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Urban Sprawl and the Effects on the Zoogeography of the Yaounde Metropolis, Cameroon

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Abstract:

Found at the pinnacle of the Tropical rain forest, the Yaounde metropolis epitomizes cities that allow little or no space for wildlife. Spotting the colonies of bats around the University Teaching Hospital (CHU), Mvog-Betsi and Bastos Quarters, gives an impression of a symbiosis of urbanization and wildlife conservation. The water fowls and snakes around the marshy valleys in the city would only re-iterate this fact which is debatable.

Using a methodology that entailed field observation, analysis of questionnaires, the interpretations of topographical maps and aerial photographs, it was realized that there has been a rapid sprawl or expansion of the Yaoundé City. As a result of this situation, a great deal of animals has been pushed away by the advancing population into the fringes. The disappearance of forest just meant the no habitat for wildlife. Since there is no Government policy for protection and management of wildlife in the city except at the Mvog-Betsi Zoo, even the tiny moles, squirrels, hedgehogs amongst others that still thrive, are being poached and wiped out.

The solutions that are proposed include preservation/conservation by more Zoos, Sensitization of the masses on how to cope with animals and then the control of poaching and to encourage the consumption of home reared species of animals.

Keywords: *Population growth, urbanization, wildlife, poaching, domestication, sensitization, sustainable management*

1. Introduction

Man has been a threat to animals since time immemorial, when he hunted for food, cleared the habitat for settlement or even captured species for home use. Urban sprawl, an uncontrolled expansion of the city has wiped most if not all the natural forest cover in Yaounde. Since forest is a true habitat for most wildlife, this has accounted for the retreat or disappearance of specific forms of fauna in the area.

The population of urban dwellers has sky rocketed during the past decades. Catering for the food needs of this population has resulted in an untold impact on wildlife. In fact, Kabongo (1984), Bakarr et al (2001), and others hold that the preference for bush meat has greatly impacted wildlife.

The main problem in this study is the disappearance of wildlife from the city of Yaounde and even the outskirts. This is happening squarely in a modern world where management policies are supposed to provide room for these creatures. This management approach is currently being realized in some cities of the Developed world with great success.

2. Ecological and Human Background

Yaounde Metropolis (Figures 1) is found between latitudes 3° 45′ 50″ and 3° 59′ 55″ North of the Equator and Longitudes 11° 22′ 40″ and 11° 30 ′ 25″ East of the Greenwich Meridian.

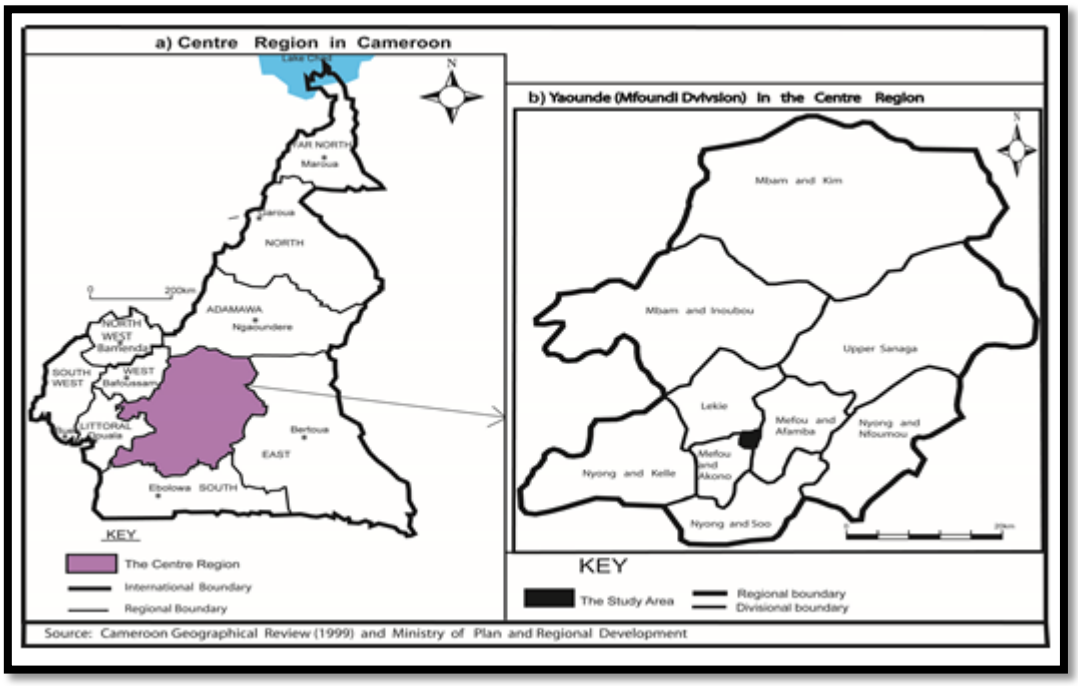

Figure 1: Location of the Yaounde Metropolis in Cameroon

It is bordered to the north east by Mefou and Afamba Division, to the North West by Lekie Division and to the south by Mefou and Akono Division. Its surface area is 304 km^2 and this occupies the Mfoundi Division in the Centre Region.

The Yaounde Metropolis is part of the western sector of the Southern Cameroon Plateau. It is made up of gentle rolling chains of hills, and numerous valleys. These topographic elements depict a contrasted relief. With regards to the morphology, there is a contrast in the topographic lay out of the Yaounde Metropolis. This difference in the nature of the relief can be viewed from the local relief of the area. The Yaounde metropolis is characterized by interfluves as part of the Southern Cameroon Plateau. The topographic map of Yaounde and field observation gives the impression that the Yaounde Metropolis is on a water divide. This water divide appears like a crest line according to Fritz and Kuete (1974) and Tchotsoua (1989). It is a crest-line with a width of about 100-800m that moves in a zig-zag manner from the Atlantic Ocean to Maiganga.

