



The uptake of wildlife research in Botswana

**a study of productive
interactions**

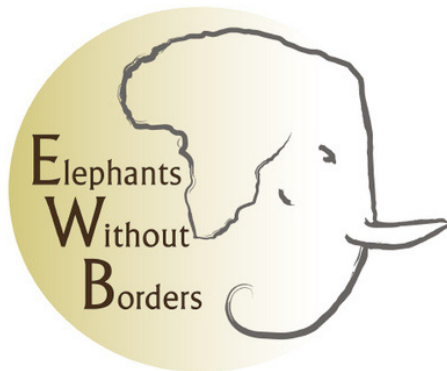
**SUMMARY OF
DOCTORAL
DISSERTATION**



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SCIENTISTS STUDY WILDLIFE AND NATURAL AREAS IN BOTSWANA TO DISCOVER WAYS OF UNDERSTANDING AND CONSERVING WILD ANIMALS AND THEIR HABITATS. THE RESULTS OF THEIR RESEARCH CAN BE USED TO SUPPORT GOOD MANAGEMENT OF THE COUNTRY'S IMPORTANT ECONOMIC RESOURCES AND ENABLE DECISION MAKERS TO MAKE EVIDENCE-BASED DECISIONS AND POLICIES.

THESE FINDINGS ARE OFTEN NOT AVAILABLE TO THE PEOPLE AND ORGANISATIONS THAT ARE RESPONSIBLE FOR MANAGING BOTSWANA'S WILDERNESS AREAS. EVEN IF THE RESEARCH FINDINGS ARE AVAILABLE, THEY ARE OFTEN NOT USED WHEN DECISIONS ARE MADE, OR NEW POLICIES ARE CRAFTED.



THE RESEARCH TAKES TIME AND MONEY TO PRODUCE, SO HOW CAN ITS RESULTS BE BETTER USED? ARE THERE MORE EFFECTIVE WAYS TO MAKE SURE THAT EVERYONE WHO MIGHT USE THE RESULTS KNOWS ABOUT THEM, AND UNDERSTANDS THEM?

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Centre for Research
on Evaluation,
Science and Technology



The path to research uptake is long and winding: Boro tracks near Maun, Botswana by Peter Apps

Theoretical Underpinnings

Productive Interactions

Attributing specific research findings to impacts on society over time, or even tracking uptake and use of research findings by others is difficult because application of the research can take years, and the path followed is rarely straightforward. Focusing attention on the research process, rather than 'final' outputs such as publications, enables a more nuanced understanding of the labour of research, in terms of both emotion, and time and financial resources, opening up more possibilities for valuing academic contributions to society. For this reason, in 2011 a project team led by Dutch researchers coined the term 'productive interactions'.

They proposed that following the interactions of researchers with stakeholders during the research process would reveal work most likely to be adopted for use, and perhaps to result in societal impact. They considered interactions to be productive when there were exchanges between researchers and stakeholders in which scientifically-sound and socially-relevant knowledge was created. Later this definition was refined to include the idea that interactions were productive when they led to other interactions.

Spaapen, J., & Van Drooge, L. (2011). Introducing "productive interactions" in social impact assessment. *Research Evaluation*, 20(3), 211–218.

Communities of Practice

Communities of practice, a concept made popular by Étienne Wenger, can be made up of researchers only, or of a mix of ‘stakeholders’: actors with a common interest – vested or other – in a field of inquiry or a resource. Their relevance to the productive interactions approach is that if they have a lifespan greater than that of a research project, they can be understood to support and reinforce the beneficial interactions that can indicate likely uptake of the project’s research. In northern Botswana there is an extended wildlife research community of practice made up of stakeholders from academia, local communities, the tourism private sector,

management consultancies, government officials, and NGOs – a localised social system characterised by mutual engagement, joint enterprise, and shared repertoire.

Wenger, E. (2010). Communities of practice and social learning systems : the career of a concept in Social Learning Systems and Communities of Practice: 179-198

Conditions for Uptake

Scholars have acknowledged that certain conditions, including credibility, relevance, salience, and legitimacy, are needed for research to be taken up and used.

Cash, D. W., Clark, W. C., Alcock, F., Dickson, N. M., Eckley, N., & Jager, J. (2002). Salience, credibility, legitimacy and boundaries : linking research, assessment and decision making. *SSRN Electronic Journal*. doi:10.2139/ssrn.372280



Do ... Follow Meetup, Maun, Botswana, February 2017

My study incorporated these concepts in the form of the following categories to guide my investigation:

- **Awareness:** do potential users know the research exists, and if it is accessible?
- **Relevance:** do potential users think the research relates to what is important to them?
- **Trust:** do potential users think the research findings are believable because they come from, or are backed by, an authoritative source?
- **Understanding:** do the research findings make sense to the potential user?

Viewing the challenges to uptake of conservation science research through these categories reveals a recurring pattern: interactions between researchers and the stakeholders of research efforts appear to improve the functions they represent, and, by extension, the uptake and use of research.

"We still do what is of interest to us, rather than work on what are the needs of the country"
[Government scientific programme manager]



Round River Conservation students present their fieldwork at Okavango Research Institute, Maun, April 2017

Five Key Findings

THE RESULTS OF THIS STUDY POINT TO FIVE KEY WAYS THAT WILDLIFE RESEARCH FINDINGS FROM BOTSWANA ARE MORE LIKELY TO BE PUT TO USE THROUGH PRODUCTIVE INTERACTIONS IN AN EXTENDED COMMUNITY OF PRACTICE

- **early engagement** of researchers and research stakeholders through joint priority setting and project planning leads to local relevance and awareness text
- **ongoing exchange of data and knowledge** among stakeholders builds trusted relationships
- **use of knowledge-sharing outreach platforms** increases trust and understanding
- **capacity-building** through involvement in research and sharing the growing knowledge base leads to broader uptake of research
- **long-term investment in a research location and its stakeholders** contributes to all conditions for research uptake: awareness, relevance, trust and understanding



Participants at DWNP research seminar, Maun, February 2014: LtoR Roger Heath of Plantsandpeople Africa, Peter Stevens of Wild Planet Trust, and Christiaan Winterbach of Tau Consultants



Collaborators in GBIF hunting records rescue project, Maun, September 2016. LtoR Debbie Peake of Botswana Wildlife Management Association, Masego Dhlwayo of Okavango Research Institute GIS Lab, and Dr Lucas Rutina, former Government of Botswana wildlife biologist, Okavango Research Institute

Background

Which (and whose) science? How does evidence from research findings find its way into use to meet the need for management actions

While Botswana is a small country in terms of its human population, its wealth of natural resources and experience in management of wildlife has given it a place on the global political stage.

There have been many public discussions connected with concerns about the governance of natural resources, the influence of the West over conservation policies and economic incentives for protecting wildlife, and even the human-nature relationship itself. Many of these discussions make reference to the role of science in providing evidence to inform management of natural resources.

But there are perceptions among local people, many of them stakeholders in the management of Botswana's wildlife, that much scientific research is carried out by foreigners who do not necessarily choose relevant topics, and come and go from the country without sharing their findings. There is also a perception that, even when shared with government officials who are the stewards of Botswana's wildlife, research findings are not put to use, but rather "gather dust on the shelf".

AFRICA WILDLIFE AND CONSERVATION NEWS, ELEPHANTS, LIONS, SOUTHERN AFRICA

KAZA adopts Botswana's scientific management plan for transfrontier area



Date: April 14, 2019

Chronicle (Zimbabwe)

Excerpt from news story about decision made at Victoria Falls wildlife meeting of regional Ministers in April 2019

Interactions between flooding and upland disturbance drives species diversity in large floodplains

Murray-Hudson, Michael; Arias, Mauricio, E.; Wittmann, Florian; Parolin, Pia; Chochrane, Thomas, A. (Springer International Publishing Switzerland, 2016-02-10)

Understanding and predicting vegetation patterns in floodplains are essential for conservation of river floodplains subject to hydrological alterations. We propose a conceptual hydroecological model.

Fire frequency drives habitat selection by a diverse herbivore guild impacting top-down plant communities in an African savanna

Fynn, Richard, W.S.; Burkepile, Deron E.; Thompson, Dave, I.; Koerner, Sally E.; Eby, Stephanie; Govenor, Hagenah, Nicole; Lemoine, Nathan P.; Matchett, Catherine J.; Wilcox, Kevin R.; Collins, Scott L.; Kirkman, Alan K.; Smith, Melinda D. (Nordic Society Oikos, www.nordicsocietyoikos.org/, 2016)

In areas with diverse herbivore communities such as African savannas, the frequency of disturbance alters the top-down role of different herbivore species on plant community dynamics. In a severe drought...

Tree-grass competition along a catenal gradient in a mesic grassland, South Africa

Tedder, Michelle; Kirkman, Kevin; Morris, Craig; Fynn, Richard (Wiley Online Library; https://onlinelibrary.wiley.com/doi/10.1111/j.1365-3113.2014.00303.x, 2014-03-03)

The interaction, both above and belowground, between tree saplings and the surrounding grassland is dependent on solar radiation, temperature, rainfall, soil depth, tree species and sward cover factors, ...

Classical fisheries theory and inland (floodplain) fisheries management; is there need for a paradigm shift? lessons from the Okavango Delta, Botswana

Mosepele, K. (Fisheries and Aquaculture Journal; https://www.omicsonline.org, 2014-07-29)

This paper reviews the fisheries management question of inland (floodplain) systems in the developing world. It proposes a paradigm shift in approach. Inland fisheries management is largely based on classical fisheries management...

