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SCIENTIFIC EXPEDITION REPORT I

Rethy and LogoHealth Area, Djugu Territory, Ituri Province, Democratic Republic of the Congo

06 – 20th MARCH 2016

**RELICT, REFUGE and FRAGMENTED ALTITUDE FOREST:
FAUNA AND FLORA INVENTORY, and ECOLOGICAL NOTES ON AN ISOLATED
CHIMPANZEE POPULATION (*Pan troglodytes schweinfurthii*) - PART I**



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ABSTRACT

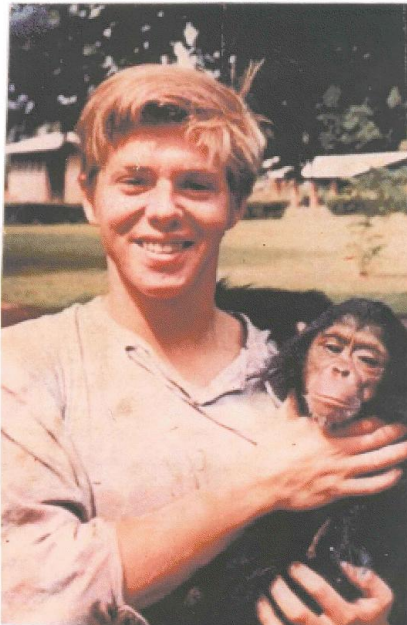
This report presents the results of an exploratory mission and preliminary biodiversity inventory in a mountainous region of the Ituri province, Democratic Republic of Congo. The main goal of the mission was to document the presence of primates and in particular of chimpanzees (*Pan troglodytes schweinfurthii* Giglioli, 1872). Direct observations of 6 primate species were performed. Chimpanzees have not been directly observed but were heard and recorded. This is the first scientific report stating the presence of chimpanzees and documenting evidence of their presence in this area which thus needs to be added to their current confirmed (with GPS data points) distribution map. A total of 48 nests were recorded with a nest encounter rate of 1.9 to 3 nests / km in the two fragmented forest blocks explored. The height of the nest, the state of degradation (fresh or dry) and host trees (or support) on which the nests were observed were identified and a photographic collection of selected flora (on a total of 202 specimens) was carried out for supplying a digital herbarium. Besides landscape ecology (habitat description), threats were identified, and faeces were collected for DNA analysis, diet description and zoonotic infectious agents screening (*Onchocerca volvulus* as this area is hyperendemic for Onchocerciasis). Camera traps (15) have been installed in the two forest blocks explored ; the images will be collected in mid-June 2016 and end of August 2016. Inventories and observations documented in this report demonstrate the specific diversity and richness of these relict forests in the western strip of the Albertine Rift and demonstrate the urgent need for their management and conservation.

ACRONYMS

CIFOR	<i>Center for International Forestry Research</i>
FARDC	Forces Armées de la République Démocratique du Congo
FFN	Fond Forestier National
ICCN	Institut Congolais de Conservation de la Nature
ISPT	Institut Supérieur Pédagogique et Technique
MECENT	Ministère de l'Environnement
RBINs	Institut Royal des Sciences Naturelles de Belgique
UA	Université d'Anvers
UNIKIS	Université de Kisangani
WWF	<i>World Wildlife Fund</i>

CONTEXT

In October 2015, during a case contro study on epilepsy and onchocerciasis in Rethy area, several villagers mentioned the presence of baboons and chimpanzees in the forest fragments of the valley down the Lendu plateau overlooking the Albert Lake in the DRC. At the end of the day, while climbing uphill, we heard the chimpanzees and the waypoint recorded. Our guide, also informed us on the fact that in the years 1970-1980, the Rethy mission welcomed a series of Amercian citizens one of whom was hunting chimpanzees in the valley and a picture – here below - of the time was found on a website dedicated to the period where the mission was actively supported by US citizens.



Dr Laudisoit and the UNIKIS team planned and performed an exporatory expedition in the area in March 2016 to try to document the site and gather evidence of chimpanzee presence in the area.

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I. INTRODUCTION

The Ituri province and particularly the region of Rethy-Kpandroma was the stronghold of retrenchment of the Lendu and the MONUSCO HQ in resolving the conflict in Ituri and reintegration of various armed militias in the regular Congolese army (FARDC) (Tamm, 2013). The province is now well attended primarily by humanitarian NGOs and the military more than by scientific research teams. However, WHO has rehabilitated a center for research on tropical diseases in the Protestant mission of Rethy and helped replace gradually the region on the map of “frequented” areas. Despite these actions, the region is classified as a “red zone” and international research missions remain very infrequent.

The current Ituri province has experienced dark days during the ethnic wars of the 2000s and border conflicts that have marked its recent history. It is also perforated and polluted by the miners and - given its cooler climate - provides with vegetables the town of Bunia, while its lowland forests is fuelling uncontrolled and illegal cross-border timber trade. Moreover, the rapid conversion of the mountain forests, especially on Mount Aborro, into agricultural area has disfigured the Lendu plateau ; its slopes plunging into Lake Albert today are the last refuges of a diverse fauna and flora once abundant throughout the region. The Lendu plateau and the slopes descending towards Lake Albert are classified as IBA or important bird biodiversity area. This area is little known and explored scientifically but the few faunal surveys conducted have reported high levels of fauna endemism, especially of birds and herpetofauna (Lawrence, 1956; Pedersen, 1997 Demey & Louette 2001; Fishpool & Collar, 2006; Evans et al, 2011). Some ornithological surveys in the region by Vrijdagh (1949), Prigogine (1985) and Pedersen (1997) were synthesized by Birdlife International in 2000 and reported the presence of 37 species of birds. This list by no means is exhaustive and only reports 26 common species (IUCN: LC), five unrated, one endangered (IUCN: EN; *Chlorocichla prigoginei*), four Near Threatened (IUCN: NT; *Columba albinucha*, *Coracina graueri*, *Tersiphone bedfordi* and *Kuperonis chapini*) and one vulnerable (IUCN: VU; *Muscicapa Lendu*). The alleged fauna and flora diversity of the current fragmented gallery forests therefore result from the combination of recent deforestation and removal of animals in the rugged areas most difficult to access.

The erosion of biodiversity is closely linked to deforestation, fragmentation and degradation of all the natural habitats. The DRC also hosts many primate species whose populations are declining and fragmented by the aforementioned disturbances. Wild chimpanzee populations and specialized birds face extinction in all their distribution range and their conservation requires a multi and interdisciplinary approach. In particular, fragmented populations or relictual chimpanzees and bonobos populations have been found in areas of the country where their presence had not been reported before the 2000s (Kawamoto et al, 2013). During a mission in Ituri, a chimpanzee population was spotted in a high altitude area of the region Rethy - between 900m and 2000m - while no current distribution map (Fig.1) as well as the latest predictive models inform of their presence there (Plumptre et al, 2011).

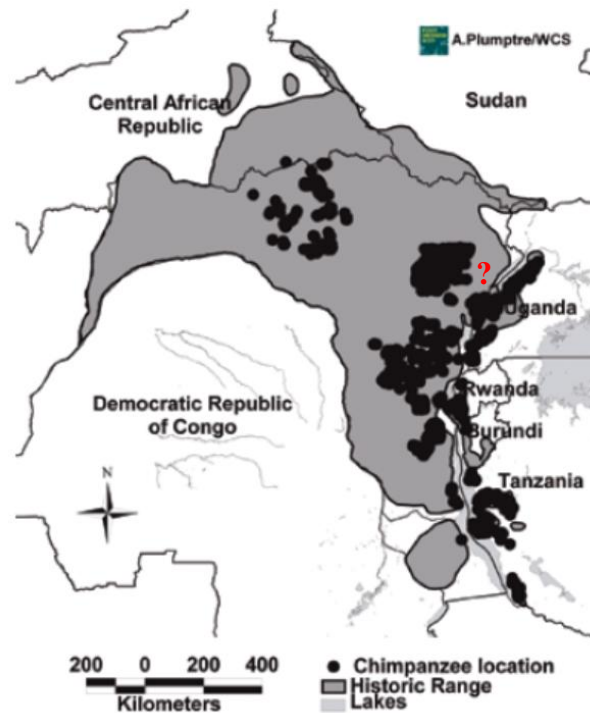


Figure 1. GPS locations of chimpanzee *Pan troglodytes schweinfurthii* over the past 10 years (Source: Plumtre et al, 2011).

These chimpanzees should theoretically be linked genetically to the North Western population of the *Pan troglodytes* subspecies *schweinfurthii* such as those encountered in the provinces of the Ubangi, Uélé and Ituri. This population is characterized by a larger skull, a long face, and skull and broader zygomatic arches than southern populations (Maniema, Uganda, and Marungu) (Groves, 2005). In addition, villagers reported the presence of baboons (*Papio anubis*) and at least five other species of primates (monkeys and colobus). No article on mammals in these forest fragments could be found by combining various search MESH terms in French, Spanish and English in various search engines. It therefore appears that the empirical evidence on diversity and the presence of mammals and the perception of their presence by local people is unprecedented.

