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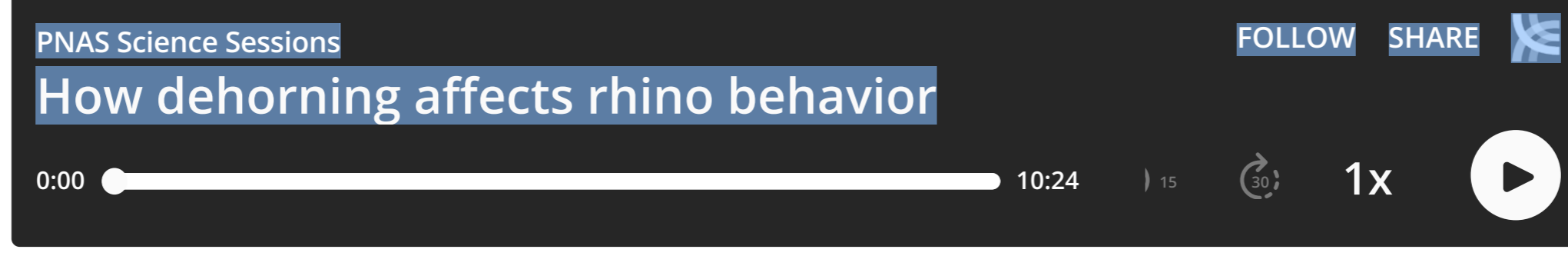


How dehorning affects rhino behavior

Vanessa Duthé explains how dehorning affects the behavior of black rhinoceroses.

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PNAS: Welcome to *Science Sessions*, the podcast of the Proceedings of the National Academy of Sciences, where we connect you with Academy members, researchers, and policymakers.

Join us as we explore the stories behind the science. I'm Paul Gabrielsen.

Black rhinoceroses are a frequent target of poachers, who collect the animals' highly valuable horns. Some rhino preserves proactively trim horns to reduce the rhinos' value to poachers. It's a procedure called "dehorning." Dehorning is associated with decreased mortality due to poaching. But the effect of removing the horns on rhino behaviors is unclear.

In a recent PNAS study, Vanessa Duthé of the University of Neuchâtel and colleagues reviewed 15 years of data on the behaviors of hundreds of black rhinos in game preserves in South Africa. They specifically looked at how the ranges of dehorned rhinos changed following the procedure.

Vanessa, what is the impact of poaching on black rhinos?

Duthé: Black rhinos are critically endangered, and the biggest threat to them is, right now, poaching. Even though the poaching pressure in time was a lot worse, and it has dropped now, it is still relentless. And so, black rhinos represent about 10% of poached animals, but thinking of—there's only between 5[,000] and 6,000 animals left; it's a huge pressure on them, even though white rhinos are the ones that are bearing the bulk of the brunt of poaching because of their higher density. So, the horn is sold in illegal markets, mainly in Asia. And it's incredibly valuable.

PNAS: Can you tell us about dehorning? How widespread is it, and how much of the horn is removed?

Duthé: Dehorning has been around for quite some time. I know that in Namibia, they were even dehorning maybe in the '80s, but it's been relatively widespread in southern Africa since the poaching has really rocketed. So, for these study sites, dehorning mainly started in 2016.

So, a dehorning procedure generally involves sedating a rhino. We'll then equip the rhino with [a] blindfold and earplugs to limit the sensory overload. And the horns are cut off with a chainsaw. The entire unnerved part of the horn is removed. We will generally leave 10 to 15 centimeters of base. This is where it becomes more sensitive. And so it's like a hoof or even like hair; it will just regrow.

It regrows depending on the age of the animal; [for] younger animals, it grows a lot faster than older animals. But, in general, if we want to keep the rhinos dehorned and to be able to take enough horn off to cut it off with a chainsaw, we'll dehorn them every 18 months to 2 years.

And the operation generally takes between 15 [and] 20 minutes, and then the rhino is awoken with a reversal.

PNAS: Have you participated in a dehorning?

Duthé: I've done a lot because, sedating the animals, we also have access to get samples. And because we're fitting tracking devices to dehorned animals. So, I've actually done a lot.

PNAS: What did we know before this study about the behavioral role of the black rhino's horn?

