Institution: University of Reading

Unit of Assessment: UoA5

Title of case study:
Proof and advocacy of African vulture declines drive changes to international conservation status, policy, national planning and local action

Period when the underpinning research was undertaken: 2008 to 2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Dr Graham J. Holloway	Associate Professor	1996 to Present
Dr Campbell Murn	PhD, University of Reading; Visiting Research Fellow, University of Reading & Head of Conservation and Research, Hawk Conservancy Trust (Category C); Lecturer, University of Reading	October 2007 to March 2014 May 2015 to August 2018 August 2018 to Present

Period when the claimed impact occurred: 1 August 2013 to 31 July 2020

Is this case study continued from a case study submitted in 2014? No

1. Summary of the impact

African vultures are a conservation priority because their populations have declined by more than 80%, and because of their ecological importance as scavengers which rely entirely on carrion for food (obligate scavengers). Research at Reading used local and continental-scale assessments to help quantify and highlight these declines, outline the problem and drive changes to the conservation status of vultures at the international scale. Subsequently, the Reading researchers quantified the high mortality risk vultures face from poisoning that occurs as part of criminal activities such as elephant poaching, and then showed the benefits of poison response actions in reduced mortality. These actions have been incorporated into international policy (Convention on Migratory Species), contributed to national-level action plans (South African National Parks, Kenya Wildlife Service) and also deployed in the field to reach over 2,500 personnel with the Reading research team's in-country partners, the Endangered Wildlife Trust (South Africa).

2. Underpinning research

Across Africa, vulture populations are in crisis, having declined by >80% since the 1980s: hooded vultures by 83%; white-backed vultures by 90%; white-headed vultures by 96%; and Rüppell's vultures by 97%. These declines are due to a range of threats, but the combination of poisoning and the trade in body parts for witchcraft and traditional uses account for approximately 90% of reported deaths. Vultures are obligate scavengers and are especially vulnerable to the widespread misuse of inexpensive, toxic pesticides, because hundreds of them can feed on a single poisoned carcass. Vultures play a key role in the removal of carcasses and disease ecology, and the disappearance of vultures has negative consequences for ecological and environmental processes.

Research at Reading, starting in 2008, provided the first detailed study of the already rare white-headed vulture in Kruger National Park (KNP) in South Africa [1] and highlighted the importance of protected areas for this species. Researchers then used Africa's protected area network to generate an improved global population estimate for the species [2], which adjusted from 12,000 to only 5,000 birds. Subsequent ground surveys and aerial surveys in KNP [3] generated data that improved accuracy and enabled the first reliable population estimates for two additional vulture species (white-backed and lappet-faced) in KNP [4], where there are approximately 900 nests and >2500 birds. These population estimates published by Reading researchers helped highlight the extent of the African vulture crisis and led to researchers at Reading becoming core members of the multi-national team that generated estimates of 30-year Pan-African vulture declines [5]. The research showed that over three generations, populations of seven vulture species in Africa declined by >80%, putting them at a high risk of extinction.

Since 2010, an emerging and severe threat to vultures is the deliberate poisoning of vultures *en masse* by elephant poachers, who poison the birds deliberately to stop them circling above poached elephants as they are butchered for their ivory – thus betraying poachers to the authorities. This is called sentinel poisoning and can kill hundreds of birds at the site of a poisoning event. Research at Reading [6] quantified the population-level risk to vultures from sentinel poisoning and showed that it will cause local extinctions of vulture populations within five decades. Importantly, the same research shows that where trained field staff are equipped to deal with poisoning events, vulture casualties fall by up to 60% and the expected rate of decline for vulture populations slows to avoid local extinctions. Finally, the Reading research team's mark-recapture studies [7] have informed conservation actions by showing that poisoning risk for vultures is spatially explicit.

The research has provided a strong base of evidence that has informed practical conservation action for critically endangered vultures in Africa, with the aim of slowing and stopping ongoing population declines.