The uniqueness of this site hosting at least 7 species of sympatric and syntopic non-human primates in the area makes it an ideal study site that requires urgent attention in order to issue protective measures to establish a Forest Management Community Managed Forest and attract support from national and international institutions. This project also aims at gathering historical data on the area, and on the fragmentation of its primary forests to estimate the direct threats related to the reduction of forest cover (examination of a time series of satellite images of the study area).

Scientific evidence presented in this report is only the beginning of a three steps biodiversity inventory (next visits are planned in June and September 2016) and give preliminary ecological notes on the fauna and flora of the region. In particular, this report describes the behavioral research (using camera traps and direct observation), genetic (collecting excrement and possibly skins or animal remains), ecological (rhythm, reproductive biology and diet) and mapping activities in progress.

II.OBJECTIVES

The main objectives of this first mission are to describe a relict fragmented forest, its genesis, and make inventories of the flora and fauna with a special accent on chimpanzees.

This area is located in the Province of Ituri - classified as red zone in terms of security – and has not been explored previously by scientific teams. The selected fragments, forest Ndeke 3 and Nzerku were selected especially given the reported presence of chimpanzees during a research trip on epilepsy and onchocerciasis in October 2015 (see §Contexte). Therefore, the mission was also aiming at raising awareness in the community to the sustainable management and protection of the forest by explaining the consequences of deforestation and forest degradation, and also tried to identify the major threats.

The specific objectives were to

- i) describe the botanical characteristics of the fragmented altitude forests
- ii) obtain behavioral sequences (sequence analysis of camera traps) of wildlife by focusing on chimpanzees (*Pan troglodytes cfr schwenfurthii*)
- iii) collect material and DNA (collection of faeces and hairs) for species confirmation, parasite and zoonotic agents detection
- iv) estimate the size and diversity, as well as the rate of reduction of the forest by combining groundtruthing of vegetation communities and remotely sensed images processing
- v) record local / indigenous knowledge on wildlife (especially non-human primates and two endemic bird species), flora and threats to local forests by interviewing chiefs, notables, scientists and villagers living in the prospected region
- vi) provide perspectives of research, conservation and management of this unprotected area.

II. MATERIAL AND METHODS

2.1. Research Site: general situation

Given the easy access to health statistics, the demographics of the study area are presented according to the territorial division of health. The study area is located in the Democratic Republic of Congo, Ituri province, Djugu territory, Rethy health zone (population: 149 472 inhabitants) and Linga health zone (144 179 inhabitants). The area is on the edge of the Lendu Plateau (Fig. 2), a large mass of 410 000 ha, with altitudes ranging between 1700 and 2455m, and located at the northern end of the Albertine Rift, west of Lake Albert in the northeast of the DR Congo. It is bordered to the north by Uganda, while its oriental part is punctuated by a series of mountain of which Mount Aboro (2455m) is the highest and located in the Linga health zone.

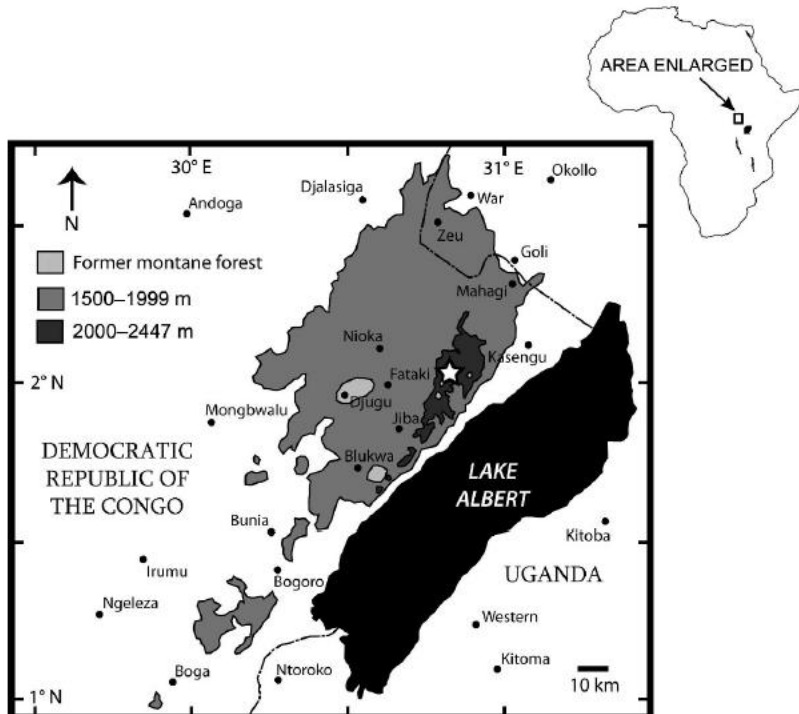


Figure 2. Plateau Lendu and former forest cover from Vrijdagh 1949 (Source: Greenbaum et al, 2012).

The Lendu plateau is now totally deforested and mostly covered with agricultural land and grassland with scattered trees; it was covered till the 70s by a dense mountain forest above 1500 m.

When planning the expedition, we arbitrarily named the various forest fragments or blocks as FG1, FG2 and FG3 (Fig. 3). The FG1 block is located in the village of Ndeke 3, in the Rethy health zone and the FG2 block is located in Nzerku village in the Linga health zone. At the administrative level, the explored area is shared between two population groups, the Ndeke and Buba. A smaller fragment also persists to the east of the FG1 block or Bbai forest, and is called the Zabu group; but this area has not been explored.



Figure 3. Forest Fragments and arbitrary zoning of blocks 1-3 (denoted FG1 to FG3).

Plastic maps were prepared to facilitate the visualization of areas to explore, and a series of points (waypoints) were recorded in the GPS prior to the team fieldtrip via conversion of KML files in gpx file using free softwares Basecamp © Garmin. These points correspond to dense forest areas.

2.2. Georeferencing and mapping

The geographical location of villages, houses, camera-traps (CT) and other fauna and flora observations were georeferenced using GPS Garmin 60CSx and 60Cx. The calculation of surfaces and the production of maps are in progress using the QGIS software and ENVI for landsat image chronological sequence analysis. In each forest fragment - FG 1 and FG2 - two to three exploratory walks (or recce) were randomly conducted by heading in the direction where chimpanzees were reported by the interviewees (see further). All tracks and waypoints (remarkable flora, fauna, observations, faeces, etc..) from the different devices were combined in gdb files and GPX, KMZ and KML for later use. They are available upon request to the members of the team.

2.3. Botanical description of selected forest fragments

The tree species encountered during the recce, those present in the forest canopy and useful species used by chimpanzees were systematically identified; a pair of binoculars was used to confirm the observations in the canopy. Furthermore, a series of samples of plant organs - mainly the leaves - were collected for subsequent botanical identification. Some were dried in a press, the other preserved in silica gel.

2.4. Description of the chimpanzees resting sites

The location and counts of chimpanzee nests identified during walking represents the most objective way to estimate the density and size of their population. During each recce, the nest site and individual nest - if further than 3m apart (>3m GPS accuracy) – locations were recorded and the walk track considered to start at the entrance to the forest and end at the exit of the forest.

The general description of the resting sites where nests were located was completed by the inventory and description of the trees species used as support, the condition (dry/fresh) and the height (m asl). Some nests available without climbing equipment were measured (N = 3). Traces of passage, play, bite signs in bark or leaves, ripped tree trunks, and faeces were recorded, measured and / or photographed with a metric scale, collected and stored if applicable (in silica gel for plants and 70% ethanol for faeces) and georeferenced. The diameter at breast height for host trees was not measured but will systematically during the second mission in June 2016.

2.5. Monitoring of chimpanzees

The use of camera traps (CT) will help collect data on wildlife diversity and to study more specifically the population of wild chimpanzees in the region. Using CTs combined with interviews maximizes the chances of getting images and videos footage, and most importantly counts and behavioral sequences of groups and individual chimpanzees. On the basis of information provided by respondents during interviews and informal discussions and during the recce (and taking into account the security), the field team identified suitable areas to place camera traps.

The devices were placed in particular in places where clear evidence of the presence of chimpanzees were recorded. The Bushnell CT (3 models) have been programmed in hybrid mode with different sensitivity settings depending on where they were placed (number of consecutive images per trigger, 1080p video resolution, a picture resolution of 8 to 14 megapixels, with or without field scan) and systematic printing of the trap number, date and time.

2.6. Interviews, discussion and community dialogue

Interviews and informal discussions were organized to / from:

- 1) obtain baseline information on the presence-absence of chimpanzees, other primates and two endemic bird species and their name in the local language
- 2) obtain data on the location of the target species in order to identify priority areas of interest to explore and where to put the CT
- 3) investigate the popular attitude towards chimpanzees and use of this and other target species, in whole or in part, in the local culture and if beliefs are associated to them
- 4) develop a questionnaire and field record sheets that will be used during the future missions

III.RESULTS

3.1. Characterization of forest fragments

Ecosystem of medium altitude fragmented forest galleries (800-2000m) the study site is located on the eastern slope of the Lendu Plateau bordering Lake Albert in the Rethy Kpandroma-region in the Ituri Province. The area is mainly converted to agricultural land; the landscape is dominated by active farmland or fallow. The valley floor is characterized by wetlands, cropland and agricultural wasteland and by palm plantations. Marshes are used to grow rice while cassava, peanuts and other cash crops such as corn, sesame and sorghum are planted on the slopes of the mountains. The characteristic species of the forests include *Alstonia congens*, *Chrysophyllum spp* *Drypetes sp sp* *Cytopetalum*, *Pycnanthus angolensis*, *Canarium shweinfurthii*, *Strombosia cf. shefflerii* ... etc. (Full list by forest fragment in Annex I). In total 24 and 25 plant families were recorded in FG1 and FG2 blocks for a total of 100 and 102 observations respectively, with Moraceae and Malvaceae dominating. Primary and secondary forests typically consists of and are reduced to narrow strips of "riverine" forest aligned on the banks of the fast flowing rivers, coming down the Lendu Plateau into Albert Lake. the river marks the geographical boundary between the two groups Ndeke and Buba.