The substratum of the Yaounde metropolis is characterized by the outcrop of the basement complex, basically of igneous and metamorphic rocks. The area under study is found in the Humid Tropical Region. The aborigines of Yaounde were Pygmies. These Pygmies were pushed out by the invading Ewondo. Similar to the Fang (Beti, Bulu, and Fang) where they constitute a major part, the Ewondo came from Northern Sanaga to seek refuge in the hills of the South. They were escaping from the Foulbe in the North who constituted their main threat of the Century. They formed the Mvog who are found distributed on the hills that constitute the present Yaounde town. Yaounde, was founded in 1888 by the German Colonial Administration. It became the capital of the French territory under the League of Nations in 1922. During the 2nd World War, it was temporarily shifted as the capital of the former East Cameroon Province. With the independence of the Country in 1960, the city has remained the political capital. The Yaounde metropolis plays double administrative roles. It is currently the Regional and National capital.

3. Materials and Methods

The basic materials and methods used in this study involved the interpretation of aerial photographs and topographic sheets of Yaounde 3b, 3d and 4c (Oveng, Nkolbisson etc.) at the scales 1:50.000. Then came field observations, analyses of questionnaires on core elements such as the perception of city dwellers about animals and socio-cultural welfare. Other data collected was by way of questionnaires administered to hunters. Internet information greatly facilitated the upgrading of data view points and conclusions arrived at in recent studies. Other basic data were obtained from the ministry of forestry and wildlife (MINFOF)

4. Findings and Discussions

4.1. A Rapid Urban Sprawl

The population of Mfoundi according to the IFORD (Institute for Demographic Studies) data of 1976 was 313206. This figure rose to 703588 in 1987. The figure went up to 1372 800 in 2001 (Encarta 2006). The population has risen to 1.881.876 inhabitants according to BUCREP (2010). The bulk of this population is contributed by in-migrants. They come from the villages around and all over the Country. The 2001 population figure qualifies the area to be a millionaire city.

The density for 1987 was 2748.4 which in 2001 was 5362.5 and 5900 persons per square kilometer in 2010. This makes the area to be one with the highest density in the country.

The surface area of Mfoundi was 256km^2 (25600ha) before the new administrative divisions were created in 1992. Currently, the surface area (from planimetric measurements on topographic maps at the scales 1:50 000) stands at 304 km^2 (30400ha). The evolution of the population of the area was computed by Nkwemoh (2019) as can be seen in figure 2

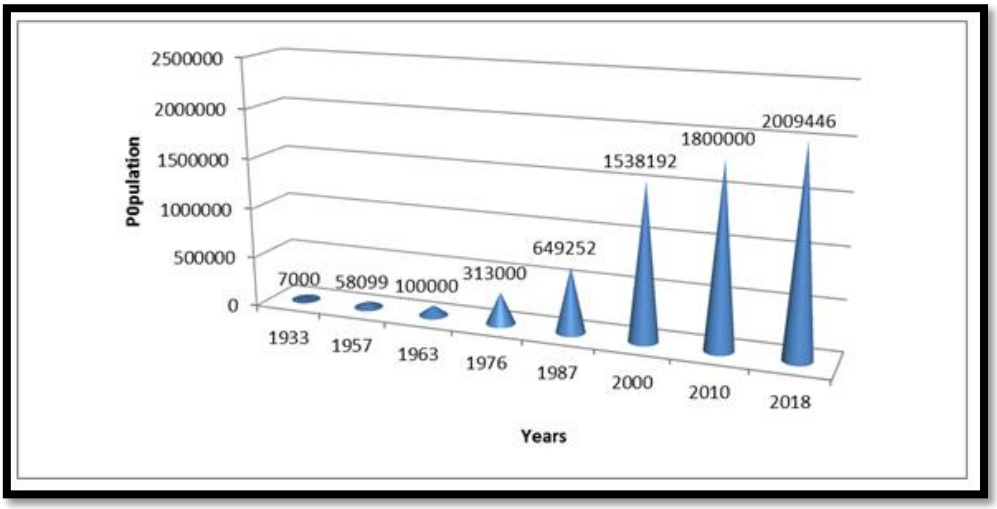

Figure 2: Evolution of the Population of Yaounde (1939-2018)
Source: Franqueville (1979) & Nyangono (2008) and BRPH (2010) Nkwemoh (2019)

A presentation of the sprawl of the Yaounde metropolis is clearly seen in Figure 3. This figure shows the different stages of growth as shown by aerial photographs and maps of 1956, 1964, 1968 and 1974.

