ban the bullet

Yet another threat to African vultures

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White-backed Vultures feed on a game animal carcass.

Humans are responsible for introducing many harmful heavy metals into the environment. Human-produced lead is one such toxin and it is the most widely occurring toxic heavy metal globally. While some lead pollution originates from mining, paint and leaded fuel, spent lead ammunition from hunting is increasingly recognised as a major contributor to lead contamination in wildlife.

The impact of lead from hunting gamebirds and waterfowl has been well documented. It has been shown to cause substantial mortality as well as have severe sub-lethal effects, resulting in some population decreases. The impacts on scavenging raptors were highlighted by the plight of the California Condor *Gymnogyps californianus*, which teetered on the brink of extinction as a result of ingesting lead ammunition fragments in carcasses shot by hunters. The condor's survival required heroic interventions, including taking all birds into captivity until a ban on the use of lead ammunition could be implemented in California.

Vultures in Africa are in crisis. Across the continent their numbers have declined so rapidly that most species are now Endangered or Critically Endangered. The main causes of these declines are mass poisoning, either by livestock owners trying to kill predators or by poachers deliberately trying to kill vultures. When vultures gather to feed on poached animals, their presence can help guide rangers to the sites of poaching activity.

Although hunting is widespread throughout Africa, the threat of lead poisoning to vultures has received little attention. However, the results from our recent study, published in *Science of the Total Environment* (2018, volume 630: 1654-1665), suggest that this threat needs to be addressed if we are to save African vultures from extinction. Previous studies showed that African vultures contain elevated levels of lead in their blood, but ours is the first study to reveal a direct link between the raised levels of lead in African vultures and the activities of big game hunters.

In collaboration with the conservation NGO Raptors Botswana, lead levels were measured in nearly 600 Critically Endangered White-backed Vultures *Gyps africanus* caught in Botswana over a four-year period. We were dismayed to find that 30 per cent had elevated blood lead levels. Most importantly, the levels were highest during the hunting season and in hunting areas, suggesting that lead ammunition used in hunting is the most likely source of contamination. When an animal is shot, bullets fragment widely throughout the carcass and if the carcass or its guts are left in the veld, vultures ingest lead fragments.

Vultures are particularly at risk of lead poisoning because they are wholly reliant on carcasses for food and because their physiology rapidly breaks down and absorbs lead, storing it in their tissues. We were shocked at how widespread lead poisoning was for this population and how clearly the elevated levels were linked to recreational hunting.

Worryingly, our findings suggest that the 2014 ban on hunting on government-owned land in Botswana had no effect on the lead levels in vultures, with levels if anything increasing after the ban. The vultures may have shifted their foraging efforts to private game farms, where ongoing hunting provides a more reliable food source. It is also possible that because vultures range so widely, often crossing national boundaries, they are exposed to lead use throughout the region. As a result, mitigation needs to be addressed at a regional level.

Concern is increasing over the threat to other scavenging raptors. Even if lead poisoning doesn't kill the birds, it can have negative impacts on them. For example, it can alter their movement patterns and reduce their breeding performance. For some birds, moderately elevated lead levels can even increase the likelihood of collisions with powerlines.

A key step is to increase awareness among policy makers of the threat to vultures posed by lead ammunition. Non-lead ammunition is now increasingly available and accredited for use by hunters around the world. The Convention for Migratory Species has urged all signatory countries to phase out the use of lead ammunition, but unfortunately Botswana is one of the few countries that have not signed the convention. We urge all African countries to ban lead ammunition in order to help protect our embattled vultures.

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