News and updates from *AfricanBioServices*, a European Union-funded research project investigating ecosystem services in the greater Serengeti-Mara ecosystem in eastern Africa.

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AfricanBioServices Updates

February 2017

Note from the project coordinator

It is dark winter in Europe while it is hot and dry summer in East Africa. The AfricanBioServices project is into its most serious stage so far, preparing for our first periodic report to the European Union (EU). We have been working together for more than 20 months – as a team and a big family. During the second week of February 2017, most of the scientists in the AfricanBioServices project met in Naivasha in Kenya to discuss our findings. We are a mixture of young enthusiastic promising scientists together with more experienced seniors. The first 20 months of the AfricanBioServices project are history. About 100 scientists have been working in the field, in the lab or with already collected data to meet the objectives of the project.

Data quality and open access to data are important aspects of our project. All of us are committed to ensuring our data is of high quality. Over the last six months we have been engaged in finalising our plans to ensure high quality data collection and management. One of the most serious responsibilities we have established is to prepare the data files (metafiles). Not all of us have finalised our data plans or uploaded the metafiles yet, but it is important to do so before the end of February. One of the most important deliverables from the project to EU is our open access relational database. The report about this work will be submitted on 28 February 2017. In this report, we have to verify that the work has been successful.

The project has engaged five community facilitators: four in Tanzania and one in Kenya. We are looking forward to engaging them in our field activities and having them communicate and disseminate our results to local communities in the Serengeti-Mara ecosystem. They are most welcome! It is my hope that they will interact with all of us with a positive attitude which will enrich all of us. It is my wish that the community facilitators will find this engagement fruitful and the link to the local communities will be positive. I wish you all good luck with your preparations, and with good communication services.

Eivin Røskaft

Coordinator, AfricanBioServices project

Communicating research results from Work Package 3 through journal articles, working papers, opinion pieces and videos

The team from Work Package 3 is studying the effects of climate change on biodiversity and ecosystem dynamics. Already, the team has published a number of research outputs, ranging from peer-reviewed journal articles and working papers for specialist audiences to opinion pieces in newspapers and academic blogs for more general audiences. The popular NTV Wild Talk series, a weekly 45-minute television show that airs on NTV Kenya, ran two programmes featuring Joseph Ogutu discussing the work on monitoring trends in wildlife population. You may access these outputs via the links below.

Journal articles

Ogutu, J.O., Piepho, H.-P., Said, M.Y., Ojwang, G.O., Njino, L.W., Kifugo, S.C. and Wargute, P.W. 2016. Extreme wildlife declines and concurrent increase in livestock numbers in Kenya: What are the causes? *PLOS ONE* 11(9): e0163249. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0163249 Published 27 September 2016

Said, M.Y., Ogutu, J.O., Kifugo, S.C., Makui, O., Reid, R.S. and Leeuw, J. de. 2016. Effects of extreme land fragmentation on wildlife and livestock population abundance and distribution. *Journal for Nature Conservation* 34: 151–164. https://dx.doi.org/10.1016/j.jnc.2016.10.005 Published December 2016

Ogutu, J.O., Kuloba, B., Piepho, H.-P. and Kanga, E. 2017. Wildlife population dynamics in human-dominated landscapes under community-based conservation: The example of Nakuru Wildlife Conservancy, Kenya. *PLOS ONE* 12(1): e0169730. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0169730 Published 19 January 2017

Press release (in German) on the PLOS paper on declining wildlife numbers

Artenschutz: Wildtierbestände in Kenia drastisch zurückgegangen
https://www.uni-hohenheim.de/pressemitteilung?tx_ttnews%5Btt_news%5D=33431&cHash=262bb04dd0d966f1f26557567c0f9042

Working papers

Bedelian, C. and Ogutu, J.O. 2016. *Trade-offs for climate-resilient pastoral livelihoods in wildlife conservancies in the Mara Ecosystem, Kenya: Small Grants Programme*. United Kingdom: Overseas Development Institute. http://hdl.handle.net/10568/76544 Published June 2016

Bartzke, G.S., Ogutu, J.O., Mtui, D., Mukhopadhyay, S. and Piepho, H.-P. 2016. *Modelling trends and variation in climate of the Serengeti-Mara ecosystem*. Working Paper. Deliverable 3.1. Submitted to EU in August 2016 http://dx.doi.org/10.13140/RG.2.2.11603.17449

Opinion pieces

Kenya's wildlife populations are declining markedly as livestock numbers grow. *The Conversation*, 10 October 2016. http://theconversation.com/kenyas-wildlife-populations-are-declining-markedly-as-livestock-numbers-grow-66643

