MANAGEMENT

A proposed framework for short-, medium- and long-term responses by range and consumer States to curb poaching for African rhino horn

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Abstract

African rhinos are suffering a new poaching onslaught for their high-priced horns. Despite intensified anti-poaching activities, the number of rhinos poached per day has continued to increase since 2008. Between 2010 and 2011 more than 1.5% of the African rhino population was poached each year: a higher percentage is projected for 2012. This trend in increased poaching will reverse overall positive rhino population growth in the long term. In response, a rhino emergency summit comprising representatives of rhino range States, the private sector, government officials and non-governmental organizations met in Nairobi during April 2012. Following this meeting, we propose an integrated framework directed at reducing the demand-and-supply ratio associated with the use of rhino horn. The framework is envisaged to guide short- as well as medium- to long-term responses by range States directed at reducing the incentives for poaching and ensuring the persistence of rhinos.

R sum

Les rhinocéros d'Afrique souffrent d'une nouvelle offensive de braconnage à cause du prix élevé de leurs cornes. En dépit de l'intensification des activités anti-braconnage, le nombre de rhinocéros braconnés par jour n'a cessé d'augmenter depuis 2008. Entre 2010 et 2011, plus de 1,5% de la population des rhinocéros d'Afrique ont été braconnés chaque année alors qu'on prévoit un pourcentage encore plus élevé pour 2012. Cette tendance à l'augmentation du braconnage va renverser la croissance positive de la population des rhinocéros dans le long terme. Pour cette raison, un sommet d'urgence comprenant les représentants des Etats de l'aire répartition de rhinocéros, le secteur privé, les responsables gouvernementaux et les organisations non-gouvernementales s'est tenu à Nairobi au mois d'avril 2012. Suite à cette réunion, nous proposons un cadre intégré visant à réduire le rapport de la demande et de l'offre associé à l'utilisation de la corne de rhinocéros. Le cadre est prévu pour guider à court, à moyen et à long termes les réponses des Etats de l'aire de répartition destinées à réduire les motivations pour le braconnage et assurer la persistance des rhinocéros.

Introduction

Escalating poaching for rhino horn poses a renewed threat to the persistence of all extant species and subspecies of African rhinos. The number of rhinos poached has increased exponentially since 2008, particularly in South Africa (Thomas, 2010). The proportion of rhinos illegally killed was more than 1.5% of South African rhinos and slightly more than 2% per annum in Kenya. This has resulted in a decline

in overall rhino population growth across Africa from 9.4% annually between 2005 and 2007, when poaching was relatively low, to 5.1% annually between 2008 and 2010, when poaching escalated (calculated from population estimates extracted from the African Rhino Specialist Group, Chair Mike Knight). Kenya, Namibia, South Africa and Zimbabwe protect over 98% of Africa's black and white rhinos (Knight, 2011). Botswana, Swaziland and Tanzania each conserve over 100 rhinos while Angola, Malawi, Mozambique, Uganda and Zambia conserve fewer than 100 rhinos each (Knight, 2011).

Some authorities speculate that the increase in poaching results from societal changes in some Asian countries such as Vietnam (Anon, 2011) that has led to an increase in demand that is not associated with traditional Chinese medicinal use (Lever, 2004). Furthermore, anti-poaching investigations and intelligence in some African rhino range States suggest that organized crime syndicates exploit and, perhaps even manipulate the newly expanded demand for rhino horn. This may partly result from stock of illegal horn within consumer states being exhausted. The result is that rhino horn has high value in the black market (Anon, 2011) and thus provides financial incentives for exploitation of the commodity (Fischer, 2004), both legal and illegal.

In curbing the threat posed by poaching, government authorities of African rhino range States have responded with aggressive intent. At the CITES 15th Conference of Parties in Doha, Qatar, in 2010, the Parties unanimously adopted amendments to Resolution Conf. 9.14 on the rhinoceros to obligate implicated consumer States to report to IUCN and TRAFFIC their efforts in curbing illegal rhino horn trade in their countries. Since then, there have been bilateral discussions between some range States and implicated consumer States.

