Institution: Imperial College London

Unit of Assessment: 5 Biological Sciences

Title of case study: 9 - Conservation of the Critically Endangered saiga antelope (*Saiga tatarica)*

1. Summary of the impact (indicative maximum 100 words)

Research at Imperial College led to the saiga antelope being included in the World Conservation Union's Red List at the highest level, Critically Endangered (2001). Imperial research underpinned the Medium Term International Work Programme (MTIWP) for the species under the Convention on Migratory Species (CMS, 2006, 2010). It led to the formation of the Saiga Conservation Alliance (UK registered charity since 2010), and supported conservation interventions carried out in the five range states, including public education, alternative livelihoods, improved law enforcement, better scientific monitoring by governments and NGOs, and improved capacity of in-country scientists. Recipients range from Government ministers to local communities. The global saiga population increased by almost 190% between 2006 and 2012 as a result of these conservation efforts [section 5, source F]. The conservation processes set in place as a result of Imperial research are now seen as a model of best practice within the CMS.

2. Underpinning research (indicative maximum 500 words)

Research on saiga antelopes at Imperial College started in 1990 and is still ongoing. All research was led by Professor E.J. Milner-Gulland (EJMG), who is a full time member of Imperial academic staff since 1999. The work was carried out by her and members of her research group, in collaboration with in-country partners (see grants [G1 – G4] below for details). At the beginning, the species was very poorly known, with virtually no research published in the English language; the research by EJMG's team was ground-breaking in investigating the ecology, life history and conservation status of the species, covering a range of areas including the species' genetics, distribution, mating system, individual growth and aging, and population monitoring methods. Particularly relevant findings for impact (rather than pure research) are: Milner-Gulland et al. (2001, [1]) presented data on population trends following the break-up of the Soviet Union, leading to the listing of the species as Critically Endangered on the IUCN red list. Milner-Gulland et al. (2003, [2]) demonstrated the effects of male-biassed harvesting on fecundity and behaviour of females; an effect seen in very few other species. McConville et al. (2008, [3]) used modelling to highlight the important role of group size in determining the biases in population monitoring data, while Kuhl et al. (2009]) in Animal Conservation demonstrated the potential of calf counts as a tool for monitoring the productivity of saiga populations. Since 2009, Imperial's research has shifted towards understanding the effects of human impacts on saigas, and the drivers of poaching behaviour, with the aim of underpinning conservation interventions. For example, Kuhl et al. (2009, [4]) characterised poaching households in three countries, showing that they are significantly more likely than their neighbours to be poor, unemployed and own a motorbike. Singh et al. (2010) demonstrated that saigas are now calving further away from human disturbance, in more fragmented groups and (possibly due to climate change) further north than 40 years ago. Singh & Milner-Gulland (2011, [5]) used this information to analyse the likely robustness of the current and planned Protected Area network in central Kazakhstan for protecting saigas in the light of plausible scenarios of climate change and human disturbance. Two recent papers evaluate the effectiveness of a conservation intervention in Russia, in order to provide direct guidance on how best to reduce poaching; Howe et al. (2011) demonstrate that intensive engagement including providing alternative livelihoods led to higher intention to conserve than traditional conservation based solely on law enforcement, while Howe et al. (2012, [6]) showed that a public engagement campaign through the media had improved the general public's knowledge of saiga ecology and conservation as well as their attitudes towards the species and its conservation.

Key researchers:

EJMG, Professor of Conservation Science, at Imperial 01/10/88-30/09/91 and 01/01/99 - present
Tim Coulson, Professor of Population Biology, at Imperial 01/01/04 - 31/12/12
Navinder Singh, Post-doctoral researcher, at Imperial 01/09/08-30/9/11
Aline Kuhl, PhD student, at Imperial 01/10/02 – 31/12/07
Caroline Howe, PhD student, at Imperial 01/10/06 – 31/08/12

Andrew McConville, MSc student, at Imperial 01/10/06 – 30/09/07

3. References to the research (* References that best indicate quality of underpinning research)

[1] *Milner-Gulland, E.J., Kholodova, M.V., Bekenov, A.B., Bukreeva, O.M., Grachev, Iu.A., Amgalan, L., Lushchekina, A.A., "Dramatic declines in saiga antelope populations", Oryx, 35, 340-345 (2001). DOI, **Times cited: 40 (WoS as at 13/11/12)**