3. References to the research

The research team are confident that the research meets at least the 2* quality level. The research has been published within the main peer reviewed, international journals of the field. The University of Reading assessed each of the outputs in its internal peer review process and the outputs were further validated by external peer review. Many of the papers have been highly accessed and are well cited. The research provides significant advances to the knowledge in the field. It has also provided logical and coherent arguments that have contributed to new theories, which have influenced policy impacting on conservation and animal health and welfare and led to changes in management and practice.

1. Murn, C. and **Holloway, G. J.** (2014). 'Breeding biology of the White-headed Vulture Trigonoceps occipitalis in Kruger National Park, South Africa'. *Ostrich.* **85**, 125-130. ISSN 0030-6525 DOI: http://dx.doi.org/10.2989/00306525.2014.924598.

2. **Murn, C.**, Mundy, P., Virani, M.Z., Borello, W.D., **Holloway, G.J.** & Thiollay, J-M. (2016). 'Using Africa's protected area network to estimate the global population of a threatened and declining species: A case study of the critically endangered White-headed vulture *Trigonoceps occipitalis'*. *Ecology and Evolution.* **6**, 1092-1103. DOI: https://doi.org/10.1002/ece3.1931.

3. **Murn, C.** & **Holloway G.J.** (2016). 'Using areas of known occupancy to identify sources of variation in detection probability of raptors: taking time lowers replication effort for surveys'. *Royal Society Open Science.* **3,** (10), 160368. DOI: https://doi.org/10.1098/rsos.160368.

4. **Murn, C.** & Botha, A. (2016). 'Assessing the accuracy of plotless density estimators using census counts to refine population estimates of the vultures of Kruger National Park'. *Ostrich.* **87**, 241-246. DOI: https://doi.org/10.2989/00306525.2016.1221478.

5. Darcy Ogada, Phil Shaw, Rene L. Beyers, Ralph Buij, **Campbell Murn**, Jean Marc Thiollay, Colin M. Beale, Ricardo M. Holdo, Derek Pomeroy, Neil Baker, Sonja C. Krüger, Andre Botha, Munir Z. Virani, Ara Monadjem, Anthony R. E. Sinclair (2015). 'Another Continental Vulture Crisis: Africa's Vultures Collapsing toward Extinction'. *Conservation Letters* **9**, 89-97. DOI: https://doi.org/10.1111/conl.12182.

6. **Murn, C** & Botha, A. (2017). 'A clear and present danger: impacts of poisoning on a vulture population and the effect of poison response activities'. *Oryx* **52**, 552-558. DOI: https://doi.org/10.1017/S0030605316001137.

7. Monadjem, A; Kane, A; Botha, A; Kelly, C & **Murn, C**. (2018). 'Spatially explicit poisoning risk affects survival rates of an obligate scavenger'. *Scientific Reports* **8**, 4364. DOI: https://doi.org/10.1038/s41598-018-22632-y.

4. Details of the impact

Research at Reading has quantified population declines, identified poisoning as the biggest threat to African vultures and showed the impact of poison response activities. As a result, there has been a change in international policy and the research has contributed to national/regional-level action plans and local deployment of personnel.

International Policy

The International Union for Conservation of Nature (IUCN) is the world's largest conservation organisation and authority. Global conservation action is generally prioritised according to the IUCN status of a species. The populations of all African vultures had declined so rapidly that their IUCN statuses were out-of-date from only five years previously. Reading research published on the White-headed Vulture [1,2,3,5] and the white-backed vulture [4,5] highlighted this discrepancy, leading to the IUCN revising their conservation status as follows: white-headed vultures (Vulnerable to Critically Endangered), and white-backed vulture (Endangered to Critically Endangered) [A]. Research stemming from [5] contributed to the revision of conservation status of four other species: Rüppell's vulture (Endangered to Critically Endangered); cape vulture (Vulnerable to Endangered); hooded vulture (Endangered to Critically Endangered); and lappet-faced vulture (Vulnerable to Endangered) [A].

