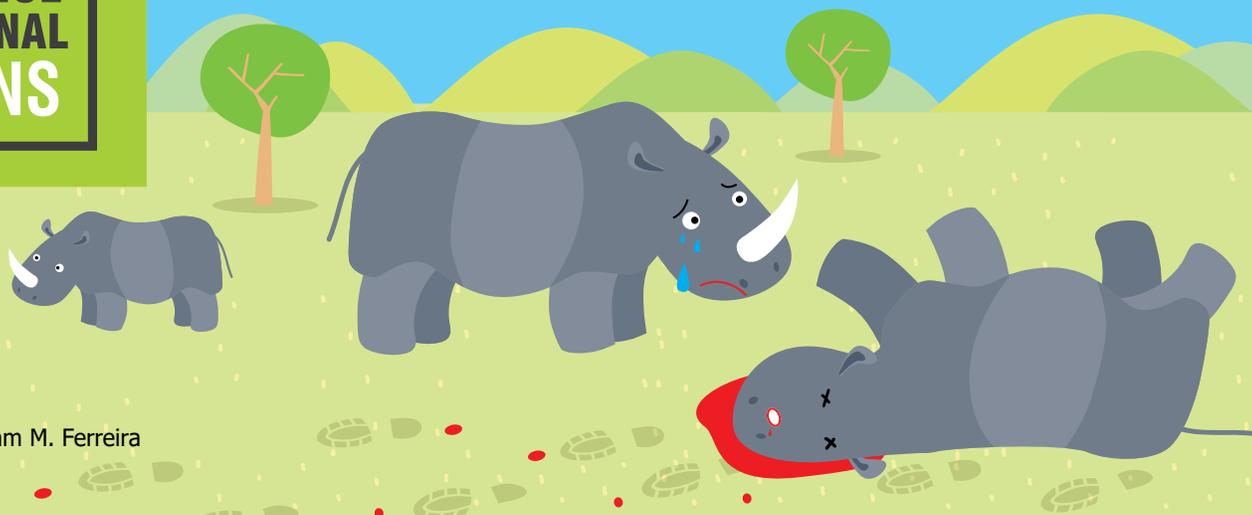


Can we save rhinos from extinction?



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Associate Editor:

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Abstract

In the past decade, poachers have increasingly hunted and killed South African white rhinoceroses, despite efforts to protect them. If the killing continues at this rate, these rhinos will soon go extinct. We created a model that took both human actions and rhino survival in the wild into account in order to test which scenarios resulted in saving

this endangered species. We found that there is a way to save rhinos from extinction – but it requires combating the international mafias that buy and sell rhino horns as well as developing legal job opportunities for people currently living in poverty near rhinos, so they don't have to resort to poaching for money.

Introduction

Rhinoceros horns are prized in some parts of East Asia for their medicinal properties or as a status symbol (even though ingesting rhino's horn is as healthy as ingesting somebody's nail clippings). In 2014, a kilogram of rhinoceros horn sold for nearly \$100,000 on the black market (up from \$5,000 per kilogram in 2009) – and demand for these horns continues to outstrip supply.

Because of this, the South African white rhinoceros (*Ceratotherium simum simum*) population is under increasing threat (Fig. 1). Poaching operations, organized by international mafias, hire people in need of money to infiltrate national parks and other protected areas to illegally slaughter white rhinos and remove their horns. The mafias then ship the horns to Asia where they can be sold for a massive profit. If the illegal horn trade continues at this rate, South African white rhinos will soon go extinct.

There are many ideas about the best way to halt rhino poaching. Some people think the key is to reduce the demand for rhino horn through extensive media and outreach campaigns in Asia. Others think upping patrols in the South African parks to catch and deter poachers will stop the animals from being killed in the first place.

We wanted to figure out which policies would actually help to ensure white rhino survival. Which actions would be most effective at cutting down poaching enough that South African rhino populations could thrive?