Soil microbial biomass carbon, nitrogen and sulphur as affected by different land uses in the Okavango Delta, Botswana

Mubyana-John, T.; Masamba, W.R.L. (Sciencedomain International; www.sciencedomain.org, 2014-02-01)

Aim: The Okavango Delta at Seronga is fragmented into different land uses ranging from grassland (Ximberia and mopane), often punctuated with cropped and fallow fields. The influence of land use on soil microbial biomass...

Research publications deposited in the University of Botswana Library's online repository, UBRISA

"Wildlife, wildlife is all we hear about. Why don't researchers care about people?" [Botswana citizen]

There has been a steady increase in social science studies looking at natural resource use in northern Botswana, and an increase in the number of conservation scientists who recognise conservation as a social issue and who are incorporating social issues in their ecological studies, particularly related to the human-wildlife conflict and illegal wildlife trade.

"Where does all the research go? We see people coming from all over the world to study our animals, but they leave again and we never know what they have learned." [Botswana citizen]



Local chiefs attending a presentation of cultural heritage research at the Okavango Research Institute, Maun, September 2014

This study has shown that Botswana citizens are visible members of the northern Botswana research community of practice, in many cases participating as researchers themselves. The study also showed that most researchers submit their findings as required by their permits, but there are weaknesses in Botswana's information preservation and retrieval systems that can make it difficult to find studies that have been deposited.



Student presenters at Research Talks for Everyone, Maun, April 2018

“There are too many people studying carnivores, especially lions. What value are they adding if they keep repeating studies?” [Private sector manager]

Charismatic megafauna such as elephants and large carnivores play an important role in their natural habitat, but also, being highly visible, they are valued by the tourism industry and research about them attracts international funding. Studies of their behaviour can be used to support land use planning, and investigations of their biology can inform epidemiological studies for public health management. It appears that most studies carried out in Botswana build on previous findings, rather than repeating work. Communicating this to stakeholders at the time that research projects are launched and progress would support a broader understanding of the science.



Lion researchers in the Okavango Delta, Mammalian Ecology and Conservation Unit, University of California, Davis



Elephants in Savute, Botswana, 2011 by Diego Cue

“We know that there are too many elephants. They are destroying most of the big trees: why don't the biologists admit it?” [Private sector manager]

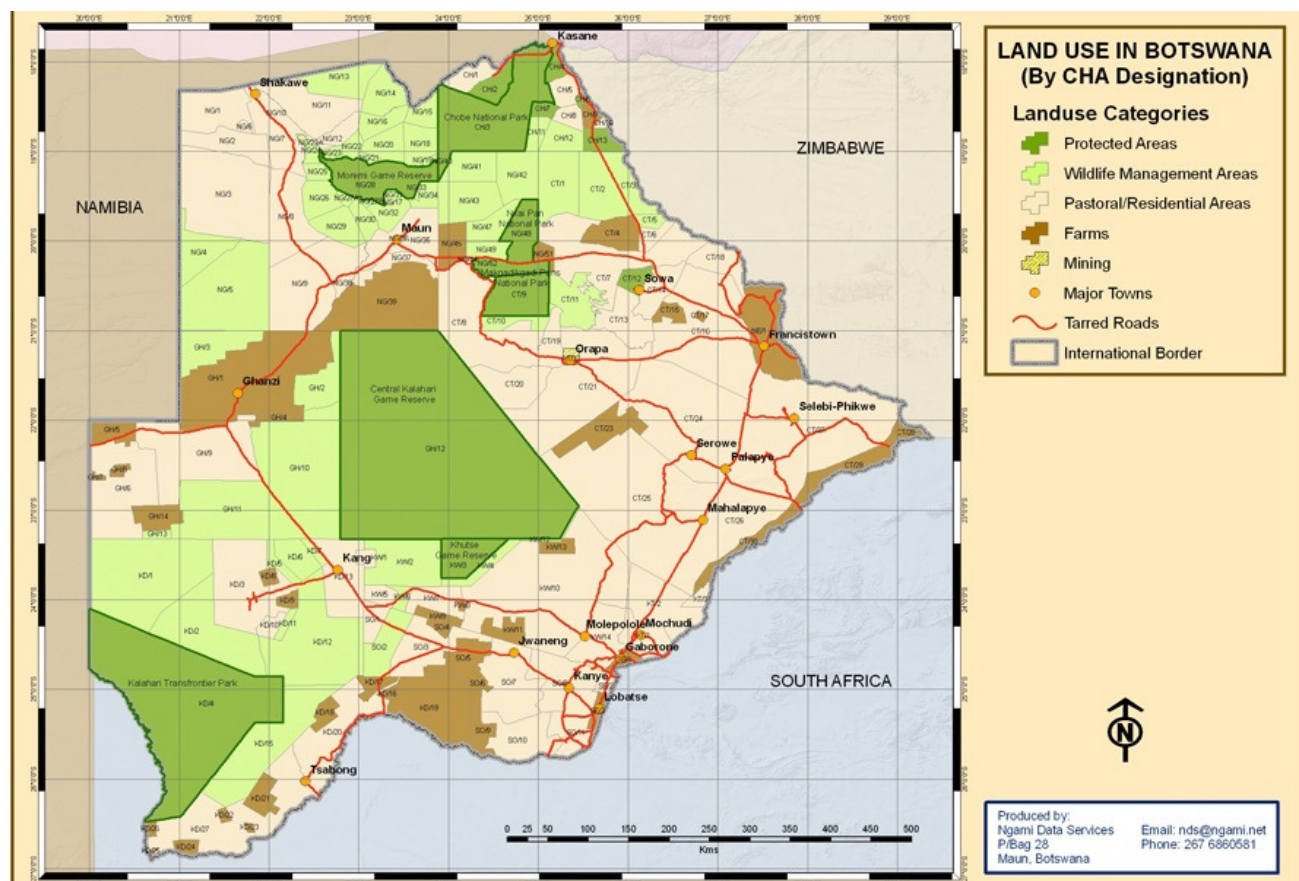
How researchers carry out their research, and present their findings, are framed by stakeholders using their own observations, experience, vested interests, and previous understanding of local conditions and acceptable interventions. Lags in theory adoption and absorptive capacity -- the ability to identify, assimilate, transform, and use external knowledge -- also influence stakeholders' understanding. Dealing with these requires scientists to communicate a clearer picture of what research is trying to achieve and explaining how much time, and how much uncertainty, is involved in producing reliable results. This is easier if researchers engage with stakeholders early in the research process, and share the state of current knowledge.

Key Research Questions

1. **Who are the research stakeholders** in wildlife research in Botswana, what is the nature of their roles and interest, and with whom among these stakeholders do researchers interact?
2. **What kind of interactions** take place between researchers and other stakeholders?
3. **What types of research data and information**, and in what form, are shared among researchers and other stakeholders? Does this sharing of research data and findings lead to uptake and use?
4. **What channels, tools, and methods** contribute to uptake? Can regulatory systems and public outreach platforms support productive interactions?
5. **Can outputs from student research** carried out in Botswana, including the content of thesis acknowledgments, **be used as evidence of uptake** in the form of capacity-building? Can these tell us if wildlife research carried out in Botswana is **building the knowledge and skills of African researchers?**



Plant identification: LtR Brookes Nkuba, from Subiya, Chobe, Selinda staff; Alison Heath, PlantsandpeopleAfrica; Robson Mashabe, Selinda Walking Trails Tracker
2007



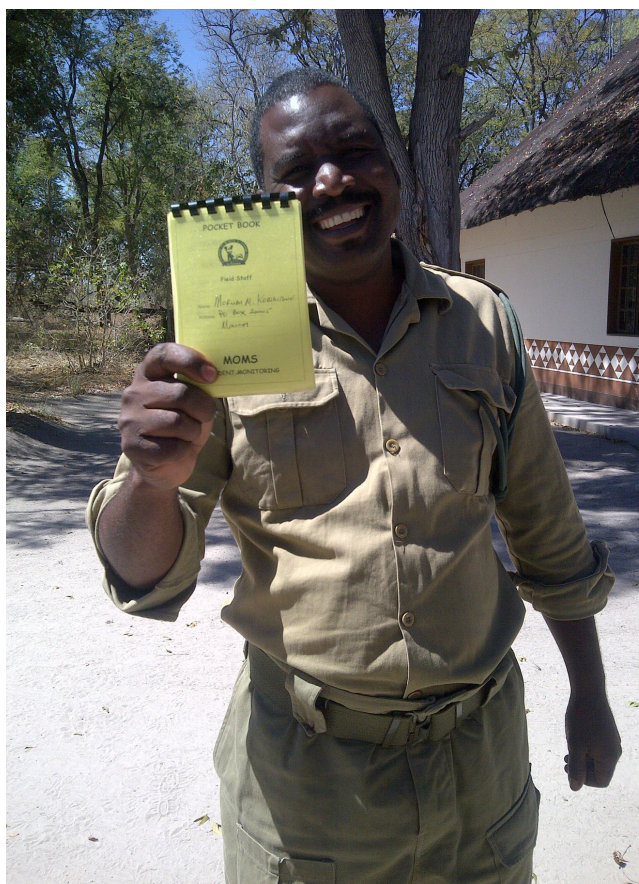
Study Area and Methods

Fieldwork to support this study focused on research carried out in northern Botswana, described in Botswana's aerial wildlife census as the open wildlife northern conservation system area, including the Okavango region and the Savuti-Mababe-Linyanti ecosystem, but also including wildlife studies in the country's other protected areas. The literature reviews, field observations, surveys, interviews, and document content and citation analysis for this study took place in Botswana's Okavango Delta and government centres Maun and Gaborone.