Range States have also allocated increased resources. South Africa, for example, which protects 93% of Africa's white rhinos and 39% of the black (Knight, 2011) has increased State funding for anti-poaching and rhino security activities from USD 20 million to USD 57 million per year since 2008 (South African National Parks, unpublished data). Even though the South African National Defence Force, the South African Police Services and South African National Parks (SANParks) have coordinated responses to poaching threats in Kruger National Park since 2009, the poaching onslaught continues. During 2007 in South Africa, an average of 0.03 rhinos were poached per day, but by March 2012 that had risen to 1.63 per day with no signs of poaching tapering off (SANParks, unpublished data). If the poaching intensity trend continues, statistically detectable declines are predicted for the white rhino population of Kruger National Park, South Africa, by 2016 (Ferreira et al., 2012) given the relative imprecision of population estimates derived through standard surveying of large mammals (e.g. Ferreira et al., 2011a). This may reflect a more widespread expected trend in rhino numbers elsewhere in South Africa if poaching threats continue.

Kenya has also intensified anti-poaching efforts by, for example, declaring 2012 as the Year of the Rhino to direct focus and resources to rhino conservation and protection. Other efforts have included increasing the rhino ranger force by more than 25% during 2011, converting rhino scouts on private rhino lands into Kenya Police reservists, offering formal training to community scouts in wildlife protection, using sniffer dogs at international ports and tracker dogs for monitoring, and relocating rhinos from areas of high risk to areas of low risk. Despite these efforts, poachers still killed two rhinos per month, which translated to more than 2% per annum of Kenya's 1000 rhinos since 2009. This has impacted negatively on the overall rhino population growth rate in 2010 and 2011 (Kenya Wildlife Service, unpublished data).

Zimbabwe has enhanced its wildlife crime penalties, conducted annual rhino operations of dehorning and marking, strengthened intelligence gathering, conducted crime-awareness campaigns, appointed a special rhino task force, and is currently reviewing intensive protection zone models. In spite of these efforts, State land populations continue to be poached while some have been poached to extinction (e.g. the Iwaba rhinos). At only three localities within Zimbabwe may rhino numbers be on the increase. In contrast, Namibia, a stronghold for the southwestern black rhino (*D. bicornis bicornis*), has not experienced the same surge in poaching as elsewhere in Africa.

The above examples suggest that poaching intensity varies across range States and more importantly, that anti-poaching effort alone will not protect African rhinos and decrease extinction risks for all subspecies. The present situation is clearly dire. In this paper we propose a framework of response following a recent emergency summit called by the African Wildlife Foundation (AWF—www.awf.org) and the Kenya Wildlife Service (KWS—www.kws.go.ke) in Nairobi, Kenya. We seek to explore the key drivers creating

poaching incentives and then construct a suite of tactical as well as strategic actions directed at ensuring the persistence of African rhinos.

Conceptual framework

Ecological problem solving has two essential approaches: 1) those that deal with the symptoms of a problem and 2) those that focus on the causes (Commission on Life Sciences, 1986). Dealing with the symptoms of a problem can be termed *a tactical approach* while dealing with causes can be termed strategic. We make use of elephants as an example to illustrate this.

Elephant (*Loxodonta africana*) impacts, both ecological and on humans, have traditionally been perceived to be associated with high local elephant densities (Cumming et al., 1997; Lee and Graham, 2006). Local high elephant densities, or intensity of use (van Aarde et al., 2006), are a symptom of where critical resources are (Young, 2010) and how elephants respond spatially (Young et al., 2009) as well as demographically (Trimble et al., 2009) to those resources. A common traditional tactical response was to reduce elephant densities through for instance culling (van Aarde et al., 1999) or translocation (Garai et al., 2004). This type of response can be considered re-active as managers respond once elephants have already reached high densities. Pro-active tactical responses might be to prevent elephant densities becoming high through for instance applying contraceptives (Fayer-Hosken et al., 2000). However, these responses have not addressed the primary driver or cause, i.e. resource distribution, of the elephant problem associated with ecological impact (Guldemond and van Aarde, 2008) or human conflict (Lee and Graham, 2006).

An alternative approach is for managers to apply strategic approaches to deal with the cause of the problem (van Aarde et al., 2006). In our example, a pro-active strategic response would be to restore landscape limitations through, for instance, naturalizing water distribution by removing water points that artificially supplement water availability (Smit et al., 2007) and causing elephants to use landscapes variably (van Aarde and Jackson, 2007). When constraints like small areas prevent landscape restoration, managers have the option to be strategically re-active by inducing variability in spatial use of landscapes by elephants through, for instance, various forms of disturbance typically used to reduce human–wildlife conflict (Osborn and Parker, 2003).

