

has also classified it as 'endangered' in the Red Data Book in 2000. Its international trade and killings are prohibited, as it is listed in Appendix-I of the CITES.

In November 2004, the World Conservation Congress had urged the Government of India to start 'Project Bustard' (on the lines of Project Tiger) to protect the GIB and the other Indian bustards and their habitats³. Some misguided efforts in Maharashtra^{7,8} to limit the area of the GIB sanctuary from the originally proposed 8500 km² to only 347 km² can be dangerous to protect the bird. However, the Rajasthan Government is keen to revive the falling GIB population and is planning to widen the DNP by relocating the nearby nine villages⁵.

Protected dry grasslands, bigger sanctuaries and captive breeding may save this bird. Otherwise, the GIB will be extinct in the next 5–10 years.

1. Bird Life International, Species factsheet: *Ardeotis nigriceps*, 2008; available online at www.birdlife.org
2. <http://www.care4nature.org/wildindia/bustard/>
3. http://www.iucn.org/congress/2004/members/Individual_Res_Rec_Eng/wcc3_rec_115.pdf
4. <http://www.indianexpress.com/res/web/p/ie/daily/19991108/ige08015.html>
5. Dey, A., *Times of India*, New Delhi, 22 July 2008, p. 6.

6. Rahmani, A. R., *J. Bombay Nat. Hist. Soc.*, 1996, **93**, 442–458.
7. http://economictimes.indiatimes.com/News/Politics/Nation/Maha_Govt_to_approach_SC_for_reducing_bird_sanctuary_area/articleshow/3202661.cms
8. [http://www.gunaah.com/index.php?id=46&tx_ttnews\[tt_news\]=1703&tx_ttnews\[backPid\]=1&cHash=642d83c449](http://www.gunaah.com/index.php?id=46&tx_ttnews[tt_news]=1703&tx_ttnews[backPid]=1&cHash=642d83c449)

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Justifying tiger farms – a step backward for tiger conservation?

We refer to the correspondence on the use of tiger farms for conservation by Xavier¹. There seems to be an over-simplification of several points raised about the management of tiger farms and other issues related to tiger conservation. In the following discussion, the terms 'breeding centres' and 'tiger farms' are used interchangeably.

The concept of 'wise use of replenishable resources for the benefit of mankind' was mentioned by Xavier, but in the case of tigers, resource-use patterns are way past 'wise use' levels, to the extent of depleting them. A large-range contraction of tigers within the past decade² and the estimated 2500 or less breeding tigers in the wild would attest to this³. Promoting tiger farms generates the dangerous notion that the wild resource cannot be depleted, but if there is an insatiable demand and tiger farms cannot cope with the situation, the remaining wild tigers will eventually succumb as well, possibly due to the anthropogenic Allee Effect⁴. On a related note, Clayton *et al.*⁵ have shown how the mere proposal of a captive programme for the babirusa, an endangered suid, caused a spike in the capture and trade of wild-caught individuals. Similarly, the set-up of several tiger breeding centres in India can potentially have adverse repercussions on wild populations.

Many researchers have maintained that it is impossible to differentiate tiger body parts taken from farmed animals and

those from the wild^{2,6}. This is contrary to the proposal of gene-tagging by Xavier¹. Gene-tagging may work within a country, whereby tiger farms are compliant with strict regulations and enforcement is strong. But if regulated international trade is allowed and the tiger parts or products are shipped, there is no way for independent verification of the legality of the trade items. Besides, tiger parts are usually smuggled out via alternative routes to escape detection. Until there is a tight cooperative network between tiger farms, tiger range states and CITES parties sharing a constantly updated genetic database and the development of an inexpensive test kit, implementation of gene-tagging as a regulating tool is not feasible.

Breeding centres established for the sake of breeding tigers for reintroduction without 'commercial motives and methods'¹ would be a truly altruistic venture. Raising a captive-bred tiger to adulthood is a costly undertaking². China's tiger farms are not established for the purpose of breeding tigers for re-introduction into the wild per se, but rather for tourism, and the eventual (underlying) aim of trade in tiger parts should the domestic trade ban be lifted. In short, the scepticism behind tiger farms is not unfounded because economics dictates the viability of such production systems. There is also a grave concern that a legalized trade in tiger parts begets the poaching of wild

tigers to be sold as legitimate trade items^{2,6,7}. The captive breeding of tigers for re-introduction into the wild or reserves formerly occupied by tigers is best left to zoos with sound breeding programmes, and not tiger farms or breeding centres where the provenance of the captive stock may be poorly recorded and not verified.