Figure 1:
White rhinos close to Waterberg National Park, Namibia

Methods

We built an economic-ecological model to test how white rhinos fared under different scenarios. It was a little like designing a video game based on real life: we wanted to see how human actions, coupled with environmental conditions, would affect rhino survival.

On the human side of our model, we included the earnings of poachers at all levels of the supply chain (from the people who actually hunt and kill the animals, to those who transport the horn across international lines, to those who sell the horn in Asia to consumers), as well as demand for rhinos – which included their horns as well as the value of live animals for tourism.

On the animal side, we simulated when each rhino in South Africa was born, reproduced, and died (see figure 2).

Combining the human and animal sides of the model gave us the economic-ecological connection: poachers and horn traders

would make a decision – every 12 weeks, in our simulation -- about whether to hunt rhinos, and how many to kill based on how much money they think they can make. Then, a certain number of rhinos in the model would die, depending on the success of other peoples' efforts to protect them and the environmental conditions (like how much food they had, how many babies they had, and how likely they were to die of natural causes). We programmed the cycle to continue on for years, so we could see if the rhino population ended up going extinct.

Once we had this model set up, we could vary the scenario and see what happened to the rhino population. What if there was an intense campaign to reduce demand for horns? What if it were actually legal to kill a certain number of rhinos? What if we could dismantle the international mafias that trafficked rhino horns? What if people living near national parks had legal job opportunities and decided not to risk their lives poaching?

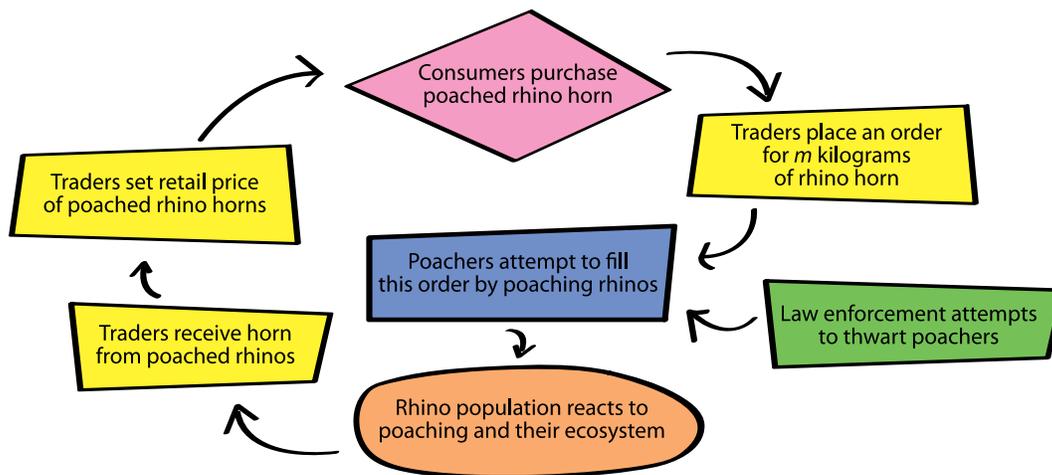


Figure 2:
Step-by-step flow of events in our economic-ecological model.

Results

Our model showed that there is a way to prevent white rhinos from going extinct (Fig. 3): All the scenarios that resulted in rhino survival included actions to interrupt international mafias that traffic in rhino horn. This was true regardless of any of the other factors, like whether there are increased patrols to catch poachers, media campaigns to reduce demand for horn, or whether the horn trade was legal or not. Our model clearly showed that without disrupting the international crime gangs that organize the poaching, export, buying and selling of rhino horn, white rhinos will go extinct.

In addition, our model showed that if there were legal job opportunities for people living in poverty next to protected areas where rhinos lived, South African white rhinos would have an even better chance of survival.

