

<b>Institution:</b> University of Stirling
<b>Unit of Assessment:</b> C17 Geography, Environmental Studies and Archaeology
<b>Title of case study:</b> Management of the Bushmeat Industry in Gabon
<p><b>1. Summary of the impact:</b> Work by University of Stirling staff has contributed directly to improved wildlife resource management in the Central African region. Innovative research into the status and trends of key wildlife populations, ecological impacts, resource harvests and trade, drivers of resource use and assessing management success have contributed directly to new thinking on the issue, revisions of laws and policy and to success in attracting foreign aid for management issues. Stirling staff members now advise the Government of Gabon on resource management policies, National Park management and biodiversity issues.</p>
<p><b>2. Underpinning research:</b> The Stirling African Forest Ecology group led by Abernethy has carried out multidisciplinary research on bushmeat harvests and trade in Central Africa for over a decade. The research work, planned as a 10-15 year conservation science initiative (2000-2015); began with an original research phase, followed by assessment of the governance framework and capacity building needs, and led ultimately to official policy review and governance reform in both the region and donor countries, such as UK and US. In 2000 despite considerable global research documenting the direct effects of hunting on wildlife, there was little consensus on the drivers of hunting (economic, cultural or nutritional need), the extent of impacts on wildlife, or the sustainability of current practices, particularly in Central Africa. Francophone wildlife managers had little access to research questions or findings, international research results were not being translated into feasible long-term management options, and managers were left with few practical tools with which to understand or mitigate the snowballing impacts of hunting and trade. Dramatic wildlife declines were already destabilizing fragile rural food security and appropriate research was crucial to providing the right solutions. This research group has established a high quality scientific reputation in the region and has systematically addressed the research required for improved management of hunting through:</p> <p>a) innovative analyses of household dietary consumption, designed to elucidate the roles of wealth, nutrition and culture on resource use; b) comparative analyses of hunter offtakes and use of bushmeat in areas with differing wildlife depletion and market opportunity; c) continuous nationwide market trade monitoring over 6 years; and d) participation in various wildlife density surveys with numerous partners. Research was carried out nationwide in Gabon and produced a unique database, non-existent in any other country of the region, but applicable region-wide. The research contributed to literature evidencing considerable declines in flagship wildlife in the Congo Basin (i.e. Walsh et al, 2003) and the existence of an unregulated hunt and burgeoning commercial chain (i.e. Milner Gulland et al., 2003). A report commissioned by the Convention on Biological Diversity (CBD) on 'the bushmeat crisis' (Nasi et al., 2008) was co-authored by University of Stirling staff.</p> <p>Milestone publications have: 1) elucidated the relative roles of different drivers in the region's bushmeat trade (Wilkie et al., 2005, 2006; Schenck et al., 2006; Coad et al., 2010), helping managers to assess the likely success of various options; 2) quantified key wildlife responses over time (i.e. Henschel et al., 2011) to support conservation planning and prioritization; 3) collated and evaluated evidence for wider ecological impacts (Abernethy et al., 2013) in order to assess overall sustainability and place hunting management needs on the development agenda.</p> <p>Very recent research report results from the past two decades to: a) measure success in ecosystem management (Laurance et al, 2013; DOI: 10.1038/nature11318); b) evaluate proactive hunting management options and changes in drivers and context (Coad et al, 2013; DOI:10.1111/cobi.12012); and c) assess significance of hunting in wildlife population declines (Maisels et al., 2013; DOI: 10.1371/journal.pone.0059469). The milestone, peer-reviewed papers indicated above have been cited over 950 times to date in the scientific literature and are widely used in policy documents, technical reports and public communication on the subject.</p>