Given the example above, we anticipate that the primary cause of rhino poaching comes from incentives driven by the financial value of horn, as is often the case with exploitation of natural resources (fig. 1, adapted from Ferreira et al., 2012). The financial value or price of a commodity is primarily driven by demand and supply ratios (Damania and Bulte, 2007), of which the dynamics may differ depending on whether the economics adhere strongly to a producer–consumer market (Gregory and Stuart, 2004) or a speculation market (Niederhoffer and Kenner, 2003). Even so, our central proposition is a common economic one—the larger the difference between high demand and low supply of a commodity, the higher the price of that commodity and the more attractive that commodity is for exploitation both legally and illegally. Strategic scenarios will deal with this driver as the primary cause of rhino poaching.

Rhino conservationists can influence supply in two alternative ways: 1) suppressing or eliminating supply or alternatively, 2) enhancing supply. Suppressing or eliminating supply has several components that dichotomize into re-active and pro-active responses (Table 1). These actions are aimed at providing disincentives to poachers. The effectiveness of disincentives is toned in some instances by the minimum wage of the work force in a community. In such cases because of limited returns on alternatives for income generation, low-wage earners are likely to continue poaching even if threat of prosecution and the probability of loss of life are high (Messer, 2010). Suppressing supply is a tactical response in the short term that may best be achieved by coordinated approaches by African range States.

Our central proposition suggests that when suppressing supply, the demand–supply ratio increases (fig. 1). This leads to increase in the price of a horn, which in turn provides larger incentives for poaching. Disincentives through intensified pro-active and re-active tactics that suppress supply may not outweigh the induced higher incentive for poaching. Such scenarios thus require compensatory suppression of demand at a faster rate than the rate of suppressing supply. Given that demand is ultimately the driver, suppressing demand through primarily awareness and education (Steg and Vlek, 2009) and, perhaps, international diplomacy (Epure et al., 2009) is a strategically re-active urgently needed response. This response seeks to

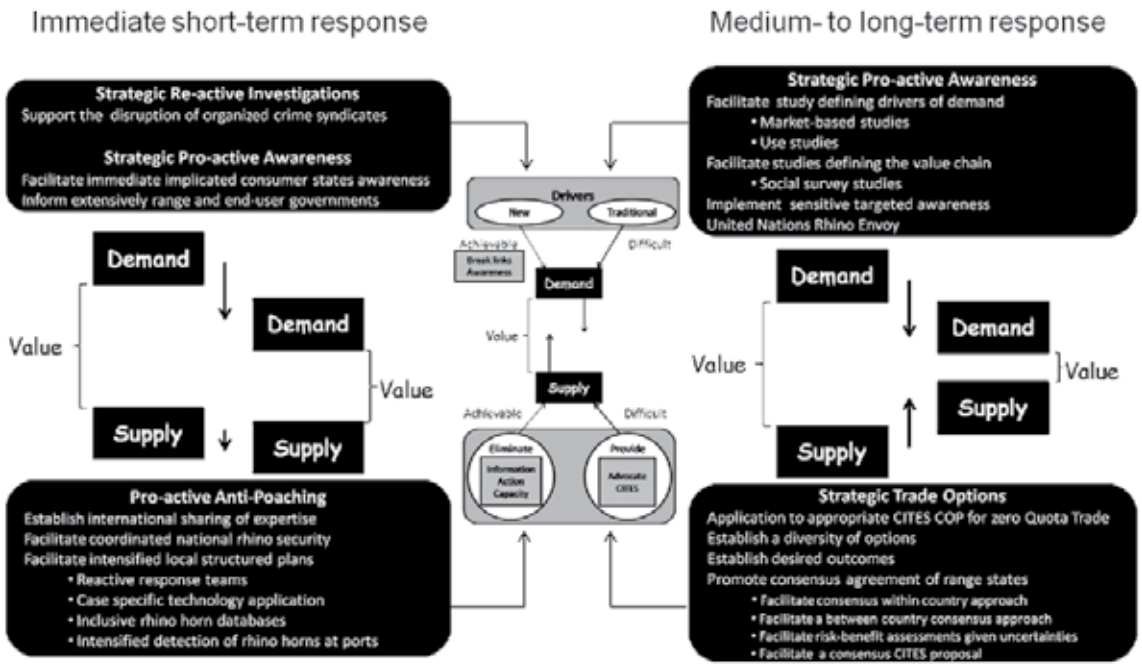

Figure 1. A conceptual framework for short-, medium- and long-term approaches to curb poaching for African rhino horn based on a model of demand and supply (Ferreira et al., 2012) as a key determinant of the financial value of rhino horn as a commodity. These approaches serve as propositions that carry uncertainties if, for instance, the provision of supply stimulates demand and no concurrent responses to suppress demand are taking place. The demand–supply ratio may then increase with increased value in the horn and poaching incentives. Similar uncertainties comprise actions associated with short-term responses.

