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Termitières: Ecological Habitat and Importance in the Food of the Chimpanzees (*Side T troglodytes*) in the Forest of Bomassa, the Forest of the Triangle of Goualougo within the National park Nouabalé Ndoki

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Abstract

Evaluation's study of termitaries as the case of ecological habitat and its importance in the feeding of Chimpanzees. (*Pan.t. troglodytes*) accomplished in the national park Nouabalé Ndoki in the northern part of Congo Brazzaville in Bomassa forest and triangle of Goualougo. The labor area was divided according to the type of vegetation found. In order to reach our goal, we lengthened those forests about 18,3km. In all studied forests, we observe 258 termitaries our studies show that the Chimpanzee had preferred staying in termitary zones depending on the type of forest. In order to feed itself in the white ant, the Chimpanzee caught the white ants using wood tools that it made in the forest two tools were picked up in the forest: defense and capture tools. In general, we enumerated 79 tools among which 23 were found the termitaries, 51 picked up in the field and 5 tools found on the way, so there are 56 capture tools and 23 defense tools. This study consider that the lack of defense tools around termitaries would be like the Chimpanzee made the tool and went with it towards another termitary to be used in the future. The analysis of the waterfree estate of those tools in wood made by the Chimpanzee atwed us to classify them according to the time of use. The presence of Chimpanzee around termitaries according to the type of forest and time of use of tools could be served as a very gig opportunity for the developpement of ecotourism in the forest of national park of Nouabalé Ndoki.

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Introduction

The Chimpanzee and Elephants are classified among the great mamiform of the Congo bassin's forest. Those animals, in order to get food in their habitats they use areas which are rich in food by taking complex trail (MBETE, 2010).

The food trails paved by Elephants are wide as 100 km (Maisels *et al.*, 2002; Blake 2002). Those trails join

many Elephants important places such as big trees with many fruits, water, and boggy clearing for the forest Elephants, the food diet was studied despite the complexity of forest the studies took place in western Africa (MBETE, 2010; ALEXANDRE, 1978; MERZ 1981; SHORRT, 1981) and in middle Africa (BLAKE, 2002) show that Elephants of forests eat a diversity of food: leaves, woods, peels, roots and fruits.

The works on BARNES, 1982; TCHAMBA, 1998; INKAMBA-NKOULOU and DIAHOUAKOU, 2005 together with TSOUMOU, 2008 confirmed the same behaviour.

Julien BERGEW (1961) also show that the feeding of Chimpanzees is as diversified as Elephant one they mainly eat fruits but they also eat young growth, insects (the white ants) and the prey they catch after hunting. They prefer eating primates species like colobe.

Julien Bergero says that those animals are very intelligent to the extent they are able to solve problems and use simple tools. Such as small branches that allow them to extract white ants from their nest.

According to him the same behaviour is visible to gorillas and young gorillas learn from old ones by watching them. William BOYD (1999) affirms that Chimpanzee are omnivorous they eat fruits, leaves honey insects, eggs. They eat more 200 different types of leaves.

According Jane GOODALL quoted by wikimedia (2007) in early 1960 in the jungle of Congo basin, the Chimpanzees are aggressive that they can create simple tools in order to catch food.

The early study accomplished in the forest in the national park of Nouabalé Ndoki precisely in Bomassa forest and the triangle of Goulougo aiming at: bringing up a contribution on the technical knowledge used by the animal in order to eat case of the white ants, the specific goals are resumed as follows:

Identify the number of fields and the kind of habitat in order to determine at least the number of food territories per habitat,

The morphological state of territories and the age of tools were also taken into a count,

And determine the number of tools used by the Chimpanzees in order to get the white ants.

WIKIMEDIA (2007) shows that a Chimpanzee is a big monkey of primates group including gorilla, all those species are closer to human being as far as human evolution is concerned.

Wikimedia confirms that: there are two species of Chimpanzees: Bonobo or small Chimpanzees (*Pan paniscus*) and the common Chimpanzee (*Pan troglodytes*) with 4 subspecies. The common

Chimpanzee is found in 21 countries in whole equatorial Africa around 187000 survive in their natural habitat, then our duty is to study the life Congo forest.

