

Full Length Research Paper

Land use pattern and fauna composition in the relics of Maba forest, Ogun State, Nigeria

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The study of land use pattern and fauna composition in the relics of Maba forest as the permanent site of the Redeemers' University (RUN's) was carried out to determine distribution and abundance of the wildlife species within the niche level and effect that such developmental pattern will have on the general ecological balance of the area. The study entailed complete ground truthing of the entire ecosystem, which is 500 ha square in area and stand to be one of the remaining natural forests in the southwestern part of the country that is rich in biodiversity, the method adopted for wildlife diversity study is analytical habitat associations (AHS), aimed at species habitat studies and to discover which part of the habitat is preferentially used by specific species of animal. Other information was obtained through structured questionnaire from 150 inhabitants at the sites. The study revealed that forest ecosystem at Maba can be classified into five according to their physiognomy and utilization rate. These are riparian forest (18.5%) plantation (12.5%), secondary forest (16.5%), farm fallow (25.5%) and arable farm land (27.0%). The sample representative of the physiognomy in all the ten transect showed that the herbaceous vegetation (grassland) has the highest mean percentage (31.8%) while others according to descending order are as follows: woodland (27.7%), bare ground (16.2%), canopy cover (15.8%) and the ground cover (10.5%). Mona monkey (*Cercopithecus Mona*) has the highest relative mean population (2.8) while species like baboon (*Papio anubis*), puff adder (*Bitis arietans*) and scorpion have relative mean population of 0.2 each. However the relative mean composition of all fauna species by the representative habitats indicated that riparian forest (11.5) has the highest, while the least was recorded in secondary forest (0.30). Bird species with the highest mean composition is village weaver (13.6) while the least is king fisher (0.2). However the mean composition of birds with the different habitat showed that forest plantation has the highest (4.8) and the least mean bird composition was in farm fallow (0.47). The common species hunted by inhabitants are grasscutter (*Thryonomys swinderianus*) (15.0%), birds (10.0%), squirrel (*Xerus erythropus*) (15.0%) and monkeys (*Cercopithecidae spp.*) (8.0%). It can therefore be concluded that certain habitats (riparian and plantation forest) supported higher diversities of species because they contain several species of relatively high conservation concerned species (Mona monkey, baboon, monitor lizard and several avifauna). Such ecological significance species would be adversely affected during the land use pattern for institutional purpose.

Key words: Maba forest, habitat, species, eco-development, Redeemer's University.

INTRODUCTION

Presently, 11% out of the total land area in Nigeria is covered by the forest, other comprising 79% savannas and ten percent high forest (Happold, 1987). Maba forest

is one of the naturally free-zone forests existing in the southwestern part of Nigeria, located in-between Ogun and Lagos States. Major reason why there have been

many environmental problems associated with eco-development is the lack of environmental considerations in the planning and implementation of the major projects (Oyaigbeuen, 1988). Projects are usually sited or embarked upon to satisfy the social and economic needs of the people and nation without consideration of the possible impact on the environment. Human activities, such as extraction of raw materials from their natural habitats by mining, drilling, harvesting and those that relate to large scale water resources development projects, construction, agriculture, energy, industry and development projects, considerably affect the natural environment due to violation of environmental impact assessment (EIA) Act (Fedra et al., 2005). The shift in environmental management and modernization presently is how to make the people understand and accept the new rules of the economic growth which include the expansion of educational facilities, improvement in environmental quality with little attention paid to alternative cost on natural resources (flora and fauna) that would be affected (Mabogunje, 1980).

Development project often has adverse impact on the environment, these are environmental pollution and degradation by both human disturbances (anthropogenic activities) and natural occurrences (adverse climatic conditions) (Fagbeja, 2001). The activities such as road construction mineral and natural resources exploitations, like oil and gas exploitation and unsustainable agricultural practices have affected the environment (Sanwo and Arimoro, 2002). In order to effectively protect, sustain and manage the environment, alongside development and advancement, the concept of environmental impact assessment (EIA) is necessary. EIA is the process of identifying and evaluating the consequences of human actions on the environment and when appropriate mitigating those consequences (Erickson, 1994). Many developmental activities such as damming of rivers, construction of dual carriage roads, and other human-economic activities have been carried out without proper EIA. The effects of these on wildlife species and other conservation areas can not be over emphasized, the multiplier effect are mostly noticeable at the feeder streams or rivers flowing in and out the channels that are blocked and the wetlands that get dried-up. In order to effectively protect, sustain and manage the environment, alongside development and advancement, the concept of environmental impact assessment (EIA) is necessary.

