NUTRITIONAL ECOLOGY AND THE CONSERVATION OF MONA MONKEY (CERCOPITHECUS MONA, SCHREBER, 1774) IN SELECTED URBAN, SEMI-URBAN AND WILD HABITATS OF SOUTHWESTERN NIGERIA

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CERTIFICATION

This is to certify that the Thesis:

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DEDICATION

I dedicate this work to **EL-SHADDAI, THE MIGHTY GOD** who made me what I am in life.

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OPERATIONAL DEFINITION OF TERMS

Assorted (Composite) foods: These were made up of different food components. They included pastries: bread, biscuit, and sausage.

Provisioned foods: These include foods people offered to the monkey at food canteens or class rooms. Examples were cooked foods such as cassava *fufu*, *eba*, *amala*, boiled and/or pounded yam, and assorted (composite) foods.

Raided foods: These include farm and home raided foods such as banana, corn, pawpaw, plantain, yam porridge, mango, and sprouting yam setts.

Scavenged foods: These refer to foods such as *amala*, boiled corn, bread, breadfruit, jollof rice, plantain, and vegetable salad sourced by monkeys at dump sites.

Wild (Natural) foods: Foods found in the natural range of the animals. These are not limited to plant sources but also animal components such as arthropods. Food plants included *Annona glabra*, *Gmelina arborea*, *Mussaenda polita*, *Musanga cecropioides* and *Pithecellobium dulce*.

LIST OF ABBREVIATIONS

AA:	Amino Acid
ADF:	Acid Detergent Fibre
ADL:	Acid Detergent Lignin
ANOVA:	Analysis of Variance
CF:	Crude Fibre
COP:	Coefficient of Preference
CP:	Crude Protein
DM:	Dry Matter
EE:	Ether Extract
GE:	Gross Energy
IUCN:	International Union for the Conservation of Nature and Natural Resources
LCC:	Lekki Conservation Centre
NFE:	Nitrogen Free Extract
NDF:	Neutral Detergent Fibre
NHP(s):	Non-human Primate(s)
ONP:	Okomu National Park
UNILAG:	University of Lagos

ABSTRACT

The mona monkey (*Cercopithecus mona*) is an arboreal Old World primate that depends on forest resources for its sustenance. Due to anthropogenic activities, forest covers are fast declining globally. The foods of the mona monkey in degraded habitats need to be understood in order to strategically plan for its conservation. This study determined the food and nutritional ecology of mona monkeys in three locations in Southwest Nigeria; an urban area, the University of Lagos (UNILAG); a semi-urban reserve, Lekki Conservation Centre (LCC), Lagos State; and a wild habitat, the Okomu National Park (ONP), Edo State. Food types and their seasonal availability were determined during a two year dry and rainy seasons' survey using focal point technique and all animal feeding behavior method. Proximate, fibre fraction and amino acids analyses of the plant foods were conducted using standard procedures. Given used foods to mona monkeys in captivity was conducted for preference trials. Likert-scale questionnaires were administered to community members in each location to determine their attitude towards mona monkeys' conservation. Different parts of 64 plant species from 38 families were identified as components of mona monkeys' diets and of which 56% were fruits. *Gmelina arborea* and *Jateorhiza macrantha* fruits were identified as two new foods. The number of foods consumed by mona monkeys in urban, semi-urban and wild habitats were 39, 19, and 29 respectively. Natural foods constituted 33.0%, 71.0% and 79.0%, while the sum of raided, provisioned, and scavenged foods made up 67.0%, 39.0% and 21.0% of the monkeys' diets in urban, semi-urban and wild habitats respectively. There was a significant difference ($P < 0.05$) in the number of available foods in the three locations; the difference was between UNILAG and LCC number of foods. The highest similarity quotient for the monkeys' food of 32.7% was between UNILAG and LCC suggesting a similarity between the two habitats in comparison to ONP. The numbers of rainy season's foods were more than that of dry seasons' in all the locations, with some foods occurring in both seasons. The mean percent crude protein of dry season foods in UNILAG was 12.12 ± 2.68 (SEM, n=14); ether extract, crude fibre and nitrogen free extract values were $14.97 \pm .20$, 9.87 ± 1.60, and 56.95 ± 3.44 respectively. There was no significant difference ($P>0.05$) in the nutrient content of foods from all locations except for ether extract values of foods in UNILAG and ONP that were significantly different ($P< 0.05$). There was a strong negative correlation ($r= -.77$, $P= .001$) between crude protein and nitrogen free extract, and a strong positive correlation ($r= .70$, $P= .003$) between acid detergent lignin and acid detergent fibre of the dry season foods in UNILAG. The monkeys' food preference was in the order *Musa sapientum* > *Zea mays* > *Solanum melongena*. These foods had high nitrogen free extract values, implying high energy content. In UNILAG, personal factors did not show significant difference ($P> 0.05$) on variables studied. In LCC, the sex of the respondents was the only factor that showed significant difference ($P< 0.05$) on their views to governments' role on conservation. In ONP, educational level significantly ($P< 0.05$) affected peoples' attitude to mona monkey conservation. For the three locations, sex and age did not significantly ($P> 0.05$) affect the attitude of respondents towards mona monkeys' conservation, but educational level and locality significantly did ($P< 0.05$). Sex, age, educational level and locality had a significant effect ($P< 0.05$) on orientation of respondents about poaching. Records of illegal activities in ONP implies that creation of protected areas do not translate to successful wildlife protection. Education, awareness campaigns and involving the Park's immediate community members on the importance of, and conservation planning for wildlife and natural resources would help in reducing encroachment incidence, and promote conservation. The detailed knowledge of the feeding and nutritional ecology of mona monkeys will help understand how conservation efforts should be applied within the study sites. The study revealed that the ONP (wild habitat) with the highest number of wild foods is the most ideal location for the conservation of mona monkeys.

CHAPTER ONE

1.0. INTRODUCTION

1.1. BACKGROUND OF THE STUDY

Wildlife conservation is an integral part of biodiversity conservation. It is important because of its role in remediating the negative impact of anthropogenic activities on wildlife habitats. This is why several government and non-governmental organizations are involved in the promotion of different wildlife conservation efforts. One species of wildlife that has attracted attention as a result of its ability to survive a varying degree of degraded habitat is the mona monkey (*Cercopithecus mona*). The mona monkey is found in the University of Lagos (UNILAG), Lekki Conservation Centre (LCC), and Okomu National Park (ONP) (Asiwaju, 1987, Nigerian Conservation Foundation, 2009; Agbelusi *et al.,* 2003; Akinsorotan *et al.,* 2011).

One major factor that influences wild animal production, growth, reproduction and survival is nutrition. These factors are critical parameters in population dynamics assessment and thus the understanding of ecology and management of wildlife populations (Rode *et al.*, 2006). Nutrients, especially energy giving types, provide quantifiable limits within which an animal and a population must operate (Lambert, 2007). As anthropogenic activities such as deforestation, logging and hunting destroy the natural habitats and reduce the population of non-human primates (NHPs), it is important to understand how these changes affect their food sources in disturbed or human dominated landscapes (Butynski, 2002; Koh and Gardner, 2010). The mona monkey appears to be a good candidate to test these changes. In areas where people live close to and depend on the natural ecosystem for their livelihood and sustenance, formulating a sustainable conservation policy would depend on their understanding and attitude to natural resources utilization (Ogunjinmi *et al.,* 2012). Thus the study of mona monkeys' diet in different habitats will enhance the understanding of how some primates survive in anthropogenically disturbed habitats.

1.2 STATEMENT OF PROBLEM

Non-human primates have been an important part of forest fauna, often recorded in very high numbers in forests of Southwestern Nigeria (Collier, 1934; Petridge, 1965; Afolayan 1987; Happold, 1987). However, their continued survival in the region is becoming greatly threatened by human activities (Agbelusi *et al*., 1999 and 2003). Factors responsible for reduction in their population include habitat fragmentation, degradation, hunting, urbanization, and infrastructural development (Anadu, 1987, Ogunjemite *et al.,* 2013). The mona monkey appears to be one species that persists despite these challenges as populations survive in some marginal environments including urban and semi-urban areas (Nwufoh, 2011; Olaleru and Egonmwan, 2012; Okekedunu *et al*.,2014). However, there seems to be no studies on the attitude of people towards the conservation of the species in University of Lagos, Lekki Conservation Centre and Okomu National Park.

The primates in Nigeria have been studied by different researchers whose focus were on the presence of different species, extraction rate and conservation status (Harcourt *et al.,* 1989; Oates *et al.,* 1992; Amakari, 2006). There is a dearth of information on the nutritional ecology of many of them including the mona monkey in different habitats and protection regimes. A good understanding of the conservation and management of the species will require a comprehensive assessment of the ways by which it meets its nutrients requirements for its survival, and the attitudes of people in the community towards its conservation in their locality. This study, therefore, examines the food and nutritional ecology of the mona monkey as basis for its survival in three locations: University of Lagos (urban), Lekki Conservation Centre (semi-urban) and Okomu National Park (wild) habitats in Southwestern Nigeria. It also examined the attitude of people to the conservation of mona monkeys in these locations.

1.3. RESEARCH AIM AND OBJECTIVES

1.3.1. Research Aim

To investigate the feeding and nutritional ecology of mona monkey in urban, semi-urban and wild habitats as well as the attitude of people towards the conservation of the animal *in situ*.

1.3.2. Research Objectives

The objectives of this study are to:

1. identify and categorize the food types utilized by mona monkeys in urban, semi-urban and wild habitats;
2. determine the seasonal availability of mona monkeys' diet in urban, semi-urban and wild habitats;
3. determine the nutrient composition of foods consumed by mona monkeys in urban, semi-urban and wild habitats; and assess the animals' food preference;
4. determine the attitude of people towards the conservation of mona monkey in urban, semi-urban and wild habitats.

1.4. SIGNIFICANCE OF STUDY

Availability of good quality food at all times is critical to the growth, reproduction and general performance of non-human primates (Lambert, 2007, Rothman *et al.,* 2011). Information on what nutrients and foods are preferred by an animal show which food resource may influence feeding competition, habitat utilization, and also which food resource and habitats should be considered in management and conservation efforts (Ganas *et al.*, 2008). Understanding the food types and their seasonal availability could assist in determining the habitat management strategies that will enhance the food quality of the mona monkey in its natural habitat (Chapman *et al.,* 2003). It could also help in the selection, formulation and provision of foods required by captive mona monkeys in particular and non-human primates in general.

It is anticipated that the successful completion of this study and implementation of its findings will halt further monkey population decline, stimulate interest in urban, and semi-urban wildlife conservation for educational, ecotourism and recreational purposes.

As anthropogenic activities destroy the natural habitats of NHPs, it is quite important to understand how the mona monkey has been able to adapt to disturbed or human dominated landscapes. Thus the study of mona monkeys in different habitats will increase our understanding of how some primates can survive in anthropogenically disturbed habitats.

The mona monkey population in University of Lagos has not been under formal protection. The populations in Lekki Conservation Centre and Okomu National Park are under formal protection as the sites are designated as Strict Nature Reserve and National Park respectively. The factors contributing to its persistence/resilience despite habitat destruction in the first location, isolation in the second are yet to be studied in comparison with a National Park setting found in the third location. Food and feeding habit of the mona monkey as well as the nutritional content of the foods are being considered as some of the factors that have contributed to its persistence in the three locations.

The findings from this study will contribute scientific knowledge to aid in saving other species of monkeys that are facing similar threats. Moreover, the study will aid in evaluating the possibility of managing small population of wild animals in an isolated area with the aim of saving threatened species.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. INTRODUCTION

The mona monkey and other non human primates (NHPs) play significant roles in their habitats. As primary consumers, feeding on fruits, fresh shoots and other plant parts (Tooze and Baker, 2008), they have been able through this process, to disperse seeds, thereby helping in the spatial distribution of fruit plants. Mittermeir (2010) has described primates as key components of the tropical forests as seed dispersers, seed predators, pollinators, and even as species that can enhance the role of forests in carbon sequestration.

The mona monkey as a NHP has interacted with man in various ways. Wolfe and Fuentes (2007) reported that there are multifaceted interactions between man and NHPs. Some of these interactions include hunting of NHPs for food, keeping them as pets, bidirectional pathogen exchange, the impacts of habitat alteration/destruction and crop raiding, indigenous knowledge of NHPs behaviour among others. Some of these interactions have caused the NHPs to lose their habitats and the resources that sustain them.

In Nigeria, NHPs are hunted for medicines and sold as pets or ‘bushmeat’. For instance, the roadside survey of ‘bush meat’ sales in the then Bendel State, showed that monkeys (mainly *Cercocebus torquatus* and *Cercopithecus mona*) ranked fifth with 72 (7.9%) out of 914 recorded number of sales (Martin, 1983). Non human primates have been used for decades in biomedical research (Herodin *et al.*, 2005).

2.2. NON-HUMAN PRIMATE DIVERSITY

The primate is an order of mammals that have adapted to arboreal life and in some forms secondarily to life on the ground. Their eyes and ears are well developed. They also have binocular vision. The snout is reduced and they have a large brain case (Allaby, 2009). Primates could either be human or non-human. The NHPs are charismatic mammals that are good as flagship species for conservation projects, either of habitats and ecosystems (Cowlishaw and Dunbar, 2000). They have been described as the ‘link’ or ‘boundary’ that connects or separates humans to or from other mammals (Haraway, 1989). The NHPs are the group through which man has been able to trace his phylogenetic history.

Cowlishaw and Dunbar (2000) put the global number of primates’ species as 230, while IUCN (2015) puts it as 634 species. All these species, apart from man occur in the tropics of Africa (and Madagascar), Asia, Central and South America (Cowlishaw and Dunbar, 2000). The West African rainforests is one of the world’s 25 “hotspots of biodiversity”. In the eastern area of the Upper Guinean Rainforest there are several endemic animal species including the Western Black and White Colobus (*Colobus polykomos*), the Lesser Spot-nose Monkey (*Cercopithecus cephus petaurista*), Diana Guenon (*Cercopithecus diana*) and White-naped Mangabey (*Cercocebus atys lunulatus*) and other mammals that are not NHPs such as Zebra Duiker (*Cephalophus zebra*), Liberian mongoose (*Liberiictis kuhni*), (http://www.wapca.org/05.htm).

2.2.1. Primate Taxonomy

The Order primate is divided into two Sub-orders: Prosimians and Anthropoidea (Cowlishaw and Dunbar, 2000, Campbell *et al*., 2007). The prosimians are made up of the nocturnal Loriformes and Tarsiiformes, and the Lemuriformes of Madagascar. The anthropoids are largely diurnal herbivores that show two distinct lineages, that is, the New World primates (the cebids and callitrichids) which occupy the neotropics (Central and South America), and the Old World primates made up of all the other taxa (guenons and apes). Obot (2010) simply grouped the NHPs into three: prosimians, simians and apes. The prosimians (‘pre’= before, and simian = monkeys) are the more primitive, small sized, mostly nocturnal and arboreal primates found in Africa mainland, and Madagascar, South and South East of Asia (Cowlishaw and Dunbar, 2000). They are the Lemurs found only in Madagascar with examples such as *Allocebus trichotis*, *Cheirogaleus major*, and *C. medius*; the Lorisidae which are found in Africa and include the bush babies (*Galago alleni*, *G. granti*, *G senegalensis*) and the Lorises such as *Loris tardigradus*, *Nycticebus coucang*; and the Tarsiers such as *Tarsius bancanus*, *T. pumilus* and *T. spectrum*.

The most diverse of the primates are the simians (monkeys). They are found in Old and New Worlds. The apes are found only in the Old World. Cowlishaw and Dunbar (2000) listed the species of primates using two classification models of Corbet and Hill (1991) and Groves (1993). Appendix 1 (A, B, C and D) show the respective global, African, Nigerian, and the Cercopithecus guenon lists of primate species.

2.2.2. Regional Surveys of Primates

Cowlishaw and Dunbar (2000) gave the distribution of primate taxa across major continental regions as follows:

Africa: Contains three families, 19 genera and 59 species, with 14 of these species being endangered. The most critical is the gorilla.

Madagascar: There are four families, and 14 genera and 24 endemic species of primates on this Island. All the species are endangered. In fact, 14 lemurs are already extinct.

Asia: Only the South and Southeast of Asia have primates (monkeys and apes). There are five families, 10 genera and 53 species of monkeys, with 16 considered as endangered. The most critical is rhinopithecus - the golden monkey. All the Asian apes: the orangutan and all 9 species of the gibbon are endangered.

Neotropics: There are two families, 16 genera and 64 species of New World primates found in the Americas (Central and South America). The endangered species are 27 with the most highly endangered being the muriqui or woolly spider monkey. They have the misfortune of living in the Atlantic rainforest of East Brazil which is heavily settled by man. Only 1-5% of this rainforest still exists. The uakaris that live in the Amazon Basin are also endangered.

2.2.2.1. New World Monkeys

New World monkeys are limited to tropical forest environments of southern Mexico, Central, and South America. All of these monkeys are predominantly arboreal and mostly herbivorous. They eat leaves, fruits, nuts, gums, and occasional small preys such as insects. There are at least 53 species commonly divided into two families: Callitricidae and Cebidae.

The Callitricidae consist of marmosets and tamarins. They range in weight from only 140-900 g. and have thick fur and long tails. The marmosets are the smallest of all monkey species. Both marmosets and tamarins are considered to be the most primitive monkeys because of their anatomical and reproductive characteristics. Their thumbs are not opposable. They have claws on all digits except for their big toes, which have nails. They do not have prehensile tails (http://anthro.palomar.edu/primate/prim_5.htm).

2.2.2.2. Old World Primates

The areas regarded as the Old World are in Africa, South and South East Asia. Monkeys and apes are found in these regions. Prosimians, monkeys and apes constitute the species of the Old World primates. The Japanese macaque (*Macaca fuscata*) commonly found in Japan have been studied in the wild in United States (Mackinnon, 2007). It is not clear whether the studied population was brought into the United States or a native population.

2.2.3. Primates in Africa

There are nine countries in mainland Africa that are rich in primate populations. These includes Democratic Republic of Congo, Cameroon, Nigeria and Equatorial Guinea with 31, 29, 23 and 22 primate species respectively (Cowlishaw and Dunbar, 2000). The Family Cercopithecidae is an Old World simian found in the tropics. They are usually referred to as guenons, which form the largest group of African primates (Enstam and Isbell, 2007). There are 37 taxa at the subspecific level of guenons in Africa, making them more than 50% of the African forest primate fauna (Colyn and Deleporte, 2002). Guenons are small to medium-sized monkeys with average size of 3.6 kg for females, and 5.9 kg for males (Haltenorth and Diller, 1988). They include the catarrhine monkeys of the genus *Cercopithecus*. Members of this genus including mona monkey are the most colourful of all primates (Rowell, 1988).

2.2.3.1. Non-human Primates in Nigeria

Nigeria is a global hotspot for primate species. Between the Niger and Cross rivers, 12 primate species, made up of five prosimians, six monkeys and one ape were reported by Oates *et al*. (1992). Nigeria is one of the 15 countries in the world scoring highest in primate species richness (Cowlishaw and Dunbar, 2000, Chapman *et al*., 2006). The IUCN

(1996) indicated that 28 species of primates are found in Nigeria, while Cowlishaw and Dunbar (2000) reported 23 species. The disparity may be in the taxonomic method used, either that of Corbet and Hill (1991) or Groves (1993) or some other methods. The IUCN (1996) probably used Groves (1993) in which certain species names are split into two or more taxa. Few of the primates such as sclater's guenon (*Cercopithecus sclateri*), white-throated guenon (*Cercopithecus erythrogaster*), Niger Delta red colobus (*Procolobus epien*i) and Cross River gorilla (*Gorilla gorilla diehli*) are endemic to Nigeria. Two of these, *Procolobus epien*i and *Gorilla gorilla diehli* are on the 2008-2010 IUCN's Red List of 25 endangered primates of the world (IUCN, 2015).

Different forest reserves in Ondo and Ekiti States harboured 16 species of NHPs, four prosimians, eleven guenons (monkeys) and one ape (Agbelusi *et al*., 1999). In northeastern Nigeria, nine species of primates peculiar to the northern part of the country were recorded in Gashaka Gumti National Park (Adanu *et al.,* 2011). These include species such as olive baboon (*Papio anubis*), black and white colobus (*Colobus guereza*), tantalus monkey (*Erythrocebus tantalus*), and grey-cheecked mangabey (*Lophocebus albigena*). The drill monkey (*Mandrillus leucophaeus*) is found in Afi Drill Ranch in Cross River State (Gadsby *et al*., 1994). Green monkeys (*Cercopithecus aethiops*) are present in Zugurma Sector of the Kainji Lake National Park (Ajibade *et al.*, 2011).

2.2.3.2. Primates in the Study Areas

The mona monkey is the only NHP in both UNILAG and LCC (Asiwaju, 1987 and Nigerian Conservation Foundation, 2009). In ONP eight species of primates have been reported by several authors. These include Bosman potto (*Perodicticus potto*), Angwantibo (*Arctocebus* *calabarensis*), Thick-tailed galago (*Otelemur crassicaudatus*), White-throated monkey (*Cercopithecus erythrogaster*), Mona monkey (*C. mona*), putty-nose monkey (*C. nictitans*), red capped mangabey (*Cercocebus torquatus*), and Chimpanzee (*Pan troglodytes*) (Agbelusi *et al*., 2003; Ejidike and Okosodo, 2007; Ejidike *et al*., 2010; Ogunjemite and Akinsorotan, 2009).

2.2.4. Forest Guenons: Family Cercopithecidae

The Family Cercopithecidae is made up of several Genuses of guenons that occur in Africa and Asia. Most guenons are arboreals, subsisting on forest products with several species being sympatric. Their habitats include swamp and mangrove forests, low land rainforests, gallery/riparian forests, and montane forests. In Cameroon, *C. mona* and *C. pogonias* lived as mixed-species associations and were speculated to interbreed (Gartlan and Struhsaker, 1972). From Cowlisaw and Dunbar (2000), and Kirkpatrick (2007) some genera of African and Asian guenons include the following:

i.	Cercocebus:	*Cercocebus torquatus, C. atys, C. albigena, C. galeritus*
ii.	Cercopithecus:	*Cercopithecus mona, C. mitis, C aethiops, C. nictitans*
iii.	Chlorocebus	*Chlorocebus tantalus*
iv.	Colobus:	*Colobus badius, C.satanas*
v.	Macaca:	*Macaca fuscata, M.mulatta*
vi.	Mandrillus:	*Mandrillus leucophaues*
vii.	Nasalis:	*Nasalis larvatus*
viii.	Presbytis:	*Presbytis comota, P. thomasi, P. hosei*
ix.	Procolobus:	*Procolobus badius, P. pennantii, P. verus*

x. Pygathrix: *Pygathrix nemaeus, P. nigipes, P. cinera*

xi. Rhinopithecus: *Rhinopithecus bieti, R. brelichi, R. avunculus*

xii. Rungwecebus: *Rungwecebus kipunji*

xiii. Semnopithecus: *Semnopithecus entelius, S. ajax, S. hector*

xiv. Simias: *Simias concolor*

xv. Trachypithecus: *Trachypithecus johnii, T. obscura, and T. pileatus*

2.2.5. The Conservation of Forest Guenons

Most primate species live in tropical forests where they obtain food components such as fruits, flowers, nectar, gums, leaves and animal preys, perform their social activities and derive protection from the elements and predators from these forest refugia. Man also depends on the forest ecosystem services for food, timber, non-timber forest products, and medicinal plants. This implies that man and NHPs can live in sympatric relationships, where NHPs exclusively populate a region that is equally populated and exploited by humans (Wolfe and Fuentes, 2007; Nyanganji *et al.,* 2011). Increase in human population and the attendant pressure on forest resources such as logging, extraction of non-timber forest products and illegal hunting for bush meat leads to a drastic reduction in the forests' potential to meet the needs of wildlife for food and protection (Agbelusi, 1994; Freeman and Janzen, 1994).

The general threats to primates' populations and conservation involve habitat conversion for the followings uses: agriculture and aquaculture; residential and commercial development; energy production and mining; transportation and service corridors among others (Asibey and Child, 1990; IUCN, 2015). Agriculture is the first and main cause of habitat disturbance for wildlife in general and primates in particular. The forest disturbance through agriculture could be by permanent cultivation which leads to total habitat loss and shifting cultivation. The practice of shifting cultivation (slash and burn) by peasant farmers destroys and fragments the forest vegetation. Through this farming system, forests are cleared, burnt, cultivated for a few years, and abandoned (when crop yields decline) as fallow land for a new area. This leads to a mosaic of primary forests and patches of secondary forests at various regeneration stages that favour some primates such as colobus, blue, and red tail monkeys that prefer such habitats (Cowlishaw and Dunbar, 2000). Conversion of forests to commercial farming of monocultures such as oil palm, rubber, sugar cane, or cattle ranching destroys the vegetation. Groombridge (1992) indicated that shifting cultivation is a major cause of tropical forest loss.

The second mechanism in forest disturbance is forestry. Commercial forestry has led to selective logging of timber. The extraction of few trees is associated with peripheral damage. In Malaysia, removing about 4% of forest stand led to the damage of 50% of trees. Changes to forest structure could make the habitat more flammable (Cochrane and Schulze, 1998).

Thirdly, mining and hydroelectric projects could contribute to forest disturbance. These projects require extensive road building, opening up previously inaccessible forest areas. Accessibility into forests causes more hunting pressure (Cowlishaw and Dunbar, 2000).