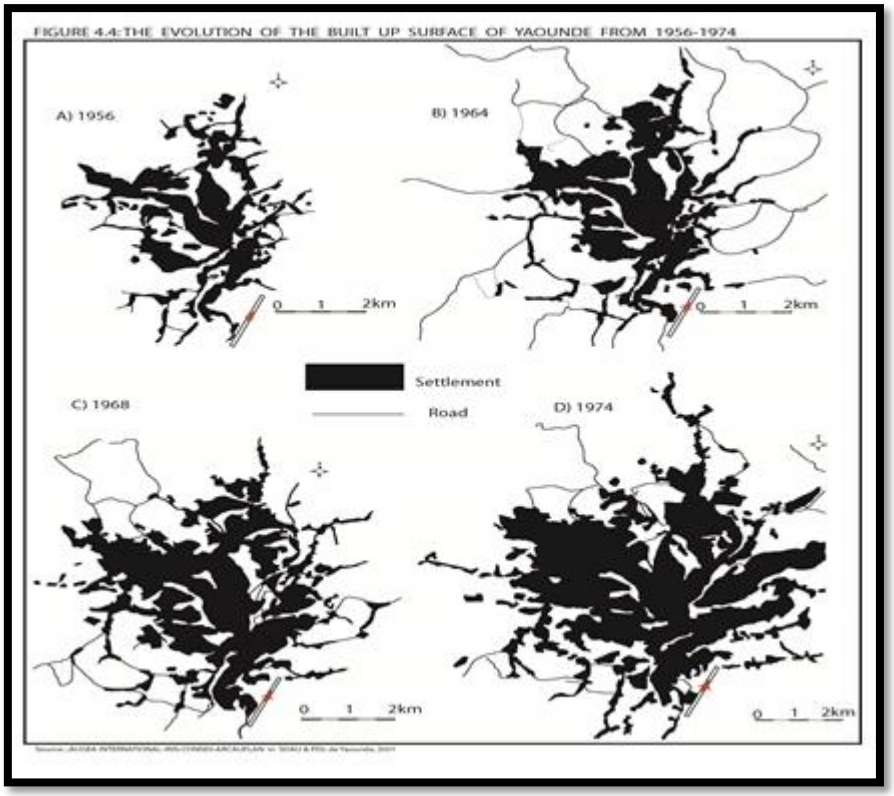

Figure 3: Spatial Evolution of Yaounde 1956 -1974

Within the town, there is still the possibility of increased density of vertical buildings. Meanwhile in the outskirts the engulfment of rural space is very evident. This is clearly seen around the Mvan and towards Mbankomo, Mesame Ndondo and Odza and towards Nsimalen Airport (South); Biteng, Mimboman II (East); Mvog Ebanda and towards Soa, Santa Barbara (Norht East); Emana towards Olembe on the Yaounde Bafia High way (North), and then Simbock and Ahala (South West). As for the expansion towards the North West and West, the sprawl is limited. The inhabitants are either

climbing unstable slopes or moving along narrow valleys. Figure 4 showing the situation of land occupation according to the periods, 1951, 1988, 2002 and 2008 clearly illustrates the above situation. Table 1 shows the evolutions of the extent and rate of urban expansion of the Yaounde metropolis.

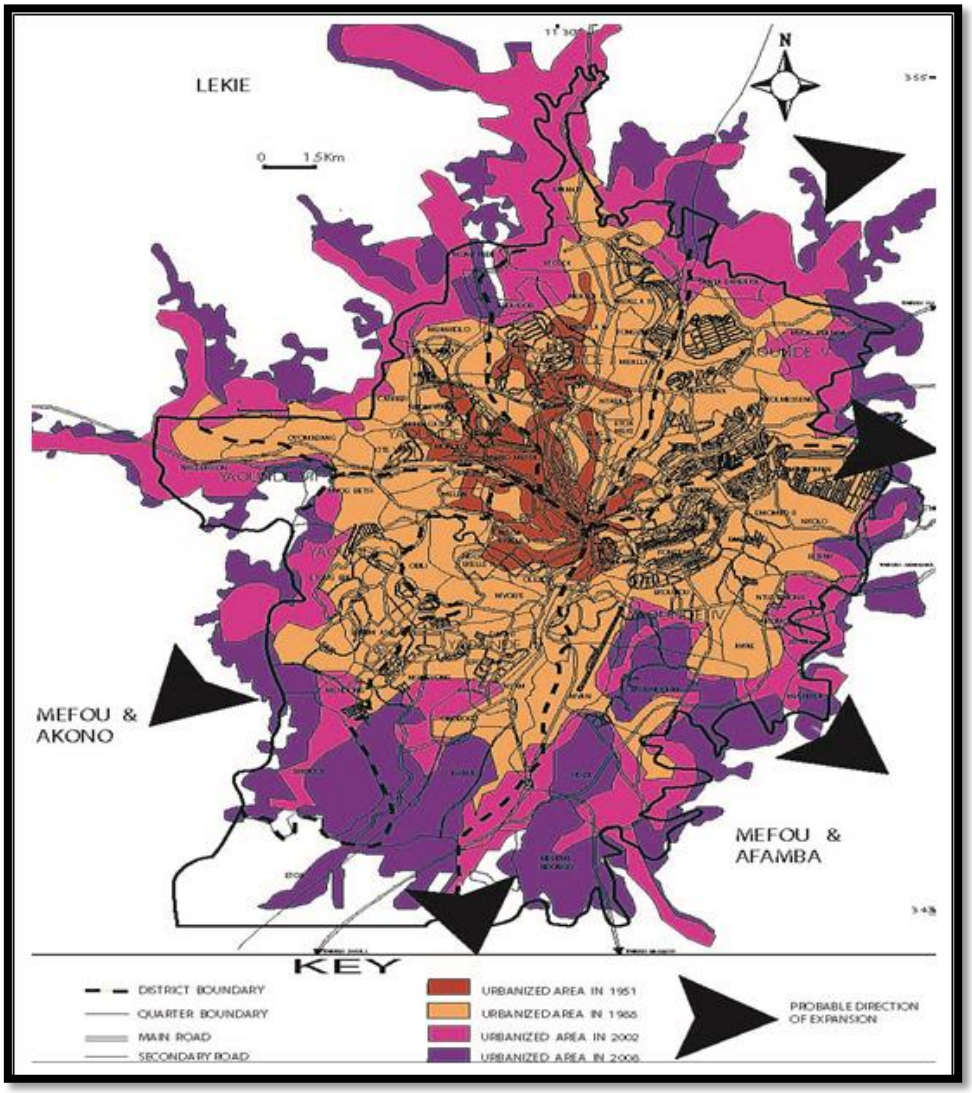

Figure 4: Various Stages of Urbanization of Yaounde
Source: Nkwemoh 2012

Year	Surface Area (Ha)	Rate of Growth During the Period in %
1956	1.740	
1964	2.250	1.29
1968	2.920	1.29
1974	3.830	1.30
1981	5.300	1.38
1990	12.300	2.32
1992	13.500	1.00
2000	18.000	1.33
2010	22.501	1.33
1018	27.002	