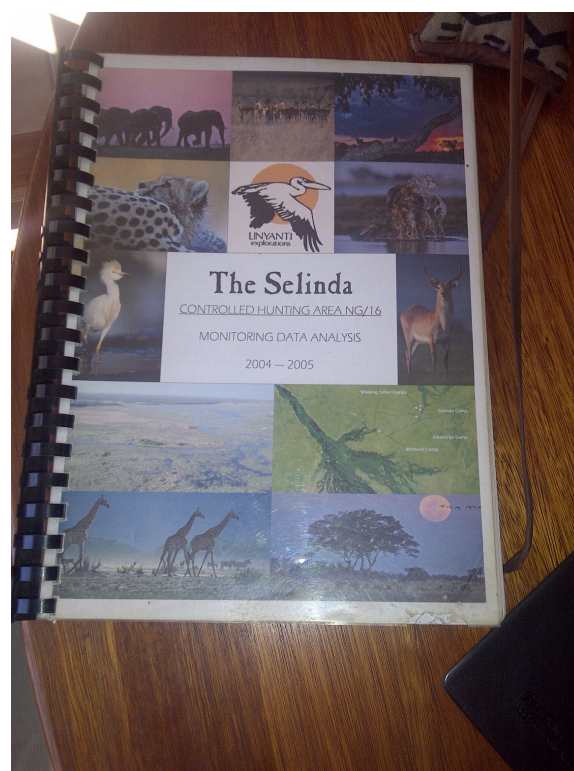
My methodology focused on identifying routes to evidence for productive interactions and uptake through actively engaging and participating in these routes. This involved a mixed methods approach, combining qualitative and quantitative analysis in three case studies: a country-wide government research permit process that engaged with wildlife surveys, a public outreach event in Maun, Botswana, and scholarly outputs related to the production of theses and dissertations from the studied research. Surveys and interviews were carried out in northern Botswana, Gaborone, and remotely through telecommunications.

49% of research permit studies included were carried out in protected areas of the north
44% of research permit studies included were carried out in protected areas in other sections of the country

Stakeholder Category	Interviews	Survey Responses
Academic researchers	16	141
Academic staff	2	7
Consultants	14	4
Government officials	14	0
NGO managers	11	13
Private sector managers	30	22
Totals	87	187



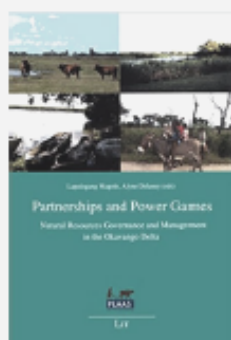
DWNP official Morui Kebinitswe at Moremi gate with monitoring pocket book, August 2014



Legacy private sector wildlife monitoring report from Linyanti Explorations, courtesy of Great Plains Conservation

Because many of the responses to the research permit survey were based on elicited perceptions and memories of the permit holders of work that took place up to 20 years previously, published outputs that were a result of the specific work done under permit were also reviewed to provide another indication of research outcomes and uptake.

A year of published environmental research focused on Northern Botswana



2017 has been an interesting year for publication of scholarly research about the environment, wildlife and natural resources in northern Botswana. Researchers looked, among many other topics, at manes on female lions, the importance of dense bush to tourists, how baskets support women's livelihoods, the amount of water used by wild animals, and the effectiveness of environmental education in Botswana schools.

Especially notable were a book about natural resources governance in the Okavango Delta, compiled by the University of Botswana's Dr Lapologang Magole, and the latest volume of *Botswana Notes and Records: a Special Issue on Environment, Tourism and Contemporary Socio-economic Issues in the Okavango Delta and other Ecosystems*. You can find the BNR articles [here](#). Professor Graham Child, who conducted the first published ecological survey in northern Botswana, passed away in 2016: he was remembered in *Pachyderm*.

Graduate theses finalised in 2017 looked at the interactions of wild animals with the communities that live alongside them (and with one another), how to manage both surface floods and groundwater on Botswana's borders, whether tourists should ride on elephants, and politics of trans-boundary parks.

Not all research gets published online in scholarly journals or on the websites of universities. Reports commissioned by government are often difficult to find, which is why the authors of the *Chobe District Integrated Land Use Plan* must be applauded for this year sharing both their [final report](#) and the [background documents](#) used in their work on planning, ecology, and natural resources for Chobe and the wider Zambezi region.

Have a look at the following list of selected publications, to get a taste of the variety of contributions to northern Botswana's knowledge base for the environment and natural resources in 2017.

shed environmental ed on northern Botswana

2019 saw an increasing trend in environmental research that included societal impact as an essential consideration in northern Botswana. Interactions between people and wild animals were a common theme. Responding to controversy related to Botswana's sustainable use of wildlife, regional researchers made their views clear through [mainstream media](#), [magazines](#), [social outlets](#), and [scholarly work](#). Relevant to this was the [declaration](#) made in June 2019 at Africa's Wildlife Economy Summit.

Especially notable among social studies was the collection edited by Botswana researchers Stone, Lenao and Moswete: *Natural Resources, Tourism and Community*, including Bongani Gumbo's chapter, "Historical evolution of northern Africa", and Wame Hambira's review of practices by multinational tourism companies. Another [frisa](#), included contributions from several Botswana

the Cubango-Okavango basin since the end of Angola's war as book, *Biodiversity of Angola: Science & Conservation: a*

by local experts
re launched:
Wetlands by
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Bibliographic tracking of Botswana research permit outputs (1138 unique outputs from 200 research permits)

Three Case Studies

Three investigations looked at interactions between researchers and other stakeholders in northern Botswana's wildlife research community of practice, and whether there was potential for evidence that the findings produced had led to uptake and use.



Research and filming permit holders at Government of Botswana pitso (consultative meeting), Gaborone, August 2017

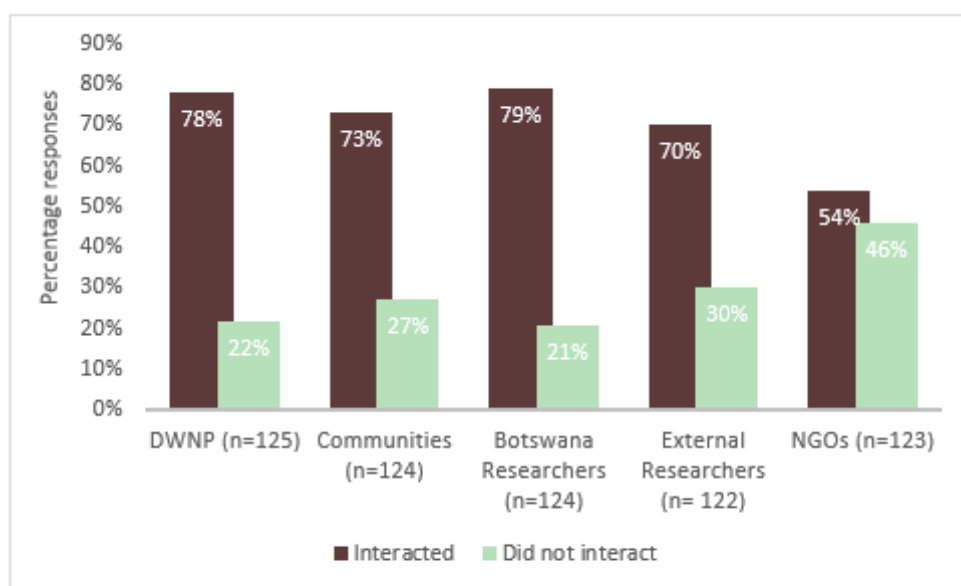
Government Regulatory Systems can Support Productive Interactions

Wildlife conservation research is intended to result in an outcome: effective management of a resource that contributes to both a country's economic and social development, and to healthy ecosystems. Data produced by wildlife research should contribute to new knowledge that results in continuous improvement of wildlife management processes. Can the regulatory process of issuing permits for research lead to productive interactions through building these qualities?

The thesis examines how the use of data and findings produced by wildlife conservation research in Botswana is affected by a regulatory process: the national government's research permit system as applied to the stages of the research 'pipeline', from project identification through to publication of results.