Forest loss has been estimated to be 8% globally within a decade, 1981-1990 (World Resources Institute, 1996). Primates are vulnerable to such losses since the impact would be more on the animals using the forests as their habitats. This is because a reduction in habitat leads to a reduction in species richness (using the island biogeography theory). Cowlishaw

(1999) reported that the species richness of forest primates was strongly correlated with the extent of closed forest cover in African countries. A high magnitude of local forest loss could lead to local extinction.

Forest fragmentation results in some primate communities to live in highly fragmented habitats. Habitats become fragmented only after forests are lost. High levels of deforestation lead to fragmentation and isolation of primate species. As the number of fragments increase, the average size of fragment declines, and these may not persist for long if deforestation is not stalled (Cowlishaw and Dunbar, 2000). Animals whose habitats have been destroyed move to the remaining fragment, leading to initial high species diversity and abundance. Decline and competition for resources could lead to rapid decline in the population, either by emigration or mortality. Fragmentation leads to the isolation of small populations, whose continuous inbreeding could have long term implications for the population's viability. This situation could be mitigated if fragment isolations are minimized and terrestrial mobility (through fragment connectivity) is increased. These would provide contact with surrounding populations, permitting immigration, rescue effects and recolonization (Cowlishaw and Dunbar, 2000).

Another major threat to primate populations and hence their conservation is hunting and poaching (illegal hunting) either for subsistence or commercial bush meat sales or sale of other parts for medicinal ingredients (Mittermeier, 1987; Jiang *et al*., 1991). The smaller taxa such as the lorisiformes, tarsiifromes and callitrichids are rarely hunted, while the largest (pongids such as orangutans, and cebids such as red-capped mangabeys) are widely hunted. Primates are hunted when they are regarded as agricultural pests. Food taboos have saved some primate communities from being hunted, although this does not, in all cases, lead to reduced hunting pressure. Where hunting is for the market, it poses a great threat to the survival of primates, especially in West Africa where bush meat is popular (Mittermeier, 1987).

Since changes in primate habitats are primarily human driven, such activities that cause forest ecosystems loss, fragmentation, and modification, any forest primate conservation should strive at preventing and/or reducing such losses (Agbelusi *et al*., 1999; Cowlishaw and Dunbar, 2000). The impact of these disturbances could be deleterious for all primates, but more especially for endemic individuals. This has resulted to extinctions of some primates and extirpation of some others.

National Parks have been the major mechanism though which wildlife and their habitats in many countries have been protected. In southern and southeastern Asia with cultures that practice Hinduism and/or Buddhism, some primate populations are under protection and provisioning by residents and visitors to temple sites. *Macaca fascicularis* have benefited from such protection (Wolfe and Fuentes, 2007). In the past, people around the Lama Forest, Republic of Bénin did not kill monkeys and considered them as sacred. Some monkeys that lived in sacred forests were also not killed. However, in recent times, many people consider monkeys as a nuisance (when they raid food crops on farms that are found near forests) and a potential meal, or a source of income (Matsuda, 2007).

2.2.6. Non-Human Primate Conservation in Nigeria

Primate conservation entails preserving the diversity of species and subspecies with endangered future and preventing those that seem secure presently from becoming endangered (Strier, 2007). In different countries of the world, NHPs have been protected through different means, formal (use of PAs) and informal (through cultural beliefs and folktales) (Strier, 2007; Baker, 2013). Formal protection is practiced globally whereas informal protection could be affected by other social and economic factors (Baker, 2013). In some countries, primate populations have received near-complete or complete cultural protection. For instance in Ghana, mona monkeys are protected culturally through the creation of the Tafi Atome Monkey Sanctuary (Ormsby, 2012).

Once the habitats where primates are found are protected (from deforestation, destruction and fragmentation), the primates themselves are invariably protected. This is so because primate conservation is inadvertently linked with the preservation of their habitat (Strier, 2007). Nigeria is the third in Africa in terms of primate diversity. It has been rated the first in terms of annual rate of deforestation (0.71%) between 1981 and 1990, and human population size (Cowlishaw and Dunbar, 2000). The human population size may not likely decrease. Associated with the high population is the increase in land use for agricultural purposes, and development of infrastructures, logging for timber either for construction or fuel wood (Nyanganji *et al*., 2011). The destruction of the habitats ranges of forest guenons have threatened many primate species and caused their population to decline (Agbelusi *et al*., 2003; Oates e*t al*., 2008). Large scale destruction and mismanagement of Nigeria's rainforest ecosystem resulted in the loss of rare and endemic biodiversities; especially NHPs that are large bodied (Ogunjemite and Olaniyi, 2008). All these factors have had their toll in primate conservation.

The conservation of NHPs and other wildlife has been through the protection of their habitats, termed protected areas (PAs) such as National Parks, Wildlife Sanctuaries, Game and Forest Reserves (Abramovitz, 1991; Ogunjinmi *et al*., 2009). Endangered primates have been protected through these means (Strier, 2007). In Nigeria, many primate species are found in PAs located in different parts of the country. Tanlatus and patas monkeys and baboons are found in Yankari Game Reserve, Bauchi State (Wolfheim, 1983); white-throated monkeys are found in ONP and Gilli-Gilli Forest Reserve, Edo State (Oates *et al*., 1992; Amakiri, 2006); Cross River Gorilla are found in Cross River National Park, Cross River State (Harcourt *et al*., 1989); chimpanzees are found in Gashaka-Gumti National Park, Adamawa and Taraba States and Afi Drill Ranch, Cross River State (Oates *et al.*, 1992; Inahoro, 2006); drill monkeys are found in Afi Drill Ranch (Gadsby *et al*., 1994).

Non-governmental organizations (NGOs) such as Centre for Education, Research and Conservation of Primates and Nature (CERCOPAN) and Pandrillus (in Cross River State), and Nigerian Conservation Foundation (NCF) in Lagos State, have played a great role in the conservation of simians and apes. CERCOPAN for instance has a guenon rehabilitation facility in Calabar and the Rhoko Forest where it released some mona monkeys. Pandrillus also keeps drill monkeys captive breeding centre and chimpanzees in Calabar, and releases them in to Afi Drill Ranch whenever they are old enough to live in the wild (Gadsby *et al*., 1994). In Lagos, NCF has a Nature Reserve where mona monkeys exists, and has worked with various organizations in the conservation of primates in Okomu Wildlife Santuary, Afi Mountain Wildlife Sanctuary among others (Nigeria Conservation Foundation, 2009).

Some primate species such as the sclater's guenon (*Cercopithecus sclateri*) that are not under formal protection are protected through cultural means. Sclaters have been protected as 'sacred monkeys' found in 'sacred groves' in two Igboland communities in eastern Nigeria: Lagwa, (Imo State) and Akpugoeze (Enugu State), because of the monkeys' connection to the deity (Baker *et al.*, 2009). With a large Christian population and the understanding of the deity being idolatrous, coupled with crop destruction caused during farm raids, the monkeys are being killed (Baker, 2013). It is uncertain if such cultural way of conserving the monkeys is strong enough to protect them in perpetuity.

All NHPs are under protection by Decree No 11 of 1985 (now Cap 108, 1990) laws of the Federation of Nigeria (Tooze and Baker, 2008). The protection is in two categories:

> Schedule 1 (Endangered) species- animals in relation to which international trade is absolutely prohibited. Animals may not be hunted, killed or captured except under special licence. These include *Arctocebus calabarensis*, *Colobus spp*., *Procolobus spp*., *Cercocebus spp*., *Mandrillus spp*., *Gorilla gorilla diehli*, *Pan paniscus* and *P. troglodytes*.
>
> Schedule 2- international trade of these animals can only be conducted under a licence. They include such primates as *Perodicticus potto*, *Galago spp*. and all monkeys (except those specified in Schedule 1). The mona monkey is protected by law under this Schedule.

Although the mona monkey is on a Least Concern status of the Red List of the IUCN, its habitats need to be protected from deforestation and fragmentation. This action could be beneficial to other sympatric species.

2.3. TAXONOMY OF THE MONA MONKEY

The mona monkey belongs to the Kingdom Animalia, Phylum Chordata, Class Mammalia, Order Primate, and Family Cercopithecidae. The Order Primates is made up of human and non-human primates. The most diverse of these are the simians (monkeys). Monkeys are members of the Cercopithecidae Family, the Old World simian found in the tropics.

2.3.1. History of Taxonomy of the Mona Monkey

Matsuda (2007) has traced the history of the taxonomy of the mona monkey in her work. Primatologists have over the years found out that the mona monkey has relatives in terms of seven related species of *burnetti*, *campbelli*, *denti*, *grayi*, *mona*, and *pogonias* (Pocock, 1907). The skull morphology examination of these species made Schwarz (1928) to recognize and categorize them, as polytypic species, into three sections, viz: *mona* section (*campbelli*, *lowei*, *mona*); *pogonias* section (*grayi*, *nigripes*, *pogonias*); and *wolfi* section (*denti*, *elegans*, *pyrogaster*, *wolfi*). Based on pelage (fur, hair or wool) colour and pattern, Booth (1955) recognized *campbelli*, *denti*, *mona*, *pogonias* and *wolfi* as separate species but was uncertain whether *denti* should be a subspecies of *wolfi* or not. The drab pelages observed in West African species were considered to be ancestral and primitive when compared with the brighter patterns seen in Central African forms. Wolfheim (1983) recognized five species similar to those recognized by Booth (1955), while Oates (1986) recognized *campbelli*, *mona* and *pogonias* as three separate species.

Advances in molecular studies have resulted in the revision of the taxa by researchers. *C. wolfi* is recognized as a separate species by Oates (1996). Kingdon (1997) and Groves (2001) suggested that *denti* should be separated form *wolfi*. *C. mona* still maintains a monospecific status. The difference in opinion is the relationships between *campbelli* and *lowei*, and that within the *pogonia*s section (Matsuda, 2007).

2.3.2. Description of Mona Monkeys

The mona monkey has a white ventral surface and buttocks with a red-brown to brown-agouti dorsal fur, and a long black tail. The snout is pink, while the feet are black. Their greyish yellow cheeks form cheek pouches, as big as the stomach, which are used for storing food while foraging. They have dark eye brow, with a dark stripe running between the eyes (Grzimek, 1990; http://www.britannica.com/EBchecked/topic/388740/mona monkey-monkey).

2.3.3. Habitat and Geographic Range of Mona Monkeys

The mona monkeys are diurnal arboreal animals that inhabit the middle and top canopies of rainforests. They also inhabit mangrove swamps, gallery forests and woodlands (Struhsaker, 1969; Nowak, 1999; Enstam and Isbell, 2007). Their geographic distribution is coastal West Africa from Ghana to Cameroon (Wofheim, 1983; Enstam and Isbell, 2007; Tooze and Baker, 2008). Mona monkey populations are also found on the Islands of Grenada and Sao Tome on the Atlantic Ocean. These populations are thought to have been taken to such islands around the late 1600s during the slave trade period (Glenn, 1997; Glenn and Bensen, 1998). On the African mainland, mona monkeys occupy lowland forest and prefer secondary rainforests and mangroves to other types of habitats (Oates, 1988). Populations of mona monkeys in mainland Africa are centred on the River Niger Delta, Nigeria and surrounding minor rivers from the River Volta to the River Sanaga (Oates, 1988; Kingdon, 2003). They live in social groups of 5 to 50, with a dominant male as the leader (Estes, 1991; Glenn, 1997).

2.3.4. Conservation Status of the Mona Monkey

Cercopithecus mona is a guenon species of "Least Concern" (International Union for Conservation of Nature and Natural Resources, IUCN, 2010). This status implies that the mona monkey is still common in their natural ranges. In Cameroon, Nigeria, and Ghana, *C.*

mona populations have been locally reduced or eliminated due to hunting (Glenn *et al.*, 2002). It is not unlikely that in some unprotected habitats, their population might have declined or extirpated due to habitat loss and hunting pressure. In PAs the mona monkey is poached, an activity that could decimate their population. In the Lama Forest, Bénin Republic, Matsuda (2007) reported that the *Cercopithecus* monkeys are hunted. In a survey of four areas in the southeastern part of Gashaka Gumpti National Park, Nigeria, only three of the five sites where *C. mona* were found in 1970s had them in 2002 (Chapman *et al.*,2004). Tooze and Baker (2008) reported on the re-introduction of mona monkeys into Iko Esai Community Rainforest, Cross River State, Nigeria, which was outside any state or nationally protected area and where the monkeys' population is nearly extirpated. Mona monkeys could become locally extirpated if conservation measures such as habitat protection and enforcement of hunting bans are lacking (Matsuda, 2007). Ukizintambara and Thebaud (2002) recommended strong conservation measures to protect the *Cercopithecus spp*. including *C. mona* in West Africa where they were found to be threatened.

2.3.5. *Cercopithecus* Populations in Urban Areas

Mona monkeys have been found to live in close proximity to human beings (http://www.theprimata.com/cercopithecus_mona monkey.html). The monkey is associated with vegetated areas in urban environments. In Lagos State, they have been reported to occur in forests around Chevron and Ogudu Estates, Agiliti, Snake Island, Badagry, Epe and Ikorodu (personal communication with residents). Nwufoh (2011) reported the presence of mona monkeys in Awka, Anambra State, Nigeria where the forests these animals inhabited have experienced conversion when the city became the State's capital. The mona monkey is not the only NHPs known to live close to human settlement. The Sclaters guenon

(*Cercopithecus sclateri*) was reported to be in some communities in Igbo land (Baker *et al.*, 2009). Urban or sub-urban mona monkey populations could have become so due to man's conversion of their habitats to farmlands or houses. The mona may be under serious threats in the future as they occur mainly in regions with high human population density (Ukizintambara and Thebaud, 2002). This proximity with human beings may affect their food and feeding behaviour.

2.4. PROTECTED AREAS AND MONA MONKEY CONSERVATION

The population decline in NHPs and that of other wildlife has been attributed to habitat loss, over hunting and poaching (Anadu, 1987, Twinomugisha and Chapman, 2007). Continued 'harvesting' of mona monkeys could lead to their depletion and local extirpation if they are not protected.

The Convention for the conservation of biodiversity (CBD) has called upon member states to set aside 25% of the different biogeography habitats as PAs. Nigeria, a signatory to the convention has made a commitment to conserve Nigeria's 25% of total forest area. Nigeria plans to increase the wildlife conservation area from 5.8% to 25% with emphasis placed on *in situ* conservation of biodiversity within protected areas such as Forest Reserves, Game Reserves, National Parks and Wildlife Sanctuaries. It also planned to encourage *in situ* conservation outside protected areas in order to complement conservation of biological diversity inside protected areas, to secure Nigeria's biodiversity for future generations (http://www.cbd.int/doc/world/ng/ng-nbsap-01-en.doc). The mona monkeys has been reported in some protected areas, viz: Cross River and Okomu National Parks and Yankari Game and Ayede/Isan Forest Reserves (Ejidike and Salawu, 2009; Akinsorotan *et al*., 2011).

The rest are in unprotected areas, urban areas inclusive (Tooze and Baker, 2008; Nwufoh, 2011).

2.5. VALUES OF WILDLIFE

2.5.1. Source of Animal Protein

One way of alleviating the general protein shortage in the African continent was through a greater use of wildlife as a human food-resource (Martin, 1983). In a study carried out between 1976 and1977, Martin (1983) showed that 50% of Nigerians ate ‘bush meat’, with more rural dwellers having access to it than urban dwellers. In the study, roadside survey of bush meat sales in the then Bendel State, showed that monkeys (mainly *Cercocebus torquatus* and *Cercopithecus mona*) ranked fifth with a 7.9% of the 914 recorded number of bush meat sales. In African moist forests, meat from wild animals is a highly valued product among many rural and urban people (Fa *et al*., 2005). The carrying capacity of a tropical moist forest is one person per square kilometer if the main protein source is derived from wild meat (Robinson and Bennett, 2000).

2.5.2. Source of Income

Wildlife serves as a source of income through the bush meat trade. Martin (1983) stated that the sale of bush meat by small-scale farmers to augment their income may play a significant role in rural economies in Nigeria. Ogunjemite and Ashimi (2010) reported that chimpanzees are captured live from the Gashaka region for sale as pet, exports and laboratory research animals. Its value according to them was said to be N10,000.00 for babies, and N15,000.00 – N30,000.00 for big adults.

2.5.3. Farm/Crop Raids

Davies (2002) indicated the issue of crop raids at forest-farm boundaries by primates, with monkeys and mangabeys as common pests of cash and food crops; and galagos as pests of cashew nuts on Kenyan coast. Chimpanzees and gorillas were banana and plantain farm raiders. Thus farmers do kill primates in order to protect their crops.

2.6. VALUES OF NON-HUMAN PRIMATES TO MAN

2.6.1. Non-human Primates as Models for Biomedical Researches

Nonhuman primates have been used for decades for biomedical research. They have proved to be models that are relevant to humans because of the high level of gene homology which underlies philological and biochemical similarities (Hau and Schapiro, 2006). The great similarity of NHPs and humans justifies their use in the investigation of pathophysiological mechanisms in haematology, immunology, and virology and in the evaluation of tolerance and efficacy of therapeutics. Screening of biomedicals with rodents must be validated in preclinical trials with NHPs. Whenever efficacy trials are impossible in humans, the demonstration of efficacy using NHPs is an unavoidable means of validation (Herodin, *et al*., 2005). Carlsson *et al*. (2004) reported that a total of 2,937 articles involving 4,411 studies that used NHPs and NPHs biological material in research were published in 2001 in peer-reviewed journals. The most common areas of research were reported as microbiology (including HIV/AIDS, 26%), neuroscience (19%), and biochemistry/chemistry (12%). Most (84%) of these works were done in North America, Europe and Japan. All the NHPs used were Old World primates from the tropics.

Even though there is a strong drive for zero use of NHPs for biomedical research, opponents advocate their use for specific tests. In the absence of *in vitro* models which take into account the complexity of the networks involved *in vivo* in humans, the use of NHPs remains justified “as a last step to human”, provided that primate research is restricted in quantity and that the experimental environment is enriched. Since NHPs are mammals very similar to humans as regards intelligence and social complexity, their use in experimental research is regulated by strict ethical rules, viz: substitute animals of other orders for NHPs as often as possible, only use the species of NHP appropriate to the experimental aim, and primate cohorts should be restricted in quantity consistently with statistical analysis (Lucciani, 1998, Herodin *et al*., 2005). Primates for experimental research must not be captured from the wild, but must come from accredited breeding facilities.

2.6.2. Ecological Services

Primates are key components of the tropical forests where more than 90% of them are found. They are perhaps the best flagship species for the tropical rain forests of the world, which are increasingly under pressure. Their important roles in these forests include seed predation and dispersal, pollination, and even as species that can enhance the role of forests in carbon sequestration (Mittermier, 2010). Studies have shown that the loss of large frugivores especially monkeys could have negative effects since monkeys are responsible for long-distance seed dispersal not seen with other frugivores like birds (Jordano *et al*., 2007).

2.6.3. Primates as Pets

Primates are commonly used as pet in areas of sympatry. Owning NHP as pet is widespread in southeastern Asia, Amazonia and other parts of South America, as well as Africa. The *Macaca* and *Nycticebus* are the common genera used as pets in Asia. In sub-saharan Africa, the small monkeys such as vervets and guenons and galagos are used as pet. Apes are regarded as status pets is Asia and Africa (Wolfe and Fuentes, 2007). The keeping of pets impacts on the wild population of monkeys and apes. This is because pets are usually by-products of hunting. The negative side of NHP pet keeping is the substantial bidirectional pathogen transmission between humans and their pets (Jones-Engel *et al.*, 2005).

2.6.4. Economic Services

Non-human primates have been used as economic tools in picking crops in southern, southeastern and northeastern Asia (Wolfe and Fuentes, 2007). In Thailand, males of macaque (*Macaca nemestrina*) have been kept, raised and trained to pick coconut. One male macaque can harvest 500-1000 per day, and does so at a lower cost. The relationship benefits both the human and the monkey for it is taken care of (Sponsel *et al*., 2002).

2.7. MONA MONKEYS' FOOD AVAILABILITY

Primates are believed to have evolved in tropical forests where most primate species are found today. Most primates take their greatest proportion of daily diet from food plants: new leaves, ripe fruits, seeds, exudates, nectars, flowers, pith and eating moderate to trace amounts of animal matter, mostly invertebrates (Harding, 1981; Oftedal, 1992; Milton, 1993). Food availability and type are major indices that would determine the species of animals that forage in such areas and their population dynamics.

2.7.1. Methods of Identifying Monkey Foods

Visual observation of feeding behaviour has been used to record foraging and feeding of primates (Altmann, 1974, National Research Council, 2003). Rothman *et al*., (2011) indicated the opportunistic method as one of the methods by which the types of foods monkeys ingested could be identified. This method relies on the remnant left after monkeys have been sighted feeding on a particular food. Opportunistic observation may be biased in many ways, but in particular may underestimate insect foraging, which may not be easily observed or the insect collected for identification. Level of habituation and duration between successive observations may introduce bias. However, the method is useful in collecting foods eaten by the primates.

Alternative feeding ecology methods were outlined in National Research Council (2003) as follows:

i. Analysis of Stomach Content: This method is now rare, since it is invasive. The stomach or pouch content of killed animals is used to estimate the mass of different food categories consumed (for example, fruits, leaves, or insects). The animal must be killed, only a single measure per animal is obtained and the persistence of fibrous items compared to fruits are the limitations of this method.

ii. Faecal Analysis: The faecal samples could be used for identifying what the animals consumed. Recognizing cell structures of plants to identify them to genus level requires training. Seeds and other materials that tend to persist are more easily identified than more digestible ones.

iii. Food remnants: This method is used in combination with faecal analysis and visual observation. The researcher must be close enough to identify the plant species on which the animal is feeding on.

The acceptable trend in food ecological studies that involves the conservation of the target species is the use of non-invasive and non-destructive methods (National Research Council, 2003).

2.8. SEASONALITY OF MONA MONKEY FOODS

The alternation of dry and wet seasons in rain forests causes variation in the availability of plant reproductive and vegetative parts thereby inducing abundance and scarcity of food for consumers (Gautier-Hion, 1980; van Schaik *et al*., 1993). Seasonality affects many aspects of primate lives (van Schaik and Brockman, 2005). Changes in the availability of preferred foods have great effect on the activity levels, reproductive, social, and ranging behavior of many primate species (Matsuda, 2007).

The availability of food varies over time (season) and space (geographic location). Food can be abundant in one area during one season and in critically short supply in another area during other seasons. Diet selection in wildlife is driven by the quantity and quality of available food in concert with the nutritional needs of the animal (Yarrow, 2009). When faced with variation in food quantity and quality at different times and places, animals must adjust their diets to meet their nutrient requirements (Rothman *et al.,* 2008b). Seasonal fluctuations in the availability of various foods and the nutritional composition of the same food affect nutrient intake and influence density and distribution of primate populations (Milton, 1990; Kay *et al.,* 1997; Worman and Chapman, 2005; Rothman *et al.*, 2008b).

2.9. NUTRIENT COMPOSITION OF MONA MONKEY DIET

Since most primates are arboreal, they depend on the forest and the forest ecosystem for food and other needs (Ejidike and Okosodo, 2007). The mona monkey like any other animal must obtain nutrients (carbohydrates, proteins, lipids -fats and oils, minerals, vitamins) and water for their metabolism, growth and reproduction through foods sourced from their environments (Oates, 1987; Waterman and Kool, 1994). Carbohydrates, proteins and lipids are the macronutirents needed for energy supply and building of new tissues; while minerals and vitamins are micronutrients and are needed in small amounts for physiological processes (Lambert, 2007). In the rainforest, primates must locate nutrient sources necessary for their metabolic maintenance (Sayer and Wegge, 1992).

The fact that food is available does not mean that animals would consume them. The availability of a particular food may influence whether or not it would be consumed independent of its nutritional content. Some seemingly attractive foods may not be consumed due to some anti nutritional factors (Ganas *et al*., 2008). Analysis of the quality and anti-quality components of wild food plants a particular primate selects, its net gain from eating them, and the factors underlying its pattern of food selection are under explored for many primate species (Milton, 2006). This lack of information makes many primatologists view primates as capable of altering their dietary behaviour. All primates appear to show species-specific dietary pattern, even though they be at home in a variety of different habitats (Milton, 2006). Proximate analysis of foods could provide such information.

Proximate analysis has been used for a very long time, but is still the starting point for most feeds analysis (http://www.ansc.purdue.edu/courses/ansc221v/feedanal.htm). Proximate analysis is the analysis of foods and feeding stuffs for nitrogen (protein); ether extract (crude fat); crude fibre and ash (mineral salts); together with soluble carbohydrate which is calculated by subtracting the sum of these values from the total (carbohydrate is determined by difference). It is also known as Weende analysis, after the Weende Experimental Station in Germany, which in 1865 outlined the methods of analysis to be used (http://www.encyclopedia.com/topic/proximate_analysis.aspx).

2.9.1. Carbohydrates

Primary producers store the products of photosynthesis in their leaves, stems, flowers, seeds, roots and gums as carbohydrates. Carbohydrates are energy providing substances in the diet of consumers, and include starches, sugars, cellulose and hemicellulose. There are three forms of carbohydrates: monosaccharides, disaccharides, and polysachharides.

Monosaccharides are simple sugars such as glucose, or fructose and are readily absorbed by the body. Disaccharides are made up of two monosaccharide units joint together through a bond. Monosaccharides and disaccharides are called soluble sugars (Lambert, 2007). Polysaccharides are polymers of mono- and disaccharides. They could either be in the form of starch or nonstarch. The nonstarch polysaccharides are structural components of the plant cell wall and include hemicellusoe cellulose, lignin, and pectin.