To achieve the equilibrium, it is pertinent to develop through necessary research mechanism, by collecting baseline ecological data from Maba forest ecosystem so as to provide adequate and standard data on the effect of the proposed University on wildlife and other general ecological balance of Maba forest. EIA is a systematic process of evaluating such probable consequences of the proposed action during decision making process whereby serious environmental damage can be minimize or even avoided (Olokesusi, 1994).

STUDY AREA, MATERIALS AND METHOD

Study area

Maba forest is one of the naturally free-zone forests existing in the southwestern part of Nigeria, located in-between Ogun and Lagos States. The Forest ecosystem is composed of mixture of secondary and agro-silviculture type. The whole land area is 500 ha/km² surrounded by numbers of human inhabitants that have their primary livelihood on subsistence fishing and farming.

Method of data collection

The method adopted for wildlife diversity and habitat pattern study is called Analytical Habitat Associations (AHS), as described by Manly et al. (1993) and Adeola (1998), Powel (1994) and Hunt (1997). Once the relationships are known, it was possible to predict how particular habitat changes have affected such species.

The farms in the reserve were assessed by using Jacob (1974) preference index method

$$D = \frac{(r - p)}{R + p - 2rp}$$

Where 'r' is the proportional use of habitat by the species, 'p' is the proportion of farm environment and '2' is a constant value. The method took into consideration habitat use, condition, the species abundant and utilization rate. Other information on social economics were obtained through administration of one hundred and fifty structured questionnaire (administered by individual by knowledge 'Ik' model) (Ajayi, 2001) to three villages inhabiting the sites that are of equal population size according to last 2002/2003 national census results. The current price of wild animals (bush meats) was established, average number of each species were used to determine current market price.

The materials used are recording-ecological sheet, binoculars, Geographic Positioning System (GPS), Forest guide (Native of the area), measuring tape (500 - 1000 m rule), camera and films, ecological map of the area. The geographic co-ordinates where transects were laid are listed in Table 1.

The results were analyzed by the use of simple percentage, bar chart representation to illustrate the values. Necessary inferences were derived for discussion, classification, mode of natural life, effect of development on ecological set up and mitigation measures proffered.

RESULTS

Forest habitat

The forest ecosystem at Maba was classified into five according to physiognomy and utilization rate. These are riparian forest, plantation, secondary forest, farm fallow and arable farm land. The percentage rate of these classification along the ten transects within the study site were given in the Figure 1. Transects one to four are dominated by arable farm land and farm fallow, thereby indicated serious edge effect, with sub-climax vegetation except at the riparian forest area (swampy ecotone of raphia palm).

Transects five to ten are mixture of all the forest ecosystems with complex tree composition where by

Table 1. Transect length and coordinate.

| Transect number | Coordinate | Elevation | Distant |
|-----------------|------------------------------|-----------|---------------------------------|
| 1. | N 06°46.505' E003°26.136' | 67 ft. | 438 m. |
| 2. | N 06°46.373' E003°26.151' | 41 ft | 425 m |
| 3. | N 06°46.245' E003°26.177' | 43 ft. | 386 m |
| 4. | N 06°46.053' E003°26.165' | 63 ft. | 140 m |
| 5. | N 06°46.885' E003°26.185' | 78 ft | 727 m (Left 347 m, Right 380 m) |
| 6. | N 06°46.752' E003°26.235' | 66 ft. | 851 m (Left 347 m, Right 506 m) |
| 7. | N 06°46.527' E003°26.335' | 35 ft. | 540 m (Left 475 m, Right 65 m) |
| 8. | N 06°46.399' E003°26.530' | 15 ft. | 411 m (Left 133 m, Right 278 m) |
| 9. | N 06°46.266' E003°26.570' | 51 ft. | 270 m (Left 95 m, Right 175 m) |
| 10 | N 06°46.100' E003°26.775' | 46 ft. | 110 m (Left 33 m, Right 77 m) |

riparian and plantation forest are concentrated with cocoa, cola, plantain, raphia palms and woody trees such as *Albizia zygia*, *Piptadeniastrum africana* and *Bombax petandra*. Figure 1 shows the ecological distribution map at the site.