Specifically, the 10, 11 and 16 March 2016, the Tsili forest composed of two valleys Bai (Koda River) and Ndoogo located in Ndeke 3 and Kpagboma City were explored. On 03/12/2016, the team moved to Nzerku southwest of Ndeke 3. On 13 and 14.03.2016, two valleys and forest fragment were investigated; either Zalu forest and forest Tchoo and Dolokpa. The boundaries of these forests consist, south and east, and Koda Tshodha rivers, to the east by the hill and the Baidha River, and the north by the river and Thedha Ndeke group.

3.2. Perception of chimpanzees and wildlife: interviews and informal discussions

3.2.1. Chimpanzees Shag (*Pan troglodytes schweinfurthii*) - IUCN: EN

During this pilot mission three interviews have provided key information related to the presence of chimpanzees. The reported facts are transcribed and commented below.

Interview 1 (M20, 25 and 30 years - Farmer)

Respondents are two young men residing in the village of Ndeke 3. They have fields in the FG2 and are the first to contact us in the village of Ndeke 3 to talk about chimpanzees. They will become our major village and forest guides for the entire stay in the region. The two young men report having seen chimpanzees there about 6 along the Ngridha and Yada river in the valley , 2h walk from Ndeke 3. They report having seen not far from their field between 25 and 27 February 2016 a female and her young, she was aggressive. They rest and sleep in nests they make a new nest every day in the forest, close to their field, not far from a small stream. They apparently eat insects.

They tell the story of a FARDC soldier named Pablo who lent his gun to a young man from the town of Nyoka forest (on the top of the mountain to Kpandroma) to go hunting. These chimpanzees have black face. They do not eat chimpanzees because they do not have the opportunity to catch them. If they caught them they would eat them. It is not forbidden by tradition or culture they try elsewhere to trap them but say they are intelligent and do not fall into traps. They report that two hunters who live near the forest Bbai and Ndoogo (FG1) hunt themselves and sometimes sell meat or buy from other hunters. Their houses are about 1 hour walk from Ndeke 3.

A third villager (M30 years) intervenes and says that hunting is carried out in company of dogs with spears, bows and arrows. It also mentions the presence of a bat colony in a rock forming a cave near the village of Ndeke 3. This first interview guided exploratory walks and the main directions taken during the first mission.

Comment

Hunters of Ndeke 3 were absent during the stay but their wives told us about chimpanzees (see interview 2) performed the same day.

On March 11, 2016, a guide led Mr Otis to the second zone of the block FG2 where the chimpanzee and mother were seen by the first two interviewees. Mr Otis has taken the coordinates and was able to estimate the number of hours of walking (3h). It was then decided that a base camp would be necessary to go exploring the FG2 block; and the team headed to FG2 on March 12th, 2016.

Interview 2 (F25 years- hunter 's wife)

The young lady informed us that the 10.3.2016 after our visit (we briefly explored the forest fragment FG1 the day before), chimpanzees screamed nearby, close to the river Koda. She noted that from time to time young people of the community of Nyoka and Kpagboma (top of the mountain) hunt with dogs, and hire her husband (hunter). They come around 3 times during the dry season after the bush fires. I asked her if she had preserved bones or skulls of chimpanzees...she took out bones humerus, femur and vertebrae (Fig. 4).



Figure 4. Bone of chimpanzee found in a hunter's house in Ndeke 3.

A skull was supposedly present in the house of a second hunter but sold it in Kpandruma market. Samples are taken from the bones. A bone is grated. We ask why. She replied that her husband really knows these things but simply explains the process.

They burn the condyle, or bone, make ashes and cuts in the patient's skin (tattoos with razor blade) and mix bone ashes with the blood. It treats rheumatism. She says you can also heat the bones near a fire and append hot bone against a strained or sprained muscle. I asked whether it works with other bones, she said no. When asked if she ever tried, for example, cow bone, she seems embarrassed ... she finally said no. We asked her how she can say that this treatment is only possible with the bone of chimpanzees. She laughs and no longer comment and refers to the knowledge of her absent husband who is a healer (and hunter). She doesn't mention other diseases treated with chimpanzee bones or other uses.

Comment

It seems that a change in mentality is possible by informing people about the protection status and risks related to the hunting of chimpanzees and other protected species and demonstrate the efficacy of other bone treatment!

Interview 3 (M52 years - chief secretary of Nzerku, and farmer)

The man lives on the Zalu hill (FG2), near a stream and a site where chimpanzees come to rest barely 700m from the house. He saw a dozen of chimpanzees near his house, and heard the shouting around 8-9am during the previous 3 days. He speaks of two "kinds" of chimpanzees who do not eat together and have faces of different color. Some have the face and hands black and the others face and hands pink or clear; they have the same size. They sleep in nests and move every day; if they do not move is that female has given birth. The nests are visible and easily recognizable, and are reached quickly from the house. He knows the appearance of footprints and hands of chimpanzees, and some plant species they eat as well as the shape and appearance of their droppings. He states that chimps have spent the past three days in the area near the bottom of the parcel, and went towards the top of the Sépéada river. He stated that another river, the river Roda is an easily accessible site where chimpanzees hide and gather but needs 5h walk. The place is too far for this first exploration, it will not be visited.

He does not hunt chimpanzees and do not eat them because they are too similar to men.

Asked whether he would react if people came in order to hunt chimpanzees, he replied that the only people killing chimpanzees are military and use their weapons. The last time was in 2013 or 2014, the FARDC came, massacred many individuals and paid the villagers to transport the smoked meat on site Kodjokpa, their camp.

He admitted killing baboons because they destroy crops but do not eat themselves because they have hands like that of a man like chimpanzees. Other species of arboreal apes are hunted with bows, arrows and spears; this is good meat for them.

Comment

The testimony of villagers on chimpanzees with black face and clear or pink face and not blending is interesting but clear face may become black with age as seen in *P.t.schweinfurthii*. Indeed, populations of *Pan troglodytes schweinfurthii* have black face, and *a priori* this population of Ituri should have black face as mentioned in the introduction. Before making any hasty conclusions about the presence of two sub-species in the region, we must ask the question of compliance by the villagers (do not mix all the time or only for eating and sleeping?) ; results of camera traps and perform genetic analysis on faeces collected, hoping to have collected faeces of two "groups".

3.2.2. Other wildlife

During the recce and interviews, villagers were asked about the presence of other mammals. Respondents named the animals in local or vernacular names; confusion between species of the same genus was identified in mammals (Table 3).

Local Name	Latin Name	FG1	FG2	FG3
Mbuu	<i>Pan troglodytes sCT.</i>	X	X	X
Ngrrr	<i>Papio anubis</i>	X	X	X
Lei	<i>Chlorocebus aethiops</i>	X	X	X
Bei	<i>Colobus guereza</i>	X	X	X
Lidda	<i>Cercopithecus mitis</i>	X	X	X
Buu	<i>Colobus badius</i>	X	X	X
Lola	<i>Cercopithecus ascanius</i>	X	X	X
?	<i>Cercocebus</i>	X	X	X
?	<i>Cricetomys sp.</i>	X	X	X
Thidha	<i>Hystrix sp.</i>	X	X	X
Baidha	<i>Syncerus caffer</i>			X
	<i>Potamocheirus sp.</i>		X	X
Rrda	<i>Orycteropus afer</i>		X	X
Kpe	<i>Manis gigantea</i>		X	X
?	<i>Thryonomys swinderianus</i>	X	X	X
Lo	Chiroptera	X	X	X
?	<i>Cephalophus dorsalis</i>		X	X

Table 3. Local mammalian fauna and presence / absence in the forest blocks in the region

We also investigated the presence of rare species of birds and / or endemic species is the Congo peacock (*Afropavo congoensis*) and shoebill (*Ballaeniceps rex*) considering the proximity of papyrus swamps in Lake Albert. The residents reported the presence of a bird that has a peak or a decoration on the head, which has blue, red and green feathers, some (red and blue) were given to the team (Fig. 5). Some mention the size of a pigeon and other those of a fowl. Drawings of Congo peacock, guinea fowl, touracos, doves and cougals were produced. Guinea fowl are excluded, turaco, and cougals are recognized and feathers were given to us (Fig 5). They eat this bird.



Figure 5. Turaco (*Turaco cfr leucolophus*) feathers.



