

Institution: University of Oxford		
Unit of Assessment: 5 – Biological Sciences		
Title of case study: Recovery of saiga antelope populations and international conservation policy changes		
Period when the underpinning research was undertaken: Oct 2015 – Dec 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:
E.J. Milner-Gulland	Tasso Leventis Professor of Biodiversity	Oct 2015 - present
Diogo Gaspar Veríssimo	Postdoctoral Research Associate, Research Fellow	Sept 2017 – Dec 2020
Joss Wright	Senior Research Fellow	Jan 2010 – present
Period when the claimed impact occurred: Oct 2015 – December 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact		
<p>In 2015 the critically endangered saiga antelope suffered the most dramatic disease-related mass mortality experienced by a mammal. An interdisciplinary research team, co-led by EJ Milner-Gulland of the University of Oxford, diagnosed the cause of the mass mortality, leading to the adoption of disease surveillance protocols for the species by the Government of Kazakhstan. Conservation efforts for saigas since 2015, which were informed by this research, have contributed to the recovery of the Kazakhstan population by more than 200%. Fundraising for conservation that was assisted by the research has enabled projects in saiga areas including ranger patrols and community engagement.</p> <p>Trade in products derived from saiga, particularly horns, has been a long-term driver of poaching and international wildlife trade. University of Oxford research on consumer demand for saiga products in Singapore informed the decision by the 2019 Conference of the Parties to the UN Convention on International Trade in Endangered Species to impose a zero quota on international trade in saiga antelope products, raised public awareness of this issue, and resulted in measurable impacts on saiga horn consumers. Both research projects have informed the revision in 2019 of the International Work Programme for saiga conservation, under the CMS-CITES MOU on saiga conservation.</p>		
2. Underpinning research		
<p>The saiga is a Critically Endangered ungulate species inhabiting the steppes of Eurasia, from southern Russia through Kazakhstan, Uzbekistan, Mongolia, and previously into China. The species lost 95% of its population in less than 10 years in the 1990s, due to illegal hunting for its horn (for export to China for use in Traditional Chinese Medicine) and meat (for local consumption). Since then, conservation efforts have led to a recovery of the species in some parts of its range, but it is still threatened by poaching, disease, and competition for grazing.</p> <p>In 2015, the species suffered the most dramatic disease-related mass mortality experienced by a mammal: 88% of the population in central Kazakhstan died in two weeks, which represented 62% of the global population of the species. Following this, Milner-Gulland joined an international, multidisciplinary team to carry out an emergency investigation of the causes including post-mortems in the field and laboratory analysis to test hypotheses about the causative factors, literature reviews and modelling [1]. Milner-Gulland led the evidence review, statistical components and writing the paper. Their conclusion was that the disease was caused</p>		

by opportunistic infection by the bacterium *Pasteurella multocida* linked to abnormally warm and wet weather [1]. The team's subsequent analysis of the wider context of mass mortalities among ungulates [2] showed that saigas are uniquely prone to mortality events that kill a very large proportion of a population, from transmissible disease and harsh weather conditions. This suggests that saigas require management that maintains them in extensive rangelands at high abundance, to buffer them against these inevitable population shocks, and strong conservation efforts across multiple populations to buffer the species as a whole against future shocks.

In 2016 Milner-Gulland co-authored a study of the prevalence of saiga horn consumption in Singapore [3], with collaborators in Malaysia and California. Following on from this, in 2017 she led a team to carry out the most extensive research to date on saiga horn consumers [4]. This work was also conducted in Singapore, as the country is highlighted by data submitted by countries to the UN Convention on International Trade in Endangered Species of flora and fauna (CITES) as a top consumer and trading country for saiga products, and within the country saiga products are widely and legally available. A very high prevalence of saiga horn consumption was found: for example, 19% of respondents cited saiga horn as their most-used treatment for fever-like symptoms [4]. Middle-aged women were the largest group to buy saiga horn for other people as well as for themselves. There were also widespread misunderstandings about the saiga's conservation status among saiga horn consumers.

Based on this consumer research, from 2017 to 2020 the Oxford team developed, implemented, and evaluated an evidence-based behaviour change intervention at the country-level to target saiga horn consumers in Singapore [5]. This intervention serves as one of the most robust interventions to date targeting wildlife trade consumers. Further, it enabled measurement of the impact on the target audience, including pledging to stop using saiga horn and encouraging others to stop. The intervention was carried out using innovative techniques including targeted online advertisements and repeated exposure to news coverage – approaches that are themselves of great interest to governments and NGOs who practice social marketing as a way of influencing the behaviour of the general public.