**3. References to the research** (University of Stirling staff in bold)

- **Abernethy KA**, Coad L, Taylor G, Lee ME & **Maisels, F. 2013**. Extent and ecological consequences of hunting in Central African rainforests in the twenty-first century. - *Philosophical Transactions of the Royal Society B*. 368 : 1625, 20120303. IF = 6.4. *Paper invited after a conference presentation in 2011 demonstrating that the ecological importance of hunting is equal to that of climate change.*
- Coad L, Schleicher J, Airey L, Milner-Gulland EJ, Marthews T, Starkey M, Manica A, Balmford A, Mbombe W, Diop Bineni TR & **Abernethy K 2013**. Social and ecological change over a decade in a village hunting system, central Gabon. *Conservation Biology*. 27: 270-280. IF = 4.69. *First paper to show how hunter strategies change over a lifetime in response to socio-economic conditions. Key for long term sustainable management and evaluation of policies.*
- Wilkie DS, Starkey MP, Bennett EL, **Abernethy K**, Fotso R, Maisels F & Elkan P. **2006**. Can Taxation contribute to sustainable management of the bushmeat trade? Evidence from Gabon and Cameroon. *Journal of International Wildlife Law* 9:1-15. *Research used to refute a common stance that legalizing bushmeat trade could be a successful governance strategy*
- Wilkie DS, **Starkey MP, Abernethy K**, Ntsame Effa E, Telfer P & Godoy R. **2005**. Role of prices and wealth in consumer demand for bushmeat in Gabon, Central Africa. *Conservation Biology* 19: 268-274. Cited 102 times. IF = 4.69. *Resolved debate on relative importance of culture and economics on bushmeat consumption.*
- Milner Gulland EJ, Bennett EL, **Abernethy K**, Bakarr M, Bodmer R, Brashares J, Cowlshaw G, Eves H, Fa J, Peres C, Roberts C, Robinson J, Rowcliffe M, & Wilkie D. **2003**. Wild Meat-the bigger picture. *Trends in Evolution and Ecology* 18:351-353. Cited 283 times. IF = 17.11. *Brought unsustainable hunting in forests to attention of major agencies,*
- Walsh PD, **Abernethy KA**, Bermejo M, Beyers R, DeWachter P, Ella Akou M, Hujibrechts B, Mambounga Idiata D, Kamden Toham A, Kilbourn AM, Lahm S Latour S, **Maisels F**, Mbina C, Mihindou Y, Obiang Ndong S, Ntsame Effa E, **Starkey M**, Telfer PT, Thibault M, **Tutin CEG, White, LJT & Wilkie DS. 2003**. Catastrophic decline in ape populations in western equatorial Africa. *Nature* 422: 611-614. Cited 383 times. IF = 38.6. *Showed how hunting had become the biggest threat to large wildlife in African forests.*

Key grants administered through Stirling:

- Darwin Initiative Fellowship 162/12/002. Support for further tertiary Education for Anne-Marie Ndong Obiang' Final report and review available from Darwin Initiative. £29,000, 1 yr, 2009.
- Darwin Initiative UK government grant 162/12/002 'Capacity building for Monitoring and Managing the Bushmeat trade in Gabon' £163,000, 2003-2006.

Other grants awarded with AFEG staff as a PI/co-PI:

- US Fish and Wildlife Service grant GACF 0274 'An integrated system for surveillance and anti-poaching effort in Gabon (SBES staff PI K. Abernethy partnering with WCS Gabon) Final report available from USFWS-GACF. US\$23,000 1yr, 2008.
- US Fish and Wildlife Service grant, GACF 0315 Creating Cross-Institutional Links for Law Enforcement in Gabon. Final report available from USFWS-GACF. US\$ 36,000, 1 yr, 2007. These were the first submissions to USFWS to support hunting management in the country. USFWS have continued to support anti-poaching efforts in Gabon, along the lines of these two grants' recommendations, for the past 5 years
- Wildlife Conservation Society (US) NGO grant, 'The Bushmeat Trade in Gabon: Projet Gibier' US\$111,000, 2000-2005. This grant matched Darwin funds and also supported research to underpin policy reforms for the sector. *Total Gabon* private industry grant 'Monitoring the Biodiversity of Lope National Park', £190,000, 2003-2005.