Figure 6. Birds commonly seen in the region

During the recce and hikes between the two base camps, the skin of a python (*Python sebae*) of 3m60 was photographed and that of a Gabon adder (*Bitis gabonica*) too (Fig 7 A and B.); samples were taken from the two species.



Figure 7. Skins of *Bitis gabonica* (A) and *Python sebae* (B)

A chameleon was found dead on the trail of Ndeke 3 and preserved in alcohol in toto; it is perhaps *Kinyongia aldofrederici* or a paratype of a new endemic species of the Lendu plateau described by Greenbaum *et al* in 2012 (Fig. 8). The new species belongs to the mountain genus *Kinyongia* and is named *Kinyongia gyrolepis* sp. (Sauria: Chamaeleonidae - Circular-scaled Chameleon)..



Spécimen vivant observé à Ndeke 3



Greenbaum *et al*, 2012



Spécimen mort collecté à Ndeke 3

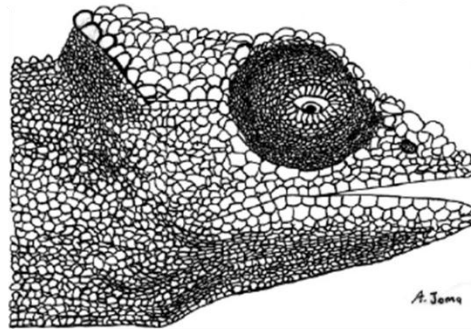


Figure 8. Chameleon collected during this mission compared to the picture and plate of the article by Greenbaum *et al*, 2012.

3.3. Direct and indirect observations of chimpanzee presence

3.3.1. Detailed description of recce and resting sites (nests)

In total 6 major nest sites have been identified and geolocated within the 2 blocks. The characteristics of the nests by site are given in the following paragraphs. Chimpanzees of this area build nests in the trees ; with preferred species to build nests identified in the following families : Sapotaceae (*Chrysopyllum spp*, *Manulkara sp*) Strombosiaceae (cf. *Strombosia shefflerii*), Anacardiaceae (*Pseudospondias microcarpa*, *Monodora myristica*, *Isolona congolana*) Leucythydaceae (*Cythopetalum sp*), and Bignoniaceae (*Fernandoa Adolphi-frederitchii*).

Each recce trail length was recorded on the GPS and the route considered complete at the exit of the forest. The number of nests per transect was calculated by dividing the total number of nests per kilometer met undirected (random recce). These data are detailed block and date below.

* BLOCK FG1

The 10, 11 and 16 March 2016, FG1 was explored with two main gallery forests and valleys namely, Bai (river Koda) and Ndoogo in the Ndeke-Kpagboma villages. Villagers interviewed reported that chimpanzees inhabiting these forest fragments have a black face.

Recce DAY 1 (10 March 2016) - Hill Ndeke 3 - Forest Bbai

Description of the recce :

trip odometer: 2.1km - Duration: 2 hours - nest encounter rate: 0 nests / km

After installing the base camp Ndeke 1 to 3, and the interview of two young men, we were led by two guides to the hunter K. but was absent. We continued the recce in FG1 from the hunter's house, towards the river Koda and continued the exploration to the South on the left bank of Koda river. No nest and no chimpanzee signs were spotted. Many traps for *Cricetomys sp.* (Gambian giat Rat) were observed under the rocks and baboon trap near the exit of the forest near cultivated fields. Faeces of baboons were harvested, 3 Blue Monkeys and 4 Colobus guereza were also observed. All collected samples were stored at CSB / Kisangani.

Recce DAY 2 (11 March 2016) - Hill Ndeke 3 - Forest Bbai

Description of the recce

trip odometer: 4.1km - Duration: 5:16 - nest encounter rate: 1.9 nests / km

FG1ZN1 site

The guides took us to the second hunter who was also absent. His wife answered our questions (interview 2) concerning the presence of chimpanzees. The hunter house is located at the edge of the forest that goes down steeply toward the river Koda. After passing through a first secondary clearing area and placed 2 CT , the descent was initiated to Koda river. Quickwaters and waterfalls are numerous along the Koda river – where Simulid (blackflies) breed - and in this particular place CT was placed near a sort of beach with easy access to water. Signs (food debris) and traces of animals were observed and followed up until reaching the first chimpanzee group of nests (site FG1ZN1).

A total of 8 nests, including 2 former nests were identified on this site, at an average height of 13.4m (Table 4). Nests were distributed on either side of the river Koda (Fig. 9). Faeces were collected in the three most fresh nests located 3-5m of Koda river. CT with a focal length of 460mm was placed at the foot of the tree where the nest n°7 was built, and where recent tracks were noted. In total 4 CT were placed March 11, 2016 in the FG1 block.

Site	Nid	Date	Hauteur (m)	Age des nids	Arbre hôte (suCTort)
FG1ZN1	FG1N1	11/03/2016	12	< 1semaine	<i>Cytopetalum sp.</i>
FG1ZN1	FG1N2	11/03/2016	12	< 1semaine	<i>Cytopetalum sp.</i>
FG1ZN1	FG1N3	11/03/2016	14	< 1semaine	<i>Cytopetalum sp.</i>
FG1ZN1	FG1N4	11/03/2016	15	< 1semaine	<i>Chrysophyllum sp.1</i>
FG1ZN1	FG1N5	11/03/2016	11	< 1semaine	<i>Fernandoa adolphifredericii</i>
FG1ZN1	FG1 N6	11/03/2016	22	pas visible	<i>Khaya cfr ivoiriensis</i>
FG1ZN1	FG1N7	11/03/2016	9	ancien	<i>Menadora myristica</i>
FG1ZN1	FG1N8	11/03/2016	12	ancien	<i>Chrysophyllum sp.1</i>

Table 4. Characteristics of nest site FG1ZN1.

FG1ZN1 – Ancien nid



FG1ZN1 - Grand nid

Vue générale FG1ZN1

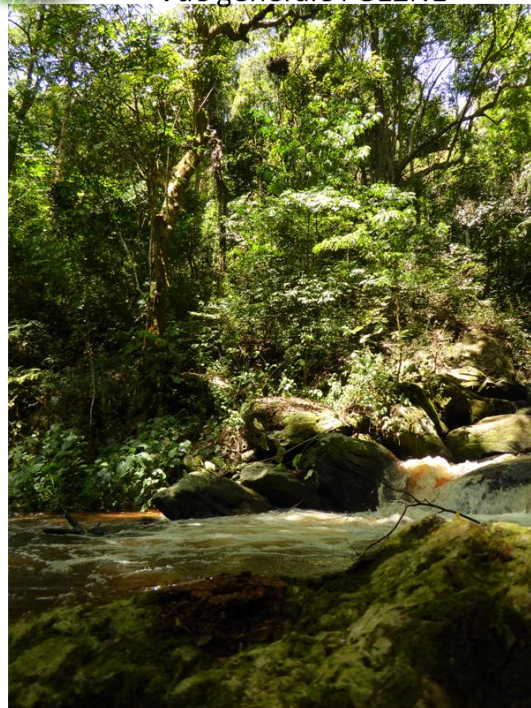


Figure 9. Overview of site FG1ZN1, Koda river that runs through the site and details of the two nests.

Recce DAY 5 (16 March 2016) - Hill Ndeke 3 - Forest Bbai and Ndoogo

Description of the recce

trip odometer: 5.1km - Duration: 5:10 - nest encounter rate: 2.2nests / km

FG1ZN2 site

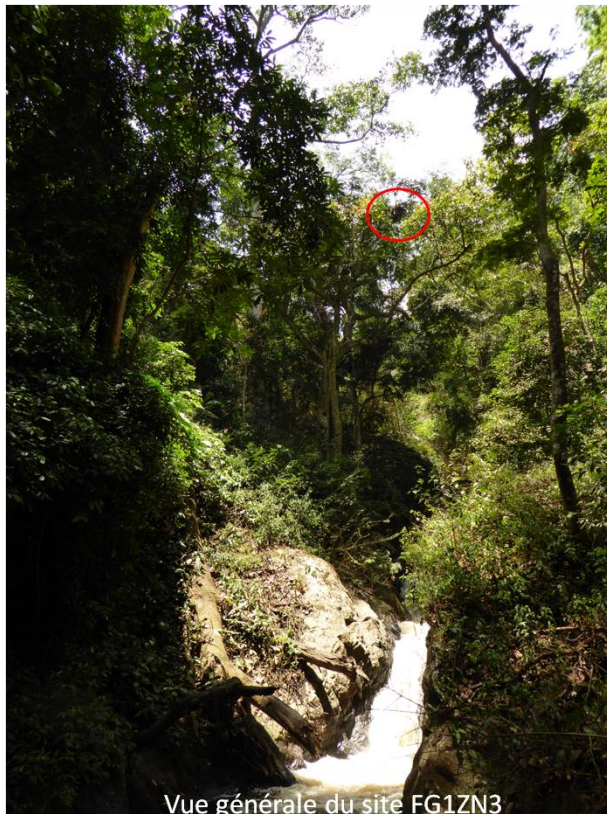
The recce was conducted towards the river to Koda towards the opposite Kpagboma hill at the north eastern side of FG1 block. Two CTs were relocated in this area where several tracks of terrestrial mammal species were followed. After rising to the top 800m from the river Koda, recent chimpanzee tracks were observed and followed westwards towards the Koda River to a site where 5 nests (4 new, one old) were recorded (site FG1ZN2).