The highest percentage habitat at the site is arable farm land (27.0%) while other according to descending orders are farm fallow (25.5%), riparian forest (18.5%), secondary forest (16.5%) and plantation (12.5%), (Figure 2).

The herbaceous vegetation (grassland) has the highest mean percentage (31.8%) while others according to descending order are as follows woodland (27.7%), bare ground (16.2%), canopy cover (15.8%) and the ground cover (10.5%), (Figure 3).

The animals representative available at the Maba Forest ecosystem were recorded according to the habitat in each transect (Table 2). Riparian ecosystem has the highest mean species composition (11.15) Followed by plantation habitats (4.0); While secondary forest and

arable farmland were least (0.46, 0.30) respectively, with species like rodents, puff adder, squirrel, agama lizard and scorpion which indicated nature of sub-climax ecosystem. The relative composition of fauna (animal species) indicated that Mona monkey has the highest relative mean population (2.8) while species like baboon, puff adder and scorpion have least relative mean population of 0.2 each.

Avifauna composition of Maba forest is listed in Table 3, forest plantation ecosystem has the highest mean species composition (4.8), least mean species composition was recorded in farm fallow area of transects (0.47). The species with highest mean composition is village weaver (13.6) while the least is king fisher (0.2).

Socio-economic activities of the community stakeholders

The major human-community that is the primary

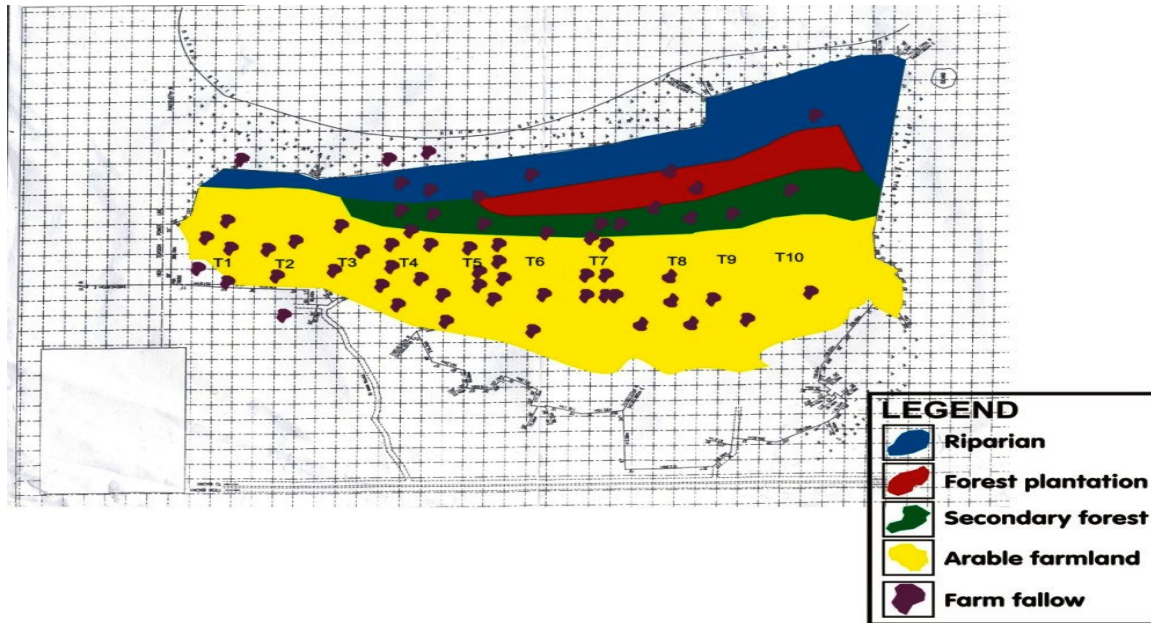


Figure 1. Ecological distribution map of Maba forest (Field Survey, 2008).

