

## **Project Update: February 2018**

### **Introduction**

The Albertine Rift Valley stretching from the northern end of Lake Albert to the southern end of Lake Tanganyika is one of Africa's most important sites for the conservation of biodiversity. The Albertine Rift has been identified as one of the major biodiversity hotspots worldwide (Huntley, 1992) and as an area with an extraordinary high rate of endemism (Pomeroy, 1993; Hill *et al.*, 2002; Plumptre *et al.* 2003). In 2016 the Government of Rwanda established Gishwati-Mukura NP located in the Albertine Rift Valley western part of Rwanda. The Gishwati Forest is a secondary montane rainforest fragment located south of Volcanoes National Park in western Rwanda (1°49'S, 29°22'E), and is part of the Congo-Nile Divide forest complex on the eastern escarpment of the Albertine Rift Valley.

Gishwati Forest has a history of deforestation extending over the past 50 years: protected as a forest reserve in 1933 (70,000 ha), it measured only 28,000 ha in the 1970s, and had shrunk to 600 ha in 2002. In 2008 the Rwandan Government launched a campaign to restore Gishwati Forest and its size had increased to 1,484 ha by 2016. Since 2008, impressive conservation impacts have been achieved at Gishwati: 600 ha reforestation area was added to the core forest and is naturally regenerating. In September 2015 the Gishwati-Mukura NP was established with a total area of 3,427 ha (Gishwati: 1,440 ha, Mukura: 1,988 ha) surrounded by a buffer zone with a surface area of 992 ha. Gishwati Forest is still home to important biodiversity including 58 species of trees and shrubs, four species of primates (eastern chimpanzee, golden, blue, and L'Hoest monkeys) and more than 200 bird species (including 20 that are endemic to the Albertine Rift). The chimpanzee population increased from 13 in 2002 to 20 in 2012, while current estimates put the number around 30. Other mammals alleged to occur in the park include the bush pig, black fronted duiker, southern tree hyrax, serval cat and the African golden cat. Thus, my study aims to quantify the non-primate mammalian wildlife abundance and distribution in Gishwati - Mukura National Park, Rwanda for the first time using camera trapping and questionnaire interview based techniques. This study will help to understand the impact of forest fragmentation and degradation on mammalian biodiversity. In the medium-term it is further envisaged to monitor how mammalian population trends relate to conservation efforts over time.

### **Methods**

I am compiling data on the presence and relative abundance of ground-dwelling mammals, i.e., ungulates and carnivores, in the newly established Gishwati-Mukura NP using camera traps and questionnaire interview based techniques. The sampling design is comprising of 16 camera traps (Ltl Acorn 6310), set in a standard grid format, 500 m apart, in four quadrats (two in Gishwati, two in Mukura). The total trapping scheme is consisting of 64 camera trapping points (16 cameras x 4 quadrats), each point was (will be) sampled over a period of 90 days. This will result in a total of 5,760 (64 cameras x 90 days) camera trapping days. To generate the sampling grid within each quadrat, the co-ordinates of 16 cameras were plotted using the Garmin Map Source software, placing each camera at the center of every other 0.25 km<sup>2</sup> grid cell. Camera positions were located at wildlife tracks, marking sites, water or mineral sources within a 50 m radius of

the predetermined location. Camera trapping image metadata were (and will be) extracted into Excel worksheets using a digital Picture Information Extractor (PIE; PIC Metasystems). Analysis have not yet started but it is planned to fit occupancy models to detection/non-detection (presence/absence) data using 'Presence' software and to determine species occupancy, detection rates, and diversity indices.