Materials and Methods

Material

To carry out this study, the following equipment was required:

- A topofil to measure the lengths of the transects
- Garmin MAP 60 GPS for the geographic coordinates of the study area,
- A graduated ruler for measuring the fishing tools used by the Chimpanzees,
- A compass (topochaix) for orientation and finding your way

Data and methods collection

Two sites have been considered in our study (figure n°1 & 2).

The site of Bomassa located near to the park is a forest where Bois Sangha operated from 1967 to 1980 and within it a second forest is developing. To facilitate our work, the site has been divided into two blocks namely:

Block n°1 where the data collection has been required in a mixed forest already exploited by a forestry enterprise and in this area the resident population exploits it for food.

Block n°2 located around Baï clearing all along Wali waterway in about 3Km of Bomassa basin which is dominated by limbali (*Gilbertiodendron dewevrei*) in about 1 km away in comparison with the first to the last marker pole of our transect.

The site of Goulougo triangle located inside the national park was also divided into two blocks:

Block n°1 located in the North-East at 3Km of the encampment is covered with forest dominated by Limbali (*Gilbertiodendron dewevrei*). At last, block N°2 located in South-east of the encampment is an intact mixed forest non-exploited. The undergrowth is more or less opened.

Chablis are the unique damage which disturbs the vegetation dominated by the creepers and Marantaceae of *Haumania dankelmani* the most dominated species and *Sarcophrynium prinopogonium* representative.

Type of transect used : We have opened the linear transects of 100 m long insert of 100m (table : 1&2). The total distance of transects is 18,30Km. This covered distance has served as the basis for the localization of termitiaries. The orientation of transects was East-West, termitiaries were localized in a plain position South or North.

The counting of termitiaries is done in broken transects by tutin & Fernandez method (1984). Termitiaries have been counted according to the habitat type or the morphological state of each has been taking into account for example : (the rubling in case of itching, the termites fisting, to shelter oneself against hard heat or rains or for the rest). The medium length of termitiaries varies between 1,05-1,7m and the medium diameter from 1,48 m to 5,10 m.

Type of tools used by the chimpanzee : we have done the collection of different fishing tools given up in every habitat. Two types of fishing tools were made by the chimpanzee namely : the capture tool and the smashing tool.

The smashing tool is often used on the way, but not around termitiaries often near of Marantaceae, whereas the capture tool is often found termitiaries. The fishing tools are in rod with 38,9cm medium long and a diameter varying between 0,1 cm- 0,53 cm.

The estimation of the age of the 79 tools found was done by comparison of the rods sample taken in the forest. The taling frequency of the rods sample was three days to determine the tools age according to the anhy drous state of the rode.

Results and Discussions

Among the four of blocks of forest retained, it would seem that the site of Goulougo triangle has more transects than that of Bomassa. 183 transects opened and mentioned as follows : 25 Transects in the exploited mixed forest of Bomassa ; 27 in the Limbali (*Gilbertiodendron dewevrei*) forest of Bomassa ; 64 in the non-exploited intact mixed forest of Goulougo at last the last forest block of Limbali (*Gilbertiodendron*

dewevrei) of Goulougo has 67. Those results of two sites of transects are represented in the table 1.

Figure 3 shows the number of termitiaries by type of habit given 258 termitiaries for the four types. The exploited forest of Bomassa of type B 75 termitiaries, the mixed forest of Goulougo of type C 43, come the forests of type A in Limbali (*Gilbertiodendron dewevrei*) and the mixed forest of Goulougo 38, follow the forest of type A in Limbali (*Gilbertiodendron dewevrei*) 22 and the exploited forest of Bomassa of type B 20, at last the forest in Limbali (*Gilbertiodendron dewevrei*) of type C 9.

Destruction of termitiaries by biotic and abiotic agents

The damage caused to termitiaries in terms of percentage pan the biotic and abiotic agents according to the type of habitat shous that water is the first destrused tive agent of termitiaries in the habitat B with a percentage 86,6%, follows by the habitat A which represents 57,1%, and then the destruction caused by animals of the habitat C with 56, 1%.