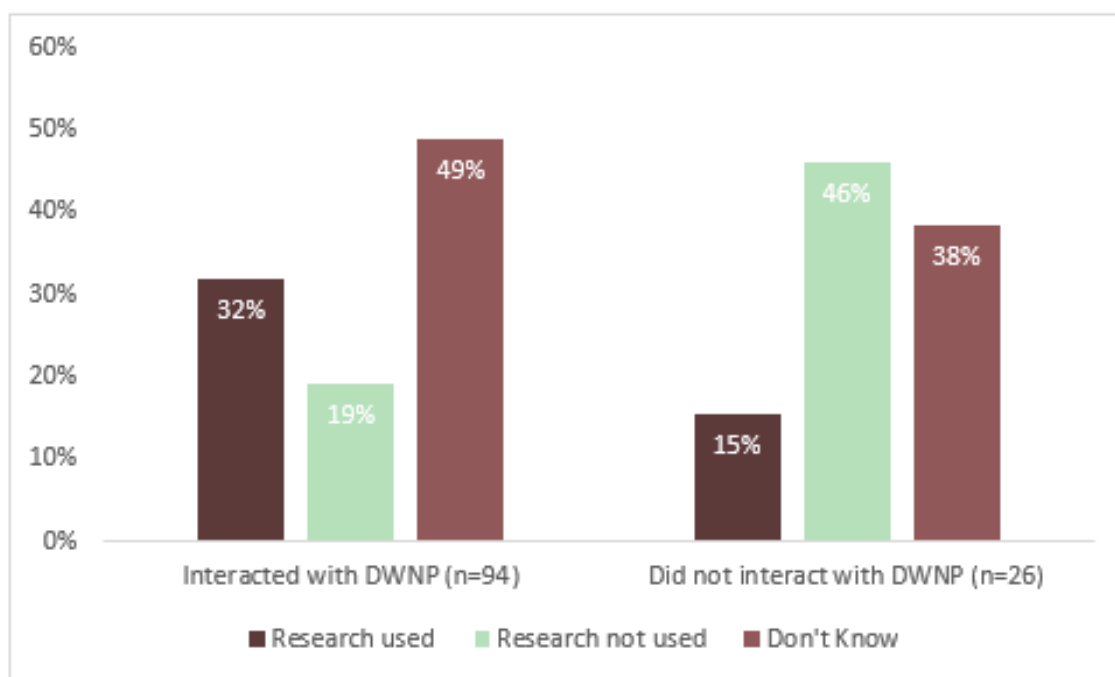
Researchers who wish to carry out fieldwork in Botswana's protected areas must apply for a research permit by submitting a proposal for their work. If awarded, the permit's conditions include the requirement to make regular progress reports, and to submit a copy of their findings to the government body responsible for administering the permit. Research priorities for wildlife studies are identified in a guidelines document that has been updated twice since 1993.

An online survey of principal investigators who were issued research permits by the Botswana Ministry of Environment, Natural Resources and Conservation through the Department of Wildlife and National Parks (DWNP) between 1996 and 2014 was carried out to investigate whether productive interactions had taken place through the research process. The survey set out to determine if interactions between the permit holders and other Botswana wildlife stakeholders could be seen to contribute to the use in policy or practice of the research produced, leading to understanding of which types of interactions could be considered most productive. For this purpose, interactions were considered to be either direct (in-person) or indirect (through documents or other communications materials), and use to include any application of knowledge on a continuum from acknowledgement to instrumental application in regulation or management planning. Follow-up interviews provided more context.



Interactions of researchers with five groups of stakeholders during fieldwork

The survey found that types of most common interactions vary according to type of stakeholder engaged, but all interactions lead to more uptake: Research permit survey responses from 128 principal investigators issued DWNP research permits between 1996 and 2014 revealed that researchers who interacted with others indicated higher confidence that their work had been put to use, irrespective of the category of stakeholder involved.



Interactions with DWNP and perception of use

Analysis of the survey results focused on several engagement functions that research uptake scholarship had shown to contribute to the creation and sharing of new knowledge, its recognition, and application.

Early engagement of researchers and research stakeholders through joint priority setting and project planning leads to local relevance and awareness

Decisions about what gets studied are often made without consideration of the needs of potential users and priorities of managers. Setting priorities for research in conservation science is closely related to issues of relevance and fitness for use of information and data. The study found that those investigators who had previous experience in Botswana or who chose a topic that was reflected in the priorities set out by the DWNP perceived more uptake of their research findings.

Examples of motivations for research topic

Type of motivation	Example [relevant stakeholder appears in brackets]
Priority identified by DWNP	<i>"It was my passion to see myself working in the field of Ecology in the long run. In addition, it was within the perfect time-frame to do a follow-up to the implemented mitigation measures by DWNP."</i> [Student at Botswana university]
Priority identified by DWNP	<i>"These monitoring objectives were put forward in the Nile crocodile management plan (2007) developed for the DWNP by the Okavango Crocodile Research Group (2002-2007)."</i> [Professional in the private sector]
Priority identified by DWNP	<i>"Priority identified by DWNP Wildlife Department when proposal for a comprehensive study of CKGR was submitted."</i> [Student at institution outside Africa]
Observed problem, Priority identified by DWNP	<i>"Initial work indicated ... and priority of elephant conservation then priority identified by DWNP 2012 onwards."</i> [Professional researcher in NGO]
Observed problem	<i>"Specific personal interest, after four years working on the Makgadikgadi system and wanting to know more about it."</i> [Professional researcher in South African institution]
Observed problem	<i>"Motivated by work that I did back in 2000, as field assistant of an ecological consultant."</i> [Professional researcher in South African institution]
Observed problem	<i>"I have worked and done research in Botswana for over 15 years and was trying to determine if there was a "browsing lawn" effect happening similar to the grazing lawn effect wherein large grazers increase the nutrient quality of their forage."</i> [Professional researcher in NGO]

Table showing motivations for some wildlife studies carried out under research permit, 1996-2014

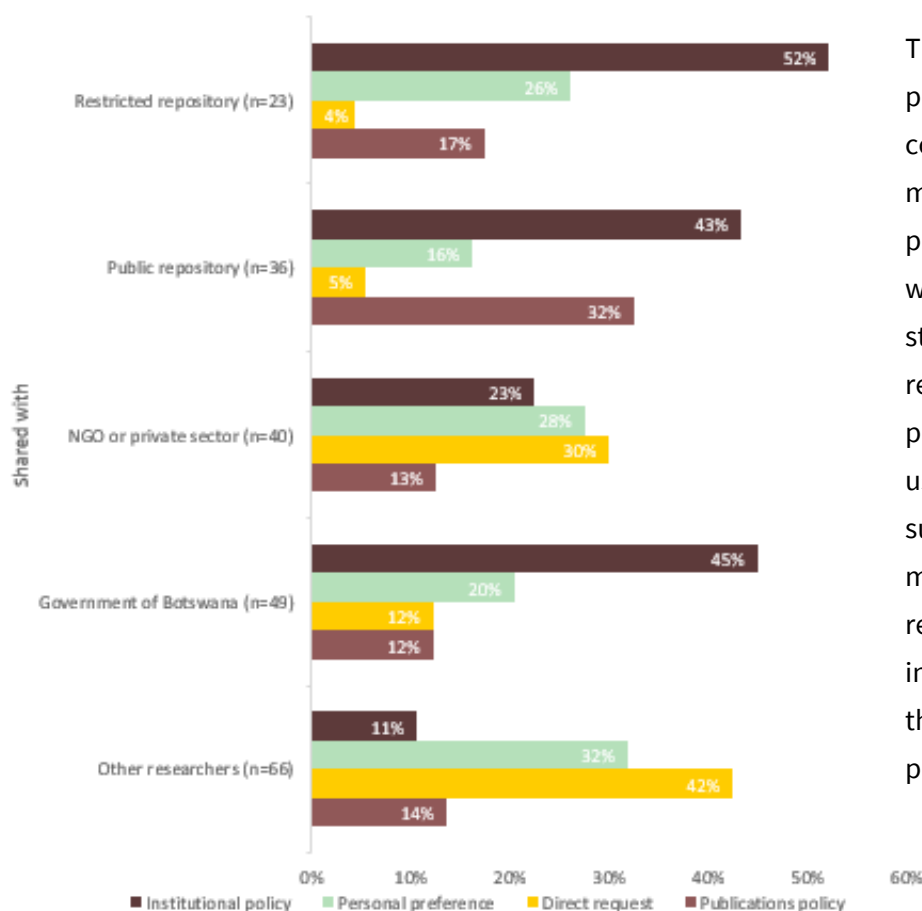
Because the DWNP is the official steward of Botswana's wildlife, interactions with its officials are considered important by researchers. But are researchers making enough effort to engage with government researchers, practitioners, and managers? The value of research findings in informing management planning has been frequently acknowledged by government. Is the Government of Botswana making the best use of independent researchers and Botswana-based NGOs as resources?

An important lesson from this study is that efforts to increase the opportunities for productive interactions among stakeholders in northern Botswana's wildlife community of practice can be increased to ensure relevance, accessibility, trustworthiness, and understanding of research produced.

The regulatory research permit process itself, including supporting guidance in its research strategy, is already in place and can be made to better support these activities.

Ongoing exchange of data and knowledge among stakeholders builds trusted relationships

A common form of indirect interaction is researchers' use of information and data collected by others. This often takes place before fieldwork, to ensure that new investigations take existing knowledge into account, but can also happen in the field, as new contacts are made and relevant knowledge about local conditions is exchanged. The re-use of locally produced data and research products should be an indicator of potential relevance of the new research to potential users.



The process of collecting, processing and analysing data collected in the field offers multiple opportunities for productive interactions among wildlife researchers and stakeholders. Just over half of all respondents to the research permit survey indicated that they used data from other sources to support their work. Even though much data sharing was ad hoc, researchers who shared data, information and knowledge throughout the research process perceived more uptake into use.