*For Figure 3,
please check page 3*

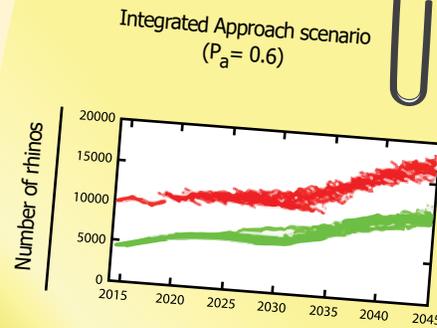
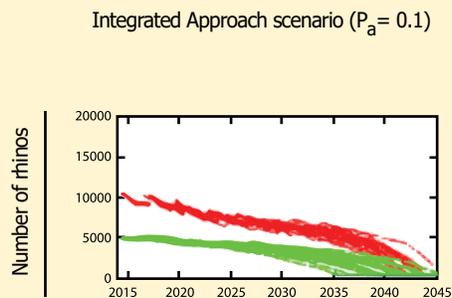
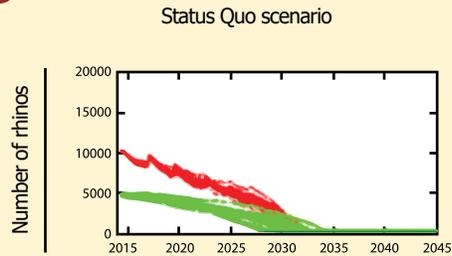


Figure 3:

Three scenarios to test conditions that result in white rhino survival or extinction. Red lines indicate rhinos in Kruger National Park, and green lines represent rhinos on privately owned reserves. P_a is the effectiveness of anti-poaching efforts.

In the Status Quo scenario, P_a is 0.1. This means that if a middleman "makes an order" for 10 rhino horns, on average 9 rhinos ($1 - 0.1$) will be killed. In the successful Integrated Approach scenario, P_a is 0.6, so on average 6 of the 10 rhinos "marked" for poaching will be saved (either by scaring off the poachers or stopping them in some other way).

Discussion

To save white rhinos from extinction, we have to stop the illegal poaching and horn-selling that's currently going on – and the only way to effectively do that, according to our model, is to stop the illegal mafias that control the rhino horn supply chain while also providing more legal job opportunities for people desperate for money who live near South African rhino populations.

This is, of course, not easy to do. South Africa's history of apartheid has meant that many communities have faced decades of disinvestment – the townships where the Afrikaners forced the black majority to live during the 1950's have made little progress in developing any type

of local economy, and many residents currently have very little economic opportunity. Investing in legal job creation and economic infrastructure in these areas is a huge and important task for the South African government.

Interrupting the international mafias that traffic in wildlife isn't easy either. It requires coordination across borders, increased law enforcement, and attention to each level of the rhino horn supply chain.

While these actions may be more complicated than traditional policies of simply adding park rangers to patrol for poachers, they are necessary to save white rhinos from extinction.

Conclusion

Our model showed that it's difficult to influence demand for rhino horn enough that it alone would cause a meaningful reduction in rhino poaching – but reducing demand can be part of the solution. As consumers, we can research where the products we buy come from, and avoid buying products like rhino horn that come from threatened or endangered species.

Yet overall, protecting rhinos – and other endangered wildlife species – requires more than just trying to reduce demand or increasing ranger patrols; we have to address the big societal issues of economic inequality and organized crime to successfully save white rhinos from going extinct.

Glossary of Key Terms

Afrikaner – A white South African of Dutch descent.

Apartheid – Laws and regulations in South Africa that segregated black South Africans from white Afrikaners, and systemically and institutionally discriminated against black South Africans, from 1948-1991.

Black market – Trade in illegal substances.

Economic-ecological model – A simulation of human actions and environmental variables based on real-life measurements and costs, which is used to predict future outcomes under different scenarios.

Mafia – An organized crime syndicate.

Poaching – Illegal hunting of wildlife

Check your understanding

- 1 Why is it necessary to use a model that takes into account both human actions and environmental variables when simulating potential futures for rhinos?
- 2 How would disrupting international mafias affect the rhino population?
- 3 Rhino horn is one product made from an endangered species – we know we should avoid buying it in order to these creatures in their natural habitat. What are some other products to avoid?
- 4 How has South Africa's history of apartheid contributed to today's poaching?

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