Primates do not have the enzymes for the breakdown of cellulose. Intestinal protozoans and bacteria help in the breakdown of these cell wall materials (Lambert, 1998). Bacterial fermentation of hemicellusose leads to the production of energy.

2.9.2. Protein

Since primates depend on wild foods for their nutrients, it is expected that the foods they consume should contain the required levels of protein. Many wild primates are able to obtain most or all of their estimated daily protein requirements largely or entirely from food plants (Milton, 1999). Mature tree leaves and fruits are not good sources of protein. Young leaves, may have considerable protein but is low in ready energy, while ripe fruits tend to be high in ready energy but low in protein (Milton, 1999; Lambert, 2007). Thus it is useful to determine the quantity of protein in the plant parts primates consume as their diets.

In developed countries where captive primates are fed manufactured chows and water, each age or age class may consume different quantities of chow depending on body size and other factors, perhaps protein requirements (Milton, 2006). However, in the wild, these primates especially if they are sympatric may feed on the same plant parts, but may consume the same foods at different stages of maturation. Thus primates (in the wild) are capable of altering their dietary behavior to fit any circumstance they find themselves, even though their dietary intake may be deficient in protein and other essential nutrients (Milton, 1999, 2006). Thus offering captive primates the same wild foods, without a clear understanding of the nutritional contents of such foods, when in captivity as practiced in developing countries may not be the best for the nutritional needs of the primates.

Nitrogen (N) is used to estimate protein content since it is an easily measurable component of the amino acids in protein. The N factor 6.25 is used in estimating crude protein.

2.9.3. Ether Extract

The part of a complex organic material that is soluble in ether and consists chiefly of fats and fatty acids is referred to as ether extract (crude lipid). Ether extract estimates for fats (lipids). Fats are the body's most concentrated source of energy, providing more than two times the energy per unit weight of either carbohydrates or protein (Lambert, 2007). The major sources of fats for primates are insects and other animal matter, seeds, and the arils of some fruits (Lambert, 2007). Insufficient lipid intake can result to developmental and reproductive problems in mammals since lipids influence neurotransmitter levels that regulate reproductive hormones (Robbins, 1993).

2.9.4. Minerals and Vitamins

Minerals are essential for physiological functions. They could be macrominerals such as calcium, magnesium, phosphorus, potassium, sodium, chlorine and sulphur which are required in large amount. The microminerals are required in trace amounts. They include iron, copper, manganese, iodine, zinc, selenium, cobalt and are expressed in parts per million

(National Research Council, 2003). Minerals are useful as biological components of molecules (Lambert, 2007).

Vitamins facilitate the utilization of energy. They are divided into water soluble (B, C) and fat soluble (A, D, E, K). Vitamin B_{12} is provided by microorganisms found in the gut of animals while C is found in fruits (Cowlishaw and Dunbar, 2007). The other vitamins are derived from the foods such as seeds, leaves aand fresh fruits consumed by the primates. For instances, vitamine A is found in leaves.

2.9.5. Fibre Fractions

Plant dry matter could be divided into two fractions on the basis of nutritional availability. These are the cell content and cell wall. Cell content made up of lipids, soluble carbohydrates, most protein and other water-soluble matter are available to animals. Most plant parts are high in indigestible cell wall material. Plant cell walls are made up of cellulose, hemicellulose and lignin, constituents that are impervious to digestive enzymes of vertebrates (Milton, 1984). The availability of plant cell wall is determined by the structural features that link cellulose, hemicelluloses and lignin together, and it is not uniform among food plants. Plant cell wall could also be termed as total fibre fraction (Goering and Van Soest, 1970).

Especially for ruminant rations, acid detergent fibre (ADF) and neutral detergent fibre (NDF) have been used as indicators of dietary energy and intake. They have replaced crude fibre (CF) in ration formulation in many parts of the world. ADF and NDF values are frequently used to estimate the amount of forage that can be digested by animals; total digestible nutrients and other energy values. The concept behind detergent fibre analysis is that plant cells can be divided into less digestible cell walls (comprising hemicellulose, cellulose and lignin) and mostly digestible cell contents (comprising starch and sugars). These two components can be separated by using two detergents: a neutral detergent and an acid detergent. Neutral Detergent Fibre is a good indicator of bulk and thus feed intake. Acid detergent fibre is a good indicator of digestibility and thus energy intake (http:// global standard adf_lignin.pdf). The stepwise procedure for the analysis of NDF, ADF and acid detergent lignin (ADL) is shown on Figure 1.

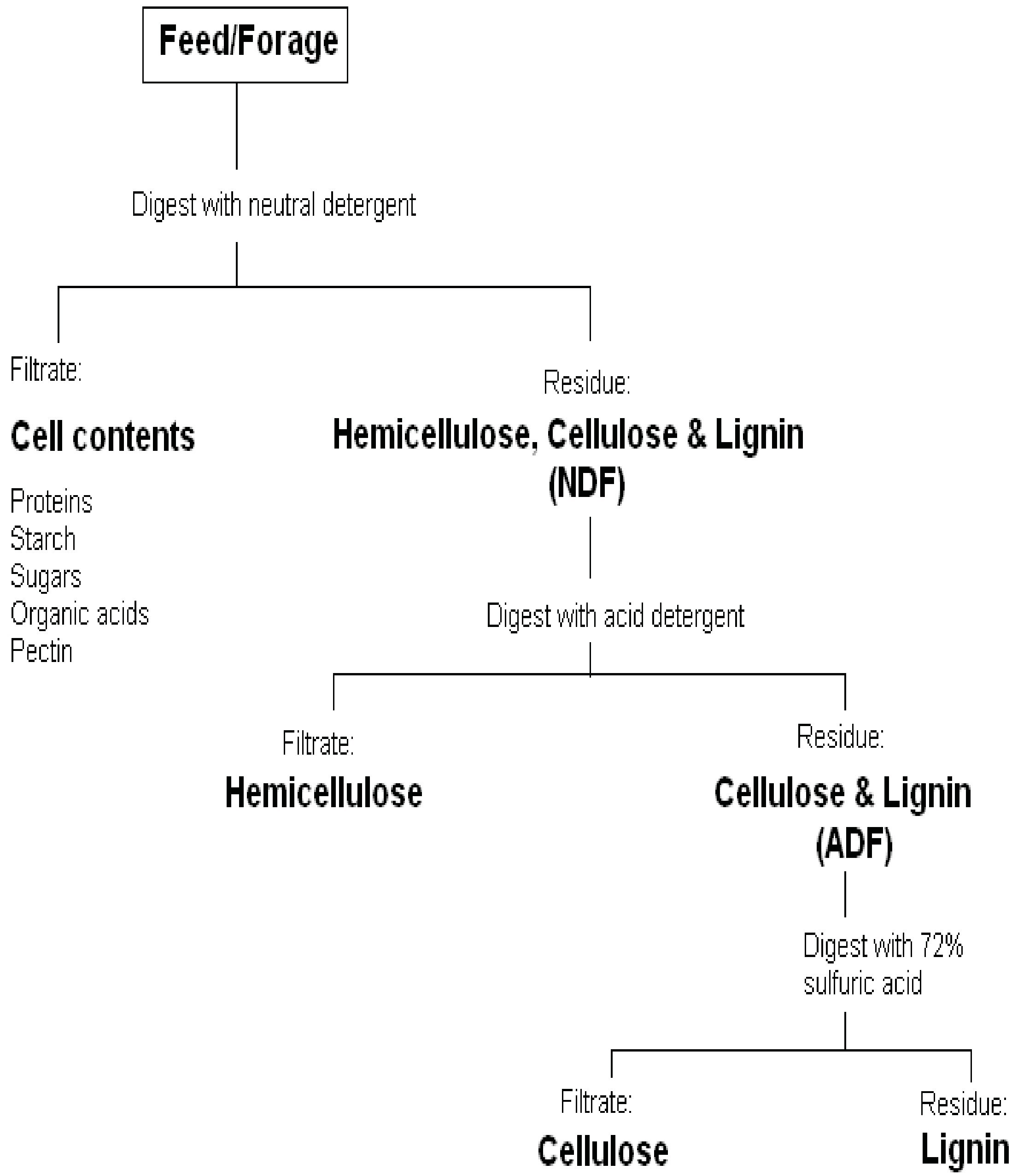

Figure 1: The Detergent Fibre System according to Van Soest (1994)

2.9.6. Amino Acid

Rothman *et al*., (2011) suggested that since animals do not require crude protein, but amino acids, the best way to examine protein intake by primates is to estimate the amounts and type of amino acids in primate foods. Few studies have analysed amino acid composition of primate foods (Curtis, 2004), perhaps because amino acid analysis is quite expensive and requires specialized technique. Estimating the amino acids in a sample provides the most information about the quality of protein (Rothman *et al*., 2011).

2.9.7. Gross Energy

Gross energy is the total energy content of a food, which may be released after combustion in a bomb calorimeter (Rothman *et al*., 2011). It is limited as an indicator of the available energy of a food item, since not all the energy is digestible by the consumer but some are voided as faeces. However, some primate studies used gross energy as a measure of energy available to them (Ganas *et al*., 2008). It is estimated via food intake and the energy contribution of fat, carbohydrates, and protein.

2.9.8. Food Requirements

Wildlife must have food to survive. Animals having adequate food and proper nutrition throughout their lives grow larger and remain healthier than animals that experience poor nutrition during part or all of their lives. Generally, wildlife in good condition has higher reproduction rates, are more resistant to diseases, and can escape predators better than animals in poor condition. Nutrition affects birth and death rates and is important in the overall survival of any wild animal population.

2.10. FOOD PREFERENCE STUDIES

Preference is a measure of which foods would be consumed by an animal if there was no variation in availability among food items in the animal's diet (Chesson, 1983; Ganas *et al*., 2008). Food preference differs from food choice because although food choice investigates how the attributes of each food species (their differing availabilities and nutrient compositions) may influence the decision of what an animal consumes, preference controls for differences in availability and then calculates which species would be chosen over another (Ganas *et al*., 2008).

Information on which nutrient and foods are preferred by an animal show which food species may influence feeding competition, habitat utilization, and which food species and habitats should be considered in management and conservation efforts (Ganas *et al*., 2008). Investigating food preference is important for the insight it gives into the nutritional requirements of an animal, which is vital to reproduction, fitness and survival (Altmann, 1998; Orians and Wittenberger, 1991). Determining nutrient requirements by analyses of food choice and/or selectivity may not give a true representation of an animal's needs. This is because during periods of low food availability, animals may eat poor quality but available foods to subsist on (Ganas *et al*., 2008).Food preference and choice seem to mean the same thing. An animal's choice may mean its preference. An animal may chose a particular food based on what is available in the environment. However, the part of the food it would consume is that portion that would provide the nutrients it would need. Food preference calculation help in determining nutritional requirements, while that for food choice determines factors that influence the consumption of particular foods in a variable environment (Ganas *et al*., 2008).

The food choices of primates have been attributed to one of two principal factors: the nutritional and/or toxic content of the plant part, or its relative availability in space or time. Body size has been suggested to also influence primate food choice (Milton, 1979; Milton, 1980; Oates *et al*., 1980). As foods contain different levels of nutrients, many primates must choose from more than one dietary category each day to get the balance of essential nutrients and the energy they require (Milton, 1984).

2.11. ATTITUDES OF PEOPLE TO MONA MONKEYS' CONSERVATION

Many protected areas in sub-Saharan Africa were created during the colonial era as hunting grounds or parks for European elites. Little attention was given to the needs of local communities that depend on the areas for their livelihoods (Adams, 2003). This has led to some increased burden and conflict where there is limited access to resources in conserved areas (Hulmes and Murphree, 2001; Akosim *et al.*, 2010). Consequently, it is good for conservationists to understand the local views with respect to wildlife and protected areas (Tessema *et al.*, 2007).

People may or may not support conservation efforts by government or non-governmental organizations due to how they understand the value of such actions either to them presently or their posterity. In poverty stricken areas, the satisfaction for present needs may override their attitude to future conservations' benefits of the resources (Akosim *et al*., 2010). Due to unsustainable utilization and destruction of biodiversity, protected areas (PAs) are being established under the guidance of IUCN to conserve biodiversity in many countries of the world. National Parks are the most common type of PAs especially in developing countries (Ogunjinmi *et al*., 2009).

Attitude is defined as the tendency to think, feel, or act positively or negatively towards objects in the environment (Petty, 1995). Attitudes towards a group of animals or a single species often acts in a complex conflicts between different groups of people over natural resources issues (Kaczensky *et al.*,2004). Studies have shown that attitude towards animals differ between groups delineated by demographic and socioeconomic variables such as gender, age, education, and occupation. Some studies did show that females are more supportive of animal conservation than males (Kellert, 1996). In formal or informal practices of conserving primates, the way in which people value or perceive primates is linked to their beliefs and attitudes which are affected by changing conditions and experiences (Hill, 2002). Taboos that are connected to traditional beliefs may be rejected as new religions are adopted by the people (Baker, 2013).

2.11.1. Likert Scale Questionnaire

The Likert Scale questionnaire developed by Likert (1932) is a psychometric response scale primarily used in questionnaires to obtain participant's preferences or degree of agreement with a statement or set of statements. Likert scales are a non-comparative scaling technique and are unidimensional (only measures a single trait) in nature. Respondents are asked to indicate their level of agreement with a given statement by way of an ordinal scale. It is named after Dr. Rensis Likert, a sociologist at the University of Michigan, who developed the technique.

CHAPTER THREE

3.0. MATERIALS AND METHODS

3.1. STUDY AREAS

The study was carried out on three selected locations in Southwestern Nigeria, viz: University of Lagos and Lekki Conservation Centre, in Lagos State, and Okomu National Park in Edo State. Respectively, these locations were selected to represent the urban, semi- (peri-) urban and wild habitats for the study locations.

3.1.1. University of Lagos, Lagos State

The University of Lagos Main Campus (Figure 2) lies between 6^o 31 0′ North (N) and 3^o 23 10′East (E) – 6^o 30 52′N 3^o 24 18′E in North Eastern part of Yaba, Lagos. It has a total land of 802 acres. The mona monkeys inhabit 11.95 hectares of the fragmented vegetation in the northern part of the University.

The climate of UNILAG was reported by Orebamjo (1968) to be similar to that of the rest of southern Nigeria. There were two rainy seasons, with the heaviest rains falling from April to July and a weaker rainy season in October and November. There was a brief relatively dry spell in August and September and a longer dry season from December to March. It has a mean rainfall of 1620.5mm; average daily temperature of about 27.6^{o}C; and relative humidity of 76-80.5%.

The terrain is undulating with various fresh water channels and creeks passing across at different locations. Huge amount of mangrove swamps, roughly 50% dominated the vegetation. Four vegetation types existed in the University, viz: fresh water swamp forest near the mainland, salt water (mangrove) swamp, sandy plain on the north, and upland vegetation. The fresh water vegetation is characterized by *Anthocleista spp.*, *Alstonia boonei*, *Elaeis guineensis* and few stands of *Olas spp.* (bamboo trees). The salt water vegetation is characterized by *Rhizophora sp.*, *Avicenna nitida*, *Paspalum vaginatum*, *Eragrostis linearis* and few species of *Raphia sp*, thereby forming a thicket, which makes it very difficult to access by humans. The upland (4-9 m above sea level) vegetation comprised of mosaics of highly disturbed secondary rain forest and a senescent rain forest on an island in the south. The vegetation consisted of *Dialium guineensis*, *Sterculia tragacantha*, *Albizia spp.*, and several introduced (exotic) species such as *Roystonea oleraceae*, *Tabebuia rosea* (Orebamjo, 1968; Orebamjo and Njoku, 1971).

3.1.2. Lekki Conservation Centre, Lagos State

The Lekki Conservation Centre (LCC) is a Strict Nature Reserve located on latitude 6° 26′ N and longitude 3° 32′ E (Figure 3). It is a 78 hectares reserve in Igbo-Efon village on the Lekki Peninsula, in Eti-Osa Local Government area of Lagos State. Appendix 2 shows the Permit to conduct this study in the Reserve.

The LCC has a mixed variation in the type of vegetation cover with a dominant mangrove swampy forest and a secondary savanna. The common trees in the fresh water marshes included *Alstonia boonei*, *Elaeis guineensis, Ficus spp., Raphia hookeri, and Xylopia aethiopica.* Shrubs and climbers reduced the visibility through the marshy habitat. The savanna grassland included trees such as *Anacardium occidentale*, *Mangifera indica*, *Vitex doniana*, and grasses such as *Panicum spp*., *Setaria anceps*, and *Imperata cylindrica*. With the so much urbanization and infrastructural development over the years in the Lekki Peninsula, the nature reserve contains the representative sample of the ecosystem type found in the area (Osinubi, 2007; Nigerian Conservation Foundation, 2009).

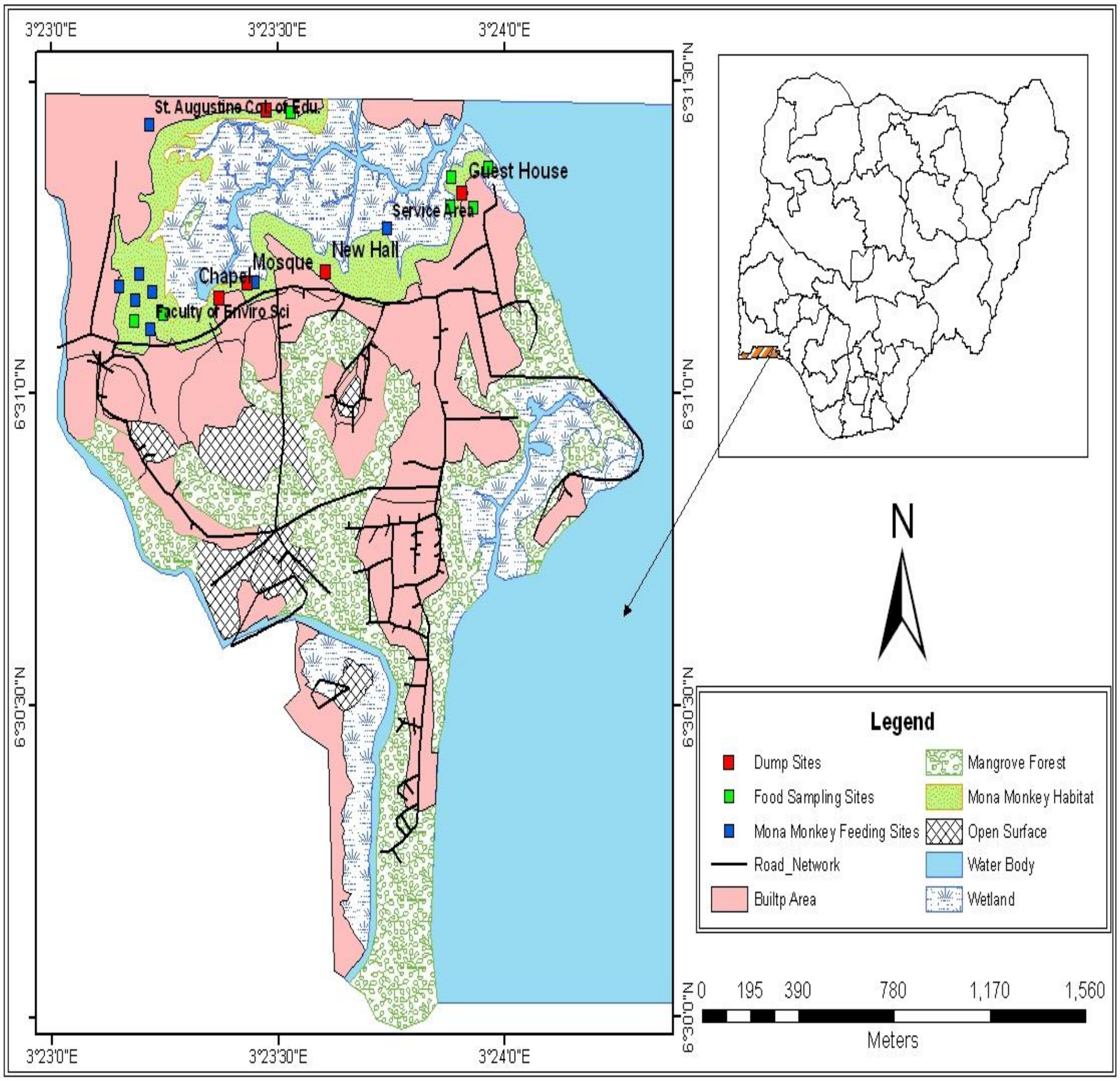

Figure 2: Map of University of Lagos

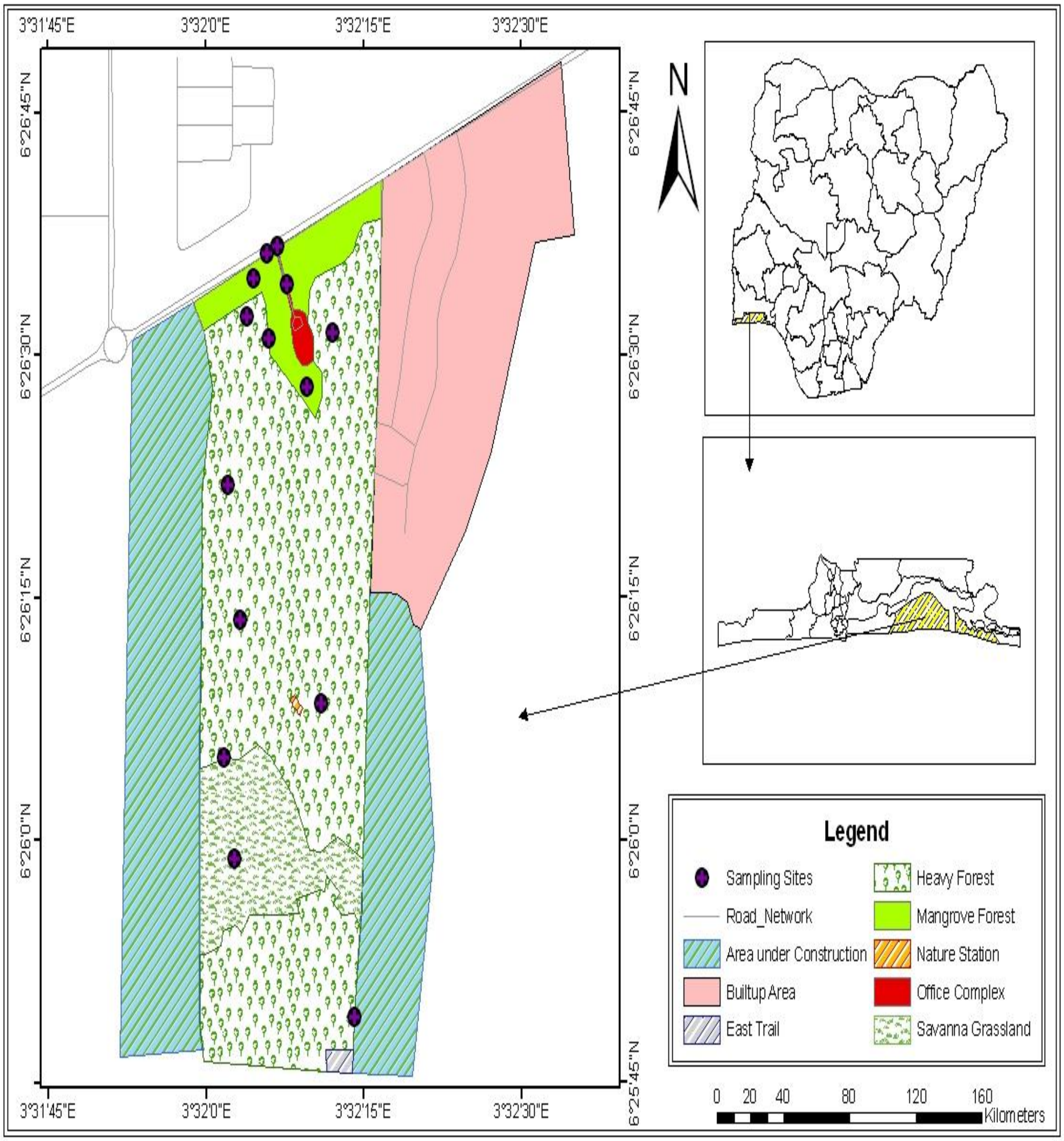

Figure 3: Map of Lekki Conservation Centre

3.1.3. Okomu National Park, Edo State

Okomu National Park (Figure 4) is located in Ovia Southwest Local Government Area of Edo State, Nigeria and lies 45km west of Benin-City. It is situated on latitudes 6^o 15′ and 6^o 25′ N and longitude 5^o 9′ and 5^o 23′ E. The Park is part of a former 123,800 ha Okomu Forest Reserve gazetted in 1935. The presence of the white-throated monkey and the forest elephant in particular led to the creation of a Wildlife Sanctuary in 1986 by the then Bendel State Government. It became a National Park in 1999 through the promulgation of Decree 46 of 1999 (Oduwaiye *et al.,* 2002, Ogunjemite and Akinsorotan, 2009). The Permit to conduct this research in the Park is shown on Appendix 3.