Table 1: The Expansion of Yaounde Town from 1956 – 2000
Source : Augea International-Iris Conseil-Arcauplan in SDAU & PDL de Yaoundé, 2001 and Nkwemoh (2019)

4.2. The Implication of Urban Expansion on Fauna

The dense forest that constituted the home for many animals (wildlife) has been degraded by urban expansion. Sources in the Wildlife unit of the Divisional Delegation of MINFOF for Mfoundi (2010) indicate that, the species of fauna that would live in the area are not different from those that are found today in the neighboring equatorial evergreen

forest. Almost 90 percent of the rain forest animal species are insects, and of these, most are beetles. A single rain forest tree can host more than 150 species of beetles. Living high in the forest canopy, most of these beetles and other insect species have eluded scientists until recently, when technology has improved access to the upper stratum. To this day, scientists are unsure how many animal species exist in the evergreen forest, largely because they have identified just a small fraction of the millions—some estimate as many as 30 million—of insects that live in the rain forest (Encarta Encyclopedia 2009).

According to the Encarta Encyclopedia (2009), within 15 sq km (6 sq mi) of rain forest, as many as 100 different mammal species may be found. These animals occupy every available niche, from burrows in the forest floor to the branches of emergent trees. Most rain forest mammals are nocturnal (active during the night) or crepuscular (active during the twilight of dusk or dawn), and they spend the heat of the day sleeping. In fact, almost half the mammals of the rain forest are bats, flying mammals known for their nighttime activity. Some rain forest mammals, including gorillas, elephants, tapirs, agoutis, and wild pigs, are ground-dwellers, but most, like their insect counterparts, live high in the treetops in the forest canopy. Canopy-dwellers have evolved an array of fascinating traits to survive in the branches of trees**.** However, an attempt has been made to understand the wildlife that existed and what obtains in the area today. Some areas in around the city today vividly illustrate the display landscapes with a bearing on hunting as an emerging activity as seen around Nomayos after Itokoss in Mbankomo
subdivision, Leboudi Carrier c- Ngoya II (Figure 5)

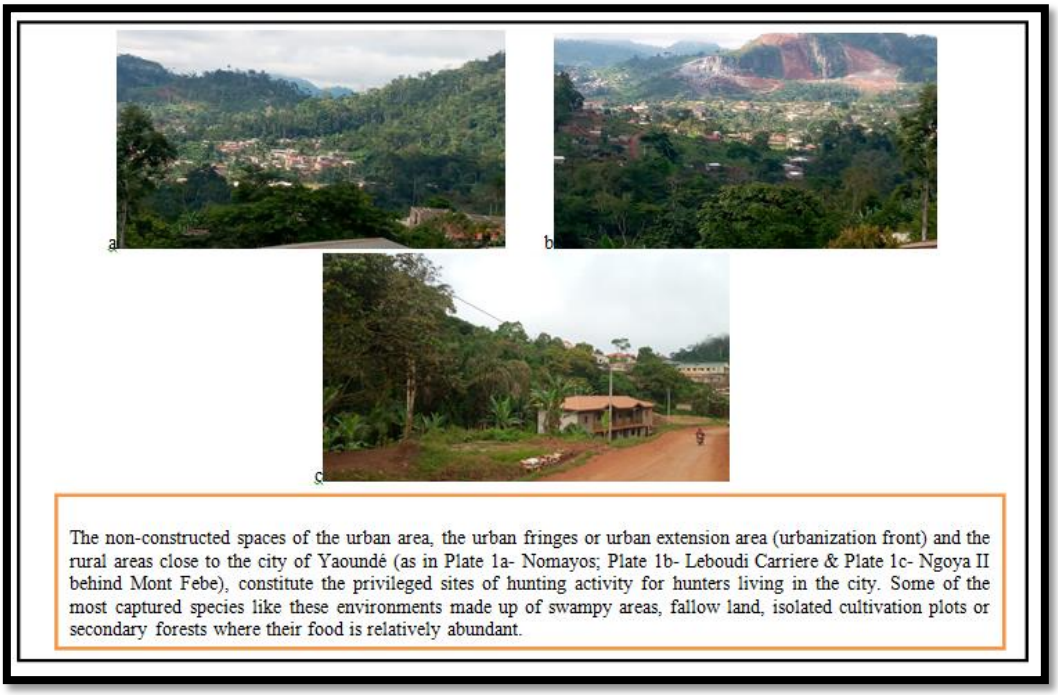

Figure 5: Hunting Landscapes in and Around Yaounde

4.2.1. An Inventory of Wildlife in Yaounde in the Phase of Rapid Urbanization

Information from MINFOF (2010), on studies of past works and analyses from interviews permit to establish an approximate inventory of some initial wildlife species of the Yaounde metropolis. The components of the animal kingdom have been classified according to mammals (Table 2). It is worthwhile to note that these species are also listed as endangered species by the World Nature Conservation Union (IUCN). The destruction of their home forest for lumber, firewood, agriculture and most importantly urbanization is the most severe threat.

