

Editorial—Not yet an obituary for Cambodia's tigers

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November 2017 marks the 10th anniversary of the last confirmed tiger *Panthera tigris* record from Cambodia: a single female tiger photographed from deciduous dipterocarp forest in what is now Srepok Wildlife Sanctuary. Between 1999 and 2007, 12 tiger photographs were obtained from camera traps in eastern Cambodia (Fig. 1), but the 2007 photograph represents the country's final confirmed record. Subsequent intensive searches, using camera traps and other survey methods, have failed to record tigers. Sadly it therefore appears that tigers, Asia's most iconic species, became the first mammal extirpation from Cambodia in the 21st century. While extensive forest remains throughout the country, the decline and national extinction of tigers was driven by extensive hunting and links to regional wildlife markets during periods of civil unrest throughout the 1980s and 1990s. This was followed by targeted hunting for remaining individuals and depressed prey densities which further reduced survivorship and reproduction.

The Royal Government of Cambodia committed at the 2010 St Petersburg global tiger summit to recover the country's tiger population and signed up to the global goal of doubling tiger numbers under the Global Tiger Recovery Program. Acknowledging the species' functional extinction from Cambodia, tiger reintroduction was identified as a critical action in the Cambodia Tiger Action Plan (CTAP) endorsed by the Ministry of Agriculture Forestry and Fisheries in 2016. This was a significant and commendable step: Cambodia became the first country to acknowledge 21st century national extirpation of tigers and to develop clear steps for recovery. The Eastern Plains Landscape of Mondulhiri and the Cardamom Landscape of Koh Kong (Fig. 2) were identified in the CTAP as candidate landscapes for tiger rein-

roduction. At the Second National Forum on Protection and Conservation of Natural Resources in August 2017, the concept of tiger reintroduction into Mondulhiri was endorsed by Prime Minister Samdach Akka Moha Senabdeiy Techo Hun Sen who instructed the Ministry of Environment to work with other relevant government agencies, conservation partners, and the Global Tiger Forum to begin detailed planning.

However for tiger reintroduction to be successful there needs to be a paradigm shift in the way Cambodia's protected areas are managed and funded. While the country's protected area network covers >75,000 km² (approximately 41% of the national territory), the effectiveness of protected area management, government funding for protection, and on-the-ground ranger numbers remain low. Improved management needs to go beyond simply increasing the numbers of law enforcement rangers and requires strong systems for supervision of enforcement staff and ensuring zero tolerance of corruption. Strengthened legislation to protect wildlife, currently being drafted in the form of an Environmental and Natural Resources Code for Cambodia, is also required.

Improving law enforcement is critical to recover numbers of ungulate tiger prey sufficiently to support a reintroduced tiger population. Densities of medium-large ungulates in dry forests in South Asia often exceed 50 individuals per km² (Karanth & Nichols, 2000); current combined densities of medium-large ungulates in the ecologically similar Srepok Wildlife Sanctuary, proposed as the initial tiger release site within the CTAP, are ~5.0 individuals per km² (Gray *et al.*, 2017). In addition to enhanced enforcement, ungulate recovery will likely require in-situ conservation breeding and release

Editorial Note: The authors were invited to contribute this opinion piece to ongoing debate regarding the proposed reintroduction of tigers in Cambodia. Editorials are not peer-reviewed.



Fig. 1 Cambodia's final tigers. Clockwise from top-left: Seima Wildlife Sanctuary, 2000 (© DWB-FA/WCS); Virachey National Park, 2001 (© GDANCP-MOE/WWF); Srepok Wildlife Sanctuary, 2005 (© DWB-FA/WWF); Seima Wildlife Sanctuary, 2003 (© DWB-FA/WCS).