In the other habitats damage caused by biotic and abiotic agents is less important. The table 2 shows the repartition of damage caused to termitiaries by the abiotic and biotic agents according to the habitat.

79 tools found in the four types of forests. The identification of those tools has shown that tools used by the Chimpanzees have been selected in the two vegetable families namely:

The Acandaceaes of which the Thomandersia laurifolia was commonly used and seemst as a species easy to make and woulk break rapidly ;

The Marantaceaes with the species the Ataenidia conferta and the Sarcophrynium prinspogonium were also very used.

Among the tools of work fof the Chimpanzee, there are two types of tools in which : the smashing tool and the capture tool.

Smashing tools

The present study have 5 smashing tools constitute by two rod branches of Thomandersia laurifolia of medium section 4,2 cm and of a medium length 34,5cm. This tool is rare to fin dit around termitiaries. That is what seems

that the Chimpanzee makes it somewhere and often would move with it and after the use it can give it up. According to our observation, the transport of the tool can be assured by adult or also by a young who would be on the back of adult (figure 4).

Capture tools

In the present study case, they are often around termitaries. We found 23 et loke tools with sheathless rods of Marantaceae where termites are often extracted by teeth. One of the ends above all that one of the basis is transformed into brush. This end is introduced into the opening of the termitary and withdrawn immediately after the termites bite which comes out hung to the brush are directly eaten by the Chimpanzee.

Table.1 Number of transects by type of forest in the two sites of Bomassa and the Goulougo triangle

Type of habitat	Number of transects
Forest in Limbali (<i>Gilbertiodendron dewevrei</i>) of Goulougo	67
Intact mixed forest of Goulougo	64
Forest in Limbali (<i>Gilbertiodendron dewevrei</i>) of Bomassa	27
Exploited mixed Forest of Bomassa	25
TOTAL	183

Table 2 : Damage caused to termitaries and percentages in comparison to the types of habitat by biotic and abiotic agents

Type de termitières by habitats	Biotic agent %		Abiotic agent %					
	Animals	%	Water	%	Wind	%	Unknown	%
A	20	24,4	0	0	4	57,1	0	0
B	16	19,5	13	86,6	2	28,6	1	100
C	46	56,1	2	13,4	1	14,3	0	0
Total	82	100	15	100	7	100	1	100

Table.3 Number of tools and termitaries found by type of habitats with their percentages

Type of habitat	Type of termitaries			% by habitat
	A	B	C	
Forêt à Limbali de Goulougo	33	0	0	41.8
Forêt mixte intacte de Goulougo	37	0	0	46.8
Forêt à Limbali de Bomassa	9	0	0	11.4
Forêt mixte exploitée de Bomassa	0	0	0	0.0

Table.4 Number and age of different tools found by type of habitat

Type of habitat	Outils de défoncement			Outils de capture		
	Recent	Old	Very old	Recent	Old	Very old
Forest in Limbali of Goulougo	0	0	0	10	3	23
Intact forest Goulougo	4	0	0	25	3	5
Forêt in Limbali of Bomassa	0	0	1	1	4	3
Exploited forest of Bomassa	0	0	0	0	0	0

Figure.1 Forestry area of Bomassa; **Figure.2** Forestry area of the Goulougo triangle