Common Names	***Scientific Names***
African buffle	*Syncerus caffer*
African civet	*Vivera civetta*
African Manatee	*Tichechus senegalensis*
Allen's Bush Baby	*Galago alleni*
Angwantibo	*Aretocebus calabarensis*
Argile mangabey	*Cercocebus agilus*
Bay duiker	*Cephalophus dorsalis*
Beecroft's Flying Squirrel	*Anomalurops beecrofti*
Bongo	*Bocerus eurycerus*
Bush pig	*Potamochoerus porcus*

Common Names	Scientific Names
Chawless otter; African camenon	*Aonyx conginus*
Chimpanzee	*Pan troglodytes*
De Brazza's Monkey	*Cercopithecus neglectus*
Drill	*Papio leucophaeus; Mandrillus leucophaeus*
Eastern black and white colobus	*Colobus guereza*
Elephant	*Loxodonta spp*
Genet	*Genetta spp*
Giant forest hog	*Hylochoerus meinertzhageni*
Giant ground pangolin	*Manis gigantean*
Gorrilla	*Gorilla gorilla*
Hippopotamus	*Hyppopotamus amphibious*
Hoest Monkey	*Cercopithecus L'hoesti*
Mandrill	*Papio spinx; Mandrill sphinx*
Mountain reebuck (reebok)	*Redunca fulvornfula*
Panther	*Panthea pardus*
Peter's and harvey's Duiker	*Cephalophus callipigus*
Potto Gibbon	*Perodicticus potto*
Preuss's Monkey	*Cercopithecus preussi*
Sitatunga	*Tragelaphus spekei*
Striped pole cat	*Ictonyx striatus*
Water chevrotain	*Hyemoschus aquaticus*
Yellow backed duiker	*Cephalophus sylvicultor*

Table 2: An Inventory of Some Endangered and Common Mammals That Existed in Yaounde
Source: Compiled from Ministry of Forest and Fauna (2010)

Following the same procedure of inquiries and investigation, we were also able to get a checklist of endangered and common species of birds that used to occupy the area (Table 3)

African Cuckoo Hawk	*Aviceda cuculoides*
African Grass Owl	*Tyto capensis*
African Harrier Hawk	*Polyboroides typus*
African Hobby	*Falco cuvierii*
African Wood Owl	*Strix woodfordii*
Akun Eagle Owl	*Bubo leucostictus*
Ayres's Hawk Eagle	*Hieraaetus ayresii*
Barn Owl	*Tyto alba*
Bateleur	*Terathopius ecaudatus*
Black Sparrowhawk	*Accipiter melanoleucus*
Brown-backed Cisticola	*Cisticola discolor*
Brown-Neck Parrot	*Poicephalus robuster*
Cameroon Blue-headed Sunbird	*Nectarinia oritis*
Cameroon Mountain Francolin	*Francolinus camerunensis*
Cameroon Olive Greenbul	*Phyllastrephus poensis*
Cameroon Olive Pigeon	*Columba sjostedti*
Cassin's Hawk Eagle	*Spizzaetus africanus*
Common Buzzard	*Buteo buteo*
Crowned Eagle	*Stephanoaetus coronatus*
Dark Chanting Goshawk	*Milierax metabates*
European Hobby	*Falco subbuteo*
European Scops Owl	*Otus scops*
Forest Swallow	*Hirundo fuliginosa*
Fraser's Eagle Owl	*Bubo poensis*
Great Snipe	*Gallinago media*
Greater Flamingo	*Phoenicopterus*
Greater-spotted Eagle	*Aquila clanga*
Green Longtail	*Urolais epichlora*
Green Turaco	*Tauraco persa*
Grey parrot	*Psittacus erithacus*
Grey-throated Greenbul	*Andropadus tephrolaemus*

Lesser Flamingo	*Phoeniconaias minor*
Lesser-spotted Eagle	*Aquila pomarina*
Little Olive Back	*Nesocharis shelleyi*
Lizard Buzzard	*Kaupifalco monogrammicus*
Long-crested Eagle	*Lophaetus occipitalis*
Long-legged Buzzard	*Buteo rufinus*
Long-tailed Hawk	*Urotriorchis macrourus*
Maned Owl	*Jubula lettii*
Martial Eagle	*Polemaetus bellicosus*
Mountain Robin-Chat	*Cossypha isabellae*
Ovambo Sparrowhawk	*Accipiter ovampensis*
Pearl-spotted Owlet	*Glaucidium perlatum*
Pel's Fishing Owl	*Scotopelia peli*
Peregrine Falcon	*Falco peregrinus*
Rachel's Malimbe	*Malimbus racheliae*
Red-chested Owlet	*Glaucidium tephrontum*
Red-fronted Parrot	*Poicephalus gulielmi*
Red-necked Buzzard	*Buteo auguralis*
Saker Falcon	*Falco cherrug*
Sandy Scops Owl	*Otus icterorhynchus*
Secretary Bird	*Sagittarius serpentarius*
Senegal Parrot	*Poicephalus senegalus*
Shelley's Eagle Owl	*Bubo shelleyi*
Sjöstedt's Barred Owlet	*Glaucidium sjostedti*
Spotted Eagle Owl	*Bubo africanus*
Verreaux's Eagle Owl	*Bubo lacteus*
Western Little Sparrowhawk	*Accipiter erythropus*
White Stork	*Ciconia ciconia*
White-crested Turaco	*Tauraco leucolophus*
White-faced Scops Owl	*Otus Leucotis*

