The value of wild tiger conservation

The value of top predators as indicators or surrogates of biodiversity value is questionable, as illustrated by recent debates (Andelman and Fagan, 2000; Ozaki *et al.*, 2006). However, conserving large carnivores is important because they are often highly threatened and play key roles in a range of ecosystem processes (Creel *et al.*, 2007). Moreover, many large carnivores are important flagship species and therefore attract funding and wider conservation benefits. Of such species the tiger is perhaps the most iconic, and international donors spent at least USD 41 million on wild tiger conservation projects over 1998 - 2005 (ZSL, 2007) of which USD 7.3 million was on monitoring. It is therefore surprising that reliable estimates of tiger numbers remain unavailable across most of their range.

This lack has been most starkly illustrated in India where, contrary to official records that indicated stable tiger populations, several protected areas were found to have vastly depleted tiger populations in 2004 or, in the case of Sariska Tiger Reserve, none at all. This provided a sobering reminder not only of the fragility of tiger populations but also of the need for a critical reassessment of the Indian tiger conservation strategy. Fortunately, a range of new distribution and habitat data are now available for India and elsewhere (Dinerstein *et al.*, 2006) and these could be used to focus resources on areas where tigers still occur. This is particularly important as some of the present Tiger Reserves in India were demarcated over 30 years ago and do not necessarily contain, or have the potential to contain, viable tiger populations today.

Knowing the absolute number of tigers, or any flagship species, is important for explaining conservation in a way that the public can easily understand and thus for attracting media attention and maintaining a high profile for tigers. However, this generates a tension because it is more meaningful for conservation monitoring purposes to estimate population trends rather than absolute numbers. The science of making replicable estimates of density using camera traps within a capture-recapture framework has been well developed for tigers by the Wildlife Conservation Society in India. This methodology has been successfully applied across many other tiger range states, and this edition of *Oryx* has the first such estimate from Thailand (Simcharoen *et al.*, 2007) and additional estimates from Malaysia (Lynam

et al., 2007). Such baseline data are an important first step in the development of any national conservation plan and should be used to inform management planning.

Monitoring activities *per se* will not save tigers or any other large carnivore unless they are an integral part of a coherent conservation programme. Unfortunately, few regions with tigers can claim to have reliable data describing medium- or even short-term population trends. Two notable exceptions are the Western Ghats of India and the Russian Far East. In the latter, tigers have been monitored yearly at key sites since 1995, and full censuses were carried out in 1996 and 2005. This monitoring has shown how a comprehensive conservation programme with emphasis on intelligence-based law enforcement has, in conjunction with favourable background factors of low human density and a selective, rather than clear-felling, logging programme, stabilized the Amur tiger population.

These conservation efforts in Russia may have also been bolstered by the Chinese Government's 14-year domestic ban on trade in tiger parts and through reduction of poaching pressure in other, and particularly in neighbouring, tiger range states. However, there are now an estimated 5,000 tigers in 200 farms in China and there is increasing pressure to resume domestic trade, with proponents arguing that tiger farming has two key conservation benefits. Firstly, that farming would reduce poaching of wild tigers by satisfying the demand for tiger products. The consensus amongst conservationists and trade experts, however, is that there is no evidence to support this, partly because consumers place a higher premium on wild animal products and because any kind of legal trade would provide cover for illegal activities.

Secondly, tiger farmers argue that they are producing a stock of Amur tigers for reintroduction into the wild. This argument is flawed because the genetic management strategy used in farming, whether for tigers or cows, aims for maximum production. This involves selecting the most productive animals and breeding from them preferentially and as fast as possible. This rapidly produces a population low in individual heterozygosity, low in overall gene diversity and heavily adapted to farmed conditions: a striking divergence from wild gene diversity. In complete contrast, genetic management in conservation breeding programmes in

accredited zoos aims to maintain maximum genetic diversity and therefore focuses on breeding equally from all available founders, avoiding inbreeding, and lengthening inter-birth interval to avoid genetic drift. Moreover, reintroduction of captive-bred large carnivores is difficult, expensive, and time consuming, particularly as it is necessary for such animals to learn to avoid humans. Consequently, large carnivore reintroduction should never be undertaken where there is any possibility of an existing wild population expanding to fill the vacant range, and there is a suitable wild population of Amur tigers living at the edge of northern China and in adjacent Russia. All that is necessary for this population to expand naturally into China is increased investment in protecting the existing wild tigers, their habitat, and their prey within China. Reintroduction, with all its attendant risks and costs, is simply unnecessary.

Another important issue in tiger conservation is problem tiger control. Man-eating tigers, or any attacks on humans, are certain to capture media headlines, and this is not surprising given the 495 people killed in the Bangladeshi Sundarbans between 1984 and 2006 (A. Barlow, pers comm.). However, most problem tiger incidents involve livestock attacks and this issue has received less attention and funding (USD 4.5 million over 1998-2005; ZSL, 2007) than other tiger conservation activities. Consequently, problem tiger control strategies are not generally well developed. In contrast, projects that focus on human-elephant conflict are running in many of the Asian countries in which tigers occur.

A fundamental component in the success of problem elephant control in Asia has been the sharing of knowledge and experience on monitoring and mitigation, both within the region and with colleagues in Africa. There is potential for tiger conservationists to follow the same process, perhaps by building on work in Russia that has developed a government conflict resolution team and a clear problem tiger control strategy. This advocates the use of tactics that include scaring a tiger away, monitored translocation, and euthanasia. Such action is already taking place in Indonesia, where the Department of Forestry is currently developing a national tiger action plan based on discussions with a range of national and international experts from the Government and NGOs.

Conserving tigers will require land use plans that addresses challenges associated with increasing human populations near tiger landscapes. There are simple strategies to regulate or even reduce human population growth that benefit human well-being, such as increasing female literacy (Drèze & Murthi, 2001). Nevertheless, habitat loss presents a more immediate and largely irreversible threat to tigers. There is particular concern that the clearance of forest for oil palm plantations is having a dramatic impact on tigers. The oil palm industry is in part growing to provide biofuels and so, ironically, responses to combat climate change may have bigger impacts on tigers than climate change itself. However, other mitigation strategies may provide important conservation opportunities, as illustrated by recent discussions on reducing emissions from deforestation in developing countries, and other avoided deforestation schemes. These initiatives are part of proposed carbon credit trading that would provide financial incentives for governments to maintain their forests and other natural habitats, encouraging the funding of enhanced law enforcement and rural economic development. Equally as important, this scheme could provide an important way to secure the political will that is essential for conserving the forest and, ultimately, for saving wild tigers and other large carnivores within these habitats.

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