

## Impact case study (REF3)

<b>Institution:</b> University of Lincoln		
<b>Unit of Assessment:</b> 4 – Psychology, Psychiatry and Neuroscience		
<b>Title of case study:</b> The Barbary Macaque Project: Applying Psychology to Animal Conservation		
<b>Period when the underpinning research was undertaken:</b> 2008 - 2020		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
MAJOLO Bonaventura MARECHAL Laëtitia	Associate Professor Senior Lecturer	1 Sep 05 to date 2 Mar 15 to date
<b>Period when the claimed impact occurred:</b> 1 Aug 13 to 31 Jul 20		
<b>Is this case study continued from a case study submitted in 2014?</b> N		
<p><b>1. Summary of the impact</b> (indicative maximum 100 words) Social and evolutionary psychology research undertaken at the University of Lincoln on the social behaviour of Barbary macaques and human-animal relationships led to the development of actions to protect this endangered species. Through empirical research on macaques in their natural environment, University of Lincoln researchers identified key aspects of macaque welfare and the effects of human activity on their environment, leading to significant changes in international practice. These include: (1) change in international trade laws, national and increased international protection status of the Barbary macaque; (2) development and implementation of Conservation Action Plans by the Algerian and Moroccan Governments; and (3) implementation of new wildlife tourism guidelines for sustainable wildlife tourism (now used by TripAdvisor and Kuoni).</p>		
<p><b>2. Underpinning research</b> (indicative maximum 500 words) Barbary Macaques are an endangered species with only 8-10,000 estimated monkeys to still live in the mountains of Morocco and Algeria (<a href="http://www.barbarymacaque.org/barbary-macaque/%20the-species/">http://www.barbarymacaque.org/barbary-macaque/%20the-species/</a>). The University of Lincoln's (UoL) Barbary Macaque Project was established in 2008 as the only long-term project to support conservation efforts in the Atlas Mountains of Morocco, by investigating the social behaviour of this monkey living under challenging environmental conditions. This research programme answers fundamental questions in social and evolutionary psychology, including the importance of sociality and personality for health, wellbeing and stress, cooperation and altruism, competition and warfare, and in conservation psychology, such as human-macaque interaction and welfare (<a href="http://barbarymacaque.blogs.lincoln.ac.uk">http://barbarymacaque.blogs.lincoln.ac.uk</a>). This interdisciplinary, inter-agency programme is led by UoL, and to date has produced 56 peer reviewed articles in internationally renowned journals (all authored by UoL).</p> <p>This pioneering research into macaque social behaviour was the first to highlight the importance of macaque social bonds to survive extreme winters [3.1], as well as to reduce the negative effects of stress (confirming the “social buffer hypothesis”) [3.2]. UoL research was also the first to demonstrate that the social style of the group (i.e. egalitarian or despotic) affects macaque personality dimensions [3.3]. This suite of original research has provided critical evidence for psychological understanding of the importance of cooperation, social bonds and behavioural resilience for enhancing survival, health, and the capacity to effectively cope with challenging environmental conditions.</p> <p>UoL's research has particularly highlighted the significant implications of macaque psychology, human (tourist) psychology and the interaction of the two on growing negative effects on this endangered species. Through collaboration between Majolo and Maréchal, the Project has also extended into conservation psychology and specifically on how wildlife tourism affects animal welfare and human-macaque communication [3.4, 3.5, 3.6]. Through field research in a</p>		

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Moroccan National Park with a considerable volume of tourists, who frequently feed the monkeys, UoL research was the first to show that interacting with tourists has negative impacts on macaque social bonds, increasing aggression between macaques and reducing pro-social behaviour [3.4]. These interactions with tourists also negatively affected macaques' anxiety and stress levels [3.5], raising serious concerns for the role of tourists on the survival of this endangered species.

Tourist-macaque interactions can also pose a danger to tourists themselves, with monkey bites the second most common animal bite risk to travellers after dog bites (World Health Organisation, 2018). UoL-led research to understand such macaque aggression indicated that the risk of bites/scratches may be exacerbated by the misreading of macaque emotions by tourists. Human participants who had never or rarely encounter macaques were poor at discriminating between friendly, distressed and aggressive macaque facial expressions [3.6]. This study recommended interventions to improve tourist safety by enhancing their knowledge via guided visits to wildlife sites [3.6].

From the outset, this Project has required the researchers to establish close, ongoing working relationships with the Moroccan and Algerian authorities and international conservation organisations. These partnerships, together with research findings on macaque social bonds, human-macaque interaction and wildlife tourism, became the basis for the development of conservation measures and managed wildlife tourism initiatives to save the Barbary macaque from extinction.