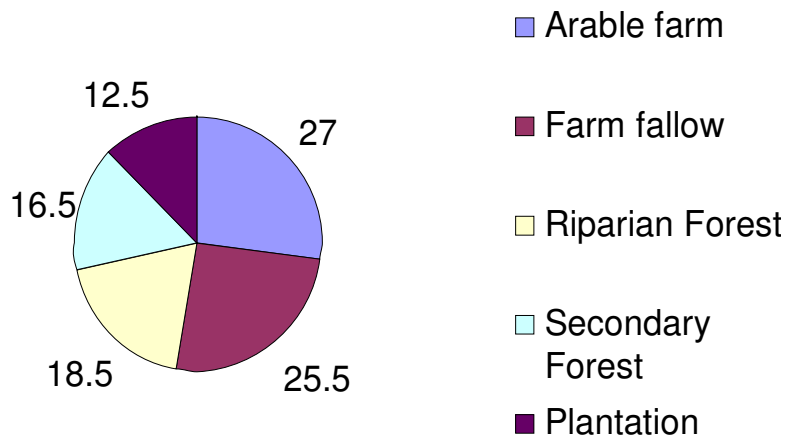


Figure 2. Percentage habitat classification at Maba forest.

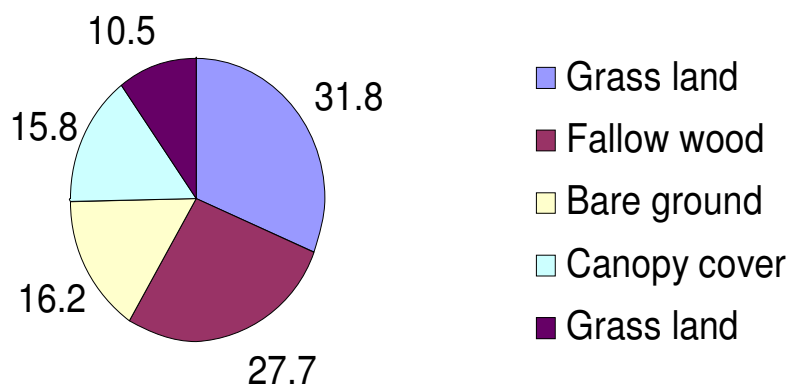


Figure 3. Percentage physiognomy classification at Maba forest.

Table 2. Relative composition of fauna species at different habitat within the Maba forest.

| Species | Habitat | | | | | Total specie | Mean specie |
|----------------------------|----------|-------------------|------------------|-------------|-----------------|--------------|-------------|
| | Riparian | Forest plantation | Secondary forest | Farm fallow | Arable farmland | | |
| Mona monkey | 80 | 40 | - | 15 | 5 | 140 | 28 |
| Monitor lizard | 5 | - | - | - | - | 5 | 1 |
| Baboon | - | 1 | - | - | - | 1 | 0.2 |
| Rodent | - | - | - | 10 | 8 | 18 | 3.6 |
| Frog | - | 4 | - | - | - | 2 | 0.8 |
| Toad | - | 2 | - | - | - | 2 | 0.4 |
| Agama lizard | - | - | - | 10 | - | 10 | 2 |
| Mud fish | >60 | - | - | - | - | 60 | >12 |
| Beetle | - | 3 | 5 | - | - | 3 | 0.6 |
| Cricket | - | 5 | - | - | 4 | 3 | 1 |
| Puff adder | - | - | 1 | - | - | 1 | 0.2 |
| Giant scorpion | - | - | - | - | 1 | 1 | 0.2 |
| Squirrel | - | - | 3 | - | - | 3 | 0.6 |
| Total species in habitat | 145 | 52 | 4 | 35 | 6 | 239 | |
| Mean of species in habitat | 11.15 | 4.00 | 0.30 | 2.70 | 0.46 | | |

Table 3. Relative composition of bird species at different habitat within Maba forest.