Table 1. Examples of pro-active and reactive tactical responses directed at suppressing supply of rhino horn through providing disincentives to poachers and end users

Re-active	**Pro-active**
Rhino security coordinated response task teams for swiftly dealing with incidences	Dehorning rhinos assumed to reduce gain per effort for poachers
Sniffer dogs at ports of export for detection of horns in transport	Toxic treatment of horns assumed to place end-users at risk
High technology for detection and persecution of transgressors	Chemical deterrent of horns assumed to reduce the willingness of end users to use
DNA profiling that assists with prosecution Relocation of rhinos from less safe to relatively safer conservation areas	Intelligence directed at pre-emptive strikes on poachers
Common stiff penalties for poaching crimes	

compensate for the likely effects of reduction in supply on the financial value of rhino horn. In addition, African rhino conservationists may achieve substantial strategic re-active gains if international crime syndicates are disrupted, assuming that organized crime is a key modulator of the new demand for rhino horn noted in some Asian countries (Anon, 2011).

A second option of rhino conservationists is enhancing supply, which directly targets the reduction of the demand–supply ratio within our central

Table 2. Examples of trade options (adapted and revised from Ferreira et al., 2012)

Option	Detail
No trade	No trade in rhino horn of any format both internationally or nationally and consider option of destroying stockpiles
Stockpile sales	Existing stockpiles made available to a trading partner using the same model as that used for recent elephant ivory sales
Sale of horn harvested from rhinos within their natural distribution	Existing rhino populations provide individuals from which horns can be harvested at regular intervals and provided to a regulated market
Sale of horn harvested from rhinos outside their natural distribution	Establishing rhinos outside natural distributions like the end-user States and harvesting horn sustainably
Buy and donate	Using donor funding to buy all stockpiled rhino horn stock and donating these to end-user States in a regulated industry

proposition (fig. 1). Several ways can be constructed to enhance supply (Table 2, adapted from Ferreira et al., 2012) with each carrying advantages and disadvantages. The reduction of the demand–supply ratio would be enhanced if a concomitant reduction in demand took place, particularly across the spectrum of old and new demand. However, there is no guarantee that providing rhino horn will result in reduction in demand given there is no information on the number of potential users that are currently restricted by high financial value. In fact, the provision of rhino horn may stimulate dormant markets because of affordability to a larger fraction of potential consumers. Enhancing supply and reducing demand are strategically pro-active actions directed at influencing the financial value of rhino horn as an incentive for exploitation both legally and illegally.

The way forward

At the recent rhino summit facilitated by AWF and KWS, experts from the African range States agreed to short- as well as medium- to long-term responses, each of which has consequences for the demand and supply ratio (fig. 1). The short-term responses are directed at reducing supply through collaborative intensified anti-poaching and rhino security activities, but with an immediate and urgent need to conduct education and awareness programmes in implicated consumer countries targeting the new horn users (Anon, 2011). The medium- and long-term responses require consideration of providing rhino horn and understanding of drivers of demand in future.

These multi-term scenarios carry two challenges. Typically, conservationists seek implementable scenarios, but they seldom ask which scenario will be the best. We focus on the latter as a key step required before operational plans can be established and evaluated. Scenarios may carry different negative (risks) and positive (benefits) outcomes for potentially six different objectives of international importance for rhinos (i.e. 1) continued existence of African rhinos, 2) continued existence of Asian rhinos, 3) value of live rhinos, 4) value of rhino horn, 5) expectations of range State stakeholders, and 6) expectations of consumer state stakeholders). The primary biodiversity objective is to reduce the threat posed by poaching and hence extinction of African rhino species. However, poachers tend to focus on other lucrative commodities, places or species if the financial value of a specific commodity's is reduced (e.g. Brashares et al., 2004). A second biodiversity objective is thus to minimize threats associated with the displacement of poaching activities to Asian rhino species. This predicts that tactical scenarios that suppress supply within African rhino range States may also need to be matched by intensified anti-poaching activities in Asian rhino range States, particularly if responses by African range States are focused on intensified pro-active and re-active anti-poaching.