Researchers' sharing of their raw data by trigger

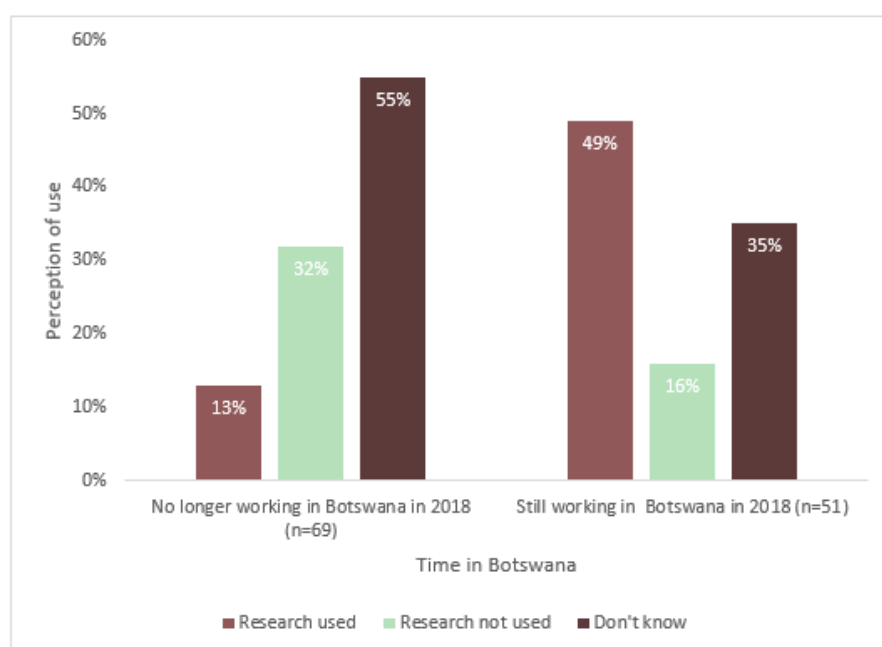
"[Name of NGO] has carried out several spoor surveys to provide population and distribution data for carnivores. 2012 in the CKGR-KTP area in 2013, the CKGR in 2014. Collaborating with [names of other NGOs], DWNP. Each contributes transport, etc. There is huge demand for the data. We give it to government and to others who ask but don't publish it. We also publish articles based on the data." [NGO manager]

Government officials, including those from DWNP, were the most common recipients of research findings, followed by other researchers and Botswana research institutions. Less than a third reported sharing with memory institutions such as libraries and archives that are responsible for long-term preservation and access.

Long-term investment in a research location and its stakeholders contributes to all conditions for research uptake: awareness, relevance, trust and understanding

Commitment to long-term wildlife research in a region can lead to increased productive interactions as researchers become more knowledgeable about environmental and political contexts, and familiar with stakeholders. It also seems likely that continued work in a country or location would provide the opportunity to observe any uptake of completed research.

The survey responses reveal a complex mix of engagement in wildlife conservation, management and research in Botswana that is constantly evolving, contributing to the long-term involvement and interactions that lead to better understanding and uptake of research. Responses to the survey question about professional status at the time of initiating the research, for example, illustrate this dynamic process.



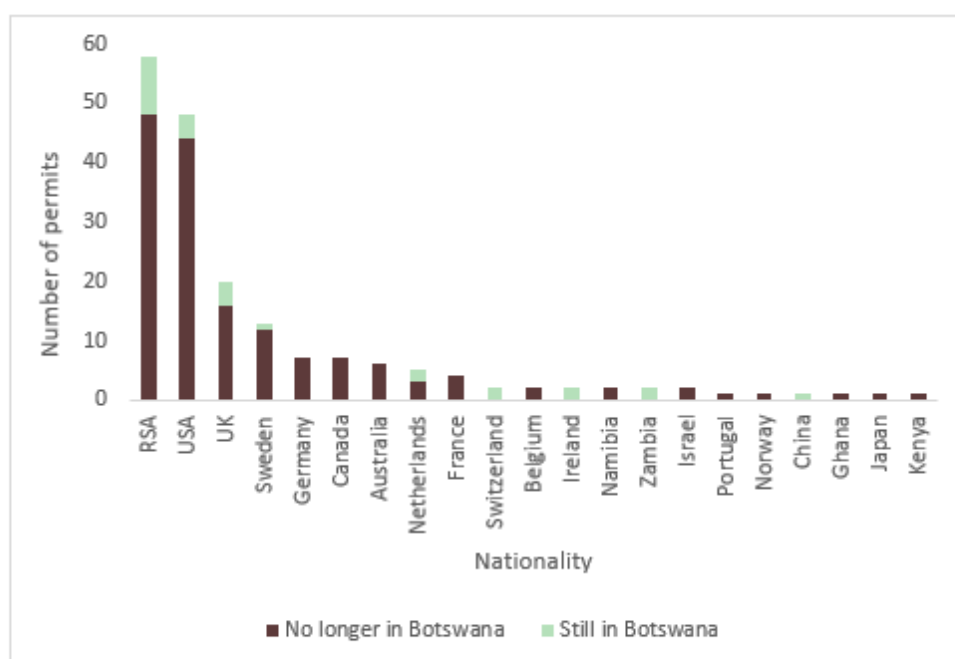
Perception of use by length of time in Botswana (n=120)

Examples of shifting professional roles

Professional consultant in the private sector (outside Africa) with affiliations with a university outside Africa, working in collaboration with a Botswana-based company.”
“Student at University outside Africa and now (under same permit extension) professional researcher in NGO and associate fellow at two universities outside Africa.”
“Initially a PhD student at a UK university. Then independent researcher. Then professional researcher in a NGO.”
“Professional in private sector and student at South African University.”
“I was a part time student and full time Camp Manager at [name of safari company] when I conducted my research.”
“I was a student at a university outside Africa as well as a researcher at Dept of Wildlife and National Parks Botswana.”

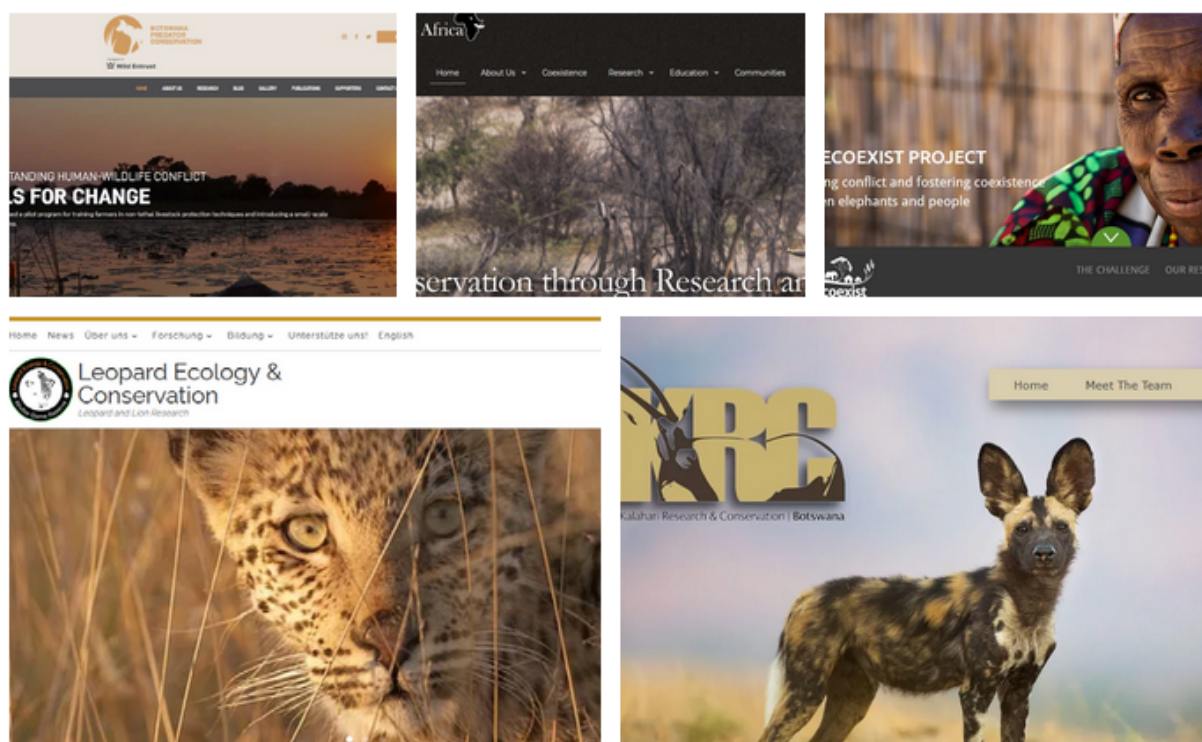
"Governments are slow to move. The bigger impact is when you go directly to the end users. Like we did with the fishing disputes resolution But you have to make government your partner; otherwise the end users will not trust your recommendations. It gains legitimacy."
[Professional researcher at Botswana university]

The length of stay in Botswana was important because there are indications that long-term commitment to a region of study can affect uptake of the research. Botswana's research permit process allows for extensions if reporting requirements and adherence to regulations are observed. Sometimes a single permit is extended many times, retaining the same reference identifier, and other times a researcher may obtain a series of different permits, working as either principal investigator or as part of a team. Looking at all research permit holders included in this study, the length of research period for permits ranged from a few days to 13 years, with an average length of 27 months. During the period studied, one researcher worked a total of 484 months as either a principal investigator or team member on 11 different permits. And, sometimes, researchers stay on to create research NGOs that allow for long-term engagement.



Nationality of PIs issued permits and whether they were still working in Botswana at the time of survey (n=185)

One pattern of researcher engagement in Botswana is for a graduate student to complete a study under one degree, and then return for follow-up work, often to obtain another degree. In the process of engagement with other stakeholders, the idea to form an organisation that would support ongoing research in the country sometimes takes shape. The resulting research NGOs invest years, and perform a mix of research, capacity-building and advocacy.



