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## **Animal Conservation**

### **Response**

#### **Towards tolerable human-elephant coexistence in tropical Asia**

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As human footprint expands in rapidly developing tropical Asia, frontier landscapes are converted into agriculture and settlements, escalating human-wildlife conflicts. In this letter we respond to the solid and constructive commentaries by Fernando & Pastorini (2021), Terada (2021), and Tiller & Williams (2021) to our paper, “There will be conflict – agricultural landscapes are prime, rather than marginal, habitats for Asian elephants”, published in this issue of *Animal Conservation* (de la Torre et al., 2021). Our study identified a high spatial overlap between Asian elephant (*Elephas maximus*) preferred habitats and the human-dominated landscapes where human-elephant conflicts (HEC) occur. Asian elephant preference for semi-disturbed habitats means that HEC is to be expected whenever we share landscapes. Strategies to mitigate HEC should, therefore, not be based on the removal of elephants from human-dominated landscapes, which, at best, is unlikely to be effective and, at worst, can have very detrimental consequences for both elephants and people (Fernando et al. 2012). We need, thus, holistic approaches that integrate ecological and human dimensions to promote tolerable human-elephant coexistence in tropical Asia.

Since we generally agree with the contents of the three commentaries, including some fair criticism, here we take the opportunity to address issues brought up by our paper and the commentaries that we consider deserve more attention. We argue that the transition from unsustainable conflict to tolerable human-elephant coexistence in tropical Asia requires: (1) people’s willingness to coexist with elephants, (2) defining responsibilities for HEC mitigation, (3) understanding the diverse characteristics of the affected communities, and (4) focusing on long-term and future-looking strategies, among others. This list does not intend to be comprehensive nor constitute a whole framework.

*1. Asian elephants will only survive where people tolerate them*

Fernando & Pastorini (2021) make a fundamentally important point when they say that Asian elephants' survival in human-dominated landscapes is mostly determined by people's actions, not habitat characteristics, which we completely agree with. In the Anthropocene, the carrying capacity of Asian elephant habitats has two dimensions: (1) *ecological carrying capacity*, dependent on the availability of ecological resources (e.g., food and water), and (2) *human-tolerance carrying capacity*, dependent on people's willingness to bear the costs of sharing landscapes with elephants. Since most of the global Asian elephant population occupies human-dominated landscapes (e.g., Fernando et al. 2021), it seems fair to argue that people's willingness to coexist with elephants (i.e., *tolerance*) is the most influential factor for Asian elephant survival in the 21<sup>st</sup> century. We agree with Tiller & Williams (2021) on the need for promoting tolerance towards elephants among local stakeholders. We can see two general pathways to promote tolerance: (1) reducing the costs and (2) increasing the benefits of living with elephants (e.g., Gibbs et al. 2016).

## *2. Responsibility, ownership, and participation*

Fernando & Pastorini (2021) propose that the main responsibility of HEC mitigation should be borne by the affected communities and the agencies responsible for their welfare, and not by conservation agencies, as is currently the norm. Terada (2021) and Tiller & Williams (2021) emphasize the importance of local ownership and participation, respectively, in strategies to mitigate HEC. We agree that stakeholder responsibility, ownership, and participation are key for the promotion of tolerable human-elephant coexistence, but we think more work is necessary to better formulate 'what it actually means to take responsibility or ownership' in different HEC contexts and with different stakeholders. Two important issues regarding responsibility are (1) incentives should be properly aligned to avoid perverse incentives (e.g., Gibbs et al. 2016), and (2) responsibilities should be distributed among stakeholders, including those who do not experience losses from HEC (e.g., urban people who support elephant conservation; Tan et al. 2020).

## *3. Understanding the diversify and characteristics of affected communities*

Socioecological systems are complex and diverse. Hence, HEC mitigation requires understanding the local context (Terada 2021), as the effectiveness of any strategy and

intervention will vary according to this context. Here we emphasize the importance of understanding the stakeholders experiencing HEC and how their characteristics play a key role on potential mitigation strategies (e.g., Zimmerman et al. 2020). In Peninsular Malaysia, for example, the affected groups could be split in three broad categories: (a) indigenous communities (locally known as Orang Asli), (b) smallholder farmer communities, and (c) large commercial plantation companies. Orang Asli communities often live in small settlements embedded in elephant habitat and, although they cultivate few crops, their livelihood and personal safety are very vulnerable to HEC. Their ongoing transition into cash-based economies increases their potential for severe conflict with elephants (e.g., Lim 2020). The exposure and vulnerability to HEC of smallholder communities tend to be very heterogenous, making them difficult to engage and coordinate. Commercial plantations, in contrast, manage vast estates in Peninsular Malaysia under top-down decision-making systems, and possess considerable resources to implement technical solutions. For commercial plantations, HEC is largely an economic issue, and increasingly a matter of public reputation and compliance with sustainability certification. Besides their differences in exposure and vulnerability to HEC, tolerance levels also seem to differ among these stakeholder groups. Our impression from interactions in the past 10 years is that HEC tolerance is high but declining among Orang Asli communities, rapidly increasing among commercial plantations, and generally low among the smallholder communities (e.g., Tan et al. 2020, Lim 2020, Wong et al. 2021).

#### *4. Long-term and future-looking focus*

We also agree with Tiller & Williams (2021)'s emphasis on having a long-term focus. In the design and implementation of long-term human-elephant coexistence strategies, we need to consider not only the complexity of socio-ecological systems (Terada 2021), but also their dynamic nature. Tropical Asia has undergone a profound transformation in the past half a century, and we can expect this trend to continue. For example, the region is projected to become highly urbanized by 2050, and many societies that are now predominantly agrarian will transition into more complex and diversified economies, whereby agriculture will contribute much less to local occupation and income. This transformation will have implications for people's exposure and vulnerability to HEC, their tolerance, sense of

ownership, and responsibility, human-nature relationships, and the most effective ways to promote coexistence.

### *Final remarks*

Ecological research plays an important role in our understanding of the drivers of HEC in tropical Asia. The time is now to implement holistic approaches and practical solutions to create coexistence models where people and elephants share landscapes without either side incurring excessive costs for living together. While further ecological research may provide a greater understanding of elephant behavior (Tiller and Williams 2021), future research should also prioritize our understanding of socio-ecological systems and their dynamic nature, which is key to design and implement holistic strategies to transition towards tolerable human-elephant coexistence in tropical Asia.

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