[2] *Milner-Gulland, E.J., Bukreeva, O.M., Coulson, T.N., Lushchekina, A.A., Kholodova, M.V., Bekenov, A.B., Grachev, Iu.A., "Conservation: Reproductive collapse in saiga antelope harems", Nature, 422, 135 (2003). DOI, **Times cited: 85 (WoS as at 13/11/12)**

[3] McConville, A.J., Grachev, Iu.A., Keane, A., Coulson, T., Bekenov, A., Milner-Gulland, E.J., "Reconstructing the observation process to correct for changing detection probability of a critically endangered species". Endangered Species Research, 6, 231-237 (2009). DOI, **Times cited: 1 (WoS as at 13/11/12)**

[4] Kuhl, A., Balinova, N., Bykova, E., Esipov, A., Arylov, Y.N., Lushchekina, A.A., Milner-Gulland, E.J., "The role of saiga poaching in rural communities: Linkages between attitudes, socio-economic circumstances and behaviour". Biological Conservation, 142, 1442-1449 (2009). DOI, **Times cited: 9 (WoS as at 13/11/12)**

[5] *Singh, N., Milner-Gulland, E.J., "Conserving a moving target: Planning protection for a migratory species as its distribution changes". Journal of Applied Ecology, 48, 35-46 (2011). DOI, **Times cited: 10 (WoS as at 13/11/12)**

[6] Howe, C., Obgenova, O., Milner-Gulland, E.J., "Evaluating the effectiveness of a public awareness campaign as a conservation intervention: the saiga antelope Saiga tatarica in Kalmykia, Russia", Oryx, 46, 269-277 (2012). DOI, **Times cited: 5 (WoS as at 23/5/13)**

Grants to Imperial for this research (all with EJMG as PI unless otherwise stated):

[G1] Three DEFRA Darwin Initiative Grants for saiga antelope research in the period 4/03-4/13, totalling £104,493, PI, with: Institute of Ecology & Evolution (Russia), Centre for Ecological Projects (Russia), Institute of Zoology (Kazakhstan) and FFI.

[G2] INTAS (European Community), "Reproductive ecology of the Critically Endangered saiga antelope". PI, with: Institutes of Zoology Kazakhstan and Uzbekistan, Institute of Ecology & Evolution Russia, University of Oslo, Centre for Study & Conservation of Wild Animals Russia, Kazakhstan National Agricultural University (£21,801, 1/3/04-29/2/07)

[G3] UNEP, Convention on Migratory Species "Support for Saiga News and the Development and Maintenance of a Saiga Projects Database to Support the Implementation of the Memorandum of Understanding concerning the Conservation, Restoration and Sustainable Use of the Saiga Antelope (Saiga tatarica tatarica)" (£12760, 1/7/07-31/8/09)

[G4] Royal Society - Wolfson Research Merit Award "Scaling up human and animal decision-making for effective conservation action", (£98,830, 1/4/08-31/3/13).

4. Details of the impact (indicative maximum 750 words)

In the late 1990s-early 2000s, the saiga population declined by 95%, due to poaching for meat and horns following the break-up of the Soviet Union. EJMG was already carrying out research on the ecology of the species, and so her research team was the first to document the threat in the international peer-reviewed scientific literature. This provided the evidence underpinning responses by international conservation bodies, including (i) inclusion of the species (in 2001) on the IUCN Red List of threatened species directly into the highest category of threat, Critically Endangered [A], (ii) its listing on Appendix 2 of the UN Convention on the Conservation of Migratory Species of Wild Animals (CMS, 2002) [B] and (iii) a Significant Trade Review by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (2004) [C]. This international response was crucial in catalysing investment in conservation both by large international NGOs and by in-country governments (N.B. the saiga remains on the current versions of these conservation lists).

Research by Imperial and collaborators then provided the underpinning evidence for guiding action on the species by international organisations. This included an understanding of the characteristics of poachers and the widespread and consistent nature of the drivers of poaching, documentation of the damaging effects of highly male-biased poaching on population dynamics, and evidence that public engagement activities leads to improved attitudes towards the saiga antelope [e.g. D, E, F].