Websites of NGOs established by former research permit holders

Longer-term research also takes place when citizens decide to become researchers in their own country. Of the 256 permits reviewed, 71 (28%) of the permits had been issued to Botswana citizens, some of whom were studying abroad, and 23 (10%) were issued to longer-term Botswana residents. At least 30% of team members on the studied permits were Botswana citizens. It needs to be noted, also, that during the period studied, researchers from Botswana institutions often did not apply for research permits as it was understood that their institutions had ‘blanket’ permission for studies in the country.

These data indicate that Botswana citizens were not only engaged in wildlife-related research, but that foreign research permit holders had opportunity for interactions with Botswana researchers – and with that, networking opportunities with other stakeholders based in Botswana – throughout the research process. Both these conditions allowed for early engagement of local stakeholders.



Poster for BONIC project that included PhD training for Botswana government biologists

Overall, the findings of the survey support the argument that long-term engagement with a research location, and its people, improve the likelihood that research is relevant to the needs of potential users, as more familiarity with the physical and social environment provides more opportunity for productive interactions. This, combined with involvement with a broad range of stakeholders, at many stages of the research process, and involving meaningful exchange of data, information and knowledge, appears to contribute to more uptake of research.

Public Outreach Platforms Support Research Uptake

Determining whether productive interactions are taking place to encourage uptake of research requires examining different channels for the exchange of knowledge among research stakeholders. One such channel is deliberate outreach by academic researchers to the broader community, in the form of an event organised as a public lecture. This type of highly structured platform provides an opportunity to observe and capture potentially productive interactions.

Use of knowledge-sharing outreach platforms increases trust and understanding

Participant observation and a survey of attendees and presenters at a structured monthly public outreach event jointly organised by the Okavango Research Institute and safari operator Kwando Safaris, between 2015 and 2019, investigated interactions and perception of research uptake. The study was carried out to see if the event, Research Talks for Everyone, could be considered a productive interaction, whether it created opportunities for ongoing productive interactions, and whether it resulted in uptake or use of the research presented. Participation and observations during the event allowed the author to follow the event in the roles of researcher, presenter and audience member.



The author presenting interim findings at Research Talks for Everyone, April 2019

The findings of the study support the initial observation that the northern Botswana research stakeholders studied make up an identifiable community of practice, whose interactions produce resources that affect their practice. The platform can be seen in itself as a productive interaction in that the event has led to further engagement with the research presented.

Data collected through attendance sheets and records of the presentations, other than the frequency of attendance that might indicate that attendees found the event useful or interesting, did not specifically address the issues of productive interactions and uptake. A web-based survey of attendees was conducted to learn more about the nature of interactions associated with the event, asking recipients whether they had followed up with presenters after the event, and whether they had shared what they learned at the Research Talks. The survey revealed that the event was valued, not only by non-academic stakeholders, but by professional researchers themselves.

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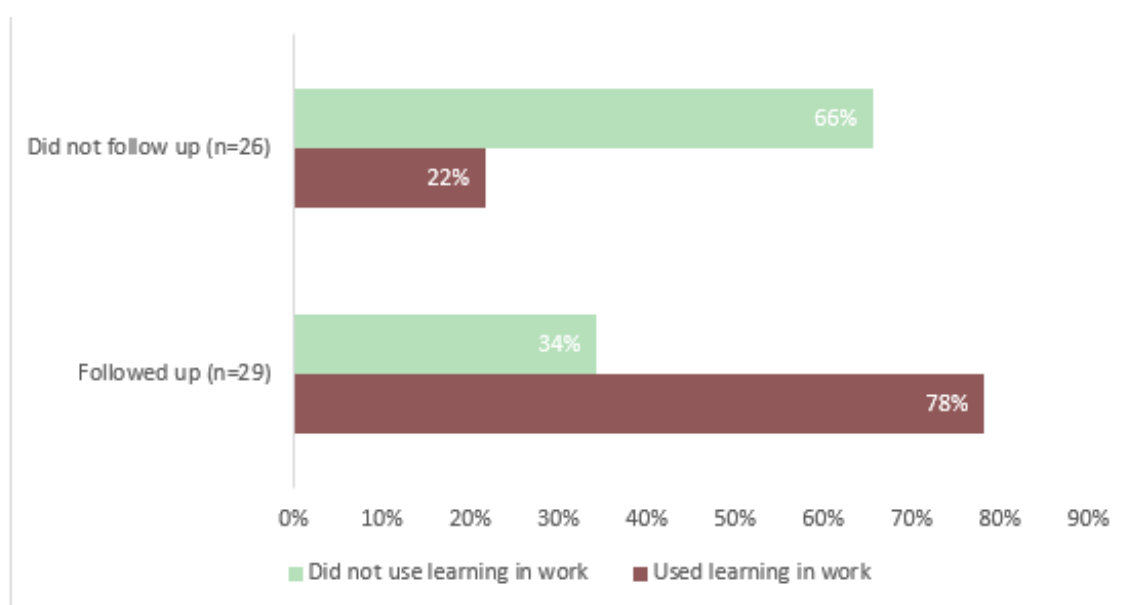
"People don't work on the same subject, it can happen by terrible bad luck, but it's another reason why researchers need to know what other researchers are doing, so then there is less chance of anybody being scooped." [NGO researcher audience member and presenter]

At each stage of the event – from planning to post-event follow-up – there were interactions between researchers (as presenters and audience members) and other research stakeholders (mainly as audience members). The most indicative interactions took place when audience members followed up with presenters, and when they later shared what they had learned with others.

Most audience members followed up with presenters after the main event to ask more questions, to get contact details, request collaboration, share experiences, request expertise, discuss a point or methodology, share data, or request a copy of the full paper.

“We followed up with [Academic researcher] after he presented ... he has been instrumental in setting up a similar monitoring system in our camps. Have also followed up with [NGO researchers] regarding invasive species.” [Tourism manager]

The act of passing on learning indicates engagement with the knowledge transmitted, and is itself an interaction that produces awareness, assumes relevance, and creates trust and understanding. Most of the respondents (93%) reported that they had shared with others after the event. Most of the sharing reported was with colleagues (62%).



Use of learning at work and follow-up

This could indicate that the research had been perceived as relevant to the respondents' professional lives, especially in the case of tourism managers and the guides in their concessions, and for academic researchers and their students.

The study revealed patterns that can be interpreted as the result of productive interactions, in that they led to effort by the stakeholders to engage with the research, either through changing their thinking and behaviour, or through use of the research findings. Survey and interview results showed changes in thinking (conceptual uptake), changes in how work is carried out (instrumental uptake), changes in interactions with members of the community (strategic uptake), use of learning at work (instrumental uptake), and use of summaries shared post-event (conceptual, instrumental, and strategic uptake).

"It's feeding my work with other points of view, new ideas or techniques. Makes me think about other factors that could affect a certain situation. In general, it fed my overall knowledge." [Academic researcher]

Engagement appears to lead to more engagement, including sharing, by attendees from all affiliations, including researchers, who over time were more willing to share their own research at the event. Overall, findings of this study support the theory that productive interactions – those engagements that result in further engagement – build up to more uptake of research in a staged continuum of varied responses.

What is learned at the Talks is being used by attendees at work to inform colleagues and staff, to apply new methods, and to make networking connections. This also applies to the use of summaries distributed post-event, where an indirect interaction in the form of the written summary led to a direct interaction in the form of a sharing event.

"I disseminate the printed summaries to the camp staff and guides. The guides really like getting that up-to-date information." [Tourism sector manager]

Observations, survey results and interview also showed a strong and interactive role for local NGOs. NGOs and graduate students working with these organisations were most likely to present their interim findings to others.



Summary of presentation published in local newspaper, The Ngami Times

Some interactions at the Talks resulted in collaborative activities, either through application of the research methodology in other settings, or through requests to researchers to share their work further. Even though it is clear that the Talks have led to some instrumental use, perhaps the strongest argument for the interactions related to the Talks leading to uptake and use is based on the event's function as a learning environment. Learning and broadening knowledge were motivations most reported by survey respondents, and mutual learning – uptake of new knowledge by both researcher presenters and audience members – was observed throughout the Talks. Findings of the survey and follow-up interviews provide evidence that the event provided opportunities for reflection --- building understanding -- and supported networking -- building trust.

Increased exchange of knowledge among wildlife research stakeholders, however, did not extend noticeably to the main steward of wildlife in the region, the Botswana Department of Wildlife and National Parks, because representatives of the government seldom attended. While the department, in theory, should be aware of ongoing research through the permit system, and through workshops organised by government, NGOs, and academic institutions, this is not always true on the ground. Absence of government representatives at the Talks also means that they are not actively adding their voice to the discussions generated by the event and engaging in follow-up that can lead to more uptake.