The interview surveys have completed and targeted only people who either worked on their own land (gardeners), who claimed to own the adjacent cattle ranch (cattle owners), who frequently graze their own (or another persons') cattle in the area (herdsmen), or who stated to continuously collect fire wood in the forest. I interviewed respondents at the spot (in their garden, in the forest or occasionally at their homes), using a semi-structured questionnaire. Each interview took around 30 min to be completed. I targeted only permanently resident adults (>18 years) as respondents. I presented photographs of large, black duiker (yellow-backed duiker), small, red duiker (Weyns duiker, black-fronted duiker), bushbuck, African (forest) buffalo, red river hog or bush pig, side-striped jackal, honey badger, genets (servaline or blotched genet), palm, civet, leopard, golden cat, serval cat, chimpanzee, baboon, L'hoest monkey, tree squirrel and giant pouched rat to each respondent prior to the interview, and respondents who did not know either species were not interviewed. GPS coordinates of the site at which the interview was recorded were taken using a Garmin GPS eTrex 10. Interviews were carried out by myself conversant with the local language (Kinyarwanda). Pre-testing of questionnaires was done prior to the study and data will not be included in the analysis. Questions were posed to obtain information on the non-primate mammalian wildlife abundance and distribution inside Gishwati-Mukura NP, i.e. the time since the last non-primate mammalian species was encountered and the frequency of encounters during that time. The interviewees were asked whether they ever saw a non-primate mammalian species in Gishwati-Mukura NP. If yes, they were further asked how long ago (in days) the last encounter was, and if, how often they encounter that species. Furthermore, the interviewees were asked whether the animals damage their crops. If yes, they were asked what crop/livestock was raided, how they estimate the damage in % of expected yield, if they can tolerate the species to be on their land, if they try to repel the wild animal, and in what habitat they encounter the wild animal (garden, cattle ranch, forest, others).

## **Preliminary results**

The data collection (using camera traps) for this project has been nearly completed, i.e.: two grids in Gishwati forest and one in Mukura forest. Interviews technique was fully completed outside of the national park. The interview survey involved a total sample of 120 independent participants, i.e.: 60 people around Gishwati and Mukura. The data collection inside Mukura forest is still ongoing and I am currently nearly at the end of data collection. Fifteen cameras out of 16 installed in Gishwati's first grid were subsequently installed/used in Gishwati forest (2<sup>nd</sup> grid) and are now used in Mukura forest 2<sup>nd</sup> grid). However, due to human interference in Gishwati forest, one camera was damaged and is now under maintenance. So far the cameras have spent 270 days or 6480 hours out in the field in three grids. The data from cameras in three grids were downloaded and the camera trap downloads resulted in 1101 photos with animals and 6746 blanks. Gishwati grid 1 and 2, 294 images with animal and 304 blanks for grid one and in Gishwati grid 2,

144 pictures with animal and 1745 blanks were taken, while for Mukura only 654 images with animal and 4691 blanks were recorded. The list of non-primate mammalian species recognized from the current camera trapping images in Gishwati-Mukura NP includes: *Canis adustus* (side-striped jackal), *Funisciurus carruthersi* (Carruther's mountain tree squirrel), *Felis serval* (serval cat), *Genetta tigrina* (blotched genet), *Nandinia binotata* (African palm civet), and Emin's giant pouched rat (see Figures 1 & 2). *Nandinia binotata* was only recorded in Gishwati. The results from camera trapping match the results from interviews, except *Funisciurus carruthersi* (Carruther's mountain tree squirrel) and *Nandinia binotata* (African palm civet). The species that are both recorded inside and outside the national park and which are claimed by the local people to raid their crops (maize), snatch chicken or damages beans and other crops are *Canis adustus* (side-striped jackal), *Genetta tigrina* (blotched genet) and Emin's giant pouched rat.

**Figure 1: Non-primate mammalian species of Gishwati\_Mukura NP**



Left: *Canis adustus*. Right: *Funisciurus carruthersi*.



Left: *Felis serval*. Right: *Genetta tigrina*

**Figure 2: Non-primate mammalian species of Gishwati\_Mukura NP**



Left: *Nandinia binotata*. Right: Emin's giant pouched rat.

Therefore, after the completion of interviews around Gishwati-Mukura National Park, I used 14 days (seven days around Gishwati and seven around Mukura) educating and raising awareness of wildlife mammals in Gishwati-Mukura National Park. I am also preparing an informative brochure for the awareness of non-primate mammals to the local community around Gishwati-Mukura National Park, Rwanda Environmental Management Authority (REMA) and Rwanda Development Board (RDB), Department of Tourism and Conservation. Several copies of this brochure is planned to be distributed to the schools that are around 7 km of Gishwati-Mukura National Park. Final report of the project is in progress and the result will be published in the peer reviewed journal.

## References

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