This research has directly driven the priorities and conservation activities of the UK-registered charity the Saiga Conservation Alliance (SCA) [G], which was formed in 2006 from a network of in-country and international researchers who had met during collaborative research projects led by Imperial College, and registered as a UK charity in 2010. The SCA is now officially responsible for monitoring and coordination of a Memorandum of Understanding (MOU) on saiga conservation under the UN CMS and is therefore highly influential both internationally and on the ground. In addition to its conservation work, the SCA produces the bi-annual newsletter Saiga News [H] which is the main dissemination vehicle for in-country stakeholders, set up by E.J. Milner-Gullland and collaborators. This gives information on research outputs in 6 different languages and is widely read by policy-makers at all levels (international and national) and by the general public in the range states. Imperial research is regularly featured in this newsletter, including research by Imperial students. In 2008, Saiga News won 'Best Environmental Publication' at the 7th national contest for Environmental Journalism in Uzbekistan. Members of the panel noted that "*Saiga News has united every saiga range country, as well as the international community, in concentrating their efforts on saiga conservation*" [I].

The CMS MOU on saiga conservation came into force in 2006 at the first meeting of the signatories to the MOU (Kazakhstan, Mongolia, Russia, Turkmenistan, Uzbekistan). This meeting was supported by Imperial College, as EJMG drafted the Medium Term International Work Programme (MTIWP) for the MOU, and co-chaired the technical meeting amending it prior to adoption by the Parties to the MOU. The second meeting of the Parties was held in 2010, and Imperial was contracted by the CMS to monitor and provide background documentation on the progress made towards the fulfilment of the MTIWP [J]. EJMG also "*drafted a revised MTIWP for 2011-2015, chaired the technical meeting discussing these documents, and led the associated discussions at the formal meeting of the Signatories*" [J]. The *"impact of this activity is that range state governments, as signatories to the MOU, are bound under their UN obligations to work to fulfil the priority actions laid out in the MTIWP*" [J]. As an example of Imperial's impact, Imperial research contributed to highlighting the inadequacy of current monitoring procedures and led to a push to improve understanding of saiga distributions and numbers, with Imperial College researcher input in Russia, Kazakhstan and Uzbekistan. The impact of Imperial's contribution to the MOU and MTIWP is confirmed by the IUCN/SSC who credit Imperial's "*invaluable contribution*" to the "*knowledge and understanding of saiga biology and ecology, the socio-economic context in saiga range, attitudes to poaching and the potential response by saiga to climate change"* [F]. They also confirm that the impact of Imperial's participatory monitoring techniques describing the methodologies as "*pioneering*" [F] and state that "*Many aspects of [the] research were used as the basis for the Medium Term International Work Programme and to inform specific actions within it and subsequent revisions*" [F].

Through engagement with world conservation organisations and the SCA, the impact of Imperial's research has therefore contributed to:

a) Improved status of the saiga antelope, a critically endangered species and a flagship of the Central Asian region. The "*Red Listing and CMS MOU have influenced national policy and spending on saiga conservation by range state governments has increased, in some cases dramatically*. *Saiga numbers have responded to these conservation efforts and the population is estimated to have increased by almost 190% between 2006 and 2012*" [F]. Improved protection of this species' habitat benefits the entire steppe ecosystem, because of its wide-ranging nature and need for large areas of natural habitat.

b) Improved recognition of the educational and livelihood needs of local people within the saiga range in 3 countries and improved access to environmental education for children in villages in these regions [e.g. E]. The SCA confirms the impact of the educational activities stating that "*people (children and adults) who attended educational activities had significantly better knowledge about saiga antelopes and their conservation*" and, for example, the *"SCA's engagement with local communities and government, and the trust they built between them have been crucial for the success of saiga conservation work in Uzbekistan*" [D]. From 2008, encouragement by EJMG led to farmers being hired as "*observers*" and involved in "*saiga monitoring*", during which time "*local famers became friendlier to saiga*" [E]. The saiga is a cultural flagship species for the steppe, so engaging local people with saiga conservation also

changes their general attitudes to nature conservation more broadly.