Graduate Student Research Builds Multiple Capacities for Uptake



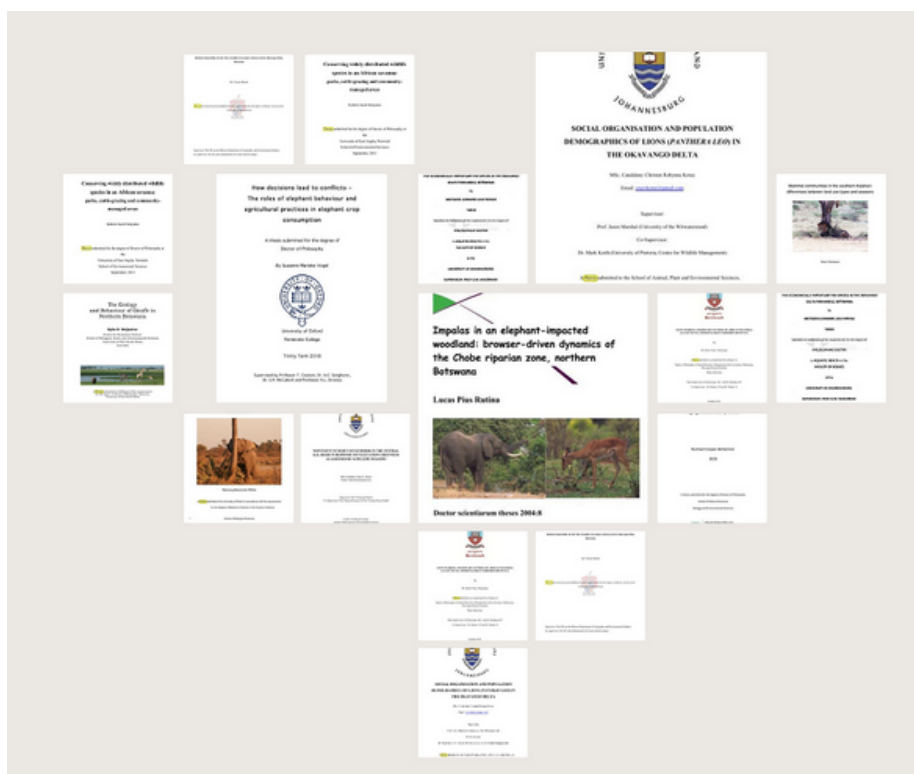
Student Kebafilwe Tshotlane presents her poster at DWNP workshop, Maun, February 2014

Capacity building through involvement in research and sharing the growing knowledge base leads to broader uptake of research

One form of uptake and use of research is development of the knowledge and skills of new researchers. Textual analysis of acknowledgements in theses produced under research permit from 1996 to 2014, and bibliographic analysis of the influence of these outputs, explored both interactions and capacity development as indicators of research uptake.

Development of research capacity in conservation science is built into an academic system that mentors and directs the work of students in an intensive process of direct and indirect interactions. A research thesis or dissertation is codified evidence of a student's research and – by extension – of capacity built, and it can function as an indirect productive interaction through going on to build knowledge by influencing other work.

To determine if it was possible to see the uptake of Botswana research through capacity building, theses and dissertations created under the government research permits studied were analysed to identify productive interactions, and to determine both direct and indirect capacity-building outcomes. Direct interactions were those where capacity building flowed directly from the production of a thesis in a project, and indirect interactions, where the outputs of a project contributed to the capacity-building of others through their use in production of another thesis.



Some covers from theses produced under Botswana research permits 1996-2014

Acknowledgements of Assistance

*"I will start with my good friends, mentors, and teachers who first walked me through Kalahari, taught me to appreciate the subtleties of the desert, and showed me how to see the world differently".
(Acknowledgment in thesis)*

The acknowledgements researchers give to people and institutions that have supported and assisted their work can be considered documented evidence of an interaction, and, possibly, of the strength and importance of the interaction. The content of acknowledgements sections of 111 theses -- 1624 separate instances of acknowledgement -- produced under Botswana research permits between 1996 and 2014 were compared with survey responses of the principal investigators for those permits. Social interactions and intellectual influences that extended beyond normal academic practice to include research stakeholders were documented in both sources but government officials, other researchers, and supervisors were most mentioned. The analysis also showed that a researcher's perception of research uptake was associated positively with having acknowledged others.

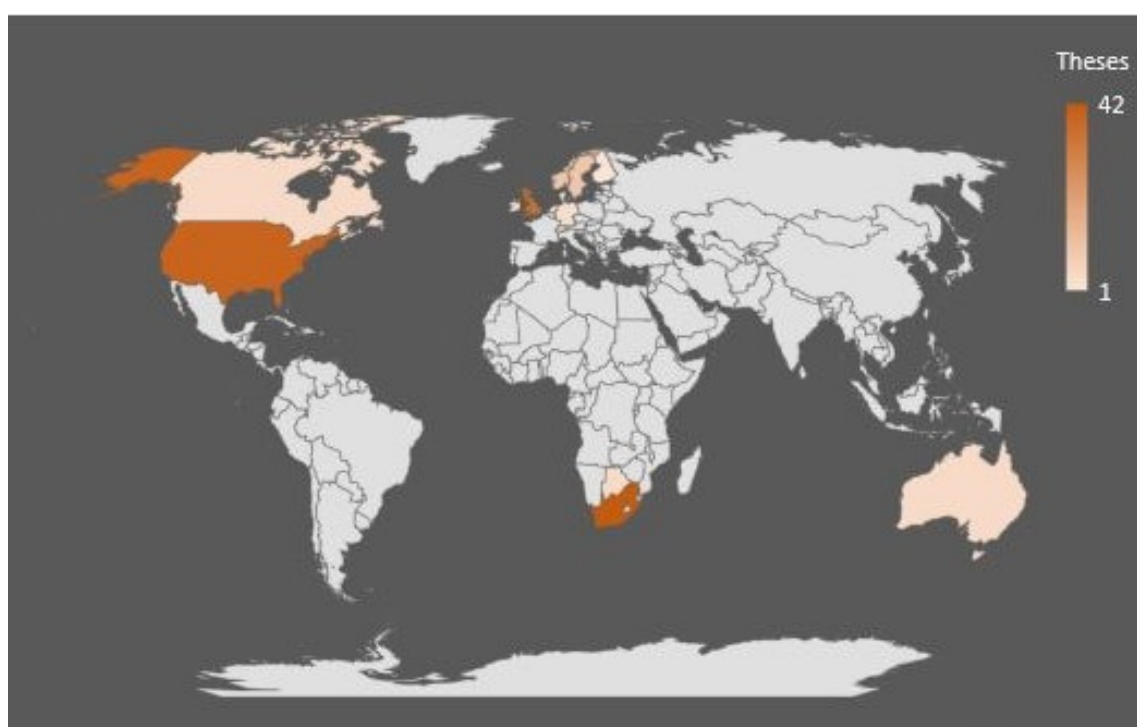


San trackers in the Kalahari, 2009 by Stuart Orford

"I would like to take this opportunity to thank the Department of Wildlife and National Parks of Botswana for granting me permission to conduct this research and for the opportunity to work in the Makgadikgadi. Logistical support provided by the Department of Wildlife was essential in capturing and collaring zebra and wildebeest for this project. ... The Makgadikgadi is a vast, untouched wilderness where the constraints of the environment are liable to be the end of the researchers as well as their study animal. The support of local safari camps ... and all of the staff who worked there was more than welcomed and not a little essential." [Student at university outside Africa]

Capacity-building as uptake of research

Capacity-building through the academic system creates a research work force that contributes to the potential for broader uptake of scientific findings. To determine if it was possible to see the uptake of Botswana research through capacity building, theses and dissertations created under the research permits studied were identified to determine direct capacity-building outcomes. 110 of the permits (55%) had produced at least one student thesis or dissertation, directly building capacity of the student writer. Institutions in 14 countries had granted degrees for the theses produced. The map shows that most degrees were issued by South Africa, the UK and USA.



Countries of degree granting bodies for original research permit thesis outputs

South African students tended to produce their theses for South African institutions and Europeans for European institutions. Students from Botswana and other African countries produced more theses for European institutions than for institutions in Africa or the rest of the world. Forty-three percent of the thesis writers associated with permits were from countries in Sub-Saharan Africa: Botswana (26), Kenya (2), Namibia (2), South Africa (44), and Zambia (2), indicating that a significant proportion (43%) of the theses produced under the studied permits were written by students with home countries in sub-Saharan Africa.

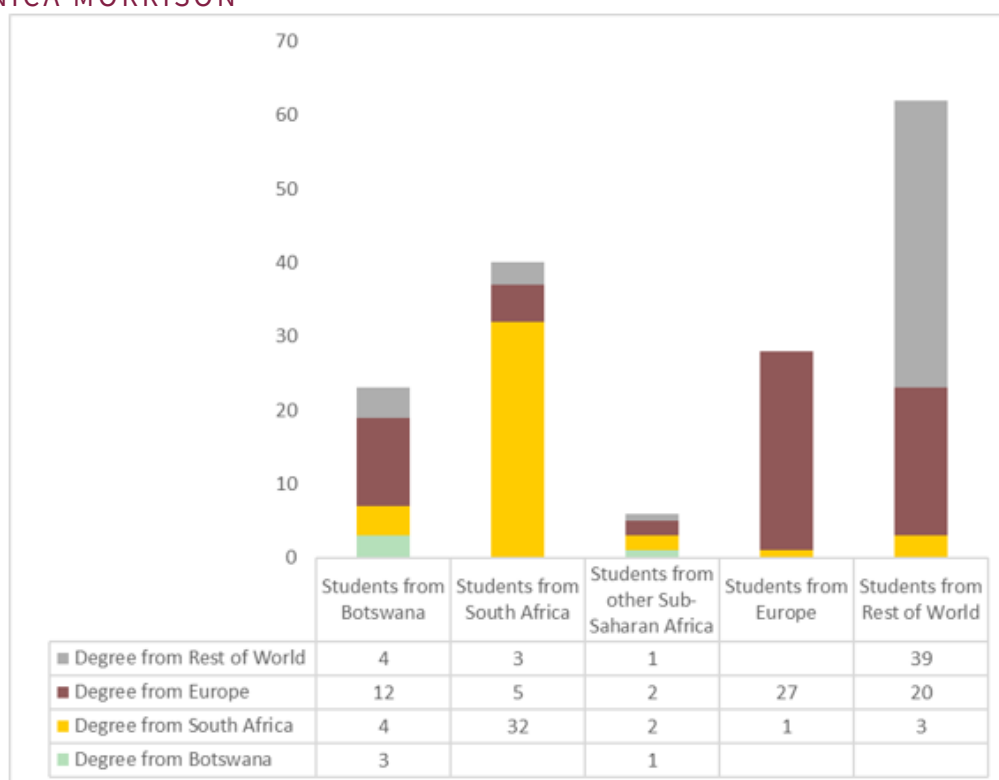


Chart showing country of student origin by country of degree granting institution (n=159)