**4. Details of the impact:** The research of the African Ecology Group has led to a growing recognition in governments and donor bodies of the imperative need to manage hunting in Central Africa, to protect the rural livelihoods, species and ecosystem function of the second largest rainforest on the planet. It also provides strategies for best practices in sustainable hunting management and practical tools for governments and managers to assess success. To ensure true impacts from the original research, the group secured funding for capacity-building within Gabon. The group received support via the UK Darwin Initiative for this section of work (2003-2009) and

matched funds from the US and Gabonese governments. The wider Stirling research group now includes researchers in Gabon and UK, ensuring that research is delivered directly to policy makers and is understood by staff within management groups. The group has been able to use research results to argue successfully for: the creation in 2009 of an intergovernment committee on hunting reform; new protected species lists, using data from hunting and trade were issued in 2010; and the promotion of the Wildlife Department to a higher status within government in 2011. Anne Marie Ndong Obiang, whose research was supported by Stirling (Darwin Initiative award 162/12/002), was the nominated focal point for Gabon at CITES, responsible for hunting issues. She is now senior staff in Gabon's National Park service, providing legacy from this educational mentoring. Stirling has signed MOU agreements with the national research authority (CENAREST, 2009) and National Parks Agency (ANPN, 2011) in Gabon to provide research advice and ensure excellence in scientific approach to this subject. Research results are regularly provided to other stakeholders as French language technical reports and advisory services.

Wider societal impacts from the research began in 2008 as a direct result of a national workshop on legislation for governance of the bushmeat trade, led by the group at Stirling. As a result of this workshop the cross-ministerial committee for the National Strategy for Sustainable Bushmeat Management requested the Stirling group to report on the state of the industry, including recommendations for legal revision and guidelines for sustainable food security and wildlife conservation, especially of globally threatened species for which Gabon may determine the survival of the species. Abernethy was also invited to: 1. Contribute to the assessment of UK government policy on the issue, which led to the creation of the Congo Basin Forest Fund by Gordon Brown in 2008 (Brown, Fa & Gordon, 2008; see section 5d); 2. Join the UK Bushmeat working group, allowing data from Gabon to be taken into account in UK policy; 3. Join the regional TRAFFIC hunting working group, contributing up to date knowledge on animal meat trade to TRAFFIC programs and contributing 'live' data to a public access forum (*SYstème de suivi de la filière Viande de Brousse en Afrique Centrale*); 4. Evaluate WWF hunting policy projects in Cameroon and DRC, enabling the group's expertise to support of one of the largest NGO's in the region; and 5. Advise FAO on regional resource management projects (i.e. GEF Project/ GCP/RAF/441/GER), ensuring that research underpins UN agency practice on the ground. University of Stirling staff participated in the CBD Secretariat evaluation of the bushmeat harvest impacts, ensuring that policies are evidence-based, and that consequences of policies on wildlife are understood. Research carried out at the University's field site in Gabon supported independent direct monitoring of wildlife to define the status of un hunted populations and create baselines for comparison with hunted populations. This greatly improved the evaluation of sustainability in hunted populations. The wide consultation of research staff on all aspects of the bushmeat industry ensures reach and influence from the research into civil society.

In 2010, the synthesis and strategy document for bushmeat management in Gabon, co-authored by University of Stirling and Gabon's Wildlife Department, was adopted by the Ministry of Water and Forests (Abernethy & Obiang Ndong, 2010). Today, Abernethy is a current member of Gabon's National Committee for Non-Timber Forest Product management, run by the Prime Minister's office; committee member for the National Strategy on Bushmeat management (Wildlife Department); expert advisor on environment to the First Lady of Gabon and a member of the UK Bushmeat working group. Several of the group (Tutin, Abernethy, White and Maisels) are members of the IUCN Species Survival Commission. This leadership in developing and modernising policy represents an opportunity to preserve wildlife populations of key species of global significance. Research by group members and others shows that Gabon is home to the majority of remaining forest elephants, leatherback turtles, humpback whales, mandrills, lowland gorillas and common chimps, as well as harbouring other endemic primate species. Gabon has international recognition as a leader in Africa for conservation planning and environmental performance (<http://www.epi.yale.edu/epi2012/rankings>), and it is likely that initiatives that are successful in Gabon will be adopted in other countries, as was the case in the gazetting of National Parks in 2002, which led to declarations of new protected areas in Cameroon and Congo. In line with recommendations for sustainable governance of resources, Gabon was the first country in the world to ratify the CBD 'Protocol of Nagoya' in 2011, for better governance of biological resources and associated traditional knowledge. Abernethy currently advises Gabon's Department of Environment on pilot work to ensure excellence in the governance framework being put in place.