Two additional objectives that scenarios should consider associate with the value of rhinos both as a commodity of the rhino itself and rhino horn ('t Sas-Rolfes, 2012). Live rhinos have a value in the game sales market that is separated from that generated by the rhino horn demand in Asian countries. Another two objectives are associated with societal expectations and

quality of living in range as well as consumer States. Within range States, rhino poaching is providing considerable public outcry and media challenges for politicians and policy makers (Knight, 2011). There is thus an expectation from key stakeholders within range States that authorities will protect rhinos and effectively fight crime. Concomitantly, Western condemnation of traditional medicinal use of rhino horns by Eastern nations be classified as customary rights discrimination (e.g. Fougere, 2006). Key stakeholders within the consumer States thus also have expectations that their specific cultural traditions are respected and needs are met.

For all potential scenarios, predicting the effects on these six objectives is substantially challenged by the lack of definite knowledge on how demand and supply would react to tactical and strategic responses by range and consumer States. Understanding the dynamics of demand and supply is thus a key strategic information requirement. Even so, to fully advise decisionmakers, both nationally and internationally, rhino conservationists within range and consumer States require a process that evaluates the risk and benefits and associated uncertainties that scenarios may carry (e.g. Assmuth and Hilden, 2008). Such a process should be directed at facilitating a consensus approach (Morgan et al., 2012) advocated by all range as well as consumer States.

Typical scenario-planning processes are subjective and recognize uncertainty, but do not explicitly account for uncertainties (Schoemaker, 2002). Combining scenario planning with common environmental risk assessment approaches (Mentis, 2010) could provide a robust way to find the most appropriate option or combination of options. Each scenario has associated actions, events or consequences which carries some impact on each objective. Impact is toned by the degree of likelihood that the impact may occur. For instance, aggressive awareness campaigns about rhino poaching in consumer States should reduce the demand for rhino horn. The impact on the persistence of African rhinos will be high, but the likelihood that it would take place is lower given the tradition of medicinal use (Lever, 2004).

In addition, defining the magnitude of impact on an outcome, positive (i.e. benefit) or negative (i.e. risk) as well as the likelihood carries various levels of uncertainty. Using the same example as above, the assignment of high impact and low likelihood of awareness campaigns on an outcome of African rhino persistence carries a great deal of uncertainty. For instance, traditional medicinal use is experiencing generational changes globally elsewhere with use diminishing among younger people (e.g. Uprety et al., 2012). It is uncertain whether this holds for medicinal use of rhino horn in traditional consumer States.

The total risk or benefit of a specific event to an objective associated with a scenario is thus a product of the impact, likelihood and uncertainty. We suggest that such an approach will provide range as well as consumer States with the best scenario or combination of scenarios that carries the largest ratio of benefits to risks in achieving all six objectives given uncertainties. Such an approach has been used to deal with morally complex and factually uncertain challenges (Dickson and Adams, 2009) such as elephant management across several spatial scales and ecological problems in South Africa (e.g. Ferreira et al., 2011b). If applied to the rhino poaching challenge, coordinated responses will thus have a transparent rationale. We anticipate that after following the above process, conservationists should find it relatively easy to justify funding and find resources for implementation through operational plans.

The generalized framework provided here offers range and consumer States a common understanding of the causes and consequences of the problem associated with poaching for rhino horn in Africa. It also highlights that responses will differ on a case-by-case basis or even between range and consumer States. Notwithstanding these case-specific considerations, responses should be directed at reducing the demand–supply ratio of rhino horn. We suggest that a workshop using a risk–benefit planning process inclusive of all range and consumer States within the integrated framework that we have proposed is a matter of urgency. This approach and framework may be also applicable to several other exploited large mammal species threatened with extinction.

Acknowledgements

We thank the African Wildlife Foundation for organizing, funding and co-hosting the summit with the Kenya Wildlife Service. We also thank Bernd Brell, Wilbroad Chanza, Pierre du Preez, Karl Karugaba, Esmond Martin, Pelotshweu Galebotswe, Pelham Jones, Ali Kaka, Julius Kipng'etich, Peter Knights, Mohamed Madehele, Nyamakumbati

Mafuru, Geoffreys Matipano, Edwin Matokwane, Martin Mulama, Leo Niskanen, Li Lotriet, Dickson Lesimirdana, Mathew Norval, Andrew Parker, Jo Shaw, Johan Strauss, Runyoro Victor, Lucy Vigne, Richard Vigne, Rodney Visser, Sam Weru, Patrick Bergin, Helen Gichohi, Philip Muruthi and Mayu Mishina for participating in the discussions in the summit facilitated by Daniel Stiles.

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