The Park covers a land mass area of approximately $202km^2$. It is a lowland rainforest ecosystem, with a topography range of 30 and 60 m above sea level, annual rainfall range of 1524 and 2540mm, and mean monthly humidity between 30.2 and 65% during the afternoons. It is the last remaining rainforest ecosystem in southwestern Nigeria, and is endowed with a complex assemblage of fauna and flora species. The wildlife found in the Park includes forest elephant (*Loxodonta africana cyclotis*), buffalo (*Syncerus caffer*), the endemic white throated monkey (*Cercopithecus erythrogaster*), red cap mangabey (*Cercocebus torquatus*), and mona monkey (Soladoye and Oni, 2000;Aminu-Kano and Marguba, 2002; Ezealor, 2002; Oduwaiye *et al*., 2002; Ogunjinmi *et al*., 2009; Aremu *et al*.,2012; Hahn, 2013).

The vegetation of ONP is a typical Guinea-Congo lowland rainforest characterized by a mosaic of swamp forest, secondary high forest and open scrub on well drained plateau sites. Lianas, climbers and stranglers make the forest difficult to traverse or sight animal activities easily. As a rain forest, it has canopy trees, understoreys and growing seedlings. Common trees include *Ceiba pentandra*, *Pycnanthus angolensis*, *Alstonia congolensis*, and *Celtis zenkeri* (Soladoye and Oni, 2000, Aminu-Kano and Marguba, 2002, Ezealor, 2002).

The objectives for the creation of ONP were to:

Preserve for posterity the unique flora and fauna of south-west Nigeria under threat from insatiable demand for timber, farmland and bush meat;

Monitor and evaluate changes caused by nature and human activities in adjoining areas, thus promoting good management and understanding of the tropical moist forest ecosystem;

Maintain a reservoir of potentially valuable species and genotypes for the improvement of crops, and trees, and for future industrial and scientific innovations in agriculture and medicines;

Provide a site for ecological education and research and for training in conservation;

Provide ecotourism attractions and services within the National Park in conjunction with community developmental efforts in adjacent areas, such as support and buffer zones

(http://onp.nigeriaparkservice.org/).

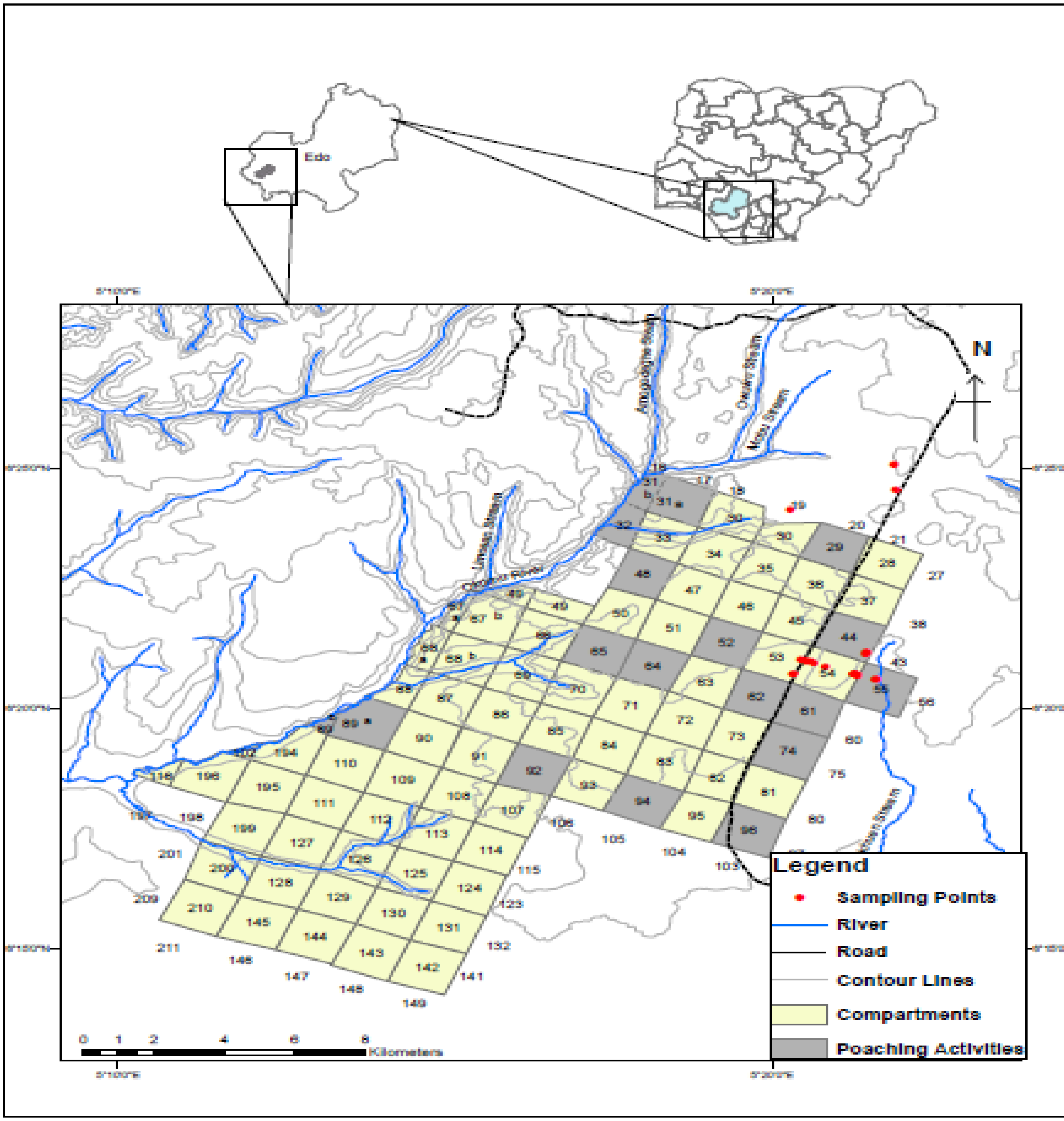

Figure 4: Map of Okomu National Park, its compartments and poaching activities

3.1.4. Climatic Data

The climatic data for the three locations were obtained from the Nigerian Meteorological Station, Oshodi, Lagos. The data (rainfall, humidity and temperature) were recorded from three stations at Oshodi, Tafawa Balewa Square and Bénin City. These stations represented UNILAG, LCC and ONP respectively.

3.2. DATA COLLECTION TECHNIQUES

3.2.1. Reconnaissance Survey

In December, 2010 five reconnaissance surveys were carried out in University of Lagos, two surveys were conducted in early January, 2011 in Lekki Conservation Centre. The purpose was to determine the habitats of the mona monkeys, and the methods to use for the studies.

3.2.2. Identification and Categorization of the Mona Monkeys' Food Types in Urban, Semi-Urban and Wild Habitats.

Focal-Animal Observation for few animals and All-Animal Observation for a group of animals as described in National Research Council (2003) were used to determine the food types the animal fed on during the study period. When an individual or troop was sighted feeding, 5-10 minutes was used to observe (with the aid of binoculars showing panorama: 122m/1000m) what food it/they was/were feeding on and the part consumed. If they were far, efforts was made to reach where they were feeding and some left over (refuse) were collected for chemical composition analyses. Instruments used during the study included Boots™ binoculars, for viewing distant animals, Global Position System (GPS, Garmin etrex model), for taking the coordinate readings where mona monkey food samples were collected and camera for photographing the food samples. Appendix 4 was the chart used for recording the food plants and parts mona monkeys consumed in the study locations.

The field studies were conducted during the dry and rainy seasons of 2011 and 2012. Feeding observations were carried out in the mornings from 7:00 to 11: 00 hrs (on non-rainy days), and in the evenings from 16:00 to 19:00 hrs. Food parts consumed by mona monkeys were collected for identification and proximate, fibre fraction and amino acid analyses. Collected food samples were categorized based on type (wild, provisioned, or composite) and where (dumpsites, savanna grassland, or mangrove swamps) the animal sourced them.

3.2.2.1. Categorization and Taxonomic Grouping of Mona Monkeys' Food Plants

Field observations of the mona monkeys as they foraged were carried out to monitor and collect refused food samples for identification. Opportunistic collection as suggested by Rothman *et al.,* (2011) was carried out to obtain the foods eaten at top canopies but which dropped to the ground. Insects and other arthropods that were consumed could not be identified for they never fell. Unknown food plants samples were taken to the Lagos University Herbarium for identification. Those picked at dump sites were identified as human foods left over.

The method used by Crissey *et al.,* (2003) to categorize callitrichids diets into fruits, vegetables and starchy vegetables was modified to include seeds, and composite foods. Food categorization was based on the type, nature and source of the food samples collected. They were categorized as: Foods in mona monkeys' natural habitat (termed natural/wild foods), raided farm produce, scavenged, and human offered foods (termed assorted/provisioned foods). The natural foods were those eaten by only monkeys and other wildlife but not man.

The monkeys raided nearby farms and provision shops. Assorted foods were the different foods people in the vicinity of their habitat offered the animal, while scavenged foods were discarded human foods that monkeys accessed from dump sites.

All the items mona monkeys accessed as part of their diets are presented on their habitat basis. The opportunistic method could not be used for determining animal based diets of the mona monkeys. Those that were of plant origins were classified into their families and the portion the monkeys consumed were indicated. In the taxonomic grouping, food plants were classified into families and species, and the parts mona monkeys consumed.

3.2.3. Seasonal Availability of Mona Monkeys' Foods in the three Habitats

The seasonal availability of food consumed by mona monkeys was determined through a study that was carried out during the dry and rainy seasons of years 2011 and 2012. The foods were termed dry or rainy season foods if they were consumed by the mona monkeys during such season. Those that were found during both seasons were indicated as such.

3.2.4. Determination of Nutrient Composition of Mona Monkeys' Food Plants

The plant parts that were observed as mona monkeys' foods were collected from the three locations during the dry and rainy seasons of 2011 for proximate, fibre fractions and amino acid analyses. The weights of the food samples were taken on the field using Tripple Beam weighing balance.

Proximate analyses of the food samples were carried out on dry matter basis for crude protein (CP), ether extracts (EE), crude fibre (CF), and ash using the AOAC (1990) method. Fibre fractions of the food samples were analysed using the methods described by Goering and Van Soest (1970), Van Soest *et al.*,(1991). The analysed fibre fractions were neutral detergent fibre, (NDF), acid detergent fibre (ADF), and acid detergent lignin (ADL). Hemicellulose (HC) and cellulose (C) were determined by difference.

3.2.4.1. Determination of Dry Matter

Dry matter values were obtained by oven drying at 100 ^{0}C to a constant weight. Dry matter (DM) was determined by using the equation:

$$DM = \frac{Initialweightofsample - Finalweight(g)}{Initialweightofsample} \times 100$$ (AOAC, 1990)

Dried samples were milled with a hammer mill of 1mm sieve and stored in sample bottles that were kept in a cool and dry place.

3.2.4.2. Determination of Crude Protein

The crude protein content of the mona monkeys' food samples was determined by the Kjeldahl digestion method. 0.5/1g of the sample was weighed into a Kjeldahl flask and one capsule of selenium oxide (SeO_2) was added as catalyst. 10 mls sulphuric acid (H_2SO_4) was added and heated for 1-3 hrs in a fume cupboard until a clear colour was obtained. The digested sample was washed with distilled water into a conical flask, and made up to the mark of the flask. 10 mls was pipetted out and put into the distiller and 85 ml of 50 % sodium hydroxide (NaOH) was added before distillation. The released ammonium was collected into 1 ml boric acid, changing the colour to light purple. This was titrated with a standard 0.01N hydrochloric acid (HCl). Crude protein was determined using the formula:

$$\%\ Crude\ Protein = \frac{V \times 0.0014 \times F}{W} \times 100$$ (AOAC, 1990)

Where V = Volume of HCl required to reach end point.

F = Protein factor; 6.25.

W = Weight of sample used (grammes).

The 6.25 factor was used to estimate crude protein in the samples by multiplying the amount of Nitrogen, because many plants and animal proteins are known to contain on average 16% nitrogen (Van Soest, 1994, Rothman *et al.*, 2008).

3.2.4.3. Determination of Ether Extract

Ether extract (crude fat) made of fat, oils, some waxes, pigments and other substances that are soluble in ether was determined using the soxhlet extraction method. Food sample was weighed and placed in an extraction thimble which was then immersed in petroleum ether and boiled. The sample was refluxed with the ether severally. The ether was distilled, leaving the crude oil in the flask.

$$\%EtherExtract = \frac{Initialweightofsample - Finalweight(g)}{Initialweightofsample} \times 100 \qquad \text{(AOAC, 1990)}$$

3.2.4.4. Determination of Crude Fibre

The weighed food sample was digested using 10 ml H_2SO_4 acid. The content was washed with hot distilled water and filtered by suction. The residue was transferred to a digestion flask, 20 mls of NaOH was added and boiled for about 30 minutes and rinsed with hot distilled water, then dried to constant weight and ignited to burn off all organic matter, leaving the ash. The change in weight represents crude fibre.

$$\%CF = \frac{WeightafterDigestion - Weightafterashing}{Initialweightofsample} \times 100 \qquad \text{(AOAC, 1990)}$$

3.2.4.5. Determination of Ash

Ash content was determined by burning the dry food sample in a muffle furnace at 550-600^{o}C overnight. 1g of the sample was put in a pre-weighed porcelain dish and placed in the muffle furnace. After burning, it was cooled in a desiccator and weighed. The sample weight differential expressed as a percentage of the mass of the sample used gave the ash content value.

3.2.4.6. Determination of Nitrogen Free Extract

This was not determined analytically but by difference. It was estimated by subtracting the sum of the other food components (crude protein, ether extract, crude fibre and ash) from 100.

$$\%NFE = 100 - (CP + EE + CF + Ash)$$ (AOAC, 1990)

3.2.4.7. Determination of Fibre Fractions

3.2.4.7.a. Neutral Detergent Fibre Analysis

100 ml neutral detergent solution (pH 7) was added to 1 g of sample. Sodium Sulphate and some drops of n-octanol was added and boiled. This was refluxed for 60 minutes from the onset of boiling. It was filtered with boiling water, and dried at 105°C for 8 hrs, cooled and weighed.

$$\%NDF = \frac{Initial\ sample\ weight - Final\ sample\ weight}{Initialsample\ weight} \times 100$$ (Van Soest *et al*., 1991).

3.2.4.7.b. Acid Detergent Fibre Analysis

100 ml of acid detergent solution at room temperature and some drops of n-octanol were added to 1 g of sample and boiled. Refluxing was carried out for 60 minutes from the onset of boiling. Boiling water was used for filtering, and the residue dried at 105 °C for 8 hrs, cooled and weighed.

$$\%ADF = \frac{Initial\ sample\ weight - Final\ sample\ weight}{Initial\ sample\ weight} \times 100$$ (Van Soest *et al*., 1991).

3.2.4.7.c. Acid Detergent Lignin Analysis

100ml of concentrated $H_2SO_4$was used to hydrolyse 1g of sample and the residue burnt to ash at 550 ^oC, cooled and weighed.

$\%ADL = \frac{Initial\ sample\ weight - Final\ sample\ weight}{Initial\ sample\ weight} \times 100$ (Van Soest *et al*., 1991).

3.2.4.7.d. Hemicellulose and Cellulose Determination

These were determined by difference (Rothman *et al*., 2007; Sommer *et al*., 2011). The amount of hemicellulose (HC) in the foods was determined by subtracting the value of ADF from that of NDF, while that of cellulose (CS) was estimated by subtracting ADL value from that of ADF.

3.2.4.8. Determination of Amino Acid

The methods described by Spackman *et al.*,(1958) and Benitez (1989) were used to determine the amino acid profile of the identified mona monkeysfood samples. A sample was dried to constant weight, defatted, hydrolysed, and evaporated in a rotary evaporator. It was loaded into the Technicon Sequential Multi-sample (TSM) Amino Acid Analyser which displayed the amino acid values of the sample. The amino acid value was expressed in g/100g protein.

3.2.4.8.a. Defatting of Sample

In order to determine the protein content of the sample, defatting was carried out when 4g of the sample was put in a soxhlet extraction thimbleand chloroform/methanol mixture (ratio2:1) was used as the solvent. The fat extraction was carried out for 15 hours. Defatting was to remove the fatty acids so that only amino acids could easily peak without intereference.

3.2.4.8.b. Nitrogen Determination

From the defatted sample, 200mg was weighed, wrapped in Whatman filtrer paper (No. 1) and digested in a Kjeldahl digestion flask. Concentrated sulphuric acid (10ml) was added. Catalyst mixture (0.5g) containing sodium sulphate (Na_2SO_4), copper sulphate ($CuSO_4$) and selenium oxide (SeO_2) in the ratio of 10:5:1 was added into the flask to facilitate digestion. Four pieces of anti-bumping granules were added.

The flask was then put in Kjeldhal digestion apparatus for 3 hours until the liquid turned light green. The digested sample was cooled and diluted with distilled water to 100ml in standard volumetric flask. Aliquot (10m1) of the diluted solution with 10ml of 45% sodium hydroxide was put into the Markham distillation apparatus and distilled into 10ml of 2% boric acid containing 4 drops of bromocresol green/methyl red indicator until about 70ml of distillate was collected.

The distillate was then titrated with standardize 0.01 N hydrochloric acid to grey coloured end point.

$$\% \, Nitrogen = \frac{[(a-b) \times 0.01 \times 14 \times V]}{W \times C} \times 100$$ (Benitez, 1989).

Where:

a. = Titre value of the digested sample

b. = Titre value of blank sample

V. = Volume after dilution (100ml)

W. = Weight of dried sample (mg)

C. = Aliquot of the sample used (10ml)

14. = Nitrogen constant

3.2.4.8.c. Hydrolysis of the Sample

A known weight of the defatted sample was weighed into glass ampoule. 7ml of 6N HCl was added and oxygen was expelled by passing nitrogen into the ampoule (this is to avoid possible oxidation of some amino acids during hydrolysis e.g methionine and cystine). The glass ampoule was then sealed with bunsen burner flame and put in an oven preset at $105^{o}C \pm 5^{o}C$ for 22 hours. The ampoule was allowed to cool before broking it open at the tip and the content was filtered. Tryptophan is destroyed by 6N HCl during hydrolysis.

The filtrate was then evaporated to dryness at $40^{o}C$ under vacuum in a rotary evaporator. The residue was dissolved with 5ml acetate buffer (pH 2.0) and stored in plastic specimen bottles, which were kept in the freezer.

3.2.4.8.d. Loading of the Hydrolysate into TSM Analyzer

The amount loaded was between 5 to 10 microlitre. This was dispended into the cartridge of the analyzer. The TSM analyzer is designed to separate and analyze free acidic, neutral and basic amino acids of the hydrolysate. The period of the analysis was 76 minutes.

3.2.4.8.e. Method of Calculating Amino Acid Values from the Chromatogram Peaks.

An integrator attached to the Analyzer calculates the peak area proportional to the concentration of each of the amino acids. Alternatively, the net height of each peak produced by the chart recorder of TSM (each representing an amino acid) was measured. The half-height of the peak on the chart was found and width of the peak on the half height was accurately measured and recorded. Approximate area of each peak was then obtained by multiplying the height with the width at half-height.

The norleucine equivalent (NE) for each amino acid in the standard mixture was calculated using the formula:

$$NE = \frac{Area\ of\ Norleucine\ Peak}{Area\ of\ each\ amino\ acid}$$ (Benitez, 1989).

A constant S was calculated for each amino acid in the standard mixture:

$$S_{std} = NE_{std} \times Molecularweight \times \mu MAA_{std}$$

Finally, the amount of each amino acid present in the sample was calculated in g/16gN or g/100g protein using the following formula:

$$Concentration(g/100gprotein) = NH \times W@\,NH/2\ \times S_{std} \times C$$

Where

$$C = \frac{Dilution \times 16}{Sample\ Wt\ (g) \times N\% \times 10 \times Vol\ loaded} / NH \times W(nleu)$$ (Benitez, 1989).

Where: NH = Net height

W = Width at half height

nleu = Norleucine

3.2.4.9. Determination of Gross Energy

Gross energy (GE) was determined by calculation using the Atwater factor (Stewart, 1992). The CP and NFE values of food samples were multiplied by the Atwater factor of 4.0, while the EE values were multiplied by Artwater factor of 9.0. The products were summed up as GE. Thus GE = (CP x 4.0) + (NFE x 4.0) + (EE x 9.0).

3.2.4.10. Determination of Food Preference of Mona Monkeys

Food preference of captive mona monkeys was determined by the cafeteria technique described by Karbo *et al*. (1993) and Babayemi (2007). Four adults mona monkeys (2 males and 2 females) purchased from Iddo market, Lagos were housed together in a cage that had two compartments. The animals were acclimatized with the food samples for three days after which weighted amounts of the foods were offered.

A total of 15 foods consumed by mona monkeys were offered in batches of five (four batches were used to determine the ones most consumed, and the fifth was used for re-acceptability to determine the most preferred foods). Each food was weighed and offered separately in food troughs. The test food types were offered at 10:00 hrs each day and the left over were withdrawn and measured 24 hours after. The difference between what was offered previously and what remained was regarded as intake. Food intake was monitored for three consecutive days after which another batch of five different foods were offered for a three days acclimatization period. On each day, the positions of the food troughs were changed in order to check the monkeys from associating one type of food to a particular position. Water was provided *ad libitum* in a water trough.

Food preference by mona monkeys was determined from the coefficient of preference (COP) value. The value was calculated from the ratio between the intakes for each food divided by the average intake of the foods.

COP for each food was determined using the equation:

$$COP(A) = \frac{Intake\ of\ food\ A}{Mean\ of\ food\ intakes}$$ (Bamikole *et al*., 2004).

A food is preferred when the COP is greater than or equal unity (Karbo *et al*., 1993; Bamikole *et al*., 2004; Babayemi, 2007). Re-acceptability study was carried out for three days with foods that had COP values above one. This was to determine the most preferred food(s).

3.2.4.11. Determination of Relationship between Food Acceptability and Nutrient Composition

Correlation analysis was carried out to determine the relationship between foods with COP values at or above unity and their nutrient compositions. This was to ascertain if nutrient composition affected food acceptability.

3.2.5. Determination of People's Attitude towards Mona Monkey Conservation

3.2.5.1. Primary Data

A questionnaire (Appendix 5) was designed to obtain primary data from three types of respondents: Students and staff members of UNILAG, Conservation Centre's staff and community members in LCC; and park staff, and community members in ONP. Likert type questionnaire was designed on a four scale rating of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) (Likert, 1932, Clason and Dormody, 1994). Attitude items were scored as 1, 2, 3 and 4 for SA, A, D and SD respectively. The designed questionnaire was ratified by an Associate Professor in the Department of Educational Foundation, University of Lagos. The questionnaire had four sections, viz:

Section A: Respondent's personal data

Section B: Culture, Attitude and Awareness of the Value of Nature Conservation.

Section C: Orientation about Hunting and Poaching Effects on Mona Conservation

Section D: Governments' Role in Nature and Mona monkey Conservation

Respondents completed the 32 Likert-scale items which was subjected to Factor analysis (with Varimax rotation). After the initial analysis 26 items that produced meaningful factors were retained (Ogunjinmi *et al*., 2012; Tomažič, 2011). The 26 Likert-scale items were used to study respondents' opinion to three factors, viz:

Attitude toward mona monkeys' conservation (8 items).

Orientation about hunting and poaching on mona monkeys (7 items).

Views about government's roles in mona monkeys' conservation (11 items).

The sample population constituted those around mona monkey habitats. Sample size was 5% of the sample population. The number of administered questionnaires were 480 and 390 were retrieved. The response rate was 81.25%.

3.2.5.2 Secondary Data

The secondary data used was obtained from ONP. It consisted of Record of offences, arrests and prosecution from 1999 to 2011.Appendix 6 shows the format used by the Park personnel in keeping these records. These recorded acts of trespassing were regarded as a manifestation of people's attitude to wildlife conservation (which mona monkeys are part of).

3.3. DATA ANALYSES

3.3.1. Descriptive Statistics

This was used to analyse the data on categorization, taxonomic grouping, mona monkeys' food types and seasonal availability, chemical composition, food preference, the biodata of respondents and the secondary data from ONP. Tables, bar charts, graphs, and bubble plots were used for all descriptive statistics.

3.3.2. Similarity Analysis

The available mona monkeys'food plants for the three locations were compared using Sorenson's quotient of similarities. Sorensen's quotient of similarity measures only the number of species shared between two locations (Southwood, 1966; Ulyshen and Hanula, 2007; Olomukoro and Eloghosa, 2009). The formula used was $Q.S = 2c/(a \times b)$ where Q.S. stands for quotient of similarity, a and b are the number of species in sites A and B respectively, and c is the number of species in common. McNemar (X^2) test was used to analyse for significant difference in dissimilarity of the food types in the study locations.

3.3.3. Inferential Statistics

To determine if nutrient contents of mona monkey foods differed with season or location, the data was subjected to analysis of variance using Statistical Package for Social Science (SPSS) version 16.

The 26 Likert-scale questions were divided into three groups. In each group (also known as a multiple-item subscale), the scale of the variables was tested for reliability using Cronbach's Alpha Reliability Coefficient (CARC). It was an adoption of the methodology used by Ogunjinmi *et al*., (2012). The essence was to eliminate item statements that were not consistent with the rest, and to maximize the CARC values. The Cronbach's alpha for the total scale of 26 items was 0.79. The CARC for UNILAG, LCC and ONP for the 26 items were 0.63, 0.73 and 0.81 respectively. Principal component analysis (PCA) was used to re-dimension the items in each section of the questionnaire. The purpose of PCA was to compress multiple variables extracted from the responses into a single variable. The effects of personal factors/biodata (sex, age and educational level) were tested on the components obtained from PCA. T-test was used for the sex factor, while analysis of variance (ANOVA) was used as a statistical method in testing the effect of age and educational level of respondents.