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

**a. Satisfaction measures:** **Abernethy's** role in conservation was endorsed by invitation to sit on the Indianapolis Prize jury (2012), which also awards the \$250,000 Lilly Medal for conservation. Members of the research group in Gabon; Lee **White** awarded a CBE for services to conservation in Africa (2010); Fiona **Maisels** elected to the Society for Biology (2013).

**b. Citation by international policy and funding bodies:**

- Van Vliet, N. et al. 2012. *The role of wildlife for food security in Central Africa: a threat to biodiversity?* Ch. 6 pp123-136. In Congo Basin Forest – State of Forests 2010. Eds: de Wasseige C. et al. EU Publications Office. Luxembourg. 276 p. doi : 10.2788/48830. *The 'State of the Forest' provides a technical assessment of management issues and informs funding strategies in Central Africa, for the EU.*
- Nasi, R. et al. 2008. *Conservation and use of wildlife-based resources: the bushmeat crisis.* Secretariat of the Convention on Biological Diversity, Montreal, and Center for International Forestry Research (CIFOR), Bogor. Technical Series no.33, 50 pages. *This report lays out the CBD assessment of the impacts of hunting on biodiversity and guidelines for member countries governance efforts.*
- CBD Bushmeat Liason Group, 2011. *Livelihood Alternatives to the Unsustainable use of Bushmeat.* Secretariat of the Convention on Biodiversity, Montreal. Technical series 60. 46pages. *Cites 5 research papers from the group, particularly using research evidence for the importance of economic context.*
- 3 papers by the group are listed on the Bushmeat Crisis Task Force 'key documents' [www.bushmeat.org](http://www.bushmeat.org).

**c. Independent documentary evidence of links between research and claimed impact(s):** The following organisations hold documentary evidence of the contracts awarded to the group to provide scientific support for policy: University of Stirling, Gabon National Parks Agency 2010-2013, WWF International 2008, WWF CARPO 2009. Letters of confirmation of research support for impacts could be requested from: Gabon Ministry of Water & Forests (Secretary General M Emile Mamfoumbi; Gabon National Parks Agency (Technical Director Christian Mbina); FAO regional Forest officer (Dr Jean Claude Nguingui); UK Bushmeat Working Group (Chair, Dr Noelle Kumpel); US Fish & Wildlife Service, (Africa programme, Dr Richard Ruggiero); WWF International (Species program.; Wendy Elliott), Bushmeat Crisis Task Force (Director Heather Eves).

**d. Documented evidence of influence on guidelines, legislation, regulation, policy or standards:**

- Letter of Support from: 1) the Gabonese National Parks Agency; 2) TRAFFIC: the wildlife trade monitoring network; 3) UK Bushmeat Working Group; 4) US Fish & Wildlife Service (submitted with other REF documents).
- Ministry of Water and Forests, Gabon. Lettre 235,07/MEFEPPN/CAB/CCC. 4 April 2007 to the Cabinet. *The Application of the law relative to the Bushmeat Industry'. Demonstrates uptake by the Government of Gabon of the recommendations of the Darwin Project, including species protection, cross-ministerial collaboration and trade regulation. Committe created 2008.*
- Brown D, Fa J E & L Gordon (2008) 'Wild Meat in the Policy Process: A Study of the Potential for Inter-Departmental Collaboration in HMG, United Kingdom', *Durrell Conservation Monographs* No. 2, Jersey. *This report provides guidelines for UK funding for hunting management in the region, for example via the Congo Basin Forest Fund. Early Stirling research is used to show the importance of economic context.*
- WWF Central Africa Regional Program Office. Consultancy 9F0739013 to **Abernethy**. Assistance in the developing of tools and methodology for wildlife hunting survey and supervision of study team leaders. Final report and review available from WWF-CARPO. *The invited consultancy demonstrates international recognition of the groups' expertise and ability to make practical recommendation for impacts on the ground.*
- **Abernethy**, K., Ndong Obiang, A.M. 2010. *Bushmeat in Gabon. Technical report to the Government of Gabon. This commissioned report collates research to date and provides a basis for governance reform. It has been contributed by Gabon to the regional ministerial group for biodiversity management (COMIFAC).*