3. References to the research (Oxford researchers in bold; students in italics)

1. Kock R, Orynbayev M, **Robinson S**, Zuther S, Singh N, Beauvais W, Morgan ER, Kerimbayev A, Khomenko S, Martineau H, Rystaeva R, Omarova Z, Wolfs S, Hawotte F, Radoux J, **Milner-Gulland EJ**. (2018). Saigas on the brink: multi-disciplinary analysis of the factors influencing a mass die-off event. *Science Advances* **4**, eaao2314. DOI: [10.1126/sciadv.aao2314](https://doi.org/10.1126/sciadv.aao2314)
2. **Robinson S**, **Milner-Gulland EJ**, Grachev Y, Zuther S, Orynbayev M, Lushchekina AA, Morgan E, Beauvais W, Singh N, Khomenko S, Cammack R, Kock R (2019). Opportunistic bacteria and mass mortality in ungulates: Lessons from an extreme event. *Ecosphere* 10(6), e02671. DOI: [10.1002/ecs2.2671](https://doi.org/10.1002/ecs2.2671)
3. Theng M, Glikman J, **Milner-Gulland EJ** (2018). Exploring saiga horn consumption in Singapore. *Oryx* **52**, 736-743 DOI: [10.1017/S0030605317001624](https://doi.org/10.1017/S0030605317001624)
4. *Doughty H*, **Verissimo D**, Tan R, Lee J, Carrasco R, Oliver K, **Milner-Gulland EJ** (2019). Saiga horn user characteristics, motivations, and purchasing behaviour in Singapore. *PLoS One* **14**(9), e0222038 DOI: [10.1371/journal.pone.0222038](https://doi.org/10.1371/journal.pone.0222038)
5. *Doughty H*, **Wright J**, **Verissimo D**, Lee J, Oliver K, **Milner-Gulland EJ** (2020). Strategic advertising of online news articles as an intervention to influence wildlife product consumers. *Conservation Science and Practice* **2**(10), e272. DOI: [10.1111/csp2.272](https://doi.org/10.1111/csp2.272)

Funding for this research included a NERC Urgency research grant led by R Kock (PI) at the Royal Veterinary College with EJ Milner-Gulland and ER Morgan (Queen's University Belfast) as Co-Investigators (NE/N007646/1, July 2015 – June 2016).

4. Details of the impact

Informing national conservation action to protect Saiga populations

The research on saiga mass mortality [1, 2] led to the development of Standard Operating Procedures for disease surveillance of wild ungulates in Kazakhstan, adapting Food and Agriculture Organisation best practice [A]. These protocols were funded by the Convention on Migratory Species (CMS) and supported by the NGO the Saiga Conservation Alliance, which Milner-Gulland had co-founded in 2006 and continues to serve as Chair and Trustee. The protocols were adopted by the Government of Kazakhstan for use in their ongoing monitoring of saiga populations and their allocation by 2020 of approximately GBP3,400,000 annually for disease surveillance, saiga conservation and anti-poaching activities for saigas [C(i)]. Since 2015, Kazakhstan's saiga population has more than tripled in size (from 100,000 to over 228,000 in 2018 [B(ii)] and over 300,000 individuals in 2019) as a result of conservation action and recovery from the 2015 mass mortality [C(i),(ii)].

The research also informed Government and NGO responses to a subsequent mass-mortality episode in Mongolia (2017-18). The Mongolian population has been hit by a viral pathogen and therefore decreased in size from around 12,000 individuals in 2016 to around 3,800 in 2019 [D(i)], but new actions were implemented (including improved control of smuggling of horn to China) that contributed to an increase in saiga population to 8,500 in 2020 [D(ii)]. The Russian population has remained stable at around 7,000 individuals, due to investment in anti-poaching (e.g. ranger teams) and protected areas [C(iii)]. GBP101,111 of this investment came from a 34% increase in fundraising by the Saiga Conservation Alliance (SCA) in 2015/16. SCA describe the research [1,2] as informing their campaigns for donor funding and enabling them to attract funding from zoos for the first time [E].

Impacts on international conservation agreements and policy

The collaborative research [1] underpinned the 2018 re-assessment of the saiga's status on the IUCN Red List [F(i)] and is cited therein. The status remained as Critically Endangered only because in order to ensure the recovery is sustained, there is a five-year lag built in between a species being eligible to move to a lower threat status, and actually moving down (in this case, to Endangered status). The Co-Chair of the IUCN/SSN Antelope Specialist Group stated that it is “particularly important that the underlying science is robust” and further explained that, *“the research carried out by Professor Milner-Gulland and colleagues concerning the mass mortality of saiga antelopes in Kazakhstan in 2015 ... greatly improved our understanding of mass mortality events, the role of disease in saiga population dynamics, and therefore the extent of the threat which disease is likely to pose to saigas in the future. This was an important consideration in the assessment process.”* [F(ii)]