Table 3: A Checklist of Some Endangered and Common Birds that Existed in Yaounde.
Source: Compiled from Ministry of Forest and Fauna (2010)

Pursuing the same procedure of inquiries and investigation, we were also able to get a checklist of endangered and common species of reptiles that used to occupy the area (Table 4)

	Euprepis nganhae
	Kinixxys homeana
Aboreal Gecko	*Urocotyledon weileri*
African Burrowing Python	*Calabaria reihardti*
African Chameleon	*Chamaeleo africanus*
African dwarf Crocodile	*Ostealeamus tetracus Crocodylus*
African Python	*Python sebae sebae*
African sharp nosed Crocodile	*Crocodilus cataphractus*
African spurred Tortoise	*Geochelone sulcata*
African Turtle	*Trionyx triunguis*
Agama Lizard	*Agama mehelyi*
Bell's Hinged Tortoise	*Pelusios gabonensis*
Black Mamba	*Naja melanoleuca*
Burrowing Cobra	*Paranaja multifasciata anomala*
Cameroon Chameleon	*Chamaeleo camerunensis*
Cested Chameleon	*Chamaeleo cristantus*
Common Tortoise	*Kinixys erosa*
Dwarf Chameleon	*Rhampholeon spectru spectrum*
Eisentraut Chameleon	*Chamaeleo eisentrauti*
Elegant Turtle	*Cyclanobis elegans*
Flap-necked Chameleon	*Chamaeleo dilepis dilepis*
Four horned Chameleon	*Chamaeleo quadricornis*
Fuhn Skink	*Leptosaiphos fuhni*
Gekos	*Cnemaspis dilepis*

Green Cobra	*Pseudohaje goldi*
Green Turtle	*Chelonia mydas*
Hawksbill Turtle	*Eretmochelys imbricate*
Leatherback Turtle	*Dermochelys coriacea*
Lepesme skink	*Lacertaspis lepesmei*
Loggerhead	*Caretta caretta*
Mount Lefo Chameleon	*Chamaeleo wiedersheimi perreti*
Nile Crocodile	*Crocodylus niliticus*
Olive Ridley	*Lepidochelys olivacea*
Ornate Monitor	*Varanus ornatus*
Owen's Three-horned Chameleon	*Chamaeleo oweni*
Palm dwelling Gecko	*Urocotyledon palmatus*
Pfeffer's Chameleon	*Chamaeleo pfefferi*
Stone Lygodactyle	*Lygodactylus dysmicus*

Table 4: A Checklist of Some Endangered and Common Reptiles That Existed in Yaounde.
Source: Compiled from Ministry of Forest and Fauna (2010).

An inventory of insects and micro-organisms has not been added to this. It is only supposed that all insects in the rest of the rainforest of the Congo basin are similar species.

It is realized that most of the above fauna is either nonexistent in the area or pushed to remnants of the tropical rainforest at the fringes or hundreds of kilometers away from Yaounde. Little or nothing of the bulk of the species that existed is found in the urban area today. For instance, gorilla that is noted to be solitary has been found around Nkolbisson and Nkolmeyos, Mbam and towards Lekie Division about 15 km away. According to the Divisional Delegation of MINFOF (2010), Chimpanzees are found in the wild towards Ngoumo-Bikok about 20km away. In the same light, many crocodiles, pythons amongst others can be found around this area. Towards Nyong and Nfoumou Division, there are even Elephants that migrate momentarily from the Dja to Bengbis.

A study of the main remnants of wildlife in the city after field observation and interviews has been attempted. With the help of workers of the Ministry of Forest and Fauna and some hunters in the area under study a rough picture of what exists today in the metropolis can be obtained. It is realized that out of the over 2500 species of trees and over 10.000 fauna species that could also occupy the area, only a handful can be traced. They are only found around the outskirts of the city where little hideouts for animals exist. Amongst the remnants of the area under study, the most frequently found mammals are squirrels, bush pigs, giant rats and moles, antelopes, hedgehogs/wild cavy (cutting grass) – wild relative of guinea pigs, porcupines, tree and rock hyrax, wart hog etc. Meanwhile the birds include; sparrow, swallow, hawks, sparrow hawk, eagle, dove, olive pigeon, owl, water fowls and/or ducks amongst others. The survival of these species in the patches/remnants of vegetation is an indication that with sustainable management, wildlife can be maintained.

The particular case of bats is worth an elaboration at this juncture. It is very common to find bats in their colony in the heart of the city just like in the wild. Colonies of bats are found around palm and mango trees within the precincts of the University Teaching Hospital (CHU) and the Military quarters at Melen. A colony of these species is also traced around Bastos junction. These bats are readily spotted through the momentary restlessness and quirking sounds.

The most common species of reptiles include mamba, cobra and viper; gecko, agama lizards, monitors, crocodiles and skink amongst others. It is realized that these species of wildlife are very insignificant. This has only gone a long way to illustrate the impact of urbanization. In fact, what has been inherited is not what is possibly to be passed down to posterity. This is especially the case since it is understood that city dwellers don't inherit from predecessors but they borrow from their descendants.