| Species | Habitat | | | | | Total specie | Mean specie |
|-----------------------------|----------|-------------------|------------------|-------------|-----------------|--------------|-------------|
| | Riparian | Forest plantation | Secondary forest | Farm fallow | Arable farmland | | |
| Swampalm bulbul | 8 | 4 | 3 | 4 | - | 19 | 3.5 |
| Senegal coucal | 1 | 2 | 2 | - | - | 5 | 1 |
| Copper sunbird | - | 15 | - | - | - | 15 | 3 |
| Village weaver | - | 43 | - | - | 25 | 68 | 13.6 |
| Black headed Senegal coucal | - | 2 | 2 | - | - | 4 | 0.8 |
| Stirling | - | - | 1 | 1 | - | 2 | 0.4 |
| Forest robins | 1 | - | 2 | - | - | 3 | 0.6 |
| Oreole | - | - | - | - | 2 | 2 | 0.4 |
| Hawk | - | - | 2 | - | 4 | 6 | 1.2 |
| Red eye dove | 2 | - | 2 | - | 4 | 8 | 1.6 |
| Eagle | 1 | - | - | - | 1 | 2 | 0.4 |
| Barbet | 4 | - | - | - | 1 | 5 | 1 |
| Ground hornbill | 2 | - | - | 2 | - | 8 | 1.6 |
| Abyssinia roller | - | 4 | 2 | - | - | 4 | 0.8 |
| King fisher | - | 2 | 1 | - | - | 1 | 0.2 |
| Total species in habitat | 19 | 72 | 17 | 7 | 37 | 152 | |
| Mean of species in habitat | 1.27 | 4.8 | 1.3 | 0.47 | 2.47 | | |

stakeholder of the forest ecosystem is Maba. The land owners comprised of different individuals, but jointly cooperated under the leadership of Baale. They are predominantly subsistence farmers, growing variety of arable crop, fruits and cash crop like cola-nut, cocoa and pineapple. Other communities that surround the area are

Ebute Maba with coordinate N06°45.061', E003°26.822'. Agunsoye village and Saga villages with coordinate points N06°45.052', E003°26.722' and N06°46.064', E003°00.522', respectively, along the adjacent site. The major river that bisects the whole forest ecosystem into two is Ebute - maba River.

Table 4. Percentage respondents' species hunting and market rate at Maba forest.

| Species | Respondents' hunting rate (%) | Market price/kilo. (N) |
|----------------|-------------------------------|------------------------|
| Grasscutter | 15 | 1,5000 |
| Squirrel | 15 | 500 |
| Birds | 10 | 800 |
| Snakes | 2 | 500 |
| Monkeys | 8 | 800 |
| Monitor lizard | 10 | 1,200 |
| Cricket | 5 | 100 |
| Fish | 35 | 450 |

The major anthropogenic activity at Maba Forest ecosystem is hunting for wild animals and birds. Information obtained from respondents by individual knowledge method '1k' noted that 15.0% of the inhabitants hunted for grasscutter. Other species indicated by the respondents mostly preferred are as follow: birds (10.0%) squirrel (15.0%) and monkeys (8.0%), (Table 4). Those that were no more in existence within the forest for hunters to be killed but obtained from questionnaire were python, rhinoceros, bush pig and aardvark. The common markets where the bush-meats were sold are Ibafo market and express road along the Lagos. The selling rate of the species by the hunters are as listed in Table 4, while some of the hunting tools are dane gun, hunting trap/wire and hunting dog. Most of the hunting activities were carried but by the young and middle aged men within the age group of 18 to 35 years of age, while the marketing is mostly by the women (75.8%). The hunting proceed (meats) are sold (75.0%) rather than being consumed (25.0%) by the household.

FISHING ACTIVITIES AT THE STUDY SITE

The major river that bisected the forest ecosystem into two is called Ebute Maba River (N 06°44.978', E003°26.820', Elevation 22 ft.). The river has its source from Shagamu (Owuru river) or Ebute Osesi and flow into Majidun, thereby become a tributary to the major river. Most of the fishermen are Ijaws (42.5%) and Eguns (40.5%) from Delta areas. The most common fish within the river Maba and other swampy rivers around the area are cat fish (*Clarias spp*), snake head fish (*Parachanna obscura*). The instrument used for fishing are nets, canoes baskets and cutlass/arrows, while both male and female as well as old and young ones are into fishing activity.

Within the area, there are some existing aquaculture fish farms; they are either practicing concrete or earthen pond systems. Names of some of the fish farms are Pyramid farm and Maba farm. They are private farms owned by indigenes of the area.

DISCUSSION

Mode of natural life

The forest ecosystem of Maba with the various natural resources (fauna, avifauna and flora) that is available are good indicators of the environment, most especially at close monitoring of their abundant within the various habitats. Unsustainable use is a concern to natural resources conservation in west, central and Eastern Africa. It affects the biodiversity that provides important ecosystem services including catchment forests, wildlife habitats, and production of food and fibre (Redmond et al., 2006).