Many traces of recent tracks and “playground”, and two ripped trunks were observed. The average height of nests on this steep site was 8.2m. Three nests were built on *Cytopetalum* sp., one on *Isolona congolana* and last on an unidentified Rubiaceae (Fig. 10).



Figure 10. Detail of a trunk ripped at FG1ZN2 site, host tree and general view of the forest understory.

Further down to the Koda river, the presence of 6 recent nests (<1 week?) were seen (Site FG1ZN3), at an average height of 22.3m, near the river Koda, including 4 on *Chrysophyllum* sp1, one on a *Cola* sp. and last on *Pseudospondias microcarpa*. Presence of chimpanzees intense activity (barked trees and trunks hollowed out, eaten fruits), were discovered along the Koda river at at the steepest waterfall area (Fig. 11). The place is little or no frequented by man and mostly inaccessible. Unfortunately no CT was placed as none were left. This area was called "FG1 hotspot" and will be the subject of further study in June and/or August 2016.



Vue générale du site FG1ZN3

Tronc éventré à proximité du site FG1ZN3



Figure 11. Site overview FG1ZN3 and detail of a trunk ripped on the right bank of the river Koda.

During the ascent back to Ndeke 3 village, the team heard the cries of the chimpanzees in the valley where the "hotspot" of their activities was discovered the same day probably meaning they had noted the presence of humans in their habitat.

* BLOCK FG2

On 03/12/2016, the team moved to Nzerku southwest of Ndeke 3. On 13 and 03.14.2016, two valleys and forest fragments have been investigated; Zalu forest and forest Tchooo and Dolokpa (making the FG2 arbitrary block).

Recce DAY 3 (13 March 2016) - Zalu Hill – black face chimpanzees area

Description of the recce

trip odometer: 4.6km - Duration: 6:45 - nest encounter rate: 2.8nests / km

FG2ZN1 site

The team began its trek to the forest against and found the first group of nests 700m down the house of the chief Nzerku after just 20 minutes walk.

In this site 6 fresh nests on *Strombosia pustulata* and 4 older nests on *Anthiaris welwitschii* (1) *S.pustulata* (2), and *Pycnathus angolensis* (1) were inventoried at an average height of 10.9 m. Villagers say that chimps have spent 3 days on the site (10-12 March 2016) and then went towards the Sépéada and Roda River; it is too far to be reached in a day and return to the camp. A fresh nest with eaten leaves was low enough to be measured (8m high, length 106 cm by 87 cm) and faeces collected underneath. Two CTs were placed on the site. A nest farther largest and highest than the others was located 200m from the other nests; close to a *Phoenix reclinata*. A third CT was placed near the nest given the presence of tracks and faeces.

FG2ZN2 nest site

After describing this site, progress was made in a clearing of the forest upstream to the river Sépéada. The initial idea was to reach the river Sépéada highest point but upon arrival in an open area (FG2ZN2), many traces of presence of chimpanzees and shouts modified the program. This area seems to be a very busy area for foraging and play as many traces of food consumed (*P.reclinata*, *Isoloana congolana*, *Ficus sp.*) were seen (Fig. 12). Three nests on Sapotaceae were recorded at an average height of 9.5m.



Figure 12. Overview of the different tracks left by chimpanzees at FG2ZN2 site.

Two CT were placed, one on a *P.reclinata* eaten and near wild yams, and near a *Ficus sp.* On which some fruit had recently been eaten. After placing the CT, the team sat and ten minutes later, repeated shouts were heard from the bank of the river ; a sequence was recorded.

Recce DAY 5 (14 March 2016) - Site of the cliff - Forest Tchou - clear face chimpanzee area

Description of the recce

trip odometer: 5.4km - Duration: 6:55 - nest encounter rate: 2.96nids / km

The recce began with the observation of *C. mitis* at the entrance to the forest Tchou. The guides state that vervet monkeys (*C. aethiops*) and guerezas (*Colobus guereza*) are also common in the area and that chimpanzees in the Tchou forest have a clear/pink face. The team is progressing in a very dry forest to a stream; many tracks of animals are observed and faeces collected. The exploitation of the forest is visible with planks and trees cut near the hilltop. CT was placed in the dense thicket area to capture all terrestrial species. Traces of small antelope were also noted; probably a little duiker (*Cephalophus sp.*)

FG2ZN3 site

Progress toward a rocky cliff of 10m, many vines and dense thickets before opening up to the observation post at the top of the cliff. The summit is an excellent observation post overlooking an area of relatively fresh nests of chimpanzees.

The place is clear and the beach overlooking the creek makes an excellent place to capture sequences. CT was placed towards the beach (Fig. 13).



Figure 13. Overview of the site FG2ZN3 and details of the site and a large nest.

The place seems an ideal resting place and a fortress protected by cliffs and steep slopes, many traces of game, spot on the river to drink, and tall trees to build nests make it an ideal place. A group of 8 nests (6 grouped on three trees very close (<3m), and 2 single) lies against the bottom and appear smaller than nests of FG1 block. However, the measurements are not possible on most nests; only two nests are measured. Moreover apart from this group of 8 nests, a nest 2 times larger than the other is located at the highest elevation; probably that of a couple. The site does not seem much frequented by man but the presence of a large *Canarium sp.* (Fig. 14) with numerous cuts in the bark and wood to collect the sap (natural incense) suggests that visits occur but probably limited to a few individuals (priest). A nest at 8 meters is measured: length = 70cm and 59cm width. One CT placed near the creek.



Figure 14. A. cliff overlooking the area FG2ZN3 nests; B. *Canarium* sp. with recent cuts and sap flowing; C. View from the height of the nest on the forest; D. Measuring the nest and appearance of the leaves of the top layer.

A third group of nests is located further down the hill, and six other former nests were identified, including one very close to the ground (4m); it measures 118cm = length and width = .82cm; faeces are collected nearby. A total of 16 nests at a height of 9.3m were recorded on this privileged site on the following species *Aningera* *cfr. robusta* (8), on unidentified Sapotaceae (6) and *S. pustulata* (2). A CT was placed close to the ground (600mm focal length) in order to capture footage of small animals (rodents, reptiles and birds).

The return to the base camp 2 in Nzerku was done through an area that looked like a coffee plantation but the area has never been exploited and a variety of wild coffee sampled. The forest of this side is drier, streams are drying and reflect the dramatic deforestation of the tops. Going back on the slopes exposed to the South, a site of four unfinished nests was observed. It seems that the animals were interrupted in building their nest and fled. Human activities are visible in the area with presence of baboon traps, recent logging, cultivated fields at 500m, old fallow, and recent fires.

* BLOCK FG3 - Forest Londoo

The third block has not been explored during the first mission given its remoteness and the number of planned day. An exploration mission is planned there in June 2016. Ideally, camera traps should be placed to 2 months to inventory all wildlife which seems richer according to the villagers.

3.3.2. Diet

As for the species eaten by chimpanzees are the fruits of *Landolphia sp*, *Chrysophyllum*, *Cola*, *Ficus*, *Monodora myristica*. Leaves of *Strombosia cf. shefflerii* found in nests are also eaten by them.



Figure 15. *Phoenix reclinata* and remains of chewed leaves the "hotspot" of FG2 block

Termites and ants are probably consumed because in FG1 block droppings were found next to a dead tree trunk and insects clearly visible. Different traces and elements of the diet of chimpanzees of FG1 and FG2 are presented in Figure 16.



Figure 16. Fruits consumed (A, B, C) and dead tree ripped by chimpanzees.

In a study on the biological and chemical activities of plants consumed by populations of *P.t.schweinfurthii* in Uganda, it was shown that 68% of seeds in feces came from the species *Chrysophyllum albidum* (SAPOTACEE; Krief, 2003). This is an excellent indicator of potential presence of chimpanzees who consume the fruits but also the bark. The common plant species in the diet of chimpanzees in both regions are *Cola giganteata* (STERCULIACEAE) and *Afromomum sp.* (ZINGIBERACEAE).

3.3.3. Faeces

In total 8 faeces were collected in each forest fragment (FG1 and 2) ; 11/16 were attributed to chimpanzees, only one was fresh in FG2 (Fig. 17).



Figure 17. Chimpanzee faeces found in the area.

The faeces DNA will also be screened for *Onchocerca volvulus* as the area is hyperendemic and the chimpanzees sleep by the quick rapid of the Koda river where Simulid flies breed. Collection of biting flies on human (human land catch) is planned in June 2016 to perform bloodmeal analysis and detect if flies do feed on chimpanzees as well.

3.4. Direct observations and traces of other Primates

3.4.1. Baboons (*Papio anubis*) –UICN : LC



Figure 18. Baboons (*Papio anubis*) in the local maize fields.

Specific baboon traps are built to capture them as the villagers see them as crop pest ; baboon faeces (Fig. 19) were also collected in various sites of FG1.



Figure 19. *Papio anubis* faeces.

Filmed and pictures.

3.4.2. Blue monkey (*Cercopithecus mitis*) – UICN : LC

Cercopithecus mitis is the most frequently observed primate species in the region from 900 to 1300m asl. In 12 observations of 3 to 6 individuals were observed and film while foraging -filmed and pictures.