Duthé: So, we know that black rhinos use their horns for offense and defense, and horns have been reported to be linked to dominance in territorial establishment.

PNAS: What impact of dehorning did you see with regard to rhino mortality?

Duthé: We observed a correlation between the increasing number of dehorned rhinos in the study populations and the decrease in the number of poached animals. This is, obviously, a correlation and not a causation. On the other hand, we observed that natural mortality did not increase with dehorning, which is very important because it shows that dehorning does not impair black rhino survival.

PNAS: What behavioral changes did you observe?

Duthé: So, we mapped home ranges for animals before they were dehorned and after relatively long periods of time, so up to 2 years on each period. And, we observed a strong reduction in the size of these home ranges post-dehorning. So, on average, females reduced their home range area by 53% and males by 38%.

The number and strength of interactions based on home range overlap between all the animals in a few of the populations, or the selected populations for the study, decreased by 37%. And the interaction that was the most affected was male–male interactions. And, to the opposite, we had a control group, which was composed of rhinos that were never dehorned, and they actually showed that, in time, they increased their home range size. So, for dehorned animals, it's a very strong response.

PNAS: Why do you think that behavioral response is connected to dehorning?

Duthé: They are definitely aware of not having their horns anymore; they must be. So, we think it's a confidence matter. Black rhinos are solitary, so they live each in their own little home range, and they do create loose associations between each other, but they definitely aren't in herds or anything. So, they actually don't know that their neighbor is also dehorned. So, they probably feel a lot more vulnerable, and they decrease this explorative behavior that they usually have with horns. They still have it, but it is significantly decreased, and they'll avoid each other a lot more and stay in the more central parts of their home ranges. Specifically for these big dominant males that patrol actively, they will just reduce those patrols.

PNAS: What are the caveats or limitations of this study?

Duthé: So, the study was performed in one geographic region, even though it had a lot of sites involved. And what we do know is that black rhino home ranges are quite variable from one geographic region to the other. Rhinos in a very different area might be behaving differently. This is based on home range overlap; it would be a lot more precise to use generated data from GPS tracking devices to have a proper temporal thing. This was based on sightings.

PNAS: What are the risks to black rhinos of continuing the practice of dehorning?

Duthé: So, one of the implications of smaller home ranges is that it may be forcing them into what we call ecological traps, where the resources in these smaller home ranges aren't as optimal as if they had larger home ranges. But it has to be determined yet if it really is the fact. The long-term impacts may involve affecting black rhino population social structure and patterns of dominance, with these big bulls maybe having less of a reproductive success than previously. But, at the same time, it might be opening the door to the subdominant bulls. And this is because the distribution of home ranges and dispersal are really central to this reproductive success and population structure. But there is no indication that population growth as a whole is affected. What I'm talking about is much more the individual success.

So, the other consequence of this is that it might be affecting gene flow. You would need genetic studies to confirm this.

Because black rhino is a highly managed species, this behavior change could impact population management. So, for example, we'll usually select individuals that are starting to show imminent dispersal, where they will wander, and they will go looking for vacant territories and go on walkabouts, for translocation to create new populations. So, it just might make the task of managing populations more difficult.

PNAS: How do those risks balance with the benefits of reducing poaching?

Duthé: Animal behavior indicators can be used to evaluate impact of a conservation tool or rapid human-induced change, as opposed to genetic studies or evolutionary studies.

There are positive aspects to this behavior change as well. In some instances, a decreased area of home range means that maybe habitats could hold more rhinos because each habitat or each reserve, we manage the rhinos to a certain carrying capacity.

So, the fact that these rhinos actually perfectly survive in smaller home ranges might be saying, well, we can now accommodate more rhinos. We are having issues in finding new habitats for them that are safe, that are adequate, and so on.

And also the fact that the male–male interactions were most affected, this may be because they are fighting less, and this might lead to decreased natural mortality. We need further studies to truly determine what are the long-term impacts and outcome.

Dehorning is a short-term solution, a temporary solution. But because it doesn't impair black rhino survival, it doesn't impose a direct threat to them. However, it must be employed with extreme caution and continuous monitoring. We may have to adjust management operations with regards to long-term impacts, but, unfortunately, due to the continuous threat of poaching, in some instances, it's still necessary. And, at the end of the day, a dehorned rhino is better than a dead rhino.

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