Adeola (1991) asserted that nature has provided wildlife with certain form of habitat, thus adaptable to surrounding depending on their adaptability nature, which could either be climax or sub-climax in nature. The riparian and plantation forest ecosystems of Maba inhabiting the highest mean population of species of animals 11.5 and 4, respectively. These ecosystems are known with con-specific forest species like Mona monkey, *Cercopithecus Mona*, baboon: *Papio anubis* and monitor lizard: *Veranus niloricus*. The habitats are serving dual purposes of natural abode and easy source of food for the aforementioned species. The increase in bushmeat hunting is a cause of biodiversity loss and decline of wildlife populations in Africa (Robinson et al., 1999; Redmond et al., 2006). In West Africa, bushmeat is used as food, commodity to trade, and play a crucial role in rituals (Wilkie and Carpenter, 1999).

The secondary forest, farm fallow and arable areas at the site were noted with least species composition due to serious edge effect and other anthropogenic activities that are predominant at the site. It can therefore be concluded that certain habitats (riparian and plantation forest) supported higher diversities of species because they contain several species of relatively high conservation concerned species (Mona monkey, Baboon, Monitor lizard and several avifauna), (Fanning, 1989). Such ecosystem as Maba forest is characteristic of the type being significance to arboreal mammals (primate)

Table 5. Fauna (Wildlife) List at the Maba forest.

| Order | Family | Common name | Scientific name | Climax/sub climax | A/NA |
|--------------------|------------------------------|---------------------------------|----------------------------------|-------------------|----------|
| Primate | <i>Ceropithecidae</i> | Mona monkey | <i>Cercopithecus mona</i> | C | A |
| | <i>Aciuridae</i> | Tree squirrel | <i>Funisciurus angyrthrus</i> | C | A |
| | | Ground squirrel | <i>Xerus erythropus</i> | Sc | A |
| Rodentia | <i>Cricetidae</i> | Cane rat | <i>Thryonomys swinderianus</i> | Sc | A |
| | | Giant rat | <i>Cricetomys gambianus</i> | Sc | A |
| | <i>Muridae</i> | Swamp rat | <i>Malacomys edwardsi</i> | Sc | A |
| Reptila | <i>Veranidae</i> | Monitor lizard | <i>Veranus niloricus</i> | C | A |
| | | Green mamba | <i>Dendroapis viridis</i> | Sc | A |
| | | Black cobra | <i>Naja melanoleuca</i> | Sc | A |
| | | Tree snake | <i>Bioga blandingii</i> | C | A |
| | | Red headed lizard | <i>Agama agama</i> | Sc | A |
| | | Puff arders | <i>Bitis arietans</i> | Sc | A |
| | | Tree frogs | <i>Hypercolius picturntus</i> | Sc | A |
| | | <i>Hyperrolius fusciventris</i> | Sc | A | |
| Mollusca | <i>Archachatinae</i> | Cowrie snail | <i>Cypraea stercorvia</i> | Sc | |
| | | Giant land snail | <i>Archatina marginata</i> | Sc | A |
| | <i>Atinidus</i> | Sand crab | <i>Ocypoda africana</i> | Sc | A |
| | | Ghost crab | <i>Ocypoda curso</i> | Sc | NA |
| <i>Suidae</i> | Warthog | <i>Phacochoerus aethiopicus</i> | C | NA | |
| Atiodactyla | | Blue duiker | <i>Cephalopus monticola</i> | C | NA |
| | <i>Bovidae</i> | Kob | <i>Kobus kob</i> | C | NA |
| | | Waterbuck | <i>Kobus ellipsiprymnus</i> | C | NA |

KEY: C = Climax; Sc = Sub climax; F = Foot print; I = Information and Interview; S = Sighted, A = Available, NA = Not available (As provided by respondents)

(Brathwaite et al., 1984).

Effect of proposed development on wildlife

The capacity of wildlife to adapt to changing environmental conditions varies within species. The rare and endangered species at the study area included species like primate (*Cercopithecus Mona*, *Papio anubis*) (Table 5) and some avifauna (*Haliastur vocifera* and *Falco chiquera*) (Table 6) these are known as climax species (Lameed, 2006), because they can not withstand the alteration in ecosystem. The less threatened and high reproductive species (high fecundity) are more adaptive species, such as monitor lizard *Veranus niloricus*, agama lizard *Agama agama*, rodents (grass-cutter *Thryonomys swinderianus* and squirrels *Xerus erythropus*), they are referred to as sub climax species.