### 3. References to the research (indicative maximum of six references)

- 3.1 McFarland, R. and Majolo, B. (2013) Coping with the cold: predictors of survival in wild Barbary macaques, *Macaca sylvanus*. *Biology Letters*, 9 (4). ISSN 1744-9561.  
<http://dx.doi.org/10.1098/rsbl.2013.0428>
- 3.2 Young, C., Majolo, B., Heistermann, M., Schülke, O. and Ostner, J. (2015) Responses to social and environmental stress are attenuated by strong male bonds in wild macaques. *Proceedings of the National Academy of Sciences*. ISSN 1411450111.  
<http://dx.doi.org/10.1073/pnas.1411450111>
- 3.3 Adams, M. J., Majolo, B., Ostner, J., Schülke, O., De Marco, A., Thierry, B., Engelhardt, A., Widdig, A., Gerald, M.S. & Weiss, A. (2015) Personality structure and social style in macaques. *Journal of Personality and Social Psychology*, 109(2): 338–353.  
<https://doi.org/10.1037/pspp0000041>
- 3.4 Maréchal, L., MacLarnon, A., Majolo, B., and Semple, S. (2016) Primates' behavioural responses to tourists: evidence for a trade-off between potential risks and benefits. *Scientific Reports*, 6.  
<http://dx.doi.org/10.1038/srep32465>
- 3.5 Maréchal, L., Semple, S., Majolo, B., Qarro, M., Heistermann, M., MacLarnon, A. (2011) Impacts of tourism on anxiety and physiological stress in wild male Barbary macaques. *Biological Conservation*, 144 (9): 2188-2193. ISSN 0006-3207.  
<http://dx.doi.org/10.1016/j.biocon.2011.05.010>
- 3.6 Maréchal, L., Levy, X., Meints, K., and Majolo, B. (2017) Experience-based human perception of facial expressions in Barbary macaques' (*Macaca sylvanus*): *PeerJ*, 5. e3413.  
<https://doi.org/10.7717/peerj.3413>

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

UoL research in social and evolutionary psychology has been pivotal in identifying causes of ecological stress on macaques, including stress occurring through human disturbance. This research has fed into multiple national and international strategies to improve macaque welfare

and protection, specifically leading to: (1) Change in international trade laws and policy, including a higher protection status for macaques; (2) Development and implementation of national conservation action plans and (3) New wildlife tourism guidelines used by international tourist companies .

**(1) Change in International Trade Laws and Policy for Higher Protection Status of the Barbary Macaque** [5.1, 5.2, 5.3, 5.4].

UoL research has informed changes to two key legislative documents:

- **Increased CITES Protection Status.** The Convention in International Trade in Endangered species of Wild Fauna and Flora (CITES) is one of the largest and oldest international agreements between 183 governments, aiming to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Findings from two UoL studies have been used as evidence to change the CITES protection status of the Barbary macaque from Appendix II (i.e. threatened species not currently at risk of extinction) to Appendix I (species at high risk of extinction) in 2016 [5.1]. This change means that Barbary macaques become a conservation priority for international organisations and that national guidelines to protect this species in native countries (i.e. Morocco and Algeria) are under stronger international scrutiny. As a result of CITES reclassification in 2016, the European legislation on wild fauna trade (which lays down the provisions for import, export and internal EU trade in specimens) was also upgraded in 2017 [5.2, 5.3]. The increased surveillance arising from these changes contributes to international strategies to reduce the illegal trade of endangered animals, which is the fourth most lucrative global crime (worth \$7-\$23 billion/year) after drugs, humans and guns traffic (source: World Economic Forum; <https://www.weforum.org/agenda/2016/09/fighting-illegal-wildlife-and-forest-trade/>).
- **Change in Red List of Threatened Species.** Majolo was invited by IUCN and the World Wildlife Fund (WWF) to become a member of the Barbary macaque special sub-panel for the Red List of Threatened Species. The Red List is the most important international document guiding conservation strategies and laws on wildlife. Four UoL studies, and a MSc project supervised by Majolo, were cited in the reassessment of the conservation status of the Barbary macaque in 2016 (published in June 2020). UoL outputs gave new data, filling a 30-year gap, which allowed IUCN to change the geographic distribution and population size of macaques in Algeria in comparison to the previous assessment of the species (in 2008) [5.4].

**(2) Development and implementation of new Conservation strategies by the Algerian and Moroccan Governments** [5.3, 5.5, 5.6].