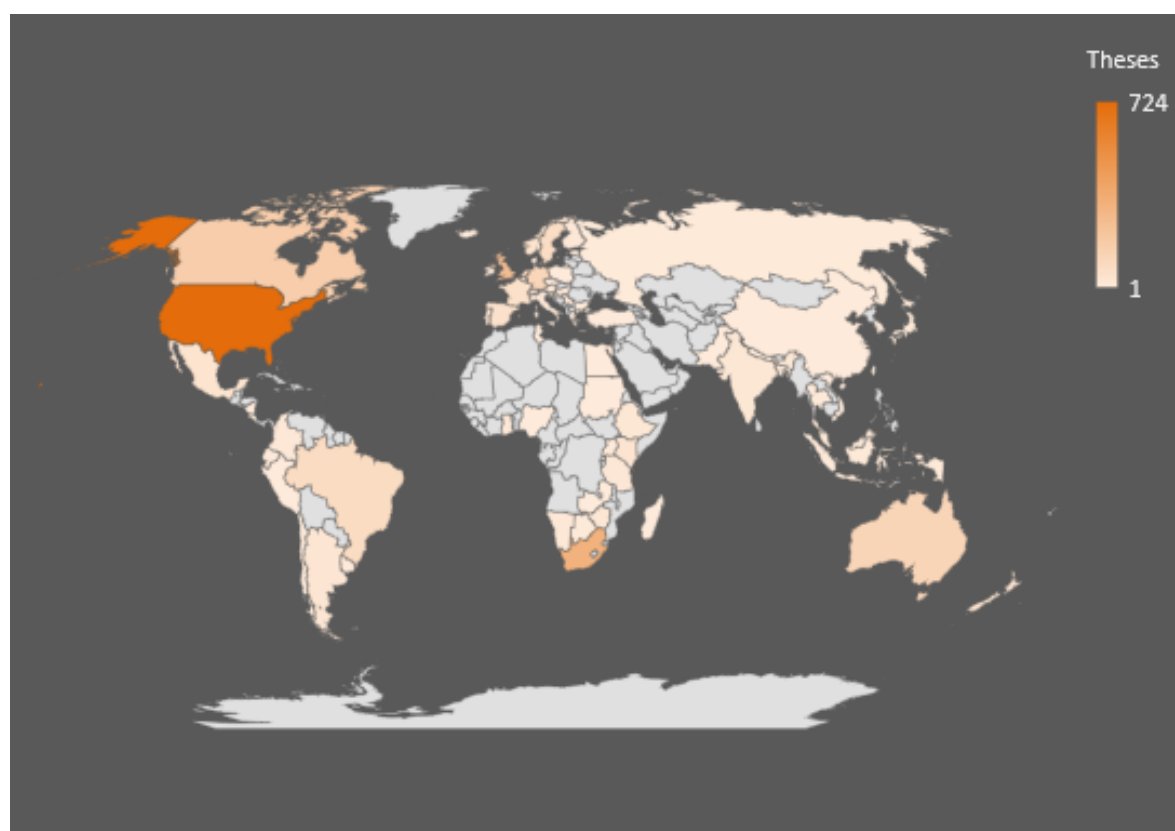
While the production of theses as outputs of Botswana research permits resulted in capacity-building for the students who carried out their studies under permit, the theses produced also had the potential to influence knowledge more broadly, and to build capacity beyond that of those who directly participated in the original Botswana work. A set of documents that cited the original set of research permit outputs was assembled to seek evidence of indirect capacity-building outcomes from the Botswana studies. This is where the outputs of a project, whether theses or other types of outputs, contributed to the capacity-building of others.

A search of Google Scholar found 825 of 1138 original outputs from the Botswana research permits (73%). The search process found that 705 of the 825 documents found in Google Scholar were cited by other documents in Google Scholar: in other words, the content of these outputs was used to support the findings and analysis carried out by other researchers not necessarily connected with the Botswana research. These 705 documents received 27,598 citations in Google Scholar.

2624 of the citing documents were unique theses or thesis sections that sometimes cited more than one of the original research permit outputs. Institutions granting the degrees for the 2624 unique theses represented 78 countries.

Institutions in the United States (28%), South Africa (13%) and the UK (10%) granted the most degrees related to the theses that cited the original research permit outputs. Most African institutions that produced the theses were based in southern or eastern Africa.

160 countries, and 35 regions were the focus of studies that produced these theses. 241 theses did not specify a geographic region, as the studies were carried out in laboratories, or were based on models. Half of the theses produced (50%) had a non-African country or region as their geographic focus, while 44% focused on Africa: Botswana (6%), South Africa (12%), the rest of southern Africa (13%), and the rest of Sub-Saharan Africa (13%).



The map shows the countries of degree granting bodies for the citing thesis documents

Analysis of the 1138 research outputs produced under the studied Botswana research permits indicates that there were notable direct and indirect capacity-building effects from the work. For example, a significant proportion (43%) of the theses produced under the studied permits were written by students with home countries in sub-Saharan Africa, directly building knowledge and capacity of African researchers, and of those with whom they interacted throughout their research. Also, outputs from the research permits were used to support creation of 2624 theses, indirectly building capacity beyond that of those who directly participated in the original Botswana work.

189% of the 200 research permits contributed to capacity-building uptake through direct (thesis production) or indirect (reading and citing) interactions. These interactions can be considered productive in that they led to further use of the research findings produced under the Botswana permits.

This analysis demonstrates that the research capacity-building process does not stop when a thesis is finalised. When a thesis is shared, and its findings are used by other researchers, its influence grows through indirect interactions far beyond the institutional, topical and geographic boundaries of the original work, supporting uptake of research in an ever-broadening community of practice.

Summary



Dr Jess Isden, presenting at Research Talks for Everyone for NGO Elephants for Africa, in November 2016

This research identified interactions among researchers and stakeholders that led to uptake and use, and explored factors that appear to support research uptake: early engagement of researchers and research stakeholders to ensure local relevance and awareness, ongoing exchange of data and knowledge to improve trust, long-term investment in a research location and its stakeholders, use of knowledge-sharing outreach platforms to increase understanding, and capacity building through involvement in research.

The work was able to describe a northern Botswana wildlife research community of practice made up of stakeholders from academia, local communities, the tourism private sector, management consultancies, and NGOs – a localised social system characterised by mutual engagement, joint enterprise, and shared repertoire. Knowledge exchange within this community of practice takes place through planned and unplanned interactions, many of which can be described as productive and leading to uptake and use. Scholarly outputs from research carried out in this community result in development of more research capacity in Botswana, the region and across the globe.

The research has shown that the interactions needed to nourish uptake of wildlife research in Botswana can be encouraged and supported through a combination of effort by all stakeholders. Based on these findings, the thesis recommends actions that could improve the uptake of northern Botswana wildlife research in the form of application to practice and capacity-building.

Recommendations

Overall, **Botswana's government** would benefit from promoting and guiding engagement with research through building on its record of supporting inclusion of local communities in natural resources management research and monitoring and using its regulatory processes to further ensure early interactions with researchers. The government should actively encourage and support long-term research partnerships with independent researchers. It should also demonstrate consistency of interest in its partnerships with the private sector that provides a large economic contribution to the region. Finally, government needs to nourish and support its existing memory institutions to better steward its knowledge assets.

Researchers should consider more engagement with stakeholders in priority setting, data collection, extended peer review, and knowledge translation, and lobby for changes in the academic process that does not recognise and reward productive interactions.



University of Botswana librarian Ruth Lekoko, tracking research permit outputs, September 2014

They should pay more attention to government aspirations – including local employment – and political windows of opportunity. They should frame their research in terms of conservation objectives that are socially relevant. Perhaps most importantly, they should consider longer-term studies and research partnerships that enable building of local relationships. Scientists could do better in engaging with stakeholders, as they still rely significantly on their academic networks.



Research institutions and projects should provide incentives for stakeholder engagement and knowledge exchange by recognising productive interactions in performance assessment and allowing time and space for them in research project planning.

Botswana Government presentation to research stakeholders about review of research permit system, Maun, September 2015



NGO, government, consultants and academic participants at hunting records workshop, Maun, March 2017



Head guide Letshithile Otoro entering wildlife sightings in register at Pom Pom Camp, October 2014

Botswana-based NGOs should build on their engagement with local communities and offer more value to government by building the capacity of local researchers to manage NGO activities, thereby opening more channels of interaction with Botswana policy-makers. International NGOs should include space and time for interactions in project planning: the global trends towards inclusivity and co-production in research are already there: they need to be recognised in the form of budgetary commitments.

Botswana's **tourism industry** could present accurate cost-benefit analysis of private sector involvement and support for research and monitoring activities so requirements for supplying information to government are not viewed as excessive.

Thank you for reading

Support for this study from **Elephants without Borders**, the **International Development Research Centre (IDRC)**, and the **South African National Research Foundation (NRF)** is gratefully acknowledged.