3.4.3. Red-tailed monkey (*Cercopithecus ascanius*) – UICN : LC

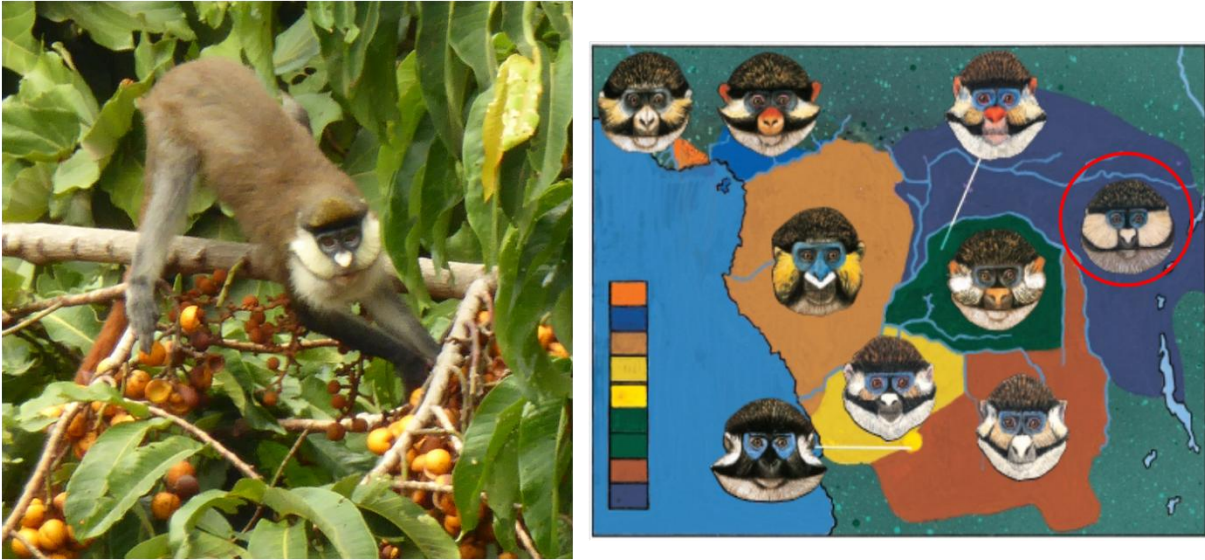


Figure 20. Red-tailed monkey (*Cercopithecus ascanius*) foraging on *Pycnatus angolensis* compared with *C. ascanius schmidtii* drawing from «Kingdon African Mammals guide» (Kingdon, 2013).

Filmed and pictures.

3.4.4. Vervet (*Chlorocebus aethiops*) – UICN : LC

Only observed around FG1 – filmed and pictures.

3.5. Threats

3.5.1. Deforestation, degradation and habitat fragmentation

A series of tree species is exploited regularly and unsustainably in the region of these relict forests; the slash-and-burn practice and clearing is the step that naturally follows the cutting process. Large trees are cut into pieces, boards or converted into charcoal. The trees are mainly for building construction, furniture and weapons or traps (recently the church of Kpagboma received a cutting permit from the chief of the territory to build the church pews), and the domestic use (cooking, heating). Some *E. abyssinica* in the grassland area that replaced primary forest and shade the fields are debarked at chest height on a 60cm layer and thus die toin situ. No reforestation is planned or carried out spontaneously by the villagers.

The team, at the meeting of 17.03.2016 in Ndeke 3, made recommendations for the community and raised some important issues related to the rights and duties of communities.

The team found that cutting the forest to make fields by farmers from the neighboring Mahagi Territory is not legal, as well as the disorderly exploitation of the forest by external sawyers (Kpandruma and Mahagi) using chainsaws machinery for cutting wood. The team highlighted the consequences of deforestation and forest degradation on fauna and flora, the drying up of rivers and the consequences for crops. The team recommended the protection of the remaining forests galleries for the well being of communities on the one hand and the balance of ecosystems on the other hand. The Head of Ndeke spoke on behalf of its population; he was very satisfied with the visit of CSB / UNIKIS, especially Dr. Anne (white person or *mzungu*) for their efforts to come to visit their home as far as Ndeke 3.

In his address, the head of the village stressed three important points which are the major concerns of his community:

- Lack of health center;
- Lack of schools for the education of children at school age;
- Lack of road to facilitate contact with the outside world (NGOs, Government, Health, Education, researchers, etc.).

The Chief asked all *good Samaritans* to advocate on these issues with the Government to bring relief to its suffering population. The community of Ndeke 3 openly accused the Environment Service and the National Forest Fund (FFN) for this illegal destruction of the forest. This fact was also reported by several chiefs in Nzerku.

The "focus group" with the population and local authorities further highlighted the responsibility of the state in the destruction of the forests through the Ministry of Environment, Nature Conservation and Tourism (MECNT) and the National Forestry Fund (FFN). Some agents operating on their behalf to allow sale of forests to individuals, in the majority Ugandans who enter the territory of Mahagi. The authorities say they have filed complaints against external operators to the Djugu territory chief. The solution suggested was to educate and inform the local population about the legal steps to achieve to be able to protect their forest, and the documents required for the exploitation of their forests. Ideally, a simplified document of their rights and the forest code should be written in order to refuse any anarchic cutting of their forests. C

3.5.2. Weapons and hunting tools

Hunting is most of the time performed passively with homemade traps of varying size and design (Fig 21); often for small game, mainly rodents, and sometimes several meters (to catch baboons). In Nzerku, we have not found or identified any hunter but the presence of baboon traps to protect crops was noted.



Figure 21. Various types of traps encountered during the recce.

In the forest near Ndeke 3, and the Bbai Ndoogo forest, hunting is done in the traditional way, with dogs, bows, arrows and Lendu spears. People in Ndeke 3 do not actively hunt but join the external hunters every 2 to 3 months to capture all game including chimpanzees to which they attribute medicinal virtues (bone; see interview 2). Modern weapons that enter the area so always come from the outside (FARDC military, police, immigrants), based in Kpandroma or in the valley towards Mahagi. In addition, FARDC soldiers settled in the village Kodjoka massacre sporadically chimpanzees, and then rent the services of the villagers to transport fresh or smoked meat to their camp. The villagers themselves do not eat chimpanzees as they consider them too similar to humans. There is thus a significant difference in culture, belief and practice between the two localities visited. The influence of the city of Kpandroma and the Nande culture - main immigrants since the last wars - affects the hunting practices and the attitude towards forest and wildlife in Ndeke 3. Hunters come from Kpandroma and Mahagi and seem reluctant to respect environmental laws. They lead the population of Ndeke 3 in their hunts by providing arms and share of the hunted game.

IV. CONCLUSION and RECOMMENDATIONS

This report outlines the potential biodiversity in relictual forest fragments of the Ituri mountains. We propose to call the whole area the Lendu Forest in reference to the major tribe and the plateau. After eight days of walking and recce through this area - roughly - 15kmx15km it appears that a high , underestimated diversity and species richness can potentially be found in this region. While we only spent 8 days walking, it seems that the Lendu forest diversity is comparable or superior to the one of Kibale National Park on the shore of Lake Albert in Uganda. The home range of chimpanzees in the three forest blocks (15km x 15km) represents roughly 225km². The altitude varies between 850 and 2000 m above sea level. Four areas were identified as privileged observation posts to watch chimpanzees and make direct observations. The nest encounter rate in FG1 and FG2 varied from 1.9 to 3 (2.96) and could thus be higher in the last FG3 block that hasn't been explored yet but is the most remote from villages and potential anthropogenic disturbances.

In summary, the number and density of primates alone justify the emergency for a community based conservation program and legal protection. Moreover, forests are exposed to two major and highly visible threats; namely degradation of habitats and deforestation leading to the conversion of rich forested, cooler and wetter, areas into agricultural land with the risk of creeks drying out. Hunting is a third threat that seems especially problematic in Ndeke 3, while oil exploitation is yet another Damocles sword hanging over the head of chimpanzees and more generally over the whole ecosystem of the Lendu forest.

The visit of the team from the University of Kisangani was an awakening for the community of the region explored that was until then still stigmatized by war and the "red" security tag of the area. For the team of UNIKIS, this expedition helped to switch the light "green" and found a warm and hospitable population with the only problems related to the abuse of people from outside.