programmes for dry forest ungulate species including banteng *Bos javanicus* and Eld's deer *Panolia eldii*. Given the perilous state of the former two species, both globally and in Cambodia, such a conservation breeding programme would be inherently valuable and likely necessary irrespective of plans for tiger reintroduction. Another intriguing possibility would be to release domestic Asian water buffalo *Bubalus bubalis*. This could provide potential prey for tiger while simultaneously mimicking the ecosystem functions of previously abundant wild cattle. There must also be a concerted effort to address the widespread demand for wildlife meat throughout Southeast Asia. This will require long-term behaviour change communication, targeting the emotional and functional drivers of wild meat consumption. Any move to normalise wild meat consumption through wildlife farming needs to be strongly resisted given the potential for extremely negative impacts on biodiversity (Brooks *et al.*, 2010).

Furthermore, tiger conservation will only succeed if it is supported by the people who live near their habi-

tats. That support can come in part from national pride, because tigers are a national and cultural icon, and it can come from the recognition that recovering tigers is good for development through activities such as ecotourism. However, returning large carnivores to areas from which they have been extirpated can be socially controversial. Human-carnivore conflict can arise over access to land and resources and also result in livestock depredation and human mortalities (Inskip & Zimmermann, 2009). Any tiger reintroduction into Cambodia will have to employ robust safeguards for preventing and responding to human-wildlife conflict. Surveys have indicated <40% of Cambodian people interviewed believe tigers are absent from the country's forests and have suggested relatively high levels of support for tiger recovery measures (Gray *et al.*, 2017). However further work is clearly required to sensitise local communities and wider Cambodian society for returning tigers to the country. Long standing cultural associations between tigers and non-Khmer ethnic groups in Cambodia may offer an opportunity to increase community support for tiger reintroduction (Ishibashi *et al.*, 2015). An additional requirement for

tiger reintroduction to Cambodia is identifying a suitable source of tigers. Reintroduction success is generally higher when wild as opposed to captive individuals are used (Fisher and Lindenmayer, 2000). The Cat Specialist Group of the IUCN Species Survival Commission recently revised global tiger taxonomy and currently recognises just two tiger subspecies: the Sunda tiger *P. t. sondaica* and the continental tiger *P. t. tigris* (Kitchener *et al.*, 2017). We therefore believe that wild-to-wild translocation of tigers from stable *P. t. tigris* populations in South Asia is likely to represent the optimal source for a Cambodian reintroduction.

The Eastern Plains and Cardamom Landscapes support fantastic biological diversity including critical populations of many of Asia's most threatened species and, respectively, among the most significant expanses of deciduous dipterocarp forest and lowland evergreen rainforest remaining in Southeast Asia. Despite the challenges, we believe that tiger reintroduction has the potential to galvanise conservation within these landscapes. Tiger reintroduction can leverage the political and financial support necessary to transform conservation and protected area management in Cambodia and secure our shared biodiversity for perpetuity.

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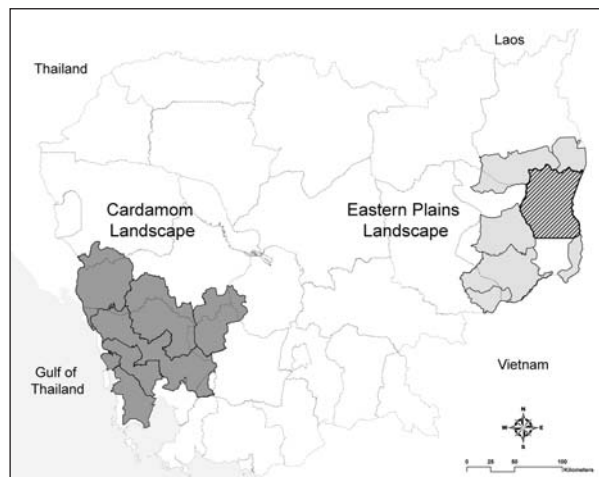


Fig. 2 Protected area complexes of the Eastern Plains and Cardamom Landscapes, Cambodia. Hatching represents Srepok Wildlife Sanctuary.

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