Animal Conservation

ZSL LET'S WORK FOR WILDLIFE

Animal Conservation. Print ISSN 1367-9430

COMMENTARY

How to reverse the rhino poaching crisis: a commentary on Nhleko *et al.* (2022)

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doi: 10.1111/acv.12780

Using the age-structured models, Nhleko *et al*. (2022) showed that the decline in the size of the white rhinoceros (hereafter 'rhinos') *Ceratotherium simum simum* population in Kruger National Park (KNP), South Africa, is largely driven by poaching. They also found that reduced rainfall had a smaller additive effect on poaching losses. The study further highlighted that current poaching levels have resulted in a reduction in the lifetime reproductive output per cow from approximately 6–0.7 calves and that under the current poaching levels a 35% decline in the KNP white rhino population is predicted in the next 10 years. However, if poaching intensity is reduced by half, the population could double over the same time frame. We believe this is an important study as it demonstrates the importance of collecting long-term ecological data to feed into reliable models to forecast extinction risk of populations that are severely affected by poaching. At the same time, the results are not surprising, but rather confirm that the white rhino population in KNP and more generally in South Africa is at high risk of extinction under current poaching levels (Di Minin *et al*., 2015).

South Africa currently conserves 86% of the white rhino population in Africa (Clements, Balfour & Di Minin, 2022). The white rhino population in KNP is the largest in South Africa and is considered of global conservation importance. However, it has now declined considerably due to poaching (Nhleko *et al*., 2022). Several state parks in South Africa have experienced similar declines over the last decade. Prior to the onset of the poaching crisis in 2008, KNP and other state parks contributed significantly to the establishment of new populations across the species range. Therefore, these declines are having and will have major consequences for the conservation of the species within South Africa but also in other range countries. The reduced translocation of rhinos to new areas is expected to result in a decline in meta-population growth rate, total population size as well as financial income to the conservation agencies that rely upon funds generated from rhinoceros sales to conserve and protect rhinos (DFFE, 2015*a*; Clements *et al*., 2020).

Importantly, these declines have occurred despite substantial investments of resources in rhino conservation, compared to the conservation of other biodiversity in need of immediate action. While these protection costs appear substantial, they are still inadequate to reverse the current onslaught by the illegal wildlife trade (Di Minin *et al*., 2015). Meanwhile, the population size of white rhinos on private land in South Africa has been steadily increasing and is now likely over 50% of the country's population (Clements *et al*., 2022). Poaching losses, for example, have been lower on private land compared to KNP (Clements *et al*., 2022). While high protection costs due to the poaching crisis have led to some private owners disinvesting in rhinos (Clements *et al*., 2020), the resources for security appear more adequate on private land than they are on state land (Clements *et al*., 2022).

Nhleko *et al*. (2022) provide a number of management recommendations on how to deal with the current poaching crisis and possibly reduce the poaching rate. Their recommendations, based on the outcomes of the analysis, are mainly focused on enhancing female rhino protection by (1) increasing fines, (2) dehorning only females; (3) translocating females to safer areas; and (4) manipulating females' perception of predation risk. While these recommendations are valid and may, in the short term, have a positive effect, they are not by themselves enough to help address the current poaching crisis in KNP and more broadly. As current measures are inadequate and unsustainable in the long term, it is time to evaluate, discuss, and test alternative sustainable long-term solutions that address the key enabling factors of poaching. Resolving the current rhino poaching crisis requires a multi-faceted approach to address the complexity of the underlying drivers (Di Minin *et al*., 2022). Coupled

with appropriately targeted interventions to influence rhino horn consumer behavior and transnational policing aimed at dismantling criminal networks engaged in rhino horn trafficking, including private rhino owners and local communities in enhanced conservation decision-making is crucial. Else, potential continued price escalation driven by market speculators will create further incentives and increase poaching pressure on wild populations even further.

There is potential to develop a legal and regulated supply of rhino horn through CITES, as this can help mitigate the economic forces that further incentivize poaching (Phelps, Biggs & Webb, 2016; Di Minin *et al*., 2022). The international ban on commercial trade in rhino horn, in place now for more than 40 years, has failed to effectively provide strict protection to the species, despite the numerous anti-poaching measures implemented in South Africa. These measures importantly fail to address the cause of the escalating poaching levels, that is, high demand and high prices for black market rhino horn (the low supply to demand ratio) coupled with poverty and unemployment in the rural communities in rhino range states. At present, the incentives gained from the illegal killing and trade in rhino horn far outweigh the risks (e.g., being fined, incarcerated, or even killed by the authorities or by the animals they target) as the promise of atypical recompense makes these risks acceptable (Haas & Ferreira, 2016). The incentives and value of rhino horn are further likely to increase as rhino numbers dwindle, leading to increased poaching and causing a potential extinction vortex, called the anthropogenic Allee effect (Courchamp *et al*., 2006). An increased fine for killing a rhino cow, as suggested by Nhleko *et al*. (2022) is thus unlikely to be a real disincentive to poachers under these conditions.

The Committee of Inquiry established in 2015 in South Africa (DFFE, 2015*b*) highlighted five key areas that require intervention prior to trade considerations: security; community empowerment; biological management; responsive legislative provisions that are effectively implemented and enforced; and demand management. While most of the recommendations under the key areas have been implemented, recommendations pertaining to community empowerment have not. These recommendations are mainly focused on alleviating poverty within communal areas surrounding key rhino populations. This, however, is a mammoth task and requires an intergovernmental approach and substantial funding, which in the absence of additional resources is unlikely to be successful. A legal and regulated supply of rhino horn through CITES may help generate the needed funding. Empowering the private sector and including private landowners in rhino conservation by allowing sustainable trophy hunting has paid off and conservation efforts by the private sector are currently instrumental in preventing further declines in the white rhino population. It is now time to be bolder and initiate a process that aims to empower communities into conservation actions that aim to boost rhino numbers following recent declines and enhance the resilience of socio-ecological systems.

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