V. PERSPECTIVES : BIODIVERSITY EXPEDITION - PART 2 in JUNE 2016

- Camera trap SD card collection
- Faeces and hair collection - -Chiroptera inventory -Botanical and fauna inventory
- FG3 exploration and camera trap surveillance (12 devices)
- Two Master thesis from Antwerp University

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VI . REFERENCES

- Demey, R. & Louette, M. 2001. Democratic Republic of Congo. In Fishpool, L. D. C. & Evans, M. I. (eds.), 2006. Important Bird Areas in Africa and Associated Islands: Priority Sites for Conservation, Newbury. Taxonomic and conservation status of Chapin's Crombec: Fishpool & Collar Bull ABC, 13(1) : 21p. Pisces Publications & Cambridge, UK: BirdLifeInternational.
- Evans, B.J., E. Greenbaum, C. Kusamba, T.F. Carter, M.L. Tobias, S.A. Mendel, and D.B. Kelley. 2011. A new octoploid species of African clawed frog (Anura:Pipidae: Xenopus) from the Albertine Rift, Democratic Republic of the Congo: Phylogenetic position, biogeography and conservation. *Journal of Zoology, London* 283:276–290.
- Fishpool and Collar, 2006; Fishpool, L.D.C., and N.J. Collar. 2006. The taxonomic and conservation status of Chapin's Crombec *Sylvietta (leucophrys) chapini*. *Bulletin of the African Bird Club* 13:17–22.
- Greenbaum E, Krystal A. Tolley, Abdulmeneem J, and Chifundera Z, 2012. A New Species of Chameleon (Sauria: Chamaeleonidae:Kinyongia) from the Northern Albertine Rift, Central Africa. *Herpetologica*, 68(1), 2012, 60–75.
- Groves C. 2005. Geographic variation within Eastern Chimpanzees (*Pan troglodytes cf schweinfurthii* Giglioli, 1872). *Australasian Primatology* 17 (2): 19-46.
- Kawamoto Y, Takemoto H, Higuchi S, Sakamaki T, Hart JA, Hart TB, et al. (2013) Genetic Structure of Wild Bonobo Populations: Diversity of Mitochondrial DNA and Geographical Distribution. *PLoS ONE* 8(3): e59660. doi:10.1371/journal.pone.0059660
- Krief S, 2003. Métabolites secondaires des plantes et comportement animal: surveillance sanitaire et observations de l'alimentation des chimpanzés (*Pan troglodytes schweinfurthii*) en Ouganda. Activités biologiques et étude chimique de plantes consommées. MNHN, Paris. THÈSE.
- Laurent, R.F. 1956. Contribution à l'Herpétologie de la Région des Grands Lacs de l'Afrique centrale. Généralités - II. Chéloniens - III. Ophidiens. *Annales du Musée Royal du Congo Belge, Tervuren (Belgique), Sciences Zoologiques* 48:1–390 + pl. I–XXXI.
- Plumptre AJ, Rose R, Nangendo G, Williamson EA, Didier K, Hart J, et al., 2011. Chimpanzé de Schweinfurth (*Pan troglodytes schweinfurthii*) : Etat de conservation de l'espèce et plan d'action 2010-2020. Gland, Suisse : UICN.48CT.
- Pedersen, 1997; Pedersen, T. 1997. New observations of a Zaïrean endemic: Prigogine's Greenbul *Chlorocichla prigoginei*. *Bulletin of the African Bird Club* 4:109–110.
- Tamm H, 2013. Rift Valley Institute, Usalama project. FNI and FRPI. Local resistance and regional alliances in north-eastern Congo. Published by the Rift Valley Institute. 57p.
- Vrijdagh, J. M. 1949. Observations ornithologiques en région occidentale du Lac Albert et principalement de la plaine d'Ishwa. *Gerfaut* 39: 1–115.

ANNEXE I : BOTANICAL INVENTORY OF FG1 AND FG2 FORESTS

FG1

11/03/2016					
SPECIES	FAMILY	NEST	HEIGHT (m)	NEST CONDITION	OBSERVATION.
<i>Acanthus montana</i>	ACANTHACEAE				
<i>Albizia gummifera</i>	FABACEAE				
<i>Albizia shinensis</i>	FABACEAE				
<i>Alstonia congensis</i>	APOCYNACEAE				
<i>Antiaris welwitchii</i>	MORACEAE				
<i>Beidelia micrantha</i>	EUPHORBIACEAE				
<i>Canarium swinifurthii</i>	BURSERACEAE				
<i>Celtis sp</i>	CANNABACEAE				
<i>Chrysophyllum sp 1</i>	SAPOTACEAE	NID 4 B; NID 8 B	15; 12	recent	
<i>Chrysophyllum sp2</i>	SAPOTACEAE				
<i>Chrysophyllum sp3</i>	SAPOTACEAE				
<i>Coffea sp</i>	RUBIACEAE				
<i>Cola gigantea</i>	MALVACEAE				
<i>Drypetes sp 1</i>	PUTRANJIVACEAE				
<i>Drypetes sp 2</i>	PUTRANJIVACEAE				
<i>Fernandoa adolphi-fredericii</i>	BIGNONIACEAE	NID 5 B	11	recent	
<i>Ficus sp 2</i>	MORACEAE				
<i>Ficus sp1</i>	MORACEAE				
<i>Ficus vallis-shoudae</i>	MORACEAE				
<i>Funtumia africana</i>	APOCYNACEAE				
<i>Glyphaea brevis</i>	MALVACEAE				
<i>Harungana montana</i>	HYPERICACEAE				
<i>Heisteria parviflora</i>	STROMBOSIACEAE				
<i>Hugonia platysepala</i>	LINACEAE				
<i>Isolona congolana</i>	ANACARDIACEAE	NID 6 B	22	recent	
<i>Khaya grandifolia</i>	MELIACEAE				
<i>Landolphia sp</i>	APOCYNACEAE				
<i>lannea welwitschii</i>	ANACARDIACEAE				
<i>Manilkra sp</i>	SAPOTACEAE	NID 7 B	9	recent	
<i>Monodora myristica</i>	ANACARDIACEAE				

<i>Musanga secropioides</i>	URTICACEAE				
<i>Myrianthus holstii</i>	URTICACEAE				

SPECIES	FAMILY	NEST	HEIGHT (m)	NEST CONDITION	OBSERVATION.
11/03/2016					
<i>Newtonia leucocarpa</i>	FABACEAE	NID 1 B; NID 2 B; NID 3 B	12; 12; 15	ancien	L= 106cm; l= 87cm POUR NID 2
<i>Dracaena arborea</i>	PANDANACEAE				
<i>Piper ombelantum</i>	PIPERACEAE				
<i>Piptadeniastrum africanum</i>	FABACEAE				
<i>Polyscia fulvae</i>	ARALIACEAE				
<i>Pseudospondias microcarpa</i>	ANACARDIACEAE				
<i>Pterygota cf. mcrocarpa</i>	MALVACEAE				
<i>Pterygota cf. mcrocarpa</i>	MALVACEAE				
<i>Pycnanthus angolensis</i>	MYRISTICACEAE				
<i>Rubiaceae sp</i>	RUBIACEAE				
<i>Scytopetalum sp</i>	LECYTHIDACEAE				
<i>Strombosia cf. shefflerii</i>	STROMBOSIACEAE				
<i>Tabernaemontana cf. jhonstonii</i>	MORACEAE				
<i>trema orientalis</i>	CANNABACEAE				
<i>Trichilia rubescens</i>	MELIACEAE				
<i>Trilepisium madagascariensis</i>	MORACEAE				
<i>Vitex sp</i>	LAMIACEAE				
16/03/2016					
<i>Acanthus montana</i>	ACANTHACEAE				
<i>Albizia gummifera</i>	FABACEAE				
<i>Albizia shinensis</i>	FABACEAE				
<i>Alstonia congensis</i>	APOCYNACEAE				
<i>Antiaris welwitchii</i>	MORACEAE				
<i>Beidelia micrantha</i>	EUPHORBIACEAE				
<i>Canarium swnfurthii</i>	BURSERACEAE				
<i>Ceiba pentandrum</i>	MALVACEAE				
<i>Celtis sp</i>	CANNABACEAE				

<i>Chrysophyllum sp 1</i>	SAPOTACEAE				
<i>Chrysophyllum sp2</i>	SAPOTACEAE	NID 6 B; NID 7 B	13; 12	recent	
<i>Chrysophyllum sp3</i>	SAPOTACEAE				
<i>Coffea sp</i>	RUBIACEAE				
<i>Cola bruneelii</i>	MALVACEAE				
<i>Cola gigantea</i>	MALVACEAE				
<i>Drypetes sp 1</i>	PUTRANJIVACEAE				
<i>Drypetes sp 2</i>	PUTRANJIVACEAE				
<i>Fernandoa adolphi-fredericii</i>	BIGNONIACEAE	NID 5 B	11	recent	
<i>Ficus sp 2</i>	MORACEAE				
SPECIES	FAMILY	NEST	HEIGHT (m)	NEST CONDITION	OBSERVATION.
<i>Ficus sp1</i>	MORACEAE	NID 8 B	35	Ancien	Le plus vieux et plus grand
<i>Ficus vallis-shoudae</i>	MORACEAE				
<i>Funtumia africana</i>	APOCYNACEAE				
<i>Glyphaea brevis</i>	MALVACEAE				
<i>Harungana montana</i>	HYPERICACEAE				
<i>Heisteria parviflora</i>	STROMBOSIACEAE				
<i>Hugonia platysepala</i>	LINACEAE				
<i>Isolona congolana</i>	ANACARDIACEAE	NID 4 B	7	Ancien recent	
<i>Khaya grandifolia</i>	MELIACEAE				
<i>Landolphia sp</i>	APOCYNACEAE				
<i>Iannea welwittii</i>	ANACARDIACEAE				
<i>Manilkra sp</i>	SAPOTACEAE				
<i>Monodora myristica</i>	ANACARDIACEAE	NID 1 B	9	Ancien	
<i>Musanga secropioides</i>	URTICACEAE				
<i>Myrianthus holstii</i>	URTICACEAE				
<i>Newtonia leucocarpa</i>	FABACEAE				
<i>Dracaena arborea</i>	PANDANACEAE				
<i>Piper ombelantum</i>	PIPERACEAE				
<i>Piptadeniastrum africanum</i>	FABACEAE				
<i>Polyscia fulvae</i>	ARALIACEAE				
<i>Pseudospondias microcarpa</i>	ANACARDIACEAE	NID 9 B; NID 10 B	20	Ancien	
<i>Pterygota cf. mrocarpa</i>	MALVACEAE				
<i>Pterygota cf. mrocarpa</i>	MALVACEAE				