The revised Endangered/Critically Endangered conservation statuses led the Convention on Migratory Species (CMS) to create a mandate for a Multi-species Action Plan (MsAP) to conserve African-Eurasian vultures [B]. As an international convention, the CMS is the highest level possible for policy impact in conservation. The MsAP provides a coordinated framework for vulture recovery (all 15 African-Eurasian species) and systematically identifies regional threats and actions governments can take. The CMS (and 128 Range State signatories) adopted the MsAP in October 2017. Team member Andre Botha was the overarching coordinator of the MsAP development and Murn co-facilitated at two of the five multi-national workshops underpinning the MsAP.

National and Regional Action Plans

Implementation of the MsAP is dependent on recognition of the issue by government, the development of concrete plans for action, and then the delivery of activities through in-country partnerships. Impact is often first achieved through advocacy that feeds into regional and national action plans. For example, research in – and engagement with – KNP has resulted in wildlife poisoning mitigation training being included in KNP's 10-year management plan [C]. Also, in 2020, KNP requested assistance to mobilise resources to tackle wildlife poisoning, including vultures, from Reading's project partners: Endangered Wildlife Trust (EWT), South Africa [D]. In Mozambique, Niassa Reserve – the largest protected area in the country – has requested support to develop capacity for poison response activities [E].

Following the MsAP, Kenya Wildlife Service developed a national poisoning response protocol [F], which will create stakeholder awareness of the poisoning issue and outline how to deal with poisoning incidents. After the Kenya protocol [F], our principal trainer, Botha, co-facilitated an implementation and training workshop for 35 stakeholders in Kenya [G]. Advocacy is ongoing to raise awareness across the areas where the training has been delivered. This has included a 2019 letter, whose signatories include Murn and Botha, to the African Union Chairperson, as well as direct engagement with government departments in Namibia and Botswana.

Local Training

The MsAP [B] highlights the action 'Expand poisoning response training programmes to support conservation staff to rapidly respond to poisoning incidents' as essential (MsAP Table 6, p97). Since 2015, the Hawk Conservancy Trust/Endangered Wildlife Trust/University of Reading partnership has developed and delivered poison intervention and response training to over 2,500 personnel across southern and eastern Africa (Figure 1), including rangers, field guides, police, government staff and management personnel. Furthermore, 103 workshops have been held, and 60 training kits dispersed (per workshop/field team). The training teaches participants how to neutralise a poisoned site, help intoxicated wildlife, and collect forensic samples for prosecutions. The kits include equipment for decontamination, forensic sampling and personal protection to deal with poisoning events. The occurrence and response to poisoning events is coordinated via WhatsApp groups created after the training.