3.3.4. Correlation Analysis

In determining the relationship between the nutrients, Pearson's correlation analysis was used. Where a relationship was observed, the regression line was used to express it.

CHAPTER FOUR

4.0. RESULTS

4.1. Climatic Data

The annual mean rainfall, humidity, the minimum and maximum temperatures for 2011 and 2012 in the three study locations is shown on Appendix 7. The highest and lowest annual mean rainfalls of 34.83 mm and 12.98 mm were recorded in LCC in 2012 and 2011 respectively. The respective highest and lowest annual mean humidity of 83.38% and 79.06% were recorded in ONP, 2012 and LCC in 2011. The highest and lowest mean annual minimum temperatures of 25.85 ^{o}C and 22.95 ^{o}C were recorded in UNILAG in 2011 and ONP in 2012 respectively. The highest and lowest annual mean maximum temperatures were 31.79 ^{o}C and 30.39 ^{o}C recorded respectively in ONP and UNILAG in 2011.

The climatic data for rainfall, humidity and temperature for the three locations in 2011 and 2012 are shown on Appendices 8-12. Appendix 8 shows the weather graph of UNILAG in 2011. The highest rainfall, humidity, minimum and maximum temperatures in 2011 (Appendix 8) were 31.39mm, 84.2%, 28^{o}C and 31.39 ^{o}C which were recorded in the months of July, July, March and March respectively. The lowest rainfall, humidity, minimum and maximum temperatures in 2011 were 0mm, 69.9%, 24.5^{o}C, and 24.7^{o}C recorded in Januar and /December, January, July, and July respectively. There was no weather data for UNILAG in 2012.

Appendix 9 shows the 2011 weather graph for LCC. The highest rainfall, humidity, minimum and maximum temperatures in 2011 were 27.2mm, 85.5%, 27.5^{o}C, and 32.9^{o}C recorded in July, July, March, and March respectively.The respective lowest rainfall, humidity, minimum and maximum temperatures in 2011 were 0mm, 66%, 24.0^{o}C and 28.0^{o}C recorded in January, January, August and July. Appendix 10 shows the 2012 weather graph for LCC. The highest rainfall, humidity, minimum and maximum temperatures were 24.9 mm (recorded in June), 85.8 % (June and August), 27.0^{o}C (March) and 32.5 ^{o}C (March) respectively. The respective lowest rainfall, humidity, minimum and maximum temperatures recorded in 2012 were 1.1 mm (in January), 77.1 % (in March), 23.9 ^{o}C (August), and 27.3 ^{o}C (in August).

Appendix 11 shows the 2011 weather graph for ONP. The highest rainfall, humidity, minimum and maximum temperatures for ONP were 29.6mm, 92.8%, 23.9^{o}C, and 33.9^{o}C that were recorded in August, July, February and November, and February and December respectively. The lowest rainfall, humidity, minimum and maximum temperatures recorded for the same period were 0mm, 65.9 %, 21.9^{o}C and 28.4^{o}C recorded in January and December, January, January and August respectively. Appendix 12 shows the weather graph of ONP in 2012. The respective highest rainfall, humidity, minimum and maximum temperatures recorded in 2012 were 22.6 mm (in May), 92.1 % (in July), 24.9 ^{o}C (March), and 34.1 ^{o}C (March). The lowest rainfall, humidity, minimum and maximum temperatures recorded in 2012 were 6.0 mm (February), 69.9 % (January), 20.4 ^{o}C (September), and 28 ^{o}C (August) respectively.

4.2. IDENTIFICATION AND CATEGORIZATION OF MONA MONKEYS' FOODS IN URBAN, SEMI-URBAN AND WILD HABITATS

4.2.1. Categorization of Mona Monkeys' Foods

There were four categories of mona monkeys' foods in UNILAG: natural (wild), raided, assorted ('provisioned'), and scavenged foods. Foods in LCC had three categories: natural, provisioned and raided. The foods in ONP had three categories too, viz: wild, raided foods and foods useful to mona monkey and man. As a wild habitat, no incidence of provisioning and scavenging were observed in ONP. Natural foods were highest in wild habitat followed by the semi-urban. Raiding was common to all the habitats. Provisioning was recorded in both urban and semi-urban habitats, while scavenging occurred only in the urban habitat (Figure 5).

4.2.1.1. Categorization of Mona Monkey Foods in University of Lagos.

The categorization of the mona monkeys' foods in UNILAG is shown on Table 1. The various forms of *Dioscorea spp.* (raw, boiled, or pounded) were 'provisioned' by people patronising a local food canteen. *Manihot esculenta*, *Colocasia esculenta* and *Zea mays* were raided farm products. *Ananas comosus*, *Brassicaoleracea*, *Citrulus lunatus*, *Daucus carota*and *Oryza sativa* (in the form of Jollof rice) were scavenged at dump sites. Composite foods made up of biscuit, bread and sausage roll were provisioned, raided from shops, or scavenged at dump sites. The wild, raided, assorted (provisioned) and scavenged foods constituted 33.33%, 28%, 21%, and 18% respectively of the 39 foods recorded (Appendix 13).*Amala* (a solid food made from yam flour), *eba*, and *fufu* (made from fried cassava grits, and paste respectively) are local foods. The bar charts that show the categories of mona monkeys' foods in UNILAG in comparison to LCC and ONP is on Figure 5.

Table 1: Categories of Mona Monkey Foods in University of Lagos

Wild	**Raided**	**Assorted (Provisioned)**	**Scavenged**
Albizia lebbeck	*Carica papaya*	*Amala*	*Artocarpus altilis*
Alchornea cordifolia	*Colocasia esculenta*	Biscuit	*Brassica oleracea*
Anthocleista spp.	*Abelmoschus esculentus*	*Dioscorea spp*.	Bread
Avicennia genminans	*Mangifera indica*	*Eba*	*Citrullus lunatus*
Blighia sapida	*Musa paradisiaca*	*Fufu*	*Daucus carota*
Elaeis guineensis	*Musa sapientum*	*Manihot esculenta*	*Musa paradisiaca*
Ficus spp.	*Phaseolus vulgaris*	*Malus domestica*	*Zea mays* (boiled)
Mussaenda polita	*Psidium guajava*		
Paullinia pinnata	Sausage		
Pithecellobium dulce	*Zea mays*		
Raphia hookeri			
Senna siamea			
Terminalia catappa			

4.2.1.2. Categorization of Mona Monkeys' Foods in Lekki Conservation Centre

The categorization of 21 mona monkeys' foods in LCC is shown on Table 2. The foods in this location were 77% natural, 14% were 'provisioned', while 9% were raided foods (Appendix 14). As a Strict Nature Reserve, plants such as *Anacardium occidentale*, *Elaeis guineensis*, and *Mangifera indica* that are useful to man were utilized exclusively by the monkeys. Visitors offered biscuit and Gala sausage roll to the monkeys. The monkeys raided near by communities for bread, and Chevron quarters for *Mangifera indica* and other fruits and foods.The bar charts of the categories of mona monkeys' foods in LCC in comparison with the other locations is shown on Figure 5.

4.2.1.3. Categorization of Mona Monkey Foods in Okomu National Park

The categorization of mona monkeys' foods in ONP is shown on Table 3. Natural foods (those consumed by mona monkeys alone) constituted 58%. The plants used as foods by both man and mona monkeys, was 29%, while raided farm products was 13% (Appendix 15). Figure 5 shows the bar charts of the categories of the mona monkeys' foods in ONP in comparison with the other locations.

4.2.2. Taxonomic Grouping of Mona Monkeys' Foods

A total of 64 plants in 38 families were identified as mona monkeys' foods. The Families Euphorbiaceae and Moraceae had four species each of plants consumed by the mona monkeys, while Anacardiaceae and Annonaceae Families had three species each. Other Families had either one or two species.

Table 2: Categories of Mona Monkeys' Foods in Lekki Conservation Centre

Natural (wild) foods		'Provisioned' foods	Raided foods
Alchornea cordifolia	*Mangifera indica*	Biscuit	Bread
Anacardium occidentale	*Murraya paniculata*	Bread	*Mangifera indica*
Anthocleista vogelii	*Mussaenda polita*	Gala sausage roll	
Chrysobalanus elipticus	*Polyathia longifolia*		
Chrysobalanus icaco	*Raphia hookeri*		
Cocos nucifera	*Terminalia catappa*		
Elaeis guineensis	*Vitex doniana*		
Ficus ingens	*Xylopia aethiopica*		
Hura crepitans			

Table 3: Categories of Mona Monkeys' Foods in Okomu National Park

Wild Foods		Used by man and monkeys	Raided Foods
Alchornea cordifolia	*Jateorhiza macrantha*	*Carica papaya*	*Carica papaya*
Annona glabra	*Macaranga barteri*	*Chysophyllum africanum*	*Elaeis guineensis*
Barteria nigritiana	*Musanga cecropioides*	*Dacryodes edulis*	*Musa paradisiaca*
Brachystegia spp.	*Pycnanthus angolensis*	*Elaeis guineensis*	*Theobroma cacao*
Cola cordifolia	*Spondias mombin*	*Irvingia gabonensis*	
Duranta repens	*Staudtia stipitata*	*Mangifera indica*	
Ficus exaspirata	*Sterculia oblongata*	*Musa paradisiaca*	
Ficus mucuso	*Strombosia pustulata*	*Psidium guajava*	
Gmelina arborea	*Xylopia aethiopica*	*Tetracarpidium conophorum*	

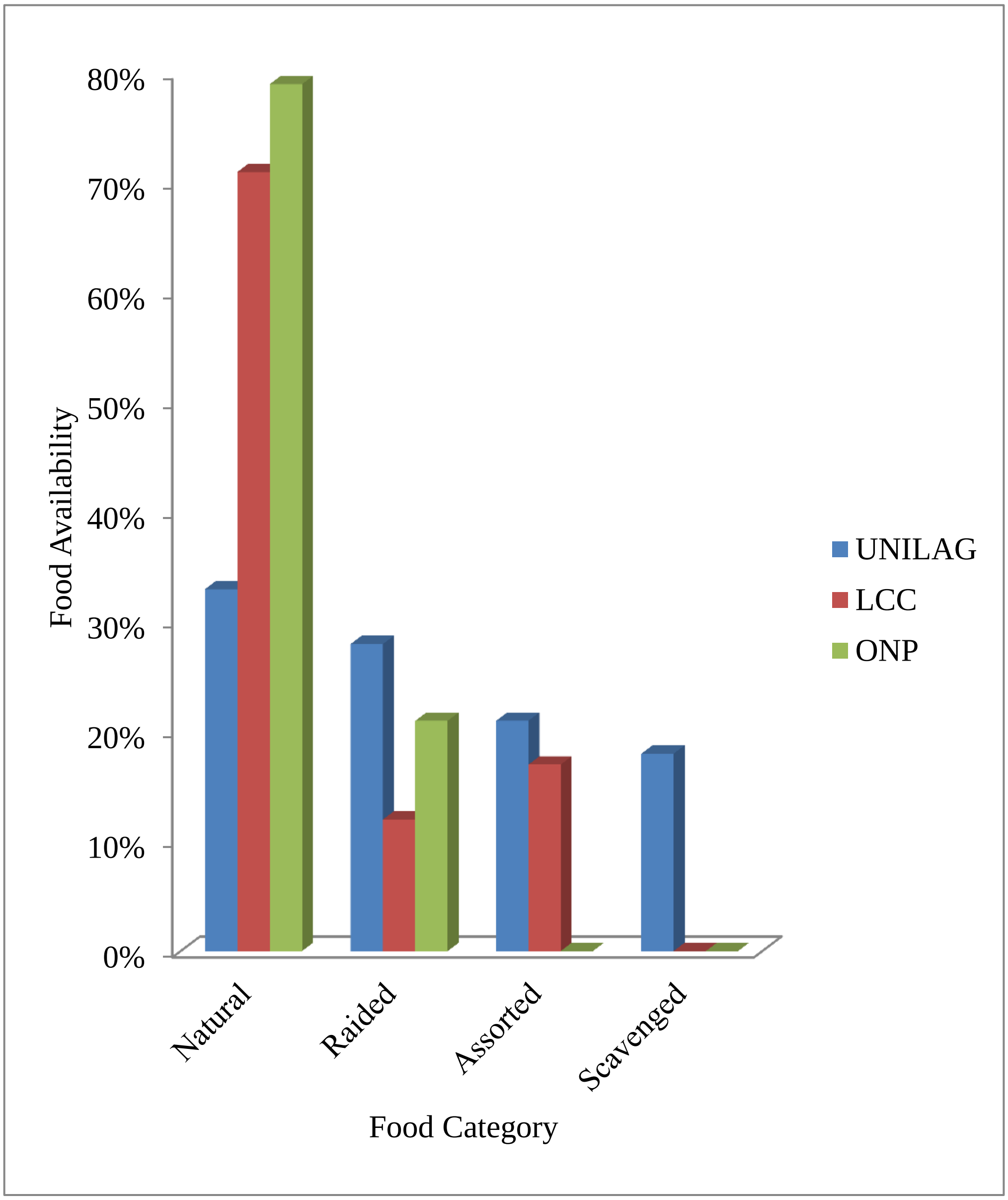

Figure 5: Mona monkey food categories in University of Lagos, Lekki Conservation Centre and Okomu National Park

4.2.2.1. Taxonomy of Mona Monkeys' Foods in University of Lagos

The taxonomy of mona monkeys' foods identified in the UNILAG are shown on Tables 4 and 5. The locations where the mona monkeys sourced for these foods are shown on Figure 6. Six Families: Arecaceae, Euphorbiaceae, Fabaceae, Moraceae, Musaceae, and Sapindaceae had more than one species. The others had only a species. The parts of the plants that constituted the mona monkeys' diets is shown on Figure 7.

4.2.2.2. Taxonomyof Mona Monkeys' Food Plants in Lekki Conservation Centre

There were 17 species from 11 Families of plants mona monkeys in LCC accessed as food. The taxonomic list of mona monkeys' food plants around the office complex of the Reserve is shown on Table 6. Those found in the mangrove areas are shown on Table 7, while foods found in the coastal savanna (grassland) portion of the Reserve are shown on Table 8. Composite foods such as biscuit, bread and sausage roll (Gala) were offered to the animal by visitors or raided by the animal from the staff canteen and nearby Olugboragan community. The percent composition of the mona monkeys' diet in LCC is shown on Figure 12.

4.2.2.3. Taxonomy of Mona Monkeys' Foods in Okomu National Park

The taxonomy of the wild foods of mona monkeys in ONP is shown on Table 9 while the cultivated and/or introduced ones are on Table 10. *Carica papaya, Dacryodes edulis, Elaeis guineensis, Gmelina arborea, Irvingia gabonensis, Mangifera indica, Psidium guajava,* and *Spondias mombin* were found near the hotel and rangers' quarters. *Ananas comosus, Elaeis guineensis, Musa paradisiaca* and *Theobroma cacao* were raided from farms that shared boundary with the Park. Two foods, *Gmelina arborea*and *Jateorhiza macrantha* were unknown as mona monkeys' food. Figure 12 shows the percent composition of the mona monkeys' foods in ONP.

Table 4: Taxonomy of Mona Monkeys' Foods in Guest Houses to Service Area of University of Lagos

Scientific Name	Family	Common Name	Parts Consumed
Ananas comosus	Bromeliaceae	Pineapple	Fruit
Artocarpus altilis	Moraceae	Bread fruit	Fruit
Avicennia germinans	Aviceniaceae	Black mangrove	Seed
Albizia lebbeck	Fabaceae	Lebbeck	Seed (immature) and gum
Brassica oleracea	Brassicaceae	Cabbage	Leaves
Carica papaya	Caricaceae	pawpaw	Fruit and seeds
Citrulus lunatus	Cucurbitaceae	Water melon	Fruit
Citrus sinensis	Rosaceae	Orange	Fruit
Daucus carota	Umbellifereae	Carrot	Tuber
Dioscorea spp.	Dioscoreaceae	Yam	Tuber
Elaeis guineensis	Arecaceae	Oil palm	Fruit
Ipomea cairica	Convvolvulaceae	Ògbèmígìlá (Ògòrì)	Flower
Malus domestica	Rutaceae	Apple	Fruit
Mangifera indica	Anacardiaceae	Mango	Fruit
Musa paradisiaca	Musaceae	Plantain	Fruit
Paullinia pinnata	Sapindaceae	Sweet gum	Seeds
Pithecellobium dulce	Fabaceae	Manila tamarind	Seeds
Senna siamea	Caesalpinoideae	Cassia	New leaves/flower
Terminalia catappa	Combretaceae	Indian almond	Fruit
Zea mays	Poaceae	Maize	Seed/tender cob
Composite food	-	Biscuit	Biscuit
Composite food	-	Bread	Bread
Composite food	-	Sausage roll	Sausage roll

Table 5: Taxonomy of Mona Monkeys' Food in New Hall to St. Augustine College of Education

Species	**Family**	**Common Name**	**Parts Consumed**
Alchornea cordifolia	Euphorbiaceae	Christmas bush	Tender leaves
Anthocleista spp.	Gentianaceae	Cabbage tree	Fruit, flower
Blighia sapida	Sapindaceae	Ackee or Akee (Ishin)	Fruit
Carica papaya	Caricaceae	Pawpaw	Fruit or seeds
Colocasia esculenta	Araceae	Cocoyam corm	Corm or New leaves
Ficus congensis	Moraceae	Fig	Fruit
Abelmoschus esculentus	Malvaceae	Okro	Fruit
Mangifera indica	Anacardiaceae	Mango	Fruit
Manihot esculenta	Euphorbiaceae	Cassava	Tuber (raw)
Musa paradisiaca	Musaceae	Plantain	Fruit
Musa sapientum	Musaceae	Banana	Fruit
Mussaenda polita	Rubiaceae	-	Fruit
Raphia hookeri	Arecaceae	Raphia palm	Fruit
Terminalia catappa	Combretaceae	Indian almond	Fruit
Composite food	-	Biscuit	Biscuit
Composite food	-	Bread	Bread
Composite food	-	Gala sausage roll	Gala sausage roll

Table 6: Taxonomy of Mona Monkeys' Food in Upland Areas in Lekki Conservation Centre

Species	**Family**	**Common Name**	**Parts Consumed**
Alchornea cordifolia	Euphorbiaceae	Christmas bush	Fruit
Anacardium occidentale	Anacardiaceae	Cashew	Fruit, gum exudates
Cocos nucifera	Euphorbiaceae	Coconut	Nut
Hura crepitans	Euphorbiaceae	Sand box	Seed
Mangifera indica	Anacardiaceae	Mango	Fruit, tender seed
Murraya paniculata	Rutaceae	Orange Jasmine	Fruit
Mussaenda polita	Rubiaceae	-	Seed
Polyathia longifolia	Annonaceae	Masquerade tree	Fruit
Terminalia catappa	Combretaceae	Indian almond	Fruit
Vitex doniana	Verbanaceae	Black plum	Fruit
Xylopia aethiopia	Annonaceae	Negro pepper	Seed

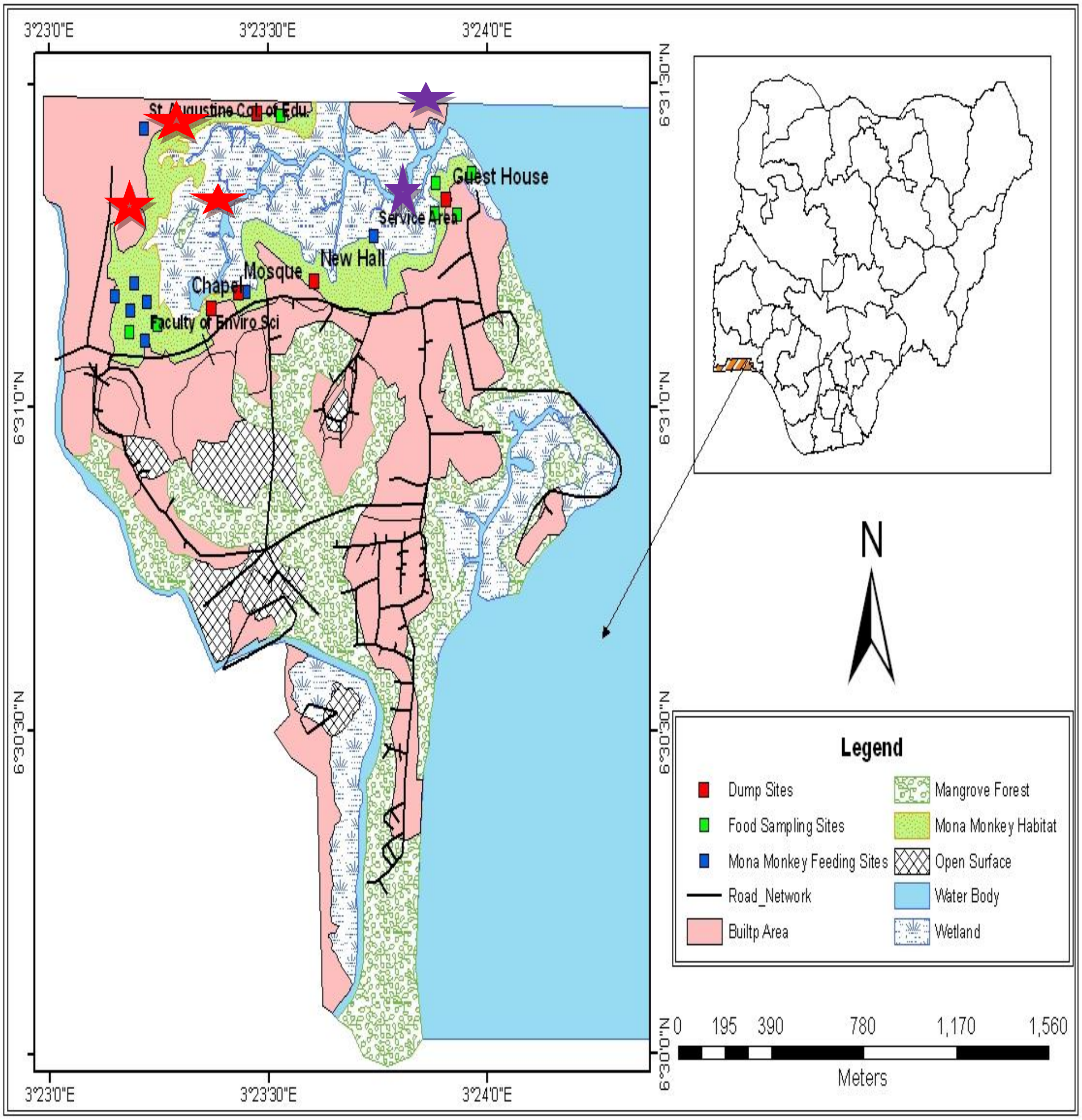

Figure 6: Mona monkeys' food sites in University of Lagos in coloured stars: Guest Houses to Service Area in purple and New Hall to St Augustine College of Education in red

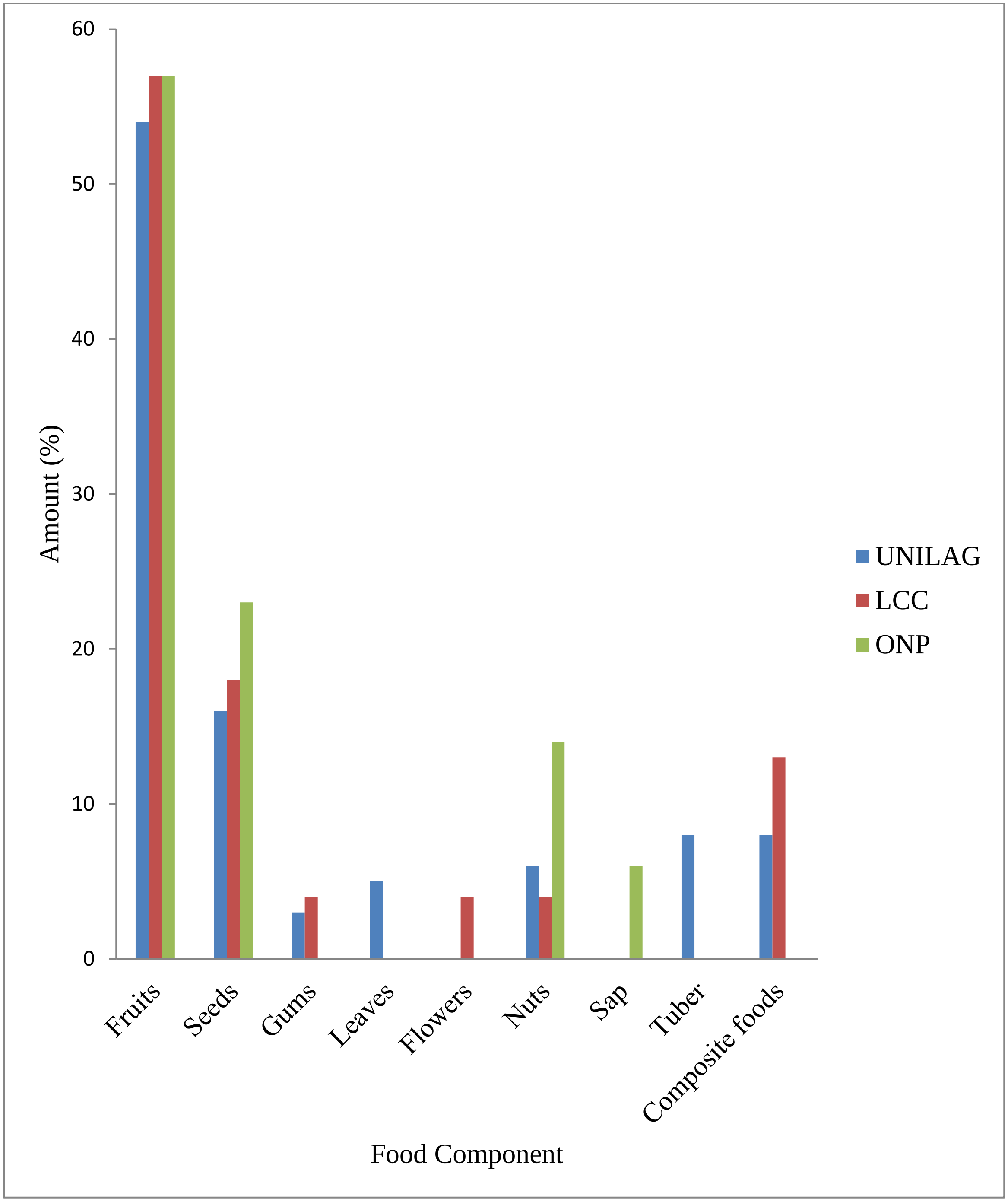

Figure 7: Percent composition of mona monkeys' foods in University of Lagos, Lekki Conservation Centre, and Okomu National Park