Therefore, classification of species at the habitat as

climax indicated that such species has less capacity to adaptation when the developmental programme of the Redeemers' University would be fully commenced. While those that are sub climax species would have high capacity to changes in environmental and eco-developmental condition within the study area of Maba forest. All the climax species will either be eliminated or migrated from the ecosystem, and the sub climax species will survive by natural adaptation to the environment. Adeniyi and Bello-Imam (1988) observed that the guidelines for the forth National Development Plan are classified as by-product of the process of development, especially industrial and institutional activities. This is because of the resultant effects are mostly on water, land, air, human beings and even wild animals.

However, the environmental problems that may arise from sighting of Redeemer's University at Maba forest are not only multi-various in attributes, but also affect all societies and spectrum of socio-economic development

Table 6. Avi-Fauna (bird) list at the maba forest.

| Family | Common name | Scientific name | Available/not available |
|--------------|--------------------------|----------------------------------|-------------------------|
| Ciconidae | White necked stock | <i>Ciconia episcopus</i> | NA |
| | African Black kite | <i>Mulius migrans</i> | A |
| | Lizard buzzard | <i>Kaupifalco monogramnicus</i> | A |
| | River eagle | <i>Haliaeetus vocifera</i> | A |
| | Red – necked kesterd | <i>Falco chiquera</i> | NA |
| | Little sparrow | <i>Accipiter erigathropus</i> | A |
| Phasiannidae | Senegambia double | <i>Francolinus bicalaratus</i> | NA |
| | Spurred francolin | | A |
| Rallidae | Black crake | <i>Limnocoroax flovirostra</i> | NA |
| Jacanidae | Common lily trotter | <i>Actophilarnis afircana</i> | NA |
| Charadriidae | White headed plover | <i>Xiphidiopterus albeiceps</i> | NA |
| | Kittlitz's plover | <i>Charadrius pecuaris</i> | NA |
| Columbidae | Vinaceous dove | <i>Streptopelia vinacea</i> | A |
| | Green fruit pigeon | <i>Trenron australis</i> | A |
| | Tambourine dove | <i>Turtur tympanistria</i> | A |
| Musophagidae | Green—crested touracuo | <i>Tauraco persa</i> | NA |
| | Grey plantain eater | <i>Crinifer poscator</i> | A |
| Cuculidae | Senegal coucal | <i>Centropus senegalenis</i> | A |
| | Black throated caucal | <i>Centropus grillii</i> | A |
| Tytonidae | African barn owl | <i>Tylo alba</i> | A |
| Apodidae | Little African swift | <i>Apus affinis</i> | A |
| Alcedinidae | Pied kingfisher | <i>Cerylerudis</i> | A |
| | Senegal kingfisher | <i>Halcyon senegalensis</i> | A |
| | Pygmy kingfisher | <i>Ccyx picta</i> | NA |
| Meropidae | White-throated bee-eater | <i>Merops albicollis</i> | NA |
| | Blue checked bee-eater | <i>Merops suercilliosus</i> | NA |
| Upupidae | Senegal wood-hoopoe | <i>Pheoeniculus purpureleus</i> | NA |
| | Hoopoe | <i>Upupa epops</i> | NA |
| Capitondiae | Naked – faced barbet | <i>Gymnobucco calvus</i> | A |
| Hirundinidae | Pird-winged swallow | <i>Hirundo peucosoma</i> | NA |
| | Mosque swallow | <i>Hirundo senegalensis</i> | NA |
| Dictruridae | Glossy-backed drongo | <i>Dictrurus adsimilis</i> | NA |
| Oriolidae | African golden oriole | <i>Oriolus auratus</i> | A |
| Pycnonotidae | Common Garden Bulbul | <i>Pycnonotus barbatus</i> | A |
| | Swamp palm bulbul | <i>Thescelocichla leupleurus</i> | A |

Table 6. Contd.