There is an adequate regulatory framework in most range states to protect tigers, but law enforcement is woefully inadequate² and compliance is lacking. Hence, we agree with Xavier that there should be stricter enforcement measures to check poaching, both within and outside protected areas where tigers occur. This would complement scientific long-term population monitoring, sensible land-use planning and swift human-wildlife conflict resolution in the toolbox of tiger conservation⁸. India may be best placed to save this iconic cat given that it probably has one of the largest tiger populations in the world⁹ and has taken some pro-active steps in tiger conservation⁸. But the proposal of initiating tiger farming in India by Xavier, seems counter-productive to those efforts.

1. Xavier, N., *Curr. Sci.*, 2007, **93**, 1467.
2. Dinerstein, E. *et al.*, *Bioscience*, 2007, **57**, 508–514.
3. IUCN (World Conservation Union), 2006; <http://www.iucnredlist.org>
4. Courchamp, F. *et al.*, *PLOS Biol.*, 2006, **4**, e415.

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5. Clayton, L. M. *et al.*, *Conserv. Biol.*, 2000, **14**, 382–385.
6. Gratwicke, B. *et al.*, *Conserv. Biol.*, 2007, **22**, 222–223.
7. Linkie, M. and Christie, S., *Oryx*, 2007, **41**, 415–416.
8. Gubbi, S., *Deccan Herald*, Internet edition, 14 February 2008; www.deccanherald.com/Content/Feb142008/editpage2008021352090.asp
9. Seidensticker, J. *et al.*, In *Riding the Tiger – Tiger Conservation in Human-dominated Landscapes* (eds Seidensticker, J., Christie, S. and Jackson, P.), Cambridge University Press, UK, 1999, pp. xv–xix.

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Response:

In my correspondence on tiger farms, I was keen to maintain the dichotomy between tiger breeding centres and tiger farms, with the former meant to be run with reintroduction in view and devoid of profit motives, and the latter being run with profit motives as well. This distinction, if followed by Lee and Dinata throughout the discussion, would have enabled them to accord the proposed breeding centres, their rightful place

among conservation strategies. They have, however, coalesced the two terms into a single concept with inappropriate inferences following.

Wise use of replenishable resources for the benefit of mankind is a conservationist's ideal. But it is regrettable, as pointed out also by them, that resources are being over-exploited. I have also acknowledged the fact that China has not so far ensured the long-term survival of tigers in the wild. There has to be strict enforcement against wildlife crimes, including illegal trade and poaching, and other institutional set-ups in order to stop depletion of the species. In the absence of such measures, breeding centres are bound to fail. Lee and Dinata have alluded to Anthropogenic Allee Effect (AAE), which according to them will possibly occur among wild tigers when farms are promoted. But the effect can be countered, even according to the proponents of the theory, if enforcement of laws against wildlife crimes and other tools of conservation are assiduously put in place. Even though Clayton and co-workers have observed the spurt in babirusa trade when *ex situ* conservation was initiated in Indonesia, they have also found as speedy a decline in the trade when law enforcement and market monitoring were vigorously pursued. Fortified by such surveillance, *ex situ* breeding of tigers will be a countervailing force against rarity of the species and will effectively offset AAE, which is founded on the rarity principle.

Lee and Dinata appear to be skeptical about the effectiveness of gene-tagging, in case tiger parts should be brought from abroad, but as they themselves have rightly proposed, development of a genetic database for tigers from the wild and from the farms, which must be shared among tiger-range countries, and surveillance by CITES parties and Interpol can make the method more efficacious.

One is inclined to support the cause of tiger farms in India only if tiger parts prove to be of medicinal value and their viable numbers have been guaranteed in the wild. It must be conceded that in China such farms serve a widely felt need for traditional Chinese medicine which uses tiger parts.

Lee and Dinata have supported breeding programmes, this time unconcerned about AAE, but insist that they be carried out in zoos. But captive breeding programmes for reintroduction purposes should allow as little contact as possible with humans, which is not practicable in zoos with animals on display. The authors are quite right in suggesting that proper records of provenance be maintained; but it ought to be in separate breeding centres and not in zoos or farms.

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