- **New Algerian Action Plan and Government Funding.** The Algerian Conservation Plan (2018) [5.5] is the first of its kind in Algeria and sets the conservation strategy for the Barbary macaque for the next 10 years. It was produced in collaboration between UoL, the Algerian government and the International Union for the Conservation of Nature (IUCN). Majolo & Maréchal were invited by IUCN to take part in the preparation of the Action Plan, contributing both to the assessment of major threats to macaque conservation in Algeria, and to the design of evidence-based conservation guidelines. The final strategy document cites twelve Barbary Macaque Project research studies. Following the launch of this action plan, the Algerian government committed 3 million dinars (£18,000 equivalent) to reduce human-macaque conflicts and protect the species from extinction [5.6].
- **Implementation of Moroccan Action Plan.** UoL research on macaque social bonds has supported the successful reintroduction of confiscated poached macaques back to the wild within one of the study groups in 2015 [5.3], implementing the reintroduction guidelines set in the Moroccan Action Plan.

(3) **New Wildlife Tourism Guidelines used by International Tourism Companies** [5.3, 5.7, 5.8, 5.9].

- The Association of British Travel Agents (ABTA) produced new Wildlife Viewing guidelines in 2013, citing our 2011 research [3.5]. These are practical guides for travel businesses and suppliers of animal experiences, which aim to encourage good practice and eliminate the risks of human-macaque interactions as identified in our research. In 2017 two major international tourism companies – TripAdvisor and Kuoni - pledged to follow these guidelines. As a result of these guidelines and their uptake, these companies are now banned from sale hundreds of tours and experiences in which guests were encouraged to come into physical contact with wild or endangered animals [5.7].
- Based on her expertise on human-animal interactions, Maréchal has been invited to be a member of the IUCN SSC Primate Specialist Group Human-Primate Interactions Section, in 2018. This work is particularly important for the conservation of Barbary macaques to address issues related to human-animal interactions and illegal trade. For example, Barbary macaques are often used as photo prop in primate tourism and become viral on social media, which fuels the international illegal trade of this endangered species. By increasing awareness, the work from this IUCN group is changing the behaviour of professionals working with primates [5.3].
- Activities to change international guidance have been complemented by a suite of public awareness raising activities based on our research into human perception of animal emotions [3.6]. UoL developed an educational quiz reflecting key aspects of human-animal interaction, macaque emotions, and the effect of wildlife tourism [5.8]. This was run online by National Geographic Magazine and via other sites and completed by 57,000 people. In addition, Maréchal has led several successful face-to-face training events at the EU parliament in Brussels, Natural History Museum London and Skegness Aquarium Lincolnshire. These included interactive “hands-on” demonstrations of primate emotions using our developed education tool, and communication of the resulting recommended guidelines for better practice in wildlife tourism. During these training events, a total of 364 quizzes were completed, 616 members of the public from over 40 different nationalities took part (some took part as a group). 90.1% stated that they would intend to behave differently [5.9] should they encounter wild monkeys, now better understanding the difficulties of recognising primate emotions and the associated danger for both monkey and human.

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

- 5.1 Confirmation of transfer of the Barbary Macaque from Appendix II to Appendix I of the Convention on International Trade in Endangered Species (CITES).
- 5.2 Official Journal of the European L27\_Wildlife Trade.
- 5.3 Testimonial letter from Dr. Sian Waters, Vice Chairs, IUCN SSC Primate Specialist Group Section on Human Primate Interactions
- 5.4 Reassessment of IUCN Red List entry for the Barbary Macaques  
<https://www.iucnredlist.org/species/12561/50043570>  
 Including Support letter from Prof. Janette Wallis, convenor of the reassessment of the IUCN Red List entry for the Barbary macaque.
- 5.5 Conservation Action Plan for the Barbary Macaque in Algeria prepared by the IUCN (International Union for the Conservation of Nature). Including Testimonial letter from IUCN representative (Ms. Violeta Barrios, Director of the IUCN Centre for Mediterranean Cooperation) describing the importance of Majolo & Maréchal’s research for the preparation of the Algerian Conservation Action Plan.

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- 5.6 Article confirming commitment of government funds for the Algerian Action Plan (<http://web.archive.org/web/20190303075911/http://lecourrier-dalgerie.com/tizi-ouzou-creation-dun-comite-de-gestion-des-problemes-lies-au-singe-magot/>)
- 5.7 Confirmation TripAdvisor and KUONI changes wildlife tourism policy according to ABTA guidelines (<https://www.tripadvisor.co.uk/blog/search/animal+welfare+education+portal/>; <https://www.tripadvisor.com/blog/our-ongoing-commitment-to-animal-welfare/>)
- 5.8 National Geographic quiz on Barbary Macaque emotion <https://www.nationalgeographic.com/animals/article/barbary-macaque-facial-expressions-quiz>
- 5.9 Monkey face quiz data – Summary and excel file.