| | | | |
|--------------|-----------------------|---------------------------------|----|
| Turdidae | West African Thrush | <i>Turdus pelios</i> | NA |
| Nectarinidae | Splendid sunbird | <i>Nectarinia caccinigester</i> | A |
| | Copper sunbird | <i>Nectarinia cuprea</i> | A |
| Fringillidae | Bronze manikin | <i>Loncaura cucullatus</i> | NA |
| | Yellow fronted canary | <i>Serinus mozambicus</i> | NA |
| | Grey-crowned | <i>Nignia canicapilla</i> | NA |
| | Negro finch | | |
| Ploceidae | Village weaver | <i>Ploceus cucullatus</i> | A |
| | Crested mallimbe | <i>Malimbus malimbus</i> | NA |
| Ardeidae | Cattle egret | <i>Ardeola ibis</i> | NA |

at the area.

Effect of development on the general ecological balance

All the plants (habitat representatives) and the fauna composition identified at Maba forest will be subjected to uncontrolled exploitation by the inhabitants and consequences of developmental projects (Redeemers' University). These species are of serious conservation importance (IUCN, 1996), that are within the status of either endangered, threatened vulnerable or at the verge of local extinction. Unsustainable hunting and logging have effect on ecosystem dynamics and therefore threaten the future of targeted species as well as the entire ecosystem (Apaza, 2002). Hunting accelerates extinctions, mostly of large mammals (Barnes, 2002). In Uganda, massive hunting reduced large mammal population by over 90% in the 1970's (Lamprey et al., 2003). Okafor (1998) noted that the rural or urban development programme in all ramifications shared a multiplicity of objectives geared in improving the living standard of the whole population. Therefore, implementation and operation of such project like Redeemer's University will invariably involve not only the tapping of the whole renewable (flora and fauna resources) and non renewable resources, but lead to transformation of the natural environment in to man-made type. Thereby affect the general ecological balance of the whole area. However, the issue of the ecological imbalance (environment) that will take place in term of quality and quantity (loss of species composition) should be seen as a serious issue of eco-development (Redeemer University) of the whole area.

CONCLUSION AND RECOMMENDATIONS

Maba forest ecosystem supports diverse range of

vegetation and animals communities, the diversity is sparsely distributed within the five identified habitats (Riparian, Secondary forest, Arable farm land, Farm fallow and Forest plantation), which reflected range of topographic condition present in the catchments.

The ecosystems are already suffering serious human impact, because most of the inhabitants' daily activities are imbedded in the hunting, peasant farming, gathering of fuel wood, fruits and other forest dependent produces. Avifauna (birds) are most dominants, more especially at the riparian forest and farm fallow areas, while the primates (mona monkeys and baboon) are also abundant within the arable farm land and riparian forest where they are able to meet their requirement (food and shelter) and also escape from human interference (hunting). The major river (Maba river) and some other swampy/streams are rich in fish species. These provide daily need for the Ijaws and Eguns communities that are living along the river course. The aim of any project can only be met when environmental impacts are foreseen at the appropriate stage of project design and addressed before any decision is taken on the project (Tayo, 2008).

In conclusion, harmony between the rural people at Maba village and the natural ecosystem at the Maba forest will definitely be interrupted and disappeared by the time the institutional development of Redeemer's University commences. The natural resources (flora and fauna) will be displaced while the climax species will be removed, killed or migrated permanently from the forest ecosystem. Thereby create mono-plantation of trees devoured of diversity of wild animals, fishes and birds that are major sustenance of the rural communities. The result of the activity is therefore distortion of ecosystem that will lead to general ecological imbalance. Therefore, government and private individuals at all levels should learn the need to have conducive and friendly environment to compliment any eco-development programme. (Webster and Fittipaldi, 2007).

In order to minimize the irreversible situation that will be

created, the following recommendations and mitigation measures are therefore necessary. The swampy area or riparian forest that inhabits the highest diversities (fauna, flora and avifauna) should be protected and developed into an ex-situ conservation area (Zoological garden). Thereby those species will be protected and become financial avenue to the Institution. The common river that serves as major hydrological source must be protected and developed as dam or construct earthen-pond along its course. This will serve as source of revenue.

Finally, the negative externality factors such as loss of land, source of livelihood and general environmental degradation that development of the area will create to the human inhabitants must be properly resolved. This can be done by given necessary priority to all the stakeholders through compensation, employment and other support to avoid wrong attitude to development.

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