Why Kenya's wildlife populations are declining. *Business Daily*, 17 October 2016.http://www.businessdailyafrica.com/Opinion-and-Analysis/Kenya-wildlife-populations-are-declining/539548-3420022-item-0-umqls6/index.html

Development has devastated wildlife in lands south of Nairobi. *The Conversation*, 27 November 2016.http://theconversation.com/development-has-devastated-wildlife-in-lands-south-of-nairobi-69123

NTV Wild Talk series

Counting wildlife, 5 September 2016: https://www.youtube.com/watch?v=8pe5BSri2i8
Kenya's wildlife trends, 13 September 2016: https://www.youtube.com/watch?v=57hJezVhAqU

New Master's thesis from University of Copenhagen using the theory of planned behaviour to examine grazing in Maswa and Serengeti protected areas

On 5 December 2016, Andreas Søndergaard Heinrich, a Master's student at the University of Copenhagen, successfully completed his thesis. He was supervised by Martin R. Nielsen, leader of Work Package 5. The title of the thesis was Investigating the relationship between attitudes, intention and illegal grazing behaviour in the Serengeti ecosystem using the theory of planned behaviour.

Andreas' study adopted a holistic social-psychological approach to investigate the relationship between attitudes, intention and illegal livestock grazing behaviour of local communities bordering Serengeti National Park and Maswa Game Reserve.

The theory of planned behaviour was used as a theoretical framework; this theory links beliefs and behaviour. The concept was developed to predict an individual's intention to engage in a behaviour at a specific time and place, including perceived behavioural control.

The main findings were that the specific protected area, study site, perception of benefits and problems experienced, awareness of local non-governmental organizations (NGOs), household size and gender influenced households' attitudes towards the adjacent protected areas. Attitude towards the protected areas was related to the intention to graze illegally.

However, the attitude towards and the perceived behavioural control over illegal grazing and attitude towards illegal resource extraction in the protected areas emerged as the strongest predictors of intention. Intention and wealth, in turn, emerged as the most important predictors of behaviour.

These findings emphasize the need to understand and incorporate psychological, general attitude and socioeconomic factors in the development of conservation interventions targeted to change behaviour.

Andreas is now writing a manuscript for submission to an international peer-reviewed scientific journal based on the results of the successfully completed Master's thesis. The paper addresses the following specific objectives:

- Examine households' attitudes and perceptions related to the protected areas, and to conservation and illegal grazing.
- Determine what factors influence the attitudes of households towards the protected areas.
- Investigate the role of psychological, general attitude and socioeconomic factors in predicting intention and the behaviour of households with respect to illegal grazing.

Contributed by Martin R. Nielsen

New Master's thesis from the University of Copenhagen on protected area–people relations

On 5 December 2016, another Master's student at the University of Copenhagen, Ditlev Damhus, successfully defended his thesis titled Analyzing protected area–people relations in the Serengeti ecosystem, Tanzania: A conservation case study in well-being impacts and attitudes. Ditlev was supervised by Martin R. Nielsen who leads Work Package 5 of the AfricanBioServices project. The project indirectly sponsored Ditlev's thesis by providing logistical support, assistance and supervision.

Through a comparison of two villages bordering Serengeti National Park and two villages bordering Maswa Game Reserve, the study had four main objectives:

- To examine the general factors of people's relationship with the protected areas.
- To examine the local people's subjective well-being as well as the well-being impacts of the protected areas using a tool called the 'Global Person Generated Index' that focuses on criteria of well-being identified by people themselves.
- To examine the attitudes towards the protected areas as well as the factors predicting these attitudes.
- To test the use of 'Importance-Performance Analysis' as a tool to visually evaluate life domains areas in most need of improvement.

The results revealed high resource dependency, low level of interaction between staff in protected areas and the communities, and some awareness of the presence of NGOs working in the areas. Some benefits were received but perceived problems related to protected areas dominated perceptions of relationships.

The Global Person Generated Index provided valuable information on the importance, performance and impact of protected areas on the identified life domains. The magnitude of negative impact on life domains was large compared to that of positive impact. Perceptions of benefits as well as awareness of NGOs were associated with a positive attitude towards protected areas.

In contrast, living in villages bordering Maswa, perceptions of costs and the magnitude of negative impact on life domains originating from protected areas were associated with a negative attitude

towards protected areas.

The use of the Importance-Performance Analysis technique and derived analyses provides a clear visualization of priorities for improvement of protected area–people relationships. However, the technique suffers from methodological and conceptual challenges, calling for the development of a standardized method.