Table 7: Taxonomy of Mona Monkeys' Food in Mangrove Area of Lekki Conservation Centre

Species	Family	Common Name	Parts Consumed
Alchornea cordifolia	Euphorbiaceae	Christmas bush	Tender leaves
Anthocleista vogelii	Gentianaceae	Cabbage tree	Fruit, flower
Chrysobalanus ellipticus	Chrysobalanaceae	Pigeon plum	Fruit
Elaeis guineensis	Arecaceae	Oil palm	Fruit, nut
Ficus ingens	Moraceae	Fig	Fruit
Mussaenda polita	Rubiaceae	-	Fruit
Raphia hookeri	Arecaceae	Raphia palm	Fruit
Xylopia aethiopia	Annonaceae	Negro pepper	Fruit

Table 8: Taxonomy of Mona Monkeys' Food in the Coastal Savannah of Lekki Conservation Centre

Species	**Family**	**Common Name**	**Parts Consumed**
Anacardium occidentale	Anacardiaceae	Cashew	Fruit, gum exudates
Chrysobalanus icaco	Chrysobalanaceae	Cocoplum	Fruit
Cocos nucifera	Euphorbiaceae	Coconut	Nut
Mangifera indica	Anacardiaceae	Mango	Fruitand tender seed
Vitex doniana	Verbanaceae	Black plum	Fruit

Table 9: Taxonomy of Wild Mona Monkeys' Food in Okomu National Park

Species	**Family**	**Common Name**	**Parts Consumed**
Alchornea cordifolia	Euphorbiaceae	Christmas bush	Fruit
Annona glabra	Annonaceae	Monkey apple	Fruit
Bateria nigritiana	Passifloraceae	Ekú (Yoruba)	Fruit
Brachystegia spp.	Fabaceae	Bean-pod tree	Seeds
Chysophyllum africanum	Sapotaceae	African star apple	Sap and pulp
Duranta repens	Vervenaceae	Yellow bush	Fruit
Ficus exaspirata	Moraceae	Fig	Fruit
Ficus mucuso	Moraceae	Fig	Fruit
Irvinga gabonensis	Irvingiaceae	Bush mango	Fruit and Seeds
*Jateorhiza macrantha**	Menispermaceae	'Atatobeme' (Bini)	Seeds
Macaranga barteri	Euphorbiaceae	'Ohaha' (Bini)	Seeds
Musanga cecropioides	Cecropiaceae	Umbrella tree	Fruit
Myrianthus arboreus	Cecropiaceae	Corkwood	Sap from fruit
Pycnanthus angolensis	Myristicaceae	White cedar	Nuts
Raphia hookeri	Arecaceae	Raphia palm	Fruit
Spondias mombin	Anacardiaceae	Hog plum	Fruit
Staudtia stipitata	Myristicaceae	Umaza (Bini)	Nuts
Sterculia oblongata	Sterculiaceae	'Okoko' (Yoruba)	Nuts
Strombosia pustulata	Strombosiaceae	'Itako' (Yoruba)	Fruit
Tetracarpidium conophorum	Juglandaceae	Walnut	Fruit and nuts
Xylopia aethiopica	Annonaceae	Negro pepper	Seeds

* Novel Mona monkeys' food

Table 10: Introduced and/or CultivatedMona Monkeys' Food in Okomu National Park

Scientific Name	Family	Common Name	Parts Consumed
Ananas comosus	Bromeliaceae	Pineapple	Fruit
Carica papaya	Caricaceae	Pawpaw	Fruit and seeds
Dacryodes edulis	Burseraceae	Local pear	Fruit
Elaeis guineensis	Arecaceae	Oil palm	Fruit and nuts
Gmelina arborea *	Verbenaceae	Gmelina	Fruit
Mangifera indica	Anacardiaceae	Mango	Fruit/and tender seed
Musa spp.	Musaceae	Banana and Plantain	Fruit
Psidium guajava	Myrtaceae	Guava	Fruit
Theobroma cacao	Malvaceae	Cocoa	Sap and seeds

* Novel mona monkeys' food

4.2.3. Brief Description of Mona Monkeys' Food in University of Lagos

Albizia lebbeck (Lebbeck) (Family: Fabaceae)

Albizialebbeck is a tree that served not just as food for the monkeys but a major corridor to where they sleep at night. It has yellowish flowers and greenish pods that containseeds. Monkeys consume the tender pods and seeds, and exudates from the tree bark.

Alchornea cordifolia (Chritmas bush) (Family: Euphorbiaceae)

Alchornea cordifolia is an evergreen dioecious shrub. It was commonly found in marshy areas but sometimes in drier sites. It often forms thickets in disturbed, unburned localities. The leaves which are eaten by monkeys (when tender) are alternate and simple. The fruit is a 2-lobed green capsule that is smooth and turns bright red when mature.

Anthocleista spp. (Cabbage tree) (Family: Gentianaceae)

Two species found in UNILAG are *Anthocleista djalonenesis* and *A. vogelii.* They are small to medium-sized trees up to 18 m tall with branchless boles. The leaves are opposite, crowded at the end of branchlets and simple while the flowers are bisexual, regular; and the fruit an ellipsoid berry, thick-walled, green, and many-seeded.

Artocarpus altilis (Bread fruit) (Family:Moraceae)

Plate 1a shows the fruit of *Artocarpus altilis*. It is a tall evergreen tree with broad leaves. The fruits, borne at the end of long flexible branches are egg shaped, green-yellow, densely covered with stiff hairy processes. The inside of the fruit is white and juicy. When ripe, the fruits are heavy and fragile, and fall on their own when not harvested. In UNILAG, mona monkeys obtained the fruit from a dumpsite near the Guest Houses where a single tree is found.

Avicennia germinans (Black mangrove) (Family: Avicenniaceae)

Avicennia germinans is a species of an evergreen shrub or small tree 3–12m high. The seeds which the mona monkey consumes are encased in a fruit, and which reveals the germinated seedling when it falls into the water. Unlike other mangrove species, it does not grow on prop roots, but possesses pneumatophores that allow its roots to breathe even when submerged.

Blighia sapida (Ackee) (Family: Sapindaceae)

Plate 1b shows the fruits of *Blighia sapida* known in Yoruba as *Ishin*. The plant is an evergreen tree that grows about 10 m tall, with a short trunk and a dense crown. The fruit which is capsule shaped and leather-like pod contains a seed in each of its 3 sections. It turns red when mature and splits open to reveal the shiny black seeds with a large yellow or whitish aril. Monkeys consume the ripe aril part of the fruit.

Elaeis guineensis (Oil palm) (Family: Arecaceae)

Plate 1c shows *Elaeis guineesis*, a species of palm commonly called African oil palm. It is the principal source of palm oil. The fruit when mature is red in colour with a hard kernel inside. Monkeys consume the reddish pulp and sometimes could crack the kernel and eat the nuts.

Ficus spp. (Fig) (Family: Moraceae)

Plate 1d shows *Ficus*, a pan-tropical genus of trees, shrubs and vines occupying a wide variety of ecological niches; most are evergreen, but some are deciduous species. They tend to be available all the year round, thereby supplying monkeys with ready food. The fruit is green but may change to reddish colour when mature.

Mangifera indica (Mango) (Family: Anacardiaceae)

Mangifera indica is an erect tree, with a broad rounded canopy. The fruits vary in shape (from round to oval, egg-shaped, or kidney-shaped) and skin colour when ripe (green or yellow). Monkeys seldom allow the fruit to mature or ripe before they access it.

Musa paradisiaca (Banana) (Family: Musaceae)

Musa paradisiaca is a large herb with succulent, very juicy stem (that have been raided upon by larger sized primates), a cylinder of leaf-petiole sheaths, arising from a corm. The flowers produce long but curved green fruits, borne on a bunch which turns yellow when ripe. Monkeys raid the fruit even before they become matured.

Mussaenda polita (Family: Rubiaceae)

Plate 1e shows the unripe fruits of *Mussaenda polita*. The plant is an evergreen flowering shrub found in marshy areas, but could be found in drier places. It produces whitish flowers. The fruits it produces are small greenish pods that have very tiny seeds inside. The pods turn yellow on maturity and are picked, opened and consumed by the monkeys.

Paullinia pinnata (Sweet gum) (Family: Sapindaceae)

*Paullinia pinnata*is a climbing shrub with compound leaves. The inflorescences stand axillary on long stalks, and bearing paired tendrils with white flowers. The fruit is in a reddish/violet capsule that opens when mature to expose the seeds that are whited coated, and which are edible by the monkeys.

Pithecellobium dulce (Manila tamarind) (Family: Fabaceae)

Plate 1f shows *Pithecellobium dulce* pods on its tree. The plant is a large, nearly evergreen tree with a broad crown. The fruits are pods that contain the seeds and a thick sweetish, but also acidic pulp that are eaten by the monkeys. The pods are green, becomes spiral as they mature and turn purple/red/pinkish when ripe.

Raphia hookeri (Raphia palm) (Family: Arecaceae)

Plate 1g shows the fruit of *Raphia hookeri*. The plant is a tall tree and isknown for the long compound, pinnate leaves, the longest in the plant kingdom. The tree produces round and long greenish fruits that are covered with scaly shells. The fruits turn yellow when they are ripe, and the scales are then easy to remove. Monkeys feed on the yellowish pulp which surrounds the seeds.

Senna siamea (Cassia) (Family: Caesalpinoideae)

Senna siamea is a medium-size tree a dense, round, evergreen crown and a short bole with smooth, grey bark. The flowers, which are consumed by mona monkeys are bright yellow and borne in numerous large pyramidal panicles at the ends of branches.

Terminalia catappa (Indian almond) (Family: Combretaceae)

Plate 1h shows the remnant of *Terminalia catappa* fruits that were eaten by mona monkeys. The plant is a tall deciduous tree with an upright bole and horizontal branches and buttress at the base. The leaves are large, broad, ovoid, glossy dark green, and leathery. The fruit is a drupe broad, green at first, then yellow and finally red when ripe, containing a single seed. The fruit is edible by monkeys, man and other animals.

a: *Artocarpus altilis* (x 4)

b: *Blighia sapida* (x 4)

c: *Elaeis guineensis* (x 3)

d: *Ficus sp.* (x 3)

e: *Mussaenda polita*(x 2)

f: *Pithecellobium dulce* pod (x 2)

g: *Raphia hookeri* fruit (x 2)

i: *Terminalia catappa* (x 3)

Plate 1 (a-i): Mona monkeys food plants in University of Lagos

4.2.4. Brief Description of the Mona Monkeys' Food in Lekki Conservation Centre

Anacardium occidentale (Cashew) (Family: Anacardiaceae)

Plate 2a shows *Anacardium occidentale*, a tropical evergreen tree that produces the cashew seed and the cashew apple.It could grow tall or short, spreads out its branches when it reaches early maturity. The tree produces green succulent fruit that turns yellow when mature, and has a hard nut attached to it.

Chrysobalanus ellipticus: (Pigeon plum) (Family: Chrysobalanaceae)

Chrysobalanus ellipticus is a genus of evergreen perennial shrubs to small trees. It is found in coastal areas as a wild plant, with a low-growing and sprawling habit. It can form dense stands and become invasive. The leaves are obovate long, thick, glossy, and deep green in colour. It has small white flowers, in axillary racemes This plant bears a small-sized edible red pulpy fruit with a black and thin skin, resembles a large plum in appearance.

Chrysobalanus icaco: (Coco plum) (Family: Chrysobalanaceae)

Plate 2b shows *Chrysobalanus icaco*. It is a shrub, or bushy tree. It has evergreen broad-oval to nearly round somewhat leathery leaves. Leaf colours range from green to light red. The bark is greyish or reddish brown, with white specks. The flowers are small, white, in clusters, and it bears fruit in singles. The fruit when ripe is dark-purple in colour, while the pulp is whitish.

Vitex doniana: (Black plum) (Family: Verbanaceae)

Vitex doniana is a tree that is found in forests, savanna woodlands and grasslands. It is tall and branches out less heavily. The leaves when tender are consumed by man. It produces greenish plum that turns dark blue/purple when ripe. The fruit is a drupe that has hard seed.

Xylopia aethiopica: (Ngro pepper) (Family:Annonaceae)

Plate 2c shows *Xylopia aethiopica* pods. It is an evergreen, aromatic tree that can grow up to 20m high in the rain forest. It is native to the lowland rainforest and moist fringe forests in the savanna zones of Africa. It has glossy leaves. It fruits are greenish pods that turns deep read when ripe. The pod contains spicy dark and hard seeds which the monkeys consume when ripe.

4.2.5. Brief Description of The Mona Monkey Foods in Okomu National Park

Barteria nigritiana: (*Ekú*) (Family: Passifloraceae)

Barteria nigritiana is an erect shrub, with white flowers at the base of its alternate broad leaves which produces green oval fruits edible by monkeys. It harbours a particular species of black ants that hinders the growth of other trees around. The plant is harvested from the wild for local medicinal use.

Brachystegia spp.: (Bean pod tree) (Family: Fabaceae)

Brachystegia is a tall tree with new leaves showing a great range of red colours when immature, later turning to various shades of green. It produces pods with seeds that monkeys eat.

a: *Anacardium occidentale* (x 2)

b: *Chrysobalanus icaco* (X3)

c: *X*ylopia *aethiopica* (X3)

d: *Cola cordifolia* pod (X 2)

e: *Ficus exaspirata* (X 2)

f: *Gmelina arborea* (X 3)

g: *Irvingia gabonenesis* (X3)

h: *Jateorhiza macrantha* plant &seeds (X3)

Plate 2: a-c Mona monkeys' foods in Lekki Conservation Centre; **d-h** Monamonkeys' foods in Okomu National Park

Chrysophyllum africanum: (African star apple) (Family: Sapotaceae)

Chrysophyllum africanum is a tropical tree, that grows and branches. The leaves are oval long, green above, densely golden pubescent below. The flowers are small, purplish white and have a sweet fragrant smell; several are clustered together, and are hermaphroditic (self fertillization). The fruit is edible; round, usually brown skinned (sometimes greenish-white), often green around the calyx, with a star pattern in the pulp; the flattened seeds are light brown and hard. Monkeys suck the sap from the fruit and could eat the gummy pulp.

Cola cordifolia: (Monkey cola) (Family: Malvaceae)

Plate 2d shows the pod (with seeds) of *Cola cordifolia*. It is an evergreen tall tree, with glossy ovoid leaves and star shaped fruit. The cola is in a thick pod that has to be opened for the several nuts to be accessed. The pod is green but turns reddish when mature.

Dacryodes edulis: (Local pear) (Family: Burseraceae)

Dacryodes edulis is an evergreen tree that has a relatively short trunk and a deep, dense crown. The bark is pale gray and rough with droplets of resin. The leaves are a compound with 5-8 pairs of leaflets. The upper surface of the leaves is glossy. The flowers are yellow, arranged in a large inflorescence. The fruit is an ellipsoidal drupe with a dark blue or violet skin. Monkeys feed on the fruits.

Duranta repens: (Yellow bush) (Family: Verbenaceae)

Duranta repens is a large, fast-growing, multistemmed shrub that has full clusters of fragrant, pale blue flowers that produce bunches of golden-orange berries, popular with birds. Flowers and fruit are often found on the plant simultaneously. Its yellow fruit often hangs on the plant.

Ficus exaspirata: (Fig) (Family: Moraceae)

Plate 2d shows the fruits of *Ficus exaspirata*, a deciduous flowering tree that produces watery latex when cut. It produces green spherical fruits that become yellow to purple when ripe. They are extremely important food resources for wildlife.

Gmelina arborea (Family: Verbenaceae)

Plate 2e shows *Gmelina arborea*fruits that were eaten and discarded by mona monkeys. It is a tall tree with straight bole that is cultivated for its wood. It is an introduced plant to the Park, for it was found in areas that were previously inhabited by people. It has yellowish flowers and green fruits that have a hard seed. The monkeys ate the fleshy part of the fruit.

Irvingia gabonensis: (Bush mango) (Family: Irvingiaceae)

Plate 2g shows the seeds of *Irvingia gabonensis*. It is refered to as *oro* in Yoruba.The plant is a small to a large flowering tree that has a straight bole with buttresses (for the large and older trees). The fruit is an ellipsoid to cylindrical drupe with juicy and sweet pulp that iseaten by the monkeys. The seed has a hard shell (like mango) that contains edible/useful nuts (*ogbono*- Igbo).

Jateorhiza macrantha: (*Atatobeme*) (Family: Menispermaceae)

Plate 13 shows the plant and seed of *Jateorhiza macrantha*. The plant occurs in dense and humid evergreen or semi-evergreen forest at low to medium altitudesin south-western Nigeria and Bioko (Equatorial Guinea), to eastern Democratic Republic of Congo and south to Angola. The fruit composed of up to 3 ovoid drupelets, yellowish to orange-red, covered with stiff long brown hairs. The pulp is slimy, creamy-white, stone kidney-shaped, hard, and one-seeded. It has medicinal values among the Edo people who apply leaf sap, mixed with other medicines to stop bleeding during pregnancy.

Musanga cecropioides (Family: Cecropiaceae)

Plate 3a shows the fruitsof *Musanga cecropioides*. The plant is a tall tree that is usually found at forest edges or gaps. The leaves which radiates out from the stalk resembles umbrella. Its flowers are in whorls. The fruits are borne on a peduncle.

Psidium guajava: (Guava) (Family: Myrtaceae)

Plate 3b shows the fruit of *Psidium guajava*,a shrub or small tree with spreading branches. It has smooth, thin, copper-colored bark that flakes off, showing the greenish layer beneath. The fruit is either rounded, egg-shaped or pear-shape and turns from green to yellowish colour as it matures. Some still remain green when mature.

Pycnanthus angolensis: (White cedar) (Family: Myristicaceae)

Plate 3c shows the nuts of *Pycnanthus angolensis*, a species of tree in the nutmeg family. It is an evergreen tree that has a straight trunk and flaking bark. It has leathery leaves. Its hairy flowers are arranged in dense, rusty panicles. The fruit is a rounded drupe borne in clusters. It is hairy brown when new, turning yellow-orange as it matures. The fruit which ripens over a long time contains a black seed with a red aril which resembles that of nutmeg.

Spondias mombin: (Hog plum) (Family: Anacardiaceae)

Plate 3d shows the fruits of *Spondias mombin*. The plant is a small deciduous tree with a moderate buttress and thick bark. Its flowers are sweet-scented, in large, lax terminal panicles of small white flowers. The fruits are long, ovoid and yellowish when ripe, and wrinkled when dry. The fruit's flesh surrounds a spiny kernel.

Staudtia stipitata: (*Umaza*) (Family: Myristicaceae)

Plate 3e shows *Staudtia stipitata* pods and nuts. When mature, the pods become yellow, while the nuts turn to orange colour. Monkeys eat only the nuts.

Sterculia oblongata: (*Okoko*) (Family: Sterculiaceae)

Plate 3f shows the pod and seeds of *Sterculia oblongata*. The three is an evergreen that has broad leaves. The tree produces pods with several seeds inside which turn black on ripening.

Tetracarpidium conophorum: (Walnut) (Family: Anarcardiceae)

Plate 3g shows *Tetracarpidium conophorum* a climbing shrub. The fruit is capsular in shape and contains sub-globular seeds. The sub-globular seeds have black shells that cover the whitish edible nuts. In ONP it grows on other trees which monkeys visit in order to feed on the nuts.

Theobroma cacao: (Cocoa) (Family: Malvaceae)

Plate 3h shows *Theobroma cacao,* a small evergreen tree. It has alternate, entire and unlobed leaves, It produces small clustered flowers directly on the trunk and older branches. The fruit/pod is ovoid, long and wide, ripening yellow to orange. The pod contains 20 to 60 seeds, usually called "beans" (used for the production of cocoa powder and chocolate), that is embedded in a white pulp. Monkeys raid cocoa farms and suck the whitish pulp or eat the tender seeds.

a: *Musanga cecropioides* (X4)

b: *Psidium guajava* **(X 4)**

c: *Pycnanthus angolensis* (X 3)

d:*Spondias mombin* (X 3)

e: *Staudtia stipitata* (X3)

f: *Sterculia oblongata* pods and seed (X2)

g: *Tetracarpidium conophorum* (X2)

h:*Theobroma cacao* beans (X 3)

Plate 3: a-h Mona monkeys' foods in Okomu National Park

4.2.6. Comparison of Mona monkeys' Foods in the Three Habitats

Mona monkeys consumed different parts of 64 plant species from the three study locations. The highest percentage (79) of natural (wild) foods was in ONP. This was followed by LCC (71), while UNILAG had the least (33). In UNILAG, raided, assorted and scavenged foods constituted 28%, 21% and 18% respectively.In LCC where there was no incidence of scavenging, raided and assorted foods constituted respectively 12% and 17% of the diet.In ONP, 21% of the foods were raided; there was no record of provisioningor scavenging. In the three locations, fruits and seeds constituted 56% and 19% of the diets respectively.Nuts, tubers and flowers were also constituent of the mona monkeys' diet (Figure 8).

4.2.7. Similarity of Available Mona Monkeys' Foods on the Three Locations

The available mona monkey foods in the three study locations were compared using Sorensen's Quotient of Similarity (Q.S.). The result is shown on Table 11a. The highest Q.S. was 0.327 for UNILAG and LCC. This was followed by 0.279 for the comparison between LCC and ONP. The least was 0.226 for comparison between UNILAG and ONP.The McNemar test statistics of dissimilarity confirmed that there was no significant difference between the number of foods in UNILAG and ONP (P= 0.885), but there were significant differences between UNILAG and LCC (P=0.010), and LCC and ONP (P=0.035) (Table 11b). The food plants unique to each and those common to the study location(s) are shown on Table 12. Five plants: *Alchornea cordifolia*, *Elaeis guineensis*, *Ficus spp*., *Mangifera indica* and *Raphia hookeri* were found in the three study locations. A checklist of the mona monkey foods is presented on Appendix 16.

4.2.8. Medicinal Values of the Mona Monkey Foods

From literatures, it was observed that the plant parts mona monkeys ingested as food has medicinal uses (Table 13). It is speculated that in addition to the nutrient acquisition and utilization for normalmetabolic activities that the mona monkeys derive from the ingestion of these diets, they may be using such food substances for curative and prophylactic purposes.