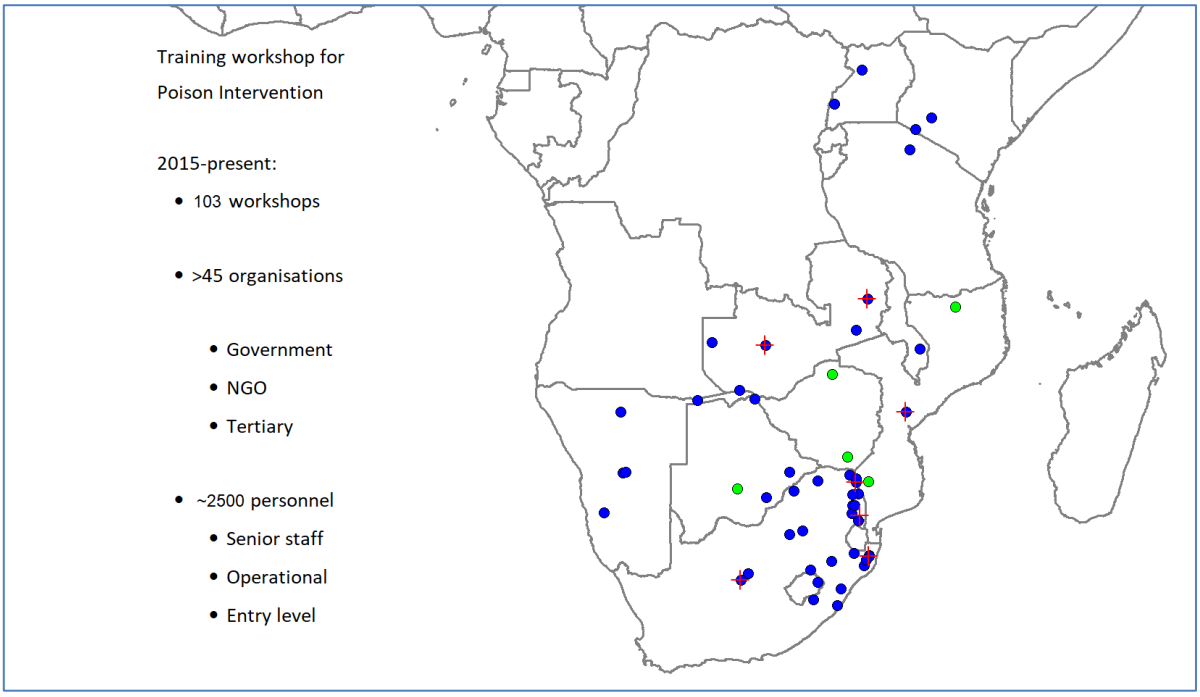

Figure 1: Distribution of training events: blue dots=training events, green dots=planned training events, +=field sites.

The effectiveness of this training is evident from a 2018 wildlife poisoning event during which a poisoned elephant carcass was found and neutralised following our training protocol [H]. Approximately 100 vultures died, but approximately 200 other vultures were observed foraging in the same area – and they, too, would have been at risk had it not been for the implementation of poison response protocols. A similar situation occurred in KNP in 2016, when rangers trained using the research team's protocols minimised the number of vultures that died from a poisoned elephant carcass [I]. In May 2020, after five years of discussion and lobbying by the Hawk Conservancy Trust/Endangered Wildlife Trust/University of Reading partnership, KNP requested further poison response training for their personnel [D]), which led to the training of more than 450 KNP field staff in July 2020. A similar request for poison response training by the National Park Authorities in Mozambique [E] highlights the regional impact of the outreach and training.

The African vulture crisis, and the negative environmental consequences it will bring, is due to uncontrolled wildlife poisoning and a lack of capacity to address the problem. Research at Reading highlighted the problem, quantified the population losses inflicted on critically endangered species and led to policy change at multiple scales. The poison intervention training described here has reached >2500 people in the field, across nine countries in southern and eastern Africa, and continues to build capacity for responding to, and dealing with, wildlife poisoning.

5. Sources to corroborate the impact

[A] List of website URLs for IUCN Red List species accounts (accessed 31 July 2020).

[B] Botha, A. J., Andevski, J., Bowden, C. G. R., Gudka, M., Safford, R. J., Tavares, J. and Williams, N. P. (2017). Multi-species Action Plan to Conserve African-Eurasian Vultures. *CMS Raptors MOU Technical Publication*. No. 5. CMS Technical Series No. 35. Coordinating Unit of the CMS Raptors MOU, Abu Dhabi, United Arab Emirates.

[C] South African National Parks. (2018). Kruger National Park Management Plan 2018-2028.

[D] Letter of support from South African National Parks requesting wildlife poison response training, May 2020.

[E] Letter of request for poison response training from Niassa National Reserve, Mozambique, May 2020.

[F] Kenya Wildlife Service. (2018). Response Protocol to Wildlife Poisoning Incidents in Kenya, Kenya Wildlife Service, Nairobi, Kenya.

[G] Kenya Wildlife Poisoning Intervention Workshop report (2018).

[H] Endangered Wildlife Trust (2018). Media release: Mass poisoning incident affects over 100 Critically Endangered vultures

[I] South Africa National Parks. (2016). Media release: Elephant and other wildlife poisoned by poachers in KNP