess.

An unpublished Population Viability Assessment using data from 2017 was used to guide an export quota of 13 cheetahs from South Africa for reintroduction into range states per year.[21] The plan is to send 12 cheetahs per year for 10 years from South Africa to India and 12 have already left for India.[22] This is the maximum amount that is potentially available from the metapopulation, leaving no cheetahs for restoration into African range states. Clearly, these cheetahs should remain part of Africa's natural heritage[16] and be used to maximise the conservation of African species and benefit African people.

The 50% mortality rate of cheetahs predicted for the Indian reintroduction[6] is much higher than the observed survival rate of 85% for reintroductions in the metapopulation in South Africa[23]. The predicted mortality rate in India is aligned with the relocation of damage-causing animals in the large areas of unfenced Namibian farmland[24], where cheetahs roam outside protected areas and are vulnerable to persecution and other anthropogenic threats. The cause of this predicted high mortality rate in India is not identified, and suggests a lack of resources to properly maintain the population, a lack of understanding of the reintroduction process or general unsuitability of the area for cheetahs.

Ten of the current tranche of 20 cheetahs are expected to die as a consequence of this translocation (with more to follow); one female cheetah has died due to what appears to be a pre-existing renal condition[9], another due to what appears to be a stress-related condition[6] and two cheetahs escaped causing conflict with villagers, with one cheetah being stoned and possibly injured[25] and multiple captures needed to return them to the park and one returned to captivity. It appears that the welfare of the animals is being compromised through a lack of mitigation of threats to their post-release survival and inadequate fencing, and the conservation potential of the animals is being squandered.

The South African fenced metapopulation model for cheetah conservation is unique. These cheetahs are maintained in fenced reserves, away from human populations and livestock and are generally habituated to vehicles and often also to people on foot. The cheetahs sourced from Namibia were wild born, but have been maintained in captivity, also making them habituated to people and unsuitable for release in the larger reserve.[11] There is evidence that the female cheetahs taken to India from Namibia have not been 'rewilded', will not be released into the larger reserve, and have been allowed to breed in fenced enclosures as part of a captive-type breeding project.[11] Therefore, these animals may not be ideal candidates for creating a founder population of wild cheetahs in an area where people and livestock are not excluded, as planned in India.

The potential for human–wildlife conflict is elevated when habituated animals come into contact with humans and their livestock. Large-scale sensitisation programmes are required to prevent conflict, as cheetahs can roam far beyond park boundaries. Conflict-related killing is a leading threat to cheetahs across their range[18], with few conflict mitigation projects being effective in the long term[26], and good legislative frameworks as preventative tools[1] do not prevent the killing. Two cheetahs have already left the reintroduction site. One roamed more than 20 km into a village where villagers, fearful for the lives of their children and livestock, threw stones at the cheetah and it was possibly injured. The cheetah has been returned to the park.[25] The other cheetah is still at large and has reportedly 'triggered panic among the surrounding villagers'[27]. If the prey base becomes depleted due to unsustainable predation, as suggested, then breakouts can be expected to increase. This human element amplifies the risk of creating a sink for African cheetahs in India.

Conclusion and the way forward

The recent global commitment to increase protected area targets at the United Nations' Convention on Biological Diversity (CoP15) should lead to an increase in protected areas, creating more opportunities for African cheetahs in Africa.

A more coordinated and science-based approach to cheetah conservation globally is needed, particularly in light of the recent warning that cheetahs are in a more precarious position than indicated by their current IUCN "Vulnerable" status.[18] *In situ* conservation action for Asian cheetahs should be prioritised and supported. Within Africa, a range-wide science-based metapopulation plan must be developed for cheetahs in fragmented populations. A collaborative peer-reviewed exercise must identify and prioritise suitable areas for indigenous cheetah restoration through reintroductions of respective individuals of the appropriate subspecies in both Asia and Africa. This should include complete, transparent risk assessments and clear references to best scientific and management practices for reintroductions. The principles of evidence-based management and transparency should be applied in future decisions, and can provide a framework for other taxa in Africa.

In South Africa, a managed metapopulation plan for cheetahs is required to guide the science-based management of these cheetahs to maximise their contribution to cheetah conservation. National-level management must be done collaboratively, and actions must be taken to maximise the management objectives of individual reserves and cheetah conservation across the range, and ensure that best practices are followed.

Establishing a cheetah sink out of Africa will threaten African (and Asian) cheetahs and undermine South Africa's reputation as a science-based leader in the conservation management of large mammal populations.

Note in Proof

A third cheetah death among the cheetahs introduced from Africa to India was reported on 9 May 2023 (https://pib.gov.in/PressReleasePage.aspx?PRID=1922858). This highlights the need for urgent interventions to prevent any further mortalities.

Competing interests

We have no competing interests to declare.

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