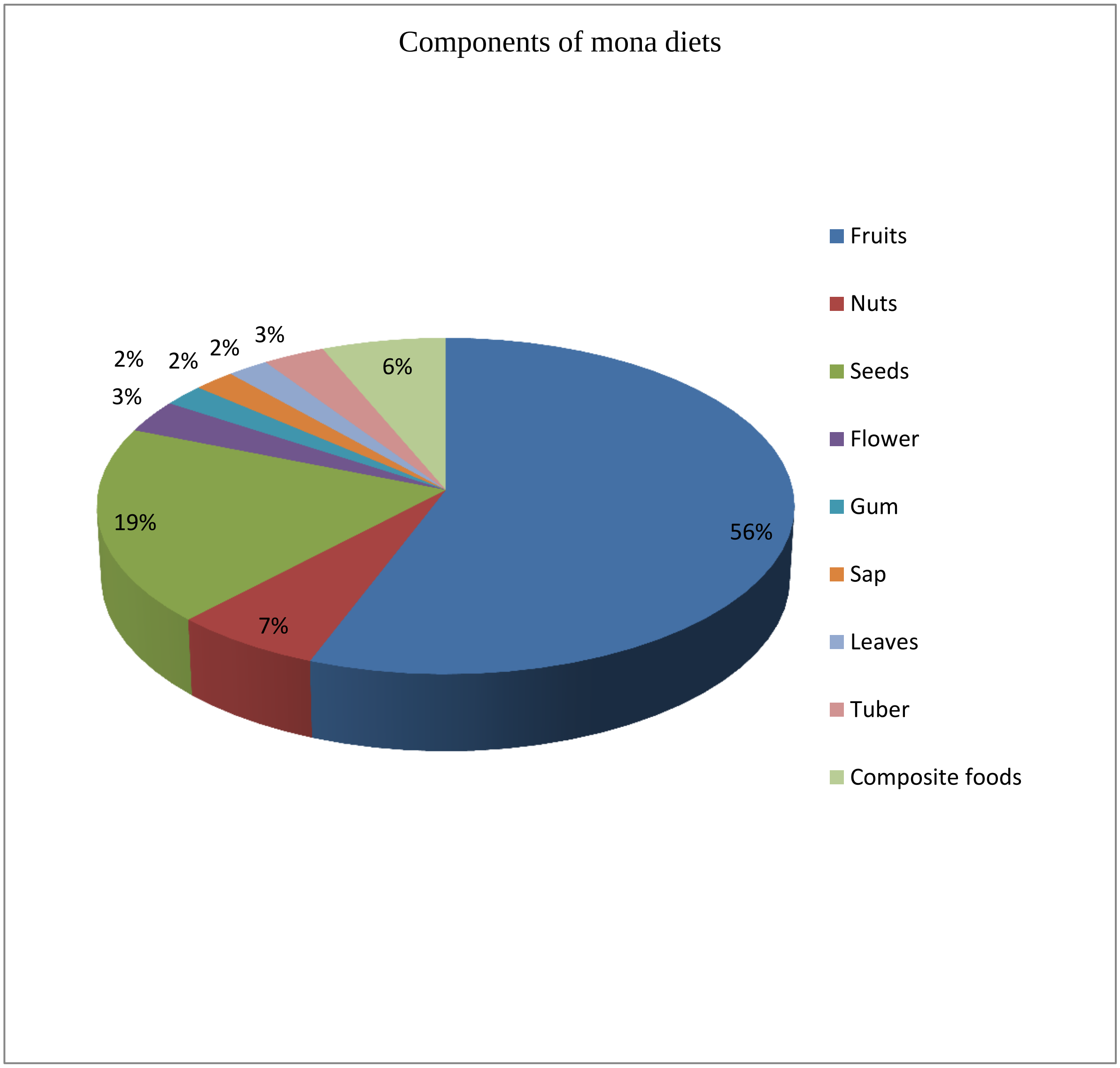

Figure 8: Components of the mona monkeys' diet in the three study sites

Table 11a: Sorensen's Quotient of Similarity of Mona monkeys' food from the three locations

Name of Mona monkey food	**UNILAG (A)**	**LCC (B)**	**ONP (C)**	**Q.S.[Q.S =2c/(a t b)]**
Alchornea cordifolia	✓	✓	✓	A and B = 0.327
Anthocleista spp.	✓	✓	x	
Carica papaya	✓	x	✓	A and C = 0.226
Elaeis guineensis	✓	✓	✓	
Ficus spp.	✓	✓	✓	B and C = 0.279
Mangifera indica	✓	✓	✓	
Musa spp.	✓	x	✓	
Mussaenda polita	✓	✓	x	
Raphia hookeri	✓	✓	✓	
Terminalia catappa	✓	✓	x	
Xylopia aethiopica	x	✓	✓	
Bread	✓	✓	x	
Gala sausage roll	✓	✓	x	
Number of foods	39	19	29	

✓ = Presnt; x = Absent

Table 11b: McNemar Test for dissimilarity in the number of foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

	UNILAG, LCC and ONP	UNILAG and LCC	UNILAG and ONP	LCC and ONP
N	64	64	64	64
Chi-Square[a]	7.600	6.618	.021	4.447
Asymp. Sig.	0.022	.010	.885	.035

UNILAG = University of Lagos; LCC = Lekki Conservation Centre; ONP= Okomu National Park

Table 12: Mona Monkeys' Foods Unique to University of Lagos, Lekki Conservation Centre, Okomu National Park, and those Common to all Locations

UNILAG	LCC	ONP	COMMON TO ALL
Abelmoschus esculentus	*Anacardium occidentale*	*Annona glabra*	*Alchornea cordifolia*
Albizia lebbeck	*Chrysobalanus ellipticus*	*Barteria nigritiana*	*Elaeis guineensis*
Artocarpus altilis	*Chrysobalanus icaco*	*Brachystegia spp.*	*Ficus spp.*
Avicennia germinas	*Cocos nucifera*	*Chysophyllum africanum*	*Mangifera indica*
Blighia sapida	*Ficus ingens*	*Dacryodes edulis*	*Raphai hookeri*
Brassica oleracea	*Hura crepitans*	*Duranta repens*	
Citrulus lunatus	*Murraya paniculata*	*Cola cordifolia*	
Colocasia esculenta	*Polyathia longifolia*	*Ficus exaspirata*	
Daucus carota	*Vitex doniana*	*Ficus mucuso*	
Dioscorea alata		*Gmelina arborea*	
Dioscorea rotundata		*Jaterhiza macrantha*	
Ficus congensis		*Macaranga barteri*	
Ipomoea cairica		*Musanga cecropioides*	
Malus domestica		*Myrianthus arboreus*	
Manihot esculenta		*Pcynanthus angolensis*	
Paullinia pinnata		*Psidium guajava*	
Phaseolus vulgaris		*Spondias mombin*	
Pithecellobium dulce		*Staudtia stipitata*	
Senna siamea		*Sterculia oblongata*	
Zea mays		*Strombosia pustulata*	
		Theobroma cacao	
		Tetracarpidium conophorum	

Table 13: Medicinal Values of some of the Mona Monkeys' Food

Species	Medicinal uses	Parts used	Reference
Alchornea cordifolia	Fever, rheumatism, antimicrobiasis, diuretic, purgative, toothache	Leaves, stem-bark, twig	Odugbemi, 2008
Phaseolus vulgaris	Antifungal, skin diseases	Seeds	Odugbemi, 2008
Psidium guajava	Fever, diarrhea, stomachache, dysentery, laxative, cough	Leaves, stem-bark, fruit	Odugbemi, 2008
Raphia hookeri	Measles, promotes lactation	Leaves	Odugbemi, 2008
Pycnanthus angolensis	Thrush, back tongue, fever, skin infection	Leaves, stem-bark, roots	Odugbemi, 2008
Tetracarpidum conophorum	Masticatory, anthelmintics, thrush, antidote to snake bite, dysentery	Bark	Odugbemi, 2008
Irvingia gabonensis	Spleen infection	Leaves	Odugbemi, 2008
Albiizia lebbeck	Astringent, mouthwash, river blindness, gonorrhoea	Seeds, leaves, stem-bark	Odugbemi, 2008
Anthocleista djalonensis	Skin diseases: rashes and eczema, diabetes, antipyretic, purgative,	Bark, leaves	Odugbemi, 2008

	abdominal pain		
Anthocleista vogelii	Antidote for snake bite	Seeds, bark	Odugbemi, 2008
Anthocleista vogelii	Antimalaria, anti-jaundice	Leaves	Alaribe *et al*., 2012
Dacrodes edulis	Antimicobial, antioxidant, anti sickle anaemia	Fruit	Ajibesin, 2011
Musanga cecropioides	Oxytocic, hypertensive, and antidiabetic activities	Stem back	Ayinde *et al*., 2006
Macaranga barteri	Anti-inflammatory	Leaves	Ngoumfo *et al*., 2008
Chrysobalanus icaco	Antidiabetes	Leaves	Barbosa *et al*., 2013
Jateorhiza macrantha	Anti-imflammatory	Leaves	Ajayi *et al*., 2013
“ “	Anti-hypertension, reduces oxidative stress, reduces alcohol induced kidney and liver damage	Leaves	Aboubakar *et al*., (2012)
Annona glabra	Anticancer	Leaves, pulp and seeds	Cochrane *et al*., (2008)
Gmelina arborea	Antioxidant, antihelminthic	Leaves	Sujatha (2012)
Vitex doniana	Antimicrobial (Escherichia coli, Salmonella typhii)	Stem bark, Leaves	Kilani (2006)

4.3. SEASONAL OCCURRENCE OF FOOD PLANTS ITEMS

4.3.1. Seasonal Occurrence of Mona Monkeys' Food Plants in University of Lagos

The food plants ofmona monkeys in UNILAG accessed during the dry and rainy seasons are shown on Table 14. There were fewer foods during the dry than rainy season with percent values of 37 and 48 respectively with a 15% of the foods occurring in both seasons (Figure 9). In both seasons, mona monkeysalso consumed such composite foods as jollof rice, biscuits, bread and sausage rolls which they scavenged from surrounding dump sites, eateries, and canteens or raided provision stores.

4.3.2. Seasonal Occurrence of Mona Monkeys' Food Plants in Lekki Conservation Centre

The dry and rainy season food plants of mona monkeys in LCC is shown on Table 15. Both seasons had the same number (ten) of foods but of different species. *Elaeis guineensis*, *Terminalia catappa*, *Alchornea cordifolia* were common during both seasons. The respective percentages of rainy, dry and non-seasonal foods are shown on Figure 9. The monkeys consumed assorted foods such as bread and Gala sausage roll in both seasons.

4.3.3. Seasonal Occurrence of Mona Monkeys' Food Plants in Okomu National Park

The dry and rainy seasons' food of mona monkeys in ONP are shown on Table 16. *Chysophyllum africanum*, *Pycnanthus angolensis* and *Staudtia stipitata* for instance occurred only in the dry season, while *Elaeis guineensis*, *Musa paradisiaca*, *Psidium guajava* and *Theobroma cacao* were available during the two seasons. Figure 9 shows the percent of foods availability in rainy, dry and both seasons as 59%, 15% and 26% repectively.

Table 14: Dry and Rainy Seasons' Food of Mona Monkeys in University of Lagos

Dry season foods	**Rainy season foods**	
Avicennia germinans	*Alchornea cordifolia*	*Ipomoea cairica*
Brassica oleracea	*Anthocleista djalonensis*	*Manihot esculenta*
Carica papaya	*Anthocleista vogelii*	*Musa paradisiaca*
Daucus carota	*Artocarpus altilis*	*Musa sapientum*
Dioscorea spp.	*Avicennia germinans*	*Mussaenda polita*
Elaeis guineensis	*Blighia sapida*	*Phaseolus vulgaris*
Mangifera indica	*Brassica oleracea*	*Pithecellobium dulce*
Musa paradisiaca	*Carica papaya*	*Raphia hookeeri*
Musa sapientum	*Citrullus lanatus*	*Senna siamea*
Paullinia pinnata	*Colocasia esculenta*	*Terminalia catappa*
Terminalia catappa	*Dioscorea spp.*	*Zea mays*

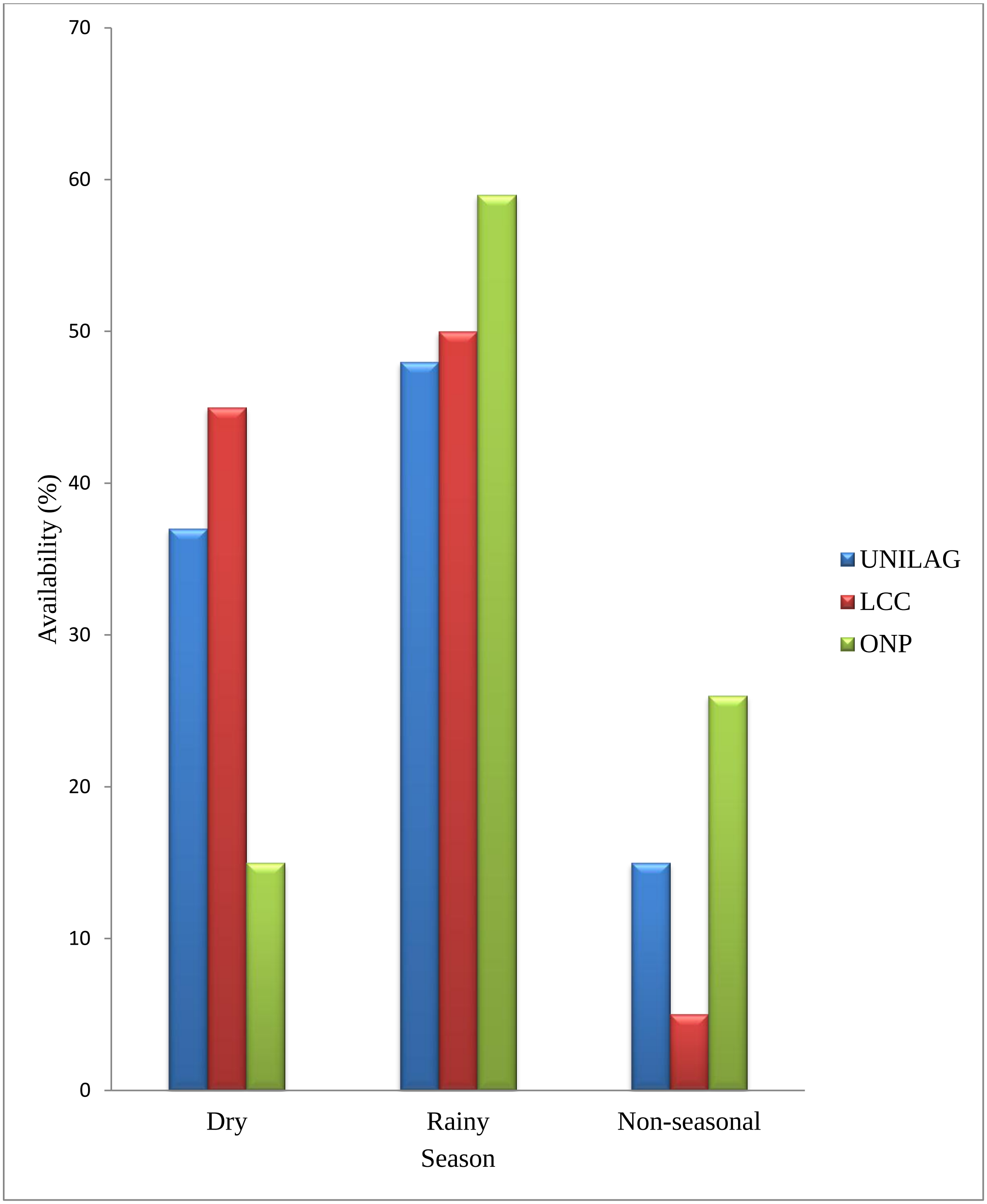

Figure 9: Dry, rainy and non-seasonal mona monkey foods in Univeristy of Lagos (UNILAG), Lekki Conservation Centre (LCC) and Okomu National Park (ONP)

Table 15: Dry and Rainy Seasons' Foods of Mona Monkeys in Lekki Conservation Centre

Dry season foods		Rainy season foods	
Alchornea cordifolia	*Elaeis guineensis*	*Alchornea cordifolia*	*Polyathia longifolia*
Anacardium occidentale	*Ficus ingens*	*Chrysobalanus ellipticus*	*Raphia hookeri*
Anthocleista vogelii	*Hura crepitans*	*Elaeis guineensis*	*Terminalia catappa*
Chrysobalanus icaco	*Mangifera indica*	*Murraya paniculata*	*Vitex doniana*
Cocos nucifera	*Terminalia catappa*	*Mussaenda polita*	*Xylopia aethiopica*

Table 16: Dry and Rainy Seasons' Food of Mona Monkeys in Okomu National Park

Dry season foods		**Rainy season food**	
Carica papaya	*Musa paradisiaca*	*Annona glabra*	*Jateorhiza macrantha*
Chysophyllum africanum	*Musa sapientum*	*Barteria nigritiana*	*Macaranga barteri*
Cola cordifolia	*Musanga cecropioides*	*Brachystegia spp.*	*Musa paradisiacal*
Elaeis guineensis	*Psidium guajava*	*Dacrodes edulis*	*Musanga cecropioides*
Ficus exaspirata	*Pycnanthus angolensis*	*Duranta repens*	*Psidium guajava*
Ficus mucuso	*Staudtia stipitata*	*Elaeis guineensis*	*Spondias mombin*
Mangifera indica	*Theobroma cacao*	*Ficus spp.*	*Strombosia pustulata*
		Gmelina arborea	*Tetracarpidium conophorum*
		Irvingia gabonensis	*Theobroma cacao*

4.4. NUTRIENTS' COMPOSITION OF MONA MONKEYS' FOODS

For all the mona monkeys' foods analysed, the highest percent crude protein (CP) value of 37.19 was from the seeds of *Albizia. lebbeck*. The highest percent ether extracts (EE) of 48.66 was from *Tetracarpidium conophorum* nuts, crude fibre (CF) of 52.00 was from the seeds of *Pycnanthus angolensis*, ash of 13.00 was from *Ficus mucuso* fruit, while that of nitrogen free extracts (NFE) was 81.55 from *Musaparadisiaca.*The highest percent neutral detergent fibre (NDF), acid detergent fibre (ADF), and acid detergent lignin (ADL) values of 76.20, 67.60 and 43.67 were from *Jateorhiza macrantha* and ripe *Terminalia catappa* respectively.

4.4.1. Nutrient Composition of Mona Monkeys' Foods in University of Lagos

4.4.1.1. Proximate Composition of Dry Season's Foods of Mona Monkeys in University of Lagos

The proximate values of the dry season's foods of mona monkeys in UNILAG is shown on Table17. The seeds of *Albizia lebbeck* had the highest CP value of 37.19%. It was followed by *Brassica oleracea* with a CP value of 29.53%. *Artocarpus artilis* had the highest EE value of 22.20% and the highest CF value of 21.4% while *Dioscorea spp*. had the highest NFE value of 75.96%.

4.4.1.2. Fibre Fraction Content of Dry Season's Mona Monkeys' Foods in University of Lagos

The percent fibre fraction values of the mona monkeys' dry season's foods in the University of Lagos is shown on Table 18.*Daucus carota* had the highest NDF, HC and CS values of 72.10%, 30.06% and 27.46% respectively. *Musa paradisiaca* had the highest ADF value of 45% while *Brassica oleracea* had the highest ADL content of 30.46%.

Table 17: ProximateComposition of Dry Season's Foods of Mona Monkeys in University of Lagos

Food sample	**DM**	**CP**	**EE**	**CF**	**Ash**	**NFE**
Albizia lebbeck	82.06	37.19	10.8	12.6	5.6	33.81
Artocarpus altilis	78.84	1.75	22.2	21.4	4.45	50.2
Avicennia germinans	88.63	15.75	13.8	10.2	4.3	55.95
Brassica oleracea	69.85	29.53	22	3.2	11.2	34.07
Carica papaya	83.05	3.5	11.2	9.8	9.6	65.9
Daucus carota	61.92	10.94	20.8	1.2	10.2	56.86
Dioscorea spp.(raw)	89.15	0.88	16.76	3.1	3.3	75.96
Mangifera indica	80.71	7	15.8	7.6	4.6	65
Musa paradisiaca	77.07	12.51	7.6	5.4	2.9	71.59
Musa sapientum	65.34	9.92	16.8	10	5.3	57.98
Terminalia catappa (ripe)	85.61	8.75	9.76	12.16	10.5	58.83
Terminalia catappa (unripe)	83.37	12.69	15.2	21.1	8.2	42.81

DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract

Table 18: Fibre Fraction Content of Dry Season's Mona Monkeys Foods in University of Lagos

Food sample	NDF	ADF	ADL	HC	CS
Albizia lebbeck	34.80	25.40	15.80	9.40	9.60
Artocarpus altilis	14.00	11.31	6.40	2.69	4.91
Avicennina germinans	41.80	28.20	16.81	13.60	11.39
Brassica oleracea	35.86	33.86	30.46	2.00	3.40
Carica papaya	56.40	39.60	18.72	16.80	20.88
Daucus carota	72.10	42.04	14.58	30.06	27.46
Dioscorea spp. (raw)	13.70	6.00	1.61	7.70	4.39
Mangifera indica	48.40	39.20	20.66	9.20	18.54
Musa paradisiaca	69.20	45.00	19.00	24.20	26.00
Musa sapientum	61.80	41.80	15.10	20.00	26.70
Terminalia catappa (ripe)	66.40	43.22	22.70	23.18	20.52
Terminalia catappa (unripe)	69.70	40.00	27.33	29.70	12.67

NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin, HC = Hemicellulose and CS = Cellulose

4.4.1.3. Proximate Values of Rainy Season's Foods of Mona Monkeys in University of Lagos

The proximate values of rainy season's foods of mona monkeys in UNILAG is shown on Table 19. *Albizia lebbeck, Phytocellobium dulce* and *Artocarpus altilis*had the highest values of CP, EE and NFE respectively as 37.19%, 20.46% and 73.57%.

4.4.1.4. Fibre Fraction Values of Rainy Season's Mona Monkeys' Foods in University of Lagos

The fibre fraction content of rainy season'smona monkeys'foods in UNILAG is shown on Table 20. The highest NDF, ADF, ADL and CS were found in *Terminalia catappa* (Ripe) as 76.20%, 62.60%, 36.61% and 25.99% respectively. *Pithecellobium dulce* had the highest HC of 31.8%.

4.4.1.5 Mean and SEM of Nutrients' Content of Mona Monkeys' Food Groups in University of Lagos

The mean of the nutrients contents of the plant parts consumed by mona monkeys in UNILAG is presented on Table 21. Seeds (n = 4) had the highest CP value of 29.5 ± 2.55, while leaves (n = 3) had the highest EE content of 19.93 ± 0.87. The highest NFE of 69.21 ± 1.59 was from tubers (n = 4).

4.4.1.6. Mean and SEM of Fibre Fraction Content of Mona Monkeys' Food Groups in University of Lagos

The mean fibre fraction content for the food groups mona monkeys in University of Lagos consumed is shown on Table 22. As a group, tubers had the least fibre fraction values. This was followed by seeds. Leaves had the highest NDF, ADF and ADL values of 52.25 ± 6.13, 39.1 ± 1.52 and 26.5 ± 3.51 respectively.

Table 19: Proximate values of rainy season's foods of mona monkeysin University of Lagos

Food sample	DM	CP	EE	CF	Ash	NFE
Albizia lebbeck	82.06	37.19	10.8	12.6	5.6	33.81
Artocarpus altilis	84.51	2.63	13	6	4.8	73.57
Brassica oleracea	65.63	25.96	17	6.3	8.8	41.94
Manihot esculenta	85.37	3.5	11.8	10.4	1.8	72.5
Pithecellobium dulce	77.75	27.86	20.46	3.8	4	43.88
Terminalia catappa (Ripe)	66.7	2.63	17.6	3	12.4	64.37
Terminalia catappa (Unripe)	73.63	6.13	13.2	14.4	9.2	57.07

DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract

Table 20: Fibre fraction content (%) of rainy season'smona monkeys'foods in University of Lagos

Food sample	**NDF**	**ADF**	**ADL**	**HC**	**CS**
Albizia lebbeck	34.80	25.40	15.80	9.4	9.6
Artocarpus altilis	14.60	3.60	1.60	11	2
Brassica oleracea	48.80	41.40	34.47	7.4	6.93
Manihot esculenta	14.30	6.86	2.10	7.44	4.76
Pithecellobium dulce	56.20	24.40	11.80	31.8	12.6
Terminalia catappa (Ripe)	76.20	62.60	36.61	13.6	25.99
Terminalia catappa (Unripe)	43.06	20.40	19.94	22.66	0.46

NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin, HC = Hemicellulose and CS = Cellulose

Table 21: Mean and SEM of nutrient content of mona monkeys' food groups in University of Lagos

Food group	DM	CP	EE	CF	Ash	NFE	GE (cal/g)
Fruits (n=10)	77.88 ± 0.72	6.75 ± 0.41	14.24 ± 0.42	11.09 ± 0.63	7.2 ± 0.32	60.73 ± 0.94	398.06 ± 9.05
Leaves (n=3)	65.8 ± 1.32	22.14 ± 3.30	19.93 ± 0.87	3.57 ± 0.86	10.07 ± 0.40	44.29 ± 3.86	445.13 ± 10.42
Seeds (n=4)	82.63 ± 1.13	29.5 ± 2.55	13.97 ± 1.14	9.8 ± 1.04	4.88 ± 0.22	41.86 ± 2.63	411.13 ± 21.19
Tubers (n=4)	85.38 ± 0.67	5.9 ± 1.11	13.84 ± 0.54	8.48 ± 0.92	2.58 ± 0.19	69.21 ± 1.59	425 ± 11.20

SEM= Standard Error of Mean, DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract, and GE = Gross Energy

Table 22: Mean and SEM of fibre fraction content of mona monkeys' food groups in University of Lagos

Food group	NDF	ADF	ADL	HC	CS
Fruits (n=10)	51.98 ± 2.23	34.67 ± 1.77	19.81 ±1.00	17.31 ± 0.16	14.86 ± 0.77
Leaves (n=3)	52.25 ± 6.13	39.1 ± 1.52	26.5 ± 3.51	13.15 ± 4.61	12.60 ± 1.99
Seeds (n=4)	41.9 ± 2.53	25.85 ± 0.41	15.05 ± 0.56	16.05 ± 2.12	10.80 ± 0.15
Tubers (n=4)	23.33 ± 5.53	23.52 ± 5.01	8.68 ± 2.01	0.19 ± 0.52	14.84 ± 3.00

SEM= Standard Error of Mean, NDF = Neutral detergent fibre, ADF = Acid detergent fibre, ADL = Acid detergent lignin, HC = Hemicellulose, and CS = Cellulose

4.4.2. Chemical Composition of Mona Monkeys' Foods in Lekki Conservation Centre

4.4.2.1. Proximate Composition of Mona Monkeys' Dry Season's Foods in Lekki Conservation Centre

The proximate composition of mona monkeys' dry season's foods in LCC is shown on Table 23. The highest CP of 22.31% was from *Mangifera indica*. *Alchornea cordifolia* had the highest EE value of 19.56%, and was followed by *Ficus ingens* with an EE value of 18.6%. Similarly, the highest CF, ash and NFE values of 12.6%, 9.40%, and 68.87% were obtained from *Xylopia aethiopica*, *Hura crepitans,* and ripe *Terminalia catappa* respectively.