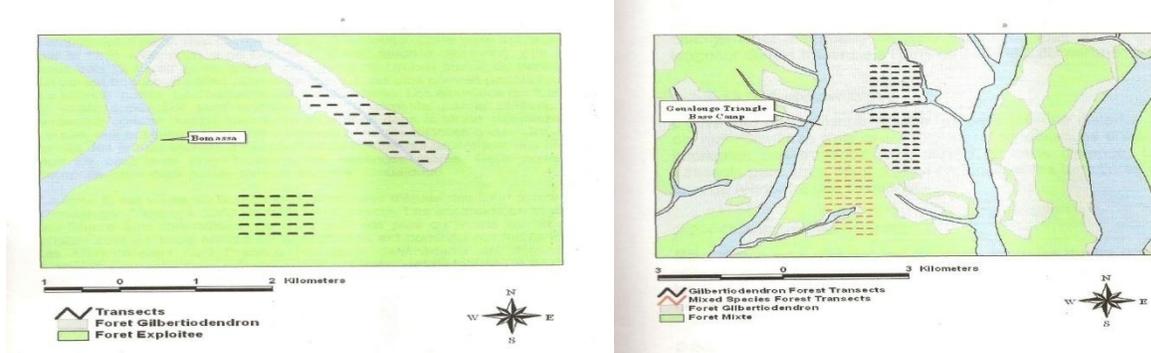


Figure.3 Number and percentage of termitiaries by type of habitat

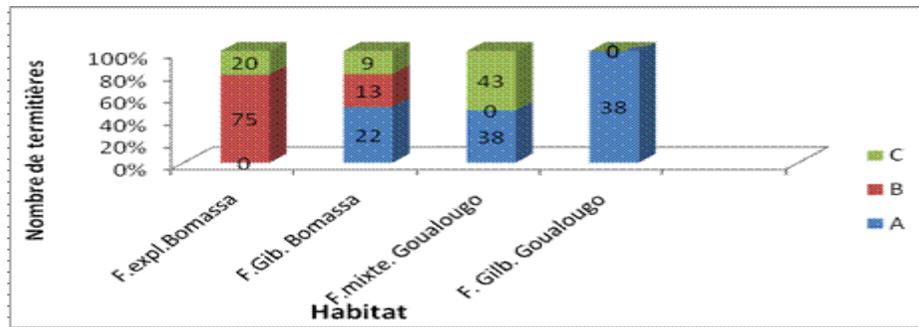


Figure.4 A termitiary and a Chimpanzee with its Young behind having a fishing tool on hand



In percentage of habitat, we notice that intact mixed forests of Goulougo have a percentage up to 46,8% of tools, follows by the forest in Limbali of Goulougo 41,8% and by the forest in Limbali of Bomassa 11,4%. The 79 tools found have been done as shows by table3.

Estimation of the tools age

The samples of the tools rods taken in forest in different types of habitat show that in comparison to the anlydrous state it exits 3 classes of age (recent, old, very old) et show as follows:

Smashing tools : 4 recent tools found in intact mixed forest of Goulougo and one (1) very old in the forest in Limbali of Bomassa,

Capture tools : 25recent tools were found in intact mixed forest of Goulougo and 23very old in forest in Limbali of Goulougo. In comparison to percentage, it was very weak and turned between 3-5% in an intact mixed forest of Goulougo as well as in the forest in Limbali of Bomassa. The results of the age classes of tools by type of habitat are represented in table 4.

The study on the termitaries as an ecological habitat and their role in the feeding of Chimpanzee (*Pan.t. troglodytes*) takes place in two sites of the National Park Nouabalé Ndoki in the Republic of Congo Brazzaville namely :

The site of the forest of Bomassa divided into two blocks, the block of the forest in Limbali (*Gilbertiodendron dewevrei*) and the block of the exploited mixed forest.

The site of triangle forest of Goualougo divided as farces it is concerned into two blocks, the forest in Limbali (*Gilbertiodendron dewevrei*) and the intact mixed forest (non-exploited).

The transects were opened over a distance of 100 m away covering a total length of 18,30Km in the two sites. It seems that the forest of Goualougo non-exploited has more transects opened them another site.

The two sites of Bomassa and the triangle of Goualougo show that it exists a forest in Limbali (*Gilbertiodendron dewevrei*) with an exploited forest of Bomassa and of Goualougo and a non-exploited forest. We have found in total 258 termitaries, those of type B 88 and those of the type C 72.

Those termitaries are often subject to destruction caused by biotic and abiotic agents by type of habitats. The habitat B has shown that water had a percentage of destruction of 86,6%, follows by the habitat A where the wind has caused 57,1% of destruction and then the habitat C where animals have seen a destruction of termitaries of 56,1%.

