Project Update: December 2019

I received funding from The Rufford Foundation end of April 2019. The funds were aimed at partly supporting the genetic part of my PhD studies, i.e. biopsy darting and DNA extraction.

My work is based in Lake Nakuru National Park, the adjacent Soysambu Conservancy and Amboseli National Park. The main objective of my research project is to investigate the impact of fencing on lion population dynamics, heterozygosity, predator prey dynamics in the fenced Lake Nakuru National park and lion-livestock conflicts in the adjacent Soysambu Conservancy compared to the unfenced Amboseli National Park.

Objective: Lion population size, and structure, heterozygosity, spatial patterns and home range

Changes: This objective was split into two and expanded to cover the entire country, I will now be looking at the genetic properties of lions in Kenya and compare the heterozygosity levels and effects of translocation as a chapter on its own.

New chapter title is: "SNP genotyping to inform conservation management: a case study of lions in Kenya".

Using SNPs, genetic diversity can be measured hierarchically: at the individual level (e.g. inbreeding, heterozygosity), at the population level (allele frequencies), and at the phylogenetic level (lineage distinctiveness).

Preliminary results of our work have indicated that the lion population in southern and northern Kenya have different haplotypes (this is also evident in other mammalian species e.g. the Grevy's zebra (Equus grevyi) restricted to northern Kenya). Therefore, we intend to investigate a possible dichotomy of lion populations in Kenya based on genome-wide single nucleotide polymorphisms (SNPs); determine heterozygosity levels of the lion populations in Kenya and possibly assess the impact of fencing, translocation and/or dispersal on lion genetics.

Progress:

- 102 lion tissue samples from different parts of Kenya i.e. south, east and northern sections of the country, were genotyped for 125 nuclear SNPs and 15 mitochondrial SNPs. These samples were collected earlier by Bertola et al., 2016.
- To ensure the entire lion population in the country is well represented, a further 50 tissue samples have been collected so far using Rufford Foundation funding i.e. In Lake Nakuru biopsy darting was used and 11 samples were collected in June 2019 and October 2019.
- Samples from other parts of Kenya i.e. Tsavo, Samburu and Amboseli and a few from Lake Nakuru were collected opportunistically. Rufford Foundation funding was used collect the samples from the field for storage at the Kenya Wildlife Service (KWS) forensic lab at the headquarters in Nairobi.
- A draft paper with preliminary results is being developed as we wait for analysis

of all samples and production of results to be completed.
- We hope to have the results published in 2020.

Challenges:
- The lion population in Lake Nakuru National Park (LNNP) and Soysambu Conservancy is quite low, and it was difficult to sight lions, thus more days than initially anticipated were spent in the field, i.e. a total of 25 days.
- Lack of equipment for collecting and preserving the samples. The Kenya Wildlife Service assisted with ethanol for preserving and cool boxes (temporarily) for transporting the samples from the field to the forensic lab. The cool box was however not easy to acquire due to the needs of the KWS office.

Future plans:
- The samples collected from LNNP and Soysambu are sufficient (i.e. they representative of the lion population in both areas.
- DNA extraction will be done in Kenya.
- Analysis to begin in March after export of samples to Leiden University.
- Require more funds for genotyping samples collected.

Objective: An analysis of independent factors influencing lion ecology in LNNP and adjacent Soysambu Conservancy and subsequent human - lion conflicts in Soysambu in comparison to Amboseli National Park.

Changes: None.

Progress:
- Two lions in Lake Nakuru National Park and two in Soysambu were collared.
- Amboseli National Park: 30 adults and 15 cubs were identified.
- A total of 30 questionnaires were administered in Soysambu Conservancy.
- The two collars fitted on lions in Soysambu will work to ensure building of synergy with the community in Soysambu through provision of an early warning system.

  Through the use of an innovative conflict mitigation programme, involving testing the effectiveness of using collars to avert livestock depredation by monitoring real-time lion movement via a software developed by Savannah Tracking Ltd. By monitoring the lion's movement livestock herders/managers will be able to pre-empt and avert possible depredation of livestock by getting an early warning when lions are close to livestock bomas through triggering of boma alarms.

Challenges:
- The two lion collars in Lake Nakuru National malfunctioned after 3 months.

Future plans:
- done from July –September 2020.

Objective: Lion diet and predator-prey relations in LNNP and adjacent Soysambu Conservancy.

Changes: To undertake an analysis of lion diet using both lion hair scat microscopic analysis and DNA and undertake a comparative analysis of the results. The aim is to determine predator prey relation in both areas and test the 'predator pit theory' in the fenced LNNP.

Progress:

- From February to April 2019, a total of 10 prey transects were set up in Lake Nakuru National Park and Soysambu conservancy (seven in LNNP and three in SC).
- A total of six adult lions and three cubs were identified in LNNP i.e. three adult females and three adult males.
- Five adult lions were sighted in SC i.e. two adult females (with seven cubs) and three adult males.
- 116 scats were collected of which 60 were collected in LNNP and 56 were collected in SC.
- A total of seven prey transects were set up in Amboseli National Park.
- 66 scats were collected in Amboseli National Park.

Challenges: None.

Future plans: None.

Collaring and collection of tissue samples from a male lion in LNNP. © Hans de Longh.

Biopsy darting. © Atif Chughtai.