The saiga antelope is one of the few species for which a UN Convention – in this case jointly the Convention on Migratory Species (CMS) and Convention on International Trade in Endangered Species (CITES) – has an internationally agreed Memorandum of Understanding (MOU) with an action plan and Medium-Term International Work Programme, agreed and ratified by governments, who commit to carrying out its priority actions. The Work Programme is revised every 5 years. Milner-Gulland is Technical Advisor to the CMS, drafting the Work Programme and evaluating both the status of the species and progress towards fulfilling the Work Programme [G]. The Head of the CMS Terrestrial Species Team emphasises the role of the Saiga Conservation Alliance (SCA) as *“the official coordinator of, and technical advisor to, the Saiga MOU”* and confirmed that the SCA prepares documentation for the CMS, including the overview reports before each meeting of the Signatories” [G]. In particular they confirm that, *“Each of these outputs is founded on Professor Milner-Gulland's scientific research expertise, as she leads on the preparation of these documents, which then inform international conservation policy and the prioritization of actions by the Signatory States, donors and NGOs.”* [G]

Accordingly, in April 2019 Milner-Gulland was the scientist in the organising team for a meeting of government and civil society representatives convened by CMS, CITES and the German government. This meeting revised the 2016-2020 work programme to a new draft programme for 2021-2025 [B(i),(iii)], for ratification in 2021 at a meeting of the Parties to the saiga MOU. The

underpinning research outputs 1-5 informed the drafting of specific actions under the '3.0 Sustainable Use and Trade' and '10.0 Health and Disease' headings [B(iii),G]. This Work Programme provides the framework which structures and guides all conservation action, policy and fund-raising for this species, by governments, NGOs (local and international) and international bodies.

As an action prescribed in this new Work Programme [B(iii), item 3.10], Milner-Gulland was co-author of a report, "The Sustainable Use of Saiga Antelopes" in Dec 2020 [H], which cites [1,4]. This report is described by CMS as one of the routes to "*inform international conservation policy and the prioritization of actions by the Signatory States, donors and NGOs*" [G]. It was commissioned to inform the 4th Meeting of the Signatories to the saiga MOU (scheduled 2021).

Removal of international trade quota in saiga products

The Oxford team's research [1,2,3] was also instrumental in the major decision of the 2019 CITES 18th Conference of the Parties in August 2019, to change the status of the saiga in international law: a zero quota was applied on trade in the species' products, so that there could no longer be any legal international commercial trade in saiga products [I(i)]. CITES described in a letter [I(ii)] that the influencing factors were not only "*the extent and causes of the mass mortality episode in Kazakhstan*" [1] but also "*the high prevalence of ongoing consumption of saiga products in Singapore, highlighting that the demand for saiga products regulated under CITES is ongoing and substantial (based on research carried out by the University of Oxford)*", acknowledging [3]. Similarly, CMS stated that both strands of the research influenced the decision-making process of national governments [G] at this meeting, and the Academy of Sciences in Uzbekistan described that "*the research of the Oxford team on disease and saiga product use directly informed the position taken by the Government of Uzbekistan*" when their Delegation approved the proposal for a zero quota [J].

Changing consumer behaviour in Singapore

The Singapore-based behaviour change intervention [4,5] was spread through a variety of English-language and Chinese-language news outlets in Singapore including the *Straits Times* (the premier English-language newspaper) [Ki], *The Mothership* (a popular English-language news outlet among younger generations) [Kii], and *Lion City News* (a popular Chinese-language outlet) [Kiii]. These news articles were strategically promoted using targeted advertisements via Facebook (in collaboration with the Saiga Conservation Alliance), Google, and Outbrain (a seller of adverts on third-party websites). Across the three advertising platforms the adverts were shown almost 5,000,000 times [5]. Both Facebook and Google adverts out-performed the expected average reach for similar adverts on these platforms. The research found that 63% of publicly-viewable Facebook user-created content in response to the adverts (e.g. comments, shares with added text) were identifiably pro-conservation (e.g. shock about the message and declaring an intention not to use saiga horn products again). In contrast, only 13% were identifiably negative towards the intervention adverts. The team's follow-up evaluation [L] found that the target audience was significantly more likely than non-target audience individuals to state that their saiga horn usage had decreased following the intervention (4% compared to 1%), and to cite the intervention as their reason for changing behaviour. The work also indicated a significant decrease across the population in misunderstandings about the saiga's conservation status, from 28% of the total sample believing they were common in the wild down to 21% [L].