In comparison with those risen rates of destruction, we can think that the presence of termitaries would not only be in the favor of the multiplication of the society termites, but also would ameliorate the conditions of the ground aeration and the exchanges between ground microfaunes.

The Chimpanzee uses tools made with vegetable material to fish termites. Our study demonstrates that 79 tools found in the two sites of forests we have : 41,8% in the forest in Limbali (*Gilbertiodendron dewevrei*) of Goualougo 46,8% in the intact mixed forest of Goualougo and 11,4% in the forest in Limbali (*Gilbertiodendron dewevrei*) of Bomassa.

In comparison with types of forests, those percentages show that the Chimpanzees have trouble to frequent the forests of Bomassa already exploited. The human presence in those milieux looklike a hypothesis for the Chimpanzee to move freely.

About the fishing tools, wikimedia (2007), confirms our hypothesis according which a team of archaeologists conducted by spanish julio Mercader of Calgary University in Canada has announced to have found in Ivory Coast stones of Chimpanzees used 4300years ago to open dried fruits. This author thinks that nowadays it is possible to see Chimpanzees using a stone by way of hammer.

Primatologist Jill Pruetz of Iowa University cited by Wikimedia 2007 adds that Chimpanzees would be also the first animals to have been observed making weapons. In fact, he describes 22 observations of female Chimpanzees of Senegal which elaborated woodshod they should use to stab galagos which took refuge in the empty tree trunk.

For the feeding needs, Jane Goodall works (1968) cited by Wikimedia (2007) show that females fish more frequently than males. Chimpanzees use 1/3 of their time for fishing termites, on the other hand the rest of time is reserved for other activities.

In our case, the number of capture tools is up to the number of the smashing tools. It seems that the smashing tools looklike too much selective and hard to makes reason why the Chimpanzee takes the charge to go with them after using.

The termites hunting is a preoccupation for the Chimpanzee, Nziendolo (2010) shows that with the gorilla, the feeding regime is very various. It is essentially composed of plants species (fruits, leaves, rods and barks) and animal species (termites). It spends much time to eat leaves, rods and fruits and the other time it takes it to eat either barks nor termites.

Boech & Boesch- Acherman (2000) confirm also our hypothesis according which the Chimpanzee is a real hunter, it eat most of time killed catch. On the other hand females in Taï spend much their time crunching walnuts whereas in Gombé, the main activity of females is the fishing of termites.

The hunting tools are classified in age in relation to their use. In the forest in Limbali of Goualougo has counted among the capture tools : 10 recent, 3 old and 23 very old. The intact mixed forest of Goualougo for the smashing tools we have counted : 4 recent.

Capture tools : 25 recent, 3 old and 5 very old. The forest in Limbali has as smashing tools : 1 very old and among the capture tools : 1 recent, 4 old and 3 very old. Considering what comes before, we notice that the capture tools are superior to smashing tools and are also found around termitaries, for that, we think that the Chimpanzee would make the smashing tool and would move with it (figure 2).

The absence of smashing and capture tools in the exploited forest of Bomassa shows that the Chimpanzee does not use termitaries of this habitat, the forestry activity would have a direct harmful impact in the fauna-forest relation. Yet, a study on the evaluation of quantities of termites eaten by Chimpanzee according the period of frequentation of termitaries in forest can be seen for a reason to develop the ecotourism in Congo.

In conclusion, this study has just shown the importance of the frequentation termitaries presence un a forest. Chimpanzees frequent forests where the man presence is negligible.

It shows also that the distribution and abundance of termitaries vary follow in the type of habitat. This type of habitat would play an essential role in the construction of termitaries in forest. This unequal repartition of termitaries in comparison with the type of habitat seems to be dictated by several ecological factors such as the ground structure, vegetable place and human activities.

Some tools made by the Chimpanzee are met around termitaries, it is the case of capture tools, on the other hand the smashing tools are rare to see around termitaries, it makes it and walks with to go to hunting termites.

The age of tools made by the Chimpanzee would be a clue which would indicate the activities period of fishing termites by the Chimpanzee in the forest and its Knowledge would be a great asset for the ecotourism in Congo.

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