The elimination of wildlife species in the Yaounde metropolis due to urbanization, is a true testimony of how man dominates mother nature. Man has however not failed to realize the importance of nature by creating the Mvog-beti Botanical and Zoological Garden where a good number of animals thrive

4.2.2. Poaching by City Dwellers in the Area

Hunting is greatly responsible for the reduction and disappearance of wildlife in the area. Some main types of hunting could be identified in the area

The first type entails hunting by use of locally made traps. In this type of hunting, the hunters (who can still be farmers or of other profession), set their traps more into the bushes (otherwise known as hide outs). They also use twines or wires and sticks to set traps on the tracks of small games. Some merely use square or round metal traps. These traps are used to lure games both daily and nocturnally. The hunter only comes to collect the game after several hours. This type of activity is very common in Carrière, Etetak and Oyomabang. Some are also traced around Simbock and Mendong.

The second type is the one which the hunters usually, 1-5 or more in number take up spears, bows and arrows, cutlasses and den guns accompanied by a park of dogs to go hunting. They go into the thickets or bushes around the outskirts of the metropolis after animals. These hunters and dogs usually ransack and kill all animals that come across their path irrespective of age. They hunt bigger animals like wild boars, deer, Hedge hogs, Antelopes and Monkeys. Hedgehog (*Erinaceus europaeus*), porcupine (*Artherurus africana*), viper (*Echidna gabonica*) and civet (*Civettictis civetta /*

Vivera civetta) as well as rats (*Cricetomys gambianus*) are among the commonly sold species (Figure 6). What is common with hunting today is the use of modern or precision tools. Hunting guns today are designed to permit shooting with precision. Oftentimes, the riffles used are well adapted to the type of hunting.

The third type of hunting is large scale. This type used to exist when the area of the metropolis was still under a dense evergreen forest and in the early 1960s. This type of hunting involves hunters and dogs going on an expedition for days and weeks in the wild to catch the animals and dry the meat at the same time. This type of hunting has been greatly restricted in the southern part of Cameroon today by MINFOF. It is no more practiced in the metropolis but can only be traced around the South and Eastern Regions. This is the type of hunting that permit the killing of animals like Buffaloes, Elephants, Chimpanzees, Gorillas, boars etc.

Preserving wildlife would have been very important because past experience has shown that specific animals are responsible for the propagation of some plants. This is especially the case with some apes that eat fruits to pass out the seeds in their wastes or droppings. Since most plants have adapted to the environment over time, their seeds tend to have thick coating. These seeds can only easily germinate after having been eaten or ingested by animals if there is no means of heating.

This means that poaching to eliminate some of the key species (principally some apes, elephants and bats amongst others) will eventually mean a reduction of plant population. The reduced plant population would also mean reduced carbon sequestration. This would finally end up in the increase in the amount of greenhouse gases (GHG). Meanwhile this would lead to increase temperature and thereby aggravating Global Warming. If these animals increase, this would result in an increase in plant population and consequently a reduction in the amount of carbon dioxide that is released. This would have been a major steep to reduce global warming alongside a lucid ecological conservation strategy.

Figure 6: Excerpts of Hunted Species in Yaounde

4.2.3. Animals for Commercial Needs and Domestication

Bush meat (Table 5) is a real delicacy to most city dwellers in the metropolis except for the restriction imposed on the marketing. It is equally realized that apart from the need of meat, hunting in and around the area is carried out for some reasons. Initially before the restriction and banning, elephants were hunted for their tusk and/or ivory. It is however still realized that some animals are hunted for their skin. These include Mammals like the deer and wild cat and Reptiles like python and others. Other animals are hunted for their horns whereas these together with Skin serve as enhancement in embroidery of homes.

Species Name in English	Name in French	Scientific Names	Level of Protection According to National Regulatory Framework (A: Totally Protected; B: Partially Protected; C: No Protection)	Minimum Price (CFA)	Maximum Price (CFA)
Porcupine	Porc-épic	*Artherurus africana*	C	5000	15000
Bush pig	Sanglier	*Potamochoerus porcus*	C		
hedgehog	Hérisson	*Erinaceus europaeus*	C	5000	10000
Giant Rat	Rat	*Cricetomys gambianus*	B	1500	4000
Doe	Biche	*Cephalophus dorsalis or Cephalophus callipygus*		20000	40000
"Antelope"	"Antilope"			25000	40000
Viper	Vipère	*Echidna gabonica*	B	10000	30000
Civet	Civette	*Civettictis civetta* Vivera civetta	C	10000	30000
Hare	Lièvre	*Philatomba monticola*	C	7000	12000
Mongoose	Mangouste	*Herpestes naso*	B	2000	4000
Black snake	Serpent noire	*Pseudechis porphyriacus* (serpent noir à ventre rouge); *Dendroaspis polylepis (mamba noir)*	B	5000	10000
striped cat	Chat tigre	*Genetta servalina (Ictonyx striatus)*	A	5000	12000
pangolin	Pangolin (nain)	*Manis tricuspis*	B	7000	10000
Renard	"Renard"			5000	
monitor lizard	Varan	*Varanus niloticus*	C	10000	15000
"monkey"	"singe"			5000	15000

Table 5: Most Desired Species and Price Ranges in the Pro-Circ Yaounde Metropolis
Source: Fieldwork and MINFOF 2020

The next impact on fauna in the metropolis is seen in domestication. According to the Encarta encyclopedia (2009) with the domestication of animals, which began perhaps 10,000 years ago, humanity came to play a more active role in biological evolution. By the 1800s and 1900s, the role that human beings played in species survival had expanded to the extent that many species survive only because human beings allow it. Some animal species survive in great numbers because of some human efforts. It is common to find parrots, monkeys and birds in some homes in the city. These are components of the wild that have become domesticated. Some of such animals are to be found in the Zoo of Mvog-Betsi.