Media coverage and global awareness of saigas

Together these research efforts have caught the imagination of the general public world-wide, with substantial coverage in print, online, TV and on radio. The research on saiga disease was very widely featured in the media [M] and as a result of this raised profile, film-makers have travelled to film saigas [Ci,E,J], from the documentary 'Ustyurt Saigas. The right to live', which was awarded the diploma of the Eurasian Academy of Television and Radio [J], to the BBC featuring saigas on 'Planet Earth II' (Episode 5: Grasslands, 2016) and 'Nature's Weirdest Events' (2018) [E]. Both in-country conservation NGOs and Governmental Protected Areas within the saiga range have received substantial additional funding for their conservation work from the public worldwide [C,E,J], not only for direct action but also enabling public engagement including 6 steppe 'wildlife clubs' in Uzbekistan for up to 3,000 children and adults annually [J].

5. Sources to corroborate the impact

- A. Convention on Migratory Species disease protocols, available in English and Russian .
<https://www.cms.int/en/publication/standard-operating-procedures-detecting-and-reacting-incidents-health-risks-and-die-offs>
- B. Accounts of the joint CMS-CITES meeting on revising the Action Plan under the saiga MOU, April 2019: (i) Overview of the meeting and document list.
<https://www.cms.int/saiga/en/meeting/joint-cms-cites-technical-workshop-under-mou-concerning-conservation-restoration-and>
(ii) Communique summarising outcomes of the meeting
(iii) Draft Medium Term International Work Programme of the MOU on saiga conservation and restoration, under the Convention on Migratory Species, 2021-2025.
https://www.cms.int/saiga/sites/default/files/document/draft_saiga-mtiwp_2021-2025_en.pdf
- C. Letters from conservation organisations corroborating the role of the University of Oxford research: (i) the Association for the Conservation of Biodiversity in Kazakhstan (ACBK), for informing their policies and attracting funding and film-makers, (ii) the Wildlife Conservation Network, in attracting donations for saigas from the American public; (iii) the Director of the Stepnoi Nature Reserve, Russia, in generating interest amongst film-makers in visiting the reserve and in generating donations via the SCA.
- D. (i) Journal article: Pruvot M et al (2020). Outbreak of Peste des Petits Ruminants among Critically Endangered Mongolian Saiga and Other Wild Ungulates, Mongolia, 2016–2017. *Emerging Infectious Diseases*, 26(1), 51-62. DOI: [10.3201/eid2601.181998](https://doi.org/10.3201/eid2601.181998).
(ii) Xinhua news, 1/2/2020, 'Mongolia's Saiga antelopes population increases to 8,500'.
- E. Letter from the Project Manager, Saiga Conservation Alliance (NGO), detailing the social, fund-raising, and news media reach of the research on saiga disease.
- F. (i) 2018 assessment on the IUCN Red List: <https://www.iucnredlist.org/species/19832/50194357#assessment-information> (ii) Letter from Co-Chair, IUCN Species Survival Commissions' Antelope Specialist Group, confirming involvement in the 2018 Red List assessment and technical support for international policy processes
- G. Letter from Head of the Terrestrial Species Team, Convention on Migratory Species confirming Milner-Gulland's role as a technical advisor and for action planning under the CMS MOU on saiga conservation.
- H. Saiga Conservation Alliance, 'The Sustainable Use of Saiga Antelopes: Perspectives and Prospects', Report to the Bundesamt für Naturschutz and the UN Convention on Migratory Species, 15 Dec 2020, UNEP/CMS/Saiga/MOS4/Inf.20.
- I. (i) CITES meeting report: <http://enb.iisd.org/download/pdf/enb21101e.pdf> (page 21-22);
(ii) Letter from CITES Chief Scientist confirming Oxford's role in informing CITES decisions about international trade and disease surveillance protocols.
- J. Letter from the Head of the Laboratory of Endangered Species, Academy of Sciences of Uzbekistan, also technical advisor to the State Committee of Ecology and Environment Protection, stating the role of the research in underpinning saiga conservation in Uzbekistan.
- K. Examples of news articles in Singapore, raising awareness of the impacts of consumer consumption of saiga products: (i) Straits Times 26-2-2019, (ii) Mothership, 6-3-2019, (iii) Lion City News 26-2-2019.
- L. Journal article measuring the impact of the intervention in Singapore: Doughty H et al, Evaluating a Large-Scale Online Behaviour Change Intervention on Wildlife Consumers in Singapore. *PLoS One* 16(3): e0248144. DOI: [10.1371/journal.pone.0248144](https://doi.org/10.1371/journal.pone.0248144)
- M. Examples of press coverage: (i) The Conversation 4-12-2016, picked up by e.g. (ii) RIA [Russian media] 11-12-2016 and (iii) Newsweek, 6-12-2016; (iv) The New York Times 17-1-2018, (v) The Atlantic 17-1-2018, and (vi) The Ecologist 18-1-2018, all reporting [1]; (vii) the Daily Mail 4-9-2015; (viii) CNN 15-4-2016.