<i>Pycnanthus angolensis</i>	MYRISTICACEAE				
<i>Rubiaceae sp</i>	RUBIACEAE	NID 5 B	9	Ancien	
<i>Scytopetalum sp</i>	LECYTHIDACEAE	NID 2 B; NID 3 B	7; 9	Ancien	
<i>Strombosia cf. shefflerii</i>	STROMBOSIACEAE				
<i>Tabernaemontana cf. jhonstonii</i>	MORACEAE				
<i>trema orientalis</i>	CANNABACEAE				
<i>Trichilia rubescens</i>	MELIACEAE				
<i>Trilepisium madagascariensis</i>	MORACEAE				
<i>Vitex sp</i>	LAMIACEAE				

FG2

FORET NZERKU

13/03/2016

SPECIES	FAMILY	NEST	HEIGHT (m)	NEST CONDITION	OBSERVATION.
<i>Acanthus montana</i>	ACANTHACEAE				
<i>Albizia gummifera</i>	FABACEAE				
<i>Albizia shinensis</i>	FABACEAE				
<i>Alstonia congenis</i>	APOCYNACEAE				
<i>Antiaris welwitschii</i>	MORACEAE	NID 004;	11	recent	
<i>Beidelia micrantha</i>	EUPHORBIACEAE				
<i>Canarium swinifurthii</i>	BURSERACEAE				
<i>Ceiba pentandrum</i>	MALVACEAE				
<i>Celtis sp</i>	CANNABACEAE				
<i>Chrysophyllum sp 1</i>	SAPOTACEAE	NID 008; NID 009; NID 010	8; 9; 13	recent	
<i>Chrysophyllum sp2</i>	SAPOTACEAE				
<i>Chrysophyllum sp3</i>	SAPOTACEAE				
<i>Coffea sp</i>	RUBIACEAE				
<i>Cola bruneelii</i>	MALVACEAE				
<i>Cola gigantea</i>	MALVACEAE	NID 007	11	Ancien	
<i>Drypetes sp 1</i>	PUTRANJIVACEAE				
<i>Drypetes sp 2</i>	PUTRANJIVACEAE				
<i>Fernandoa adolphi-fredericii</i>	BIGNONIACEAE				
<i>Ficus sp 2</i>	MORACEAE				
<i>Ficus sp1</i>	MORACEAE				
<i>Ficus vallis-shoudae</i>	MORACEAE				
<i>Funtumia africana</i>	APOCYNACEAE				
<i>Glyphaea brevis</i>	MALVACEAE				
<i>Harungana montana</i>	HYPERICACEAE				
<i>Heisteria parviflora</i>	STROMBOSIACEAE				
<i>Hugonia platysepala</i>	LINACEAE				

<i>Isolona congolana</i>	ANACARDIACEAE				
<i>Khaya grandifolia</i>	MELIACEAE				
<i>Landolphia sp</i>	APOCYNACEAE				
<i>Iannea welwitscii</i>	ANACARDIACEAE				
<i>Manilkra sp</i>	SAPOTACEAE				
SPECIES	FAMILY	NEST	HEIGHT (m)	NEST CONDITION	OBSERVATION.
<i>Monodora myristica</i>	ANACARDIACEAE				
<i>Musanga secropioides</i>	URTICACEAE				
<i>Myrianthus holstii</i>	URTICACEAE				
<i>Newtonia leucocarpa</i>	FABACEAE				
<i>Dracaena arborea</i>	PANDANACEAE				
<i>Piper ombelantum</i>	PIPERACEAE				
<i>Piptadeniastrum africanum</i>	FABACEAE				
<i>Polyscia fulvae</i>	ARALIACEAE				
<i>Pseudospondias microcarpa</i>	ANACARDIACEAE				
<i>Pterygota cf. mcrocarpa</i>	MALVACEAE				
<i>Pterygota cf. mcrocarpa</i>	MALVACEAE				
<i>Pycnanthus angolensis</i>	MYRISTICACEAE				
<i>Rubiaceae sp</i>	RUBIACEAE	NID 005		Ancien	
<i>Scytopetalum sp</i>	LECYTHIDACEAE				
<i>Strombosia cf. shefflerii</i>	STROMBOSIACEAE	NID 001; NID 002; NID 003; NID 006	13; 8; 7; 10; 13	recent	
<i>Tabernaemontana cf. jhonstonii</i>	MORACEAE				
<i>trema orientalis</i>	CANNABACEAE				
<i>Trichilia rubescens</i>	MELIACEAE				
<i>Trilepisium madagascariensis</i>	MORACEAE				
<i>Vitex sp</i>	LAMIACEAE				

FORET DOLOKPA

14/03/2016					
SPECIES	FAMILY	NEST	HEIGHT (m)	NEST CONDITION	OBSERVATION.
<i>Acanthus montana</i>	ACANRHACEAE				
<i>Albizia gummifera</i>	FABACEAE				
<i>Albizia shinensis</i>	FABACEAE				
<i>Alstonia congestis</i>	APOCYNACEAE				
<i>Antiaris welwitchii</i>	MORACEAE				
<i>Beidelia micrantha</i>	EUPHORBIACEAE				
<i>Canarium swinurthii</i>	BURSERACEAE				
<i>Ceiba pentandrum</i>	MALVACEAE				
<i>Celtis sp</i>	CANNABACEAE				
<i>Chrysophyllum sp 1</i>	SAPOTACEAE	NID 001; NID 002, NID 003; NID 004; NID 010	9; 11; 10; 13; 13	recent; Ancien	Ancien pour nid 0013
<i>Chrysophyllum sp2</i>	SAPOTACEAE				
<i>Chrysophyllum sp3</i>	SAPOTACEAE	NID 005; NID 006; NID 007; NID 008; NID009	3; 10; 15;4; 9	recent	L= 96cm; l= 70cm POUR NID 005
<i>Coffea sp</i>	RUBIACEAE				
<i>Cola bruneelii</i>	MALVACEAE				
<i>Cola gigantea</i>	MALVACEAE				
<i>Drypetes sp 1</i>	PUTRANJIVACEAE				
<i>Drypetes sp 2</i>	PUTRANJIVACEAE				
<i>Fernandoa adolphi-fredericii</i>	BIGNONIACEAE				
<i>Ficus sp 2</i>	MORACEAE				
<i>Ficus sp1</i>	MORACEAE				
<i>Ficus vallis-shoudae</i>	MORACEAE				
<i>Funtumia africana</i>	APOCYNACEAE				
<i>Glyphaea brevis</i>	MALVACEAE				
<i>Harungana montana</i>	HYPERICACEAE				
<i>Heisteria parviflora</i>	STROMBOSIACEAE				

<i>Hugonia platysepala</i>	LINACEAE				
<i>Isolona congolana</i>	ANACARDIACEAE				
<i>Khaya grandifolia</i>	MELIACEAE				
<i>Landolphia sp</i>	APOCYNACEAE				
<i>Iannea welwitcii</i>	ANACARDIACEAE				
SPECIES	FAMILY	NEST	HEIGHT (m)	NEST CONDITION	OBSERVATION.
<i>Manilkra sp</i>	SAPOTACEAE				
<i>Monodora myristica</i>	ANACARDIACEAE				
<i>Musanga secropioides</i>	URTICACEAE				
<i>Myrianthus holstii</i>	URTICACEAE				
<i>Newtonia leucocarpa</i>	FABACEAE				
<i>Dracaena arborea</i>	PANDANACEAE				
<i>Piper ombelantum</i>	PIPERACEAE				
<i>Piptadeniastrum africanum</i>	FABACEAE				
<i>Polyscia fulvae</i>	ARALIACEAE				
<i>Pseudospondias microcarpa</i>	ANACARDIACEAE				
<i>Pterygota cf. mcrocarpa</i>	MALVACEAE				
<i>Pterygota cf. mcrocarpa</i>	MALVACEAE				
<i>Pycnanthus angolensis</i>	MYRISTICACEAE				
<i>Rubiaceae sp</i>	RUBIACEAE				
<i>Scytopetalum sp</i>	LECYTHIDACEAE				
<i>Strombosia cf. shefflerii</i>	STROMBOSIACEAE				
<i>Tabernaemontana cf. jhonstonii</i>	MORACEAE				
<i>trema orientalis</i>	CANNABACEAE				
<i>Trichilia rubescens</i>	MELIACEAE				
<i>Trilepisium madagascariensis</i>	MORACEAE				
<i>Vitex sp</i>	LAMIACEAE				