c) Improved conservation planning at the international and national levels, as evidenced by the CMS process, and including national legislative changes documented in Saiga News [H]. As one example, following recommendations and scientific advice from Imperial College researchers and colleagues (including [3]), Kazakhstan and Mongolia have both dramatically improved their aerial survey techniques to produce relatively unbiased population estimates with confidence intervals; in 2010 in Mongolia [H, issue 10, p18 & issue 13, p10], and from 2008 onwards in Kazakhstan [H, issue 8, p5 & issue 9, p2]. As another example, the government of Kazakhstan in 2012 designated 490,000 ha steppe as a protected area with saiga conservation in mind, but benefitting a wide range of species [K].

d) A raised profile of the saiga antelope and of conservation issues in Central Asia more generally (historically a neglected and poorly known region) in the international and local media, including TV documentaries, magazine articles and interviews etc [L].

e) Improved capacity of in-country scientists through collaborative research with Imperial, as evidenced by articles in Saiga News and elsewhere [H, e.g. issue 15, p16]. There are 12 separate instances of collaborative research by Imperial College and in-country partners (e.g. Institutes of Zoology of Kazakhstan and Uzbekistan, Kalmykia State University) given in the CMS's official overview report of progress towards fulfilment of the MOU on saiga conservation in the period 2006-2010 [M]. This has knock-on benefits for science and conservation more generally, with people who have worked with Imperial researchers going on to posts as laboratory directors, university faculty members and directors of NGOs.

Additionally, the impact of the work of EJMG's group has been extended as a model of good practice in conservation. The "*Saiga MOU and the groundbreaking work of E.J. Milner-Gulland and SCA in facilitating the technical coordination of the MOU is frequently cited as a success story both within the CMS Family and to the wider public. In many ways, the work under the Saiga MOU is pioneering a stakeholder-led approach to coordination, which is seen as a model and useful best-practice example for the development of effective coordination, monitoring and implementation of other species instruments under CMS as well*" [J]. Based on this assessment, the CMS has in 2013 contracted Imperial researchers to develop a guidance manual for other MOUs under the convention, to share best practice and lessons learnt on stakeholder engagement with MOU coordination.

5. Sources to corroborate the impact (indicative maximum of 10 references)

[A] IUCN Red List assessment of the species: http://www.iucnredlist.org/apps/redlist/details/19832/0 (archived at here 23/5/13)

[B] Appendices I and II of the CMS, effective 23rd February 2012 (archived here)

[C] CITES Review of Significant Trade, Jan 2004 (archived here), 2012 (archived here)

[D] Letter from Executive Secretary, Saiga Conservation Alliance (available from Imperial on request)

[E] Letter from Executive Secretary, Russian Committee for the UNESCO Program on Man and the Biosphere, 16/4/13 (available from Imperial on request)

[F] Letter from Co-Chair, IUCN/Species Survival Commission Antelope Specialist Group, 8/5/13 (available from Imperial on request)

[G] Web page of the Saiga Conservation Alliance (SCA), http://www.saiga-conservation.com/home.html (archived at here on 23/5/13)

[H] SCA page containing links to Saiga News, http://www.saiga-conservation.com/saiga_news.html (archived at here on 29/5/13)

[I] Saiga News award, http://www.saiga-conservation.com/news_article/items/saiga-news-award.html (archived at here on 29/5/13)

[J] Letter from Deputy Executive Secretary, UNEP/CMS, 13/5/13 (available on request)

[K] 'Steppe Conservation and Management: Kazakhstan', GEF Agency: United Nations Development Programme, Mid-term Evaluation, 11/6/12 (archived here)

[L] Saiga Antelope press coverage: Radio Free Europe 23/5/12, 22/05/12, RIA Novosti 7/8/09, Daily Express 31/5/10, Mongabay.com 20/9/09, BBC News 28/5/10, Scientific American 1/6/11.

[M] Report on 'Progress towards the fulfilment of the CMS medium term international work programme for the Saiga Antelope for the period Oct 2006 – Sept 2010', prepared by EJMG under contract to CMS, 8/9/10 (archived here).