Of the several differences between Serengeti and Maswa, the most interesting finding is the more negative attitude towards protected areas in communities bordering Maswa, which warrants further research.

Ditlev (left) carrying out field research in Tanzania for his Master's thesis.

Contributed by Martin R. Nielsen

Testing the effect of educational lectures on knowledge and attitudes of secondary school students towards ecosystem services and biodiversity

By Solveig Trøen Børresesn, MSc student

In order to gather data for my Master's thesis, I got the opportunity to travel to Tanzania and teach secondary school students about ecosystem services and associated threats towards nature. My thesis was in the spirit of the AfricanBioServices project.

I worked in six secondary schools in Ngorongoro School District, together with PhD student Franco Mbise and Per Harald Olsen who took pictures during the research stay. The schools were Wasso Secondary School, Emanyata Secondary School, Soitsambu Secondary School, Samunge Secondary School, Digodigo Secondary School and Lake Natron Secondary School.

The aim of my study was to test if human knowledge, views and attitudes towards ecosystem services and biodiversity change after a four-day education project. Since climate change, human population growth and land use change are threats towards nature and ecosystem services, which are crucial for human well-being, it was interesting to investigate the knowledge and attitudes of students in Tanzania

before (pre-test) and after (post-test) educational lectures.

A total of 180 level-two secondary school students were involved in my project. In the post-test, I found a significant increase in the number of students who knew what ecosystem services were. In addition, they identified ecosystem services better compared to the pre-test.

The results indicate that the students got more insight on the consequences of climate change, human population growth and land use change in the post-test, but not all changes were significant. The students demonstrated an understanding of the threats that biodiversity and ecosystem services are facing.

During the education project, the respondents gained knowledge about ecosystem services and biodiversity, as well as some of the threats presented. Among the independent variables tested ('secondary school', 'gender', 'tribe' and 'pre-test/post-test'), 'pre-test/post-test' had the highest impact on the dependent variables (answer options and statements) and on the variation in the results. On the other hand, the results showed that the students were knowledgeable and had positive attitudes and views about the ecosystem and its services, even during pre-test.

Solveig gives a talk on ecosystem services and biodiversity to a class of secondary school students in Tanzania

Given that the respondents gained knowledge from the education project, I emphasize that education about ecosystem services and biodiversity should be included in school curricula for the students to gain knowledge about the environment and its importance.

I am grateful I got the opportunity to experience the school system in Tanzania and for all the help I received before and during my research stay. There are so many people I would like to thank for this experience: among others, the AfricanBioServices project, my supervisor Eivin Røskaft and especially all the secondary school teachers and students who participated in the educational program.

Solveig surrounded by a group of happy secondary school students from Tanzania.

Mapping of surface water availability for wildlife in Serengeti National Park: A research overview

By Emilian Samwel Kihwele, Senior Park Ecologist, Serengeti National Park and PhD student
Various studies have shown that surface water availability is one of the most important ecological factors driving the Serengeti-Mara ecosystem. This ecosystem is home to the last large mammal migration of ungulates, comprising an estimated 1.3 million wildebeest, the keystone species, and 0.4 million zebra which together support the lives of about 2500 lions and 7000 hyenas.

The wildebeest migration is sustained and maintained by surface water quantity and quality at spatial and temporal scales. However, long-term and systematic monitoring of spatial and temporal variation of surface water has not been implemented in this landscape.

The Serengeti-Mara ecosystem is progressively changing due to poor catchment management, loss of vegetation cover, overgrazing and excessive abstraction of water to meet livestock and irrigation demands. As a result, surface water is increasingly becoming scarce, presenting a socio-ecological crisis that threatens ecosystem functioning and human well-being.

To address this developmental challenge, I am undertaking my PhD research work under the AfricanBioservices project, focusing on ecohydrology and ecosystem functions in the Serengeti Mara ecosystem.

I will examine the water budget of the Serengeti to identify ecohydrological solutions to the developing water crisis. Among the research activities to be undertaken are mapping of dry season water availability for wildlife and monitoring of river flows in Serengeti National Park.

This study represents the first ever mapping of surface water within the Serengeti landscape. The results will be useful in informing policymakers on the conservation of biodiversity and management of water resources within protected areas.

Give us your feedback!

We welcome your feedback on this newsletter. Please feel free to share your views by sending us an email. Remember to send your contributions for the next newsletter to Bernard Bett (b.bett@cgiar.org) or Tezira Lore (t.lore@cgiar.org).

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