Man protects many species of chicken, cattle, sheep, goats, and a few other domesticated animals in order to make use of them. Inadvertently, modern civilizations have ensured the survival of certain other animals. Rat populations are thrilled or propagated because of all of the food available to them, since humans store so much food and generate so much garbage. Squirrels prosper in large part because we have created suburban landscapes with few predators.

In a nutshell, even as human beings intentionally or unintentionally encourage the survival of a few species, humans threaten many more species. Many other animals, most notably tropical forest species, suffer from destruction of their preferred habitats. Quite inadvertently, and almost unconsciously, humankind has assumed a central role in determining the fate of many species and the health of Earth's water, air, and soil. Humans have therefore assumed a central role in biological evolution.

5. Recommended Move towards a Modern System with an Integrated Wildlife

5.1. The Protection and Conservation of Wildlife

What makes a population to stop thinking or looking at wild animals as food is a rhetorical question being posed. All of this is however a matter of mentality and civilization. It is realized that as population expands, it tends to exert a pressure on the surrounding that constitutes living habitat to other living things. In some western countries, the need for conservation is forcing them to revise the conservation strategies for wildlife. It is becoming normal to find wild animals living just a couple of meters away from human clusters.

One would not have expected to find wildlife in cities of Developed Countries like the U.S.A and Australia. There are parts where the life in the city alongside wild animals is not very different from those of pygmies in the tropical

evergreen forest of Africa. In these areas it is common to find possums and Tasmanian devils even moving on telephone and electric wires. It is also common even with Squirrels, Deer, Fox, Hares and Wild cavy amongst others. It is not uncommon to find city dwellers in some parts offering peanut, to Squirrels, Hares and Rabbits as well as Geese, Ducks and Swans that live like in the wild. There has been an apparently sophisticated but simple management approach that has been adopted to let man live in a symbiosis with wild life.

The above situation does not mean that people should not eat these species. They should however be discouraged but if they must, it should be those coming from hunting areas far away from the city in hunting grounds and from food stores. The importance of this type of knowledge should also be made known by most if not all of the city dwellers of the Yaounde Metropolis. Zoologists and Botanists should be encouraged to assist in determining and promoting the survival of wildlife in the area. In same light, woodlots and remnants of natural forest should be furnished with some species of fauna. The survival of the zoological garden at Mvog-Betsi is an indication that this type of measure can work if properly designed and implemented.

This can enhance the existence of a sustainable system that is bound to be very essential in aspects like species conservation and ecotourism. The system that is recommended here is therefore socially just, economically viable, flexible/adaptable and most importantly ecologically sound.

5.2. Sensitization Campaigns

All that is needed to pursue protection and conservation of wildlife, is awareness raising. The population of the metropolis should be led to know the essence of living with wild animals. Some of the people in the Yaounde Metropolis already have an idea of living with wild life. They see the colonies of bats, and the spotted ducks around the municipal lake. They also see the water fowls in the "elobis" living like in the wild. No body owns them but the State and thus everybody.

The method of sensitization advocated here includes the introduction of the theme of wildlife/nature in the school curriculum. This had been facilitated in primary schools with nature study of the national curriculum. This knowledge should be extended to secondary and high school in specific section under biology or zoogeography in Cameroon in general and Yaounde in particular.

The city dwellers can then be constantly sensitized by the media (audio-visual and print media). Government initiative to authorize the many radio and Television stations in the city is a positive aspect. Slots dealing with wild life should be included at regular intervals in television programs. Such studies are already elaborate on the National Geographic Program. This is only afforded by those who can afford to be connected. The essence of wildlife in cities should be made known to the public on regular basis. These broadcasting centers should also conduct regular VOX POPS to know the extent of knowledge of wildlife of the common man.

Another method can be through churches or meeting groups. In this way, themes on the importance of wild life in ecology should be included as regular church announcement. The believers should be informed on the state of their environment and possible ways forward. All of this would go too well if there is some degree of deterrence from eating bush meat.

5.3. Preference for Home-Reared Animals

The initial importance of the need to get meat when needed had been indicated since the lifespan of domestication. This had been a strategy to take the interest of the ever-growing population off the wild. The meat consumed in Yaounde comes from the Adamawa and the Western Highlands. Cattle was transported by trekking in the 60s and 70s but today cattle merchants transport them in trucks and trains. In this way weight loss and time lost noticed in the old movement system is reduced. This method should be encouraged. In addition to this, the few Piggeries and Poultries around the Metropolis should be bolstered. A recent development that is paying off the bush meat lovers is the rearing of "Cutting grass"- the wild relative of guinea pigs - *Cavy*.

The so-called hedgehog is thus a pig family but with a short neck and specific nature of skeleton. It is now reared and can be sold for prices that range from 3.000 to 70.000 Francs CFA. The weight varies from 1.5 to 30kg. This should be encouraged and the indigenes made to understand that when they kill wild animals, they eat for one day but when the animal is safe, this can promote ecological resources and the people can eat for their life time. It should be understood that these animals are not inherited from our parents. Rather, we borrow from our children. We are therefore not the true owners of all these resources.

6. Conclusion

The study of the impact of urban expansion on the Zoogeography of the Yaounde metropolis permits some salient conclusions. The rapidly growing population has necessitated the need for more space. This situation has forced urbanites to clear the forest for the construction of houses. The situation has equally been aggravated by the need for food with specific reference to 'bush meat'. More-so the mere presence of man and his unpredictable habits has scared the animals.

The solutions that have been proposed to revamp the situation are those that are adaptable and flexible. In addition to these, if they are well maintained, they would uphold the economic, social and ecological status of the area. In a nutshell, these solutions would permit the sound use of the milieu today without jeopardizing the possibilities of the future generation to meet their own needs.

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