4.4.2.2. Fibre Fraction Content of Dry Season's Mona Monkeys' Foods in Lekki Conservation Centre

The fibre fraction content of dry season's mona monkeys' foods in LCC is shown on Table 24. The highest NDF and HC of 71.40% and 27.58% respectively were from *Anthocleista vogelii*. *Ficus ingens* had the highest ADF and ADL values of 49% and 30.41% respectively. Ripe *Terminalia catappa* had the highest CS value of ADL 32.76%.

4.4.2.3. Proximate Composition of Rainy Season's Mona Monkeys' Foods in Lekki Conservation Centre

The proximate composition of mona monkeys' foods in LCC during the rainy seasonis shown on Table 25. *Mussaenda polita* had the highest CP, EE and Ash of 6.56%, 31.8% and 9.00% respectively. Ripe *Terminalia catappa* had the highest NFE value of 71.28% respectively.

4.4.2.4. Fibre Fraction Content of Mona Monkeys' Rainy Season's Foods in Lekki Conservation Centre

The fibre fraction values of the rainy season's mona monkeys' foods in LCC is shown on Table 26. The highest NDF of 66.4% was found in *Mussaenda polita*. *Xylopia aethiopica* had the highest ADF and CS values of 43.19% and 25.75% respectively.

Table 23: Proximate composition of dry season's mona monkeys' foods in Lekki Conservation Centre

Food sample	**DM**	**CP**	**EE**	**CF**	**Ash**	**NFE**
Alchornea cordifolia	76.80	11.38	19.56	12.60	3.20	53.26
Anthocleista vogelii	81.43	10.50	23.00	9.00	2.60	54.90
Cocos nucifera	93.67	10.90	18.00	9.40	6.00	55.70
Ficus ingens	85.66	7.00	18.6	5.00	4.20	65.20
Hura crepitans	76.91	11.34	11.00	17.00	9.40	51.26
Mangifera indica	81.31	22.31	14.50	4.40	5.00	53.79
Terminalia catappa (Ripe)	75.45	6.13	10.20	6.40	8.40	68.87

DS = Dry season, RS = Rainy season**,** DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract

Table 24: Fibre fraction content of dry season's mona monkeys' foods in Lekki Conservation Centre

Food sample	**NDF**	**ADF**	**ADL**	**HC**	**CS**
Alchornea cordifolia	58.60	38.86	29.15	19.74	9.71
Anthocleista vogelii	71.40	43.82	19.19	27.58	24.63
Cocos nucifera	56.40	31.20	26.6	25.20	4.60
Ficus ingens	61.70	49.00	30.41	12.70	18.59
Hura crepitans	44.64	27.12	7.53	17.52	19.59
Mangifera indica	49.20	37.20	20.43	12.00	16.77
Terminalia catappa (Ripe)	66.10	48.70	15.94	17.40	32.76

NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin, HC = Hemicellulose and CS = Cellulose

Table 25: Chemical composition of mona monkeys' foods during the rainy season in Lekki Conservation Centre

Food sample	**DM**	**CP**	**EE**	**CF**	**Ash**	**NFE**
Mussaenda polita	78.19	6.56	31.80	11.80	9.00	40.84
Terminalia catappa (Ripe)	82.31	0.44	11.50	9.07	7.71	71.28
Terminalia catappa (Unripe)	84.13	0.88	12.50	12.55	5.05	69.02
Xylopia aethiopica	92.49	1.33	24.60	26.80	0.10	47.17

DS = Dry season, RS = Rainy season**,** DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract

Table 26: Fibre fraction content of rainy season's mona monkeys' foods in Lekki Conservation Centre

Food sample	NDF	ADF	ADL	HC	CS
Mussaenda polita	66.40	41.00	17.40	25.40	23.60
Terminalia catappa (Ripe)	60.35	42.99	29.24	17.36	13.75
Terminalia catappa (Unripe)	59.51	17.11	12.39	42.40	4.72
Xylopia aethiopica	61.52	43.19	17.44	18.33	25.75

NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin, HC = Hemicellulose and CS = Cellulose

4.4.2.5. The Mean Nutrients' and Fibre Fractions' Contents of Mona Monkeys' Foods in Lekki Conservation Centre

The mean of the proximate values of the mona monkeys' foods in LCC is shown on Tables 27, while the mean of the fibre fraction values is shown on Table 28. There were only two food groups: fruits (n=6) and nut (n=1).

4.4.3. Chemical Composition of Dry Season's Mona Monkeys' Foods in Okomu National Park

4.4.3.1. Proximate Composition of Dry Season's Mona Monkeys' Foods in Okomu National Park

The proximate composition of the dry season's mona monkeys' foods in ONP is shown on Table 29. *Carica papaya* had the least DM implying its high moisture content. The highest CP value of 17.06% was found in *Ficus mucuso*, while the highest EE value of 45.80% was found in *Theobroma cacao*. The highest NFE value of 81.55% was found in *Musa paradisiaca*.

4.4.3.2. Fibre Fraction Values of Dry Season's Mona Monkeys' Foods in Okomu National Park

The fibre fraction values of mona monkeys' dry season's foods in ONP is shown on Table 30.*Musanga cecropioides* had the highest NDF and ADF values of 69.70% and 61.07% respectively. The highest CS of 35.95% was recorded in *Musa paradisiaca*.

4.4.3.3. Proximate Composition of Rainy Season's Mona Monkeys' Foods in Okomu National Park

The chemical composition of mona monkeys' foods in ONP during the rainy season is shown on Table 31. *Tetracarpidium conophorum* and *Theobroma cacao*had the highest CP and EE values of 31.94% and 51.40% respectively. The highest NFE value of69.65% was found in *Musa paradisiaca*.

Table 27: Mean and SEM of nutrients' content of mona monkeys' food plants groups in Lekki Conservation Centre

Food group	DM	CP	EE	CF	Ash	NFE	GE
Fruits(n=6)	80.05 ± 0.57	11.52 ± 0.95	19.75 ± 1.21	9.97 ± 0.80	5.57 ± 0.49	53.21 ± 1.30	436.58 ± 18.76
Nut (n=1)	93.67	10.9	18	9.4	6	55.7	428.4

SEM= Standard Error of Mean, DS = Dry season, RS = Rainy season**,** DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract, GE = Gross Energy

Table 28: Mean and SEM of fibre fractions' content (%) of mona monkeys' food groups in Lekki Conservation Centre

Food group	NDF	ADF	ADL	HC	CS
Fruits (n=6)	58.66±1.70	39.5 ± 1.23	20.69 ± 1.40	17.82 ± 2.30	20.34 ± 3.17
Nut (n=1)	56.4	31.2	26.6	25.2	4.6

SEM= Standard Error of Mean, NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin, HC = Hemicellulose and CS = Cellulose

Table 29: Proximate composition of dry season's mona monkeys' foods in Okomu National Park

Food sample	DM	CP	EE	CF	Ash	NFE
Carica papaya	68.41	4.38	14.5	8.6	8.9	63.62
Ficus mucuso	84.85	17.06	24.7	12.4	13	32.84
Musa paradisiaca	82.35	0	11.8	2.5	4.15	81.55
Musanga cecropioides	87.21	7.43	14.8	8.4	5.2	64.17
Pcynanthus angolensis	94.01	4.38	18.2	52	2.6	22.82
Theobroma cacao	89.44	4.81	45.8	12.6	3.5	33.29

DS = Dry season, RS = Rainy season**,** DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract

Table 30: Fibre fractions values of dry season's mona monkeys' foods in Okomu National Park

Food sample	**NDF**	**ADF**	**ADL**	**HC**	**CEL**
Carica papaya	52.3	26.35	20	25.95	6.35
Ficus mucuso	62.3	37.4	20.9	24.90	16.50
Musa paradisiaca	27.8	24.48	12.6	8.64	35.95
Musanga cecropioides	69.7	61.06	25.11	3.32	11.88
Pcynanthus angolensis	39.4	29.6	27.71	9.80	1.89
Theobroma cacao	59.80	49.60	21.30	10.20	28.30

NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin, HC = Hemicellulose and CEL = Cellulose

Table 31: Proximate composition of rainy season's mona monkeys' foods in Okomu National Park

Food sample	DM	CP	EE	CF	ASH	NFE
Gmelina arborea	71.86	2.19	18.00	9.80	6.20	63.81
Jateorhiza macrantha	86.35	8.75	38.60	14.40	1.50	36.75
Macaranga barteri	88.69	9.63	24.00	8.70	5.00	52.67
Musa paradisiaca	72.09	1.75	12.20	13.10	3.30	69.65
Musanga cecropioides	84.29	7.44	16.04	14.30	0.30	61.92
Psidium guajava	81.69	10.50	17.36	21.20	4.50	46.14
Tetracarpidium conophorum	89.77	31.94	48.66	12.60	5.00	2.40
Theobroma cacao	85.39	2.19	51.40	35.00	5.54	15.87

DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract

4.4.3.4. Fibre Fraction Values of Rainy Season's Mona Monkey Food Plants in Okomu National Park

The fibre fraction content of mona monkeys' rainy seaon's foods in ONP is shown on Table 32.*Jateorhiza macrantha* had the highest NDF, ADF and ADL values of 65.10%, 47.40%, and 43.67% respectively. Hemicellulose content was highest in *Gmelina arborea* with a value of 28.00%, while 21.14% was the highest CS and was found in *Tetracarpidium conophorum*.

4.4.3.5. The Mean Nutrient Content of Mona Monkeys' Food Groups in Okomu National Park

The mean nutrient content of the mona monkeys' food groups in ONP is shown on Table 33. The fruits and nut had higher CP and NFE than the seeds. However, the seeds had higher EE value than the fruits and nut.

4.4.3.6. The Mean Fibre Fraction Content of Mona Monkeys' Food Groups in Okomu National Park

Table 34 shows the mean fibre fraction content of mona monkeys' food groups. The NDF, ADF, and ADL values for the seeds were higher than that of the fruits and nut. The HS and CS values for the fruits and nut were higher than that of the seeds.

4.4.4. Comparison of the Nutrient Content of Mona Monkeys' Foods on Seasonal and Location Basis

The ANOVA of the nutrient compositions is shown on Table 35.Apart from EE that was significant ($P< 0.05$) when both dry and rainy seasons' nutrient contents were compared location wise, all the other comparisons (including dry and rainy season separately compared between the locations) were not significant ($P > 0.05$). The difference was between UNILAG and ONP.

Table 32: Fibre fraction valuesof rainy season's mona monkeys' foods in Okomu National Park

Food sample	NDF	ADF	ADL	HC	CEL
Gmelina arborea	41.60	13.60	8.60	28.00	5.00
Jateorhiza macrantha	65.10	47.40	43.67	17.70	3.73
Macaranga barteri	44.60	21.52	24.65	23.08	3.13
Musa paradisiacal	47.00	31.40	26.11	15.60	5.29
Musanga cecropioides	64.40	38.20	23.60	26.20	14.60
Psidium guajava	56.80	30.00	22.80	26.80	7.20
Tetracarpidium conophorum	61.30	34.54	13.40	26.76	21.14
Theoborma cacao	38.60	25.12	5.11	13.48	20.01

NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin, HC = Hemicellulose and CEL = Cellulose

Table 33: Mean and SEM of nutrients' content (%)of mona monkeys' food groups in Okomu National Park

Food group	**DM**	**CP**	**EE**	**CF**	**Ash**	**NFE**	GE (cal/g)
Seeds(n=3)	87.06 ± 0.71	5.25 ± 1.10	45.27 ± 2.14	19.33 ± 4.63	5.31 ± 1.24	38.75 ± 7.99	583.39 ± 29.65
Fruits and nut(n=11)	82.29 ± 2.48	8.79 ± 2.73	20.02 ± 3.13	14.87 ± 3.97	5.29 ± 1.01	51.05 ± 7.01	419.59 ± 21.40

SEM= Standard Error of Mean, DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract, GE = Gross energy

Table 34: Mean and SEM of fibre fractions' contentof mona monkeys' food groups in Okomu National Park

Food group	**NDF**	**ADF**	**ADL**	**HC**	**CEL**
Seeds (n=3)	52 ± 4.42	32.96 ± 4.18	22.93 ± 6.49	19.04 ± 0.24	10.03 ± 6.25
Fruits and nut n=11)	51.56 ± 3.83	31.65 ± 3.65	20.5 ± 1.89	19.91 ± 0.18	11.15 ± 1.53

SEM = Standard Error of Mean, NDF = Neutral Detergent Fibre, ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin, HC = Hemicellulose and CEL = Cellulose

4.4.5. Descriptive and Inferential Statisitics of Nutrients' Composition of Mona Monkeys' Foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

4.4.5.1. Descriptive Statistics of Nutrient Composition of Mona Monkeys' Dry Season's Foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

The descriptive summary of some of the nutrients' content of the dry season's mona monkeys' foods in all the three study locations is shown on Table 35. The whole summary is presented in Appendix 17. UNILAG had the highest mean CP value of 12.12 ± 2.68 (n= 14). The highest mean EE level of 21.63 ± 5.16 (n = 6) was from the ONP foods. The mean CP for the three locations was 10.28 ±1.88, while that of EE was 17. 16 ±1.65 (n = 22).

4.4.5.2. Inferential Statisitics of Nutrient Content of Dry Season's Mona Monkeys' Foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

The ANOVA for the nutrient content of mona monkeys' dry season's foods is shown on Table 36. The nutrients shown here were CP, EE and CF. The values for other nutrients are shown on Appendix 18. None of the nutrients was significantly different between the locations.

Table 35: Descriptive statistics of nutrient composition of dry season's mona monkey foods: University of Lagos, Lekki Conservation Centre and Okomu National Park

Nutrient (%)	Location	N	Mean ± SEM	Nutrient (%)	Location	N	Mean ± SEM
DM	UNILAG	14	79.47 ± 2.21	NFE	UNILAG	14	56.95 ± 3.44
	LCC	2	81.23 ± 4.43		LCC	2	59.23 ± 5.97
	ONP	6	84.38 ± 3.59		ONP	6	54.77 ± 9.06
	Total	22	80.97 ± 1.75		Total	22	56.57 ± 3.20
CP	UNILAG	14	12.12 ± 2.68	NDF	UNILAG	14	46.39 ± 5.91
	LCC	2	9.19 ± 2.19		LCC	2	60.15 ± 1.55
	ONP	6	6.34 ± 2.36		ONP	6	50.63 ± 6.20
	Total	22	10.28 ± 1.88		Total	22	48.80 ± 4.13
EE	UNILAG	14	14.97 ± 1.20	ADF	UNILAG	14	34.06 ± 3.28
	LCC	2	19.08 ± .48		LCC	2	43.93 ± 5.07
	ONP	6	21.63 ± 5.16		ONP	6	34.21 ± 5.69
	Total	22	17.16 ± 1.65		Total	22	35.00 ± 2.61
CF	UNILAG	14	9.87 ± 1.60	ADL	UNILAG	14	17.87 ± 2.05
	LCC	2	8.80 ± 3.80		LCC	2	29.78 ± .63
	ONP	6	15.42 ± 7.43		ONP	6	21.05 ± 2.12
	Total	22	11.29 ± 2.23		Total	22	19.82 ± 1.59
Ash	UNILAG	14	6.10 ± .85				
	LCC	2	3.70 ± .50				
	ONP	6	7.13 ± 1.57				
	Total	22	6.16 ± .70				

DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract, NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin

Table 36: Analysis of variance for nutrients composition of dry season's mona monkeys' foodsin University of Lagos, Lekki Conservation Centre and Okomu National Park

Nutrient (%)	Source of Variation	df	F	Sig.	Inference
DM	Between Groups	2	.732	.494	Not significant
	Within Groups	19			
	Total	21			
CP	Between Groups	2	.911	.419	Not significant
	Within Groups	19			
	Total	21			
EE	Between Groups	2	1.741	.202	Not significant
	Within Groups	19			
	Total	21			
CF	Between Groups	2	.631	.543	Not significant
	Within Groups	19			
	Total	21			

DM= Dry matter, CP = Crude protein, EE = Ether extract; CF = Crude fibre

4.4.5.3. DescriptiveStatisitics of Nutrient Contentof Rainy Season's Mona Monkeys' Foods inUniversity of Lagos, Lekki Conservation Centre and Okomu National Park

The mean and standard error of mean for some of the nutrients' content of rainy season's mona monkeys' foods in all the locations is show on Table 37. The full detail for all the nutrients is shown on Appendix 19. The highest CP of 15.13 $\pm$5.55 ($n = 7$) was obtained from UNILAG, while the highest EE of 28.28 $\pm$5.52 (n = 8) was found in ONP, while the highest NDF of 58.68 $\pm$ 3.06 (n = 8) was obtained from LCC. The respective mean values for CP, EE and NDF for the three locations were 10.63$\pm$ 2.25, 20.74 $\pm$2.40 and 51.16 $\pm$ 3.29 (n=23).

4.4.5.4. Inferential Statistics of Nutrient Contentof Rainy Season's Mona Monkeys' Foods inUniversity of Lagos, Lekki Conservation Centre and Okomu National Park

The ANOVA of some nutrients' contents of the rainy season's mona monkeys' foods for the three locations is shown on Table 38, while the full analysis is shown on Appendix 20. None of the values was significant at $P < 0.05$. However, at $P \leq 0.10$, EE, CF and NDF with respective P values of 0.053, 0.102 and 0.091 were significantly different.

4.4.5.5. Descriptive Statistics of Nutrient Contentof Dry and Rainy Seasons' Mona Monkeys' Foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

The seasonal and location values of some of the nutrients' contents of mona monkeys' foods is shown on Table 39. The other values are shown on Appendix 21. The highest EE and CF values of 25.43$\pm$3.82 and 15.82$\pm$3.44 respectively (n=14) were found in ONP foods, while the highest NDF value of 58.97 $\pm$ 2.44 was from LCC (n=10). The respective mean values for these three nutrients in both seasons and all locations were 18.99$\pm$ 1.48, 11.86$\pm$ 1.33 and 50.01$\pm$ 2.60 (n=45).

4.4.5.6. Inferential Comparison of the Nutrients' Content of Mona Monkey Foods

Based on Season and Location

The ANOVA of the nutrient compositions of the dry and rainy seasons' foods of mona monkeys from the three locations is shown on Table 40, with significant one highlighted. The complete analysis is on Appendix 22. Only EE was significant ($P < 0.05$). Crude fibre and NDF were also significant at $P \leq 0.10$. A post hoc showed that while EE had a significant value of 0.002, both CF and NDF had significant value of 0.033 (Table 41). It also showed that the significant differences ($P < 0.05$) in EE and CF were both between UNILAG and ONP, while that for NDF ($P < 0.05$) was between UNILAG and LCC. The full content of the post hoc using least significant difference (LSD) is on Appendix 22.

Table 37: Descriptive statistics of nutrients content of mona monkeys' rainy season's foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

Nutrient (%)	Location	N	Mean ± SEM	Nutrient (%)	Location	N	Mean ± SEM
DM	UNILAG	7	76.52± 3.07	NFE	UNILAG	7	55.31 ± 5.95
	LCC	8	83.81 ± 2.18		LCC	8	55.50 ± 3.63
	ONP	8	82.52 ± 2.46		ONP	8	43.65± 8.48
	Total	23	81.14± 1.56		Total	23	51.32 ± 3.71
CP	UNILAG	7	15.13 ± 5.55	NDF	UNILAG	7	41.14 ± 8.43
	LCC	8	8.03± 2.62		LCC	8	58.68 ± 3.06
	ONP	8	9.30 ± 3.47		ONP	8	52.43 ± 3.78
	Total	23	10.63± 2.25		Total	23	51.16± 3.29
EE	UNILAG	7	14.84 ± 1.34	ADF	UNILAG	7	26.38± 7.68
	LCC	8	18.36± 2.65		LCC	8	35.45± 3.39
	ONP	8	28.28± 5.52		ONP	8	30.22± 3.68
	Total	23	20.74± 2.40		Total	23	30.87± 2.88
CF	UNILAG	7	8.07± 1.67	ADL	UNILAG	7	17.47±5.31
	LCC	8	12.50± 2.41		LCC	8	18.78 ± 2.48
	ONP	8	16.14 ± 3.00		ONP	8	20.99± 4.28
	Total	23	12.42 ± 1.53		Total	23	19.15± 2.27
Ash	UNILAG	7	6.66 ± 1.37				
	LCC	8	5.61 ± 1.12				
	ONP	8	3.92 ± .73				
	Total	23	5.34 ± .64				

DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract, NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin

Table 38: Analysis of variance for nutrients' contents of rainy season's mona monkeys' foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

Nutrient (%)	Source of Variation	df	F	Sig.	Inference
CP	Between Groups	2	2	.426	Not Significant (P >.05)
	Within Groups	20	20		
	Total	22	22		
EE	Between Groups	2	3.421	.053	Significant (P < 0.10)
	Within Groups	20			
	Total	22			
CF	Between Groups	2	2.566	.102	Marginally significant(P = 0.10)
	Within Groups	20			
	Total	22			
NDF	Between Groups	2	2.711	.091	Significant (P < 0.10)
	Within Groups	20			
	Total	22			

CP = Crude protein, EE = Ether extract, CF = Crude fibre and NDF = Neutral detergent fibre

Table 39: Descriptive Statistics of Nutrient Content of Mona Monkeys' foods for both seasons in University of Lagos, Lekki Conservation Centre and Okomu National Park

Nutrient (%)	Location	N	Mean ± SEM	Nutrient (%)	Location	N	Mean ± SEM
DM	UNILAG	21	78.49 ± 1.78	NFE	UNILAG	21	56.40 ± 2.95
	LCC	10	83.29± 1.87		LCC	10	56.24± 3.04
	ONP	14	83.31± 2.01		ONP	14	48.42 ± 6.16
	Total	45	81.06 ± 1.16		Total	45	53.88± 2.46
CP	UNILAG	21	13.12± 2.51	NDF	UNILAG	21	44.64 ± 4.75
	LCC	10	8.26± 2.10		LCC	10	58.97± 2.44
	ONP	14	8.03± 2.19		ONP	14	51.66 ± 3.29
	Total	45	10.46 ± 1.46		Total	45	50.01 ± 2.60
EE	UNILAG	21	14.92± .90	ADF	UNILAG	21	31.50 ± 3.35
	LCC	10	18.51 ± 2.09		LCC	10	37.15 ± 3.00
	ONP	14	25.43± 3.82		ONP	14	31.93± 3.13
	Total	45	18.99 ± 1.48		Total	45	32.89 ± 1.95
CF	UNILAG	21	9.27 ± 1.19	ADL	UNILAG	21	17.74 ± 2.15
	LCC	10	11.76± 2.04		LCC	10	20.98 ± 2.45
	ONP	14	15.83 ± 3.45		ONP	14	21.02 ± 2.53
	Total	45	11.86± 1.33		Total	45	19.48 ± 1.38
Ash	UNILAG	21	6.28± .71				
	LCC	10	5.23 ± .92				
	ONP	14	5.29 ± .87				
	Total	45	5.74± .47				

DM = Dry matter, CP = Crude protein, EE = Ether extract, CF = Crude fibre, NFE = Nitrogen free extract, NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; ADL = Acid Detergent Lignin

Table 40: Analysis of variance of the nutrients' content of dry and rainy seasons' mona monkeys' foods in University of Lagos, Lekki Conservative Centre and Okomu National Park

Nutrients (%)	**Source of variation**	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
EE	Between Groups	930.863	2	465.431	5.765	.006*
	Within Groups	3390.709	42	80.731		
	Total	4321.572	44			
CF	Between Groups	361.511	2	180.756	2.421	.101^
	Within Groups	3135.340	42	74.651		
	Total	3496.851	44			
NDF	Between Groups	1446.947	2	723.474	2.541	.091^
	Within Groups	11957.196	42	284.695		
	Total	13404.143	44			

*. The mean difference is significant at the 0.05 level. ^. The mean difference is significant at 0.10level. EE = Ether extract, CF = crude fibre, NDF = Nitrogen free extract.

Table 41: Least Significant Difference in nutrients composition of mona monkeys' foods for dry and rainy seasons in University of Lagos, Lekki Conservation Centre and Okomu National Park

Variable (%)	Location 1	Location 2	Mean Diff (1-2)	Std. Error	Sig.	95% Conf. Interval	
						Lower bound	Upper Bound
EE	UNILAG	LCC	-3.58314	3.45217	.305	-10.5499	3.3836
	UNILAG	ONP	-10.51000*	3.10014	.002	-16.7663	-4.2537
	LCC	ONP	-6.92686	3.72016	.070	-14.4345	.5807
CF	UNILAG	LCC	-2.49248	3.31962	.457	-9.1917	4.2068
	UNILAG	ONP	-6.55905*	2.98111	.033	-12.5752	-.5429
	LCC	ONP	-4.06657	3.57733	.262	-11.2859	3.1528
NDF	UNILAG	LCC	-14.33295*	6.48278	.033	-27.4157	-1.2502
	UNILAG	ONP	-7.01810	5.82171	.235	-18.7668	4.7306
	LCC	ONP	7.31486	6.98605	.301	-6.7836	21.4133

*. The mean difference is significant at the 0.05 level. EE = Ether extract, CF = crude fibre, NDF= Nitrogen free extract

4.4.6. Correlation of Nutrients' Composition

4.4.6.1. Correlation of Nutrients' Content of Dry Season's Mona Monkeys' Foods in University of Lagos

The correlation summary of the nutrients' content of dry season's mona monkeys' foods in UNILAG is shown on Table 42, while the full matrix is shown on Appendix 24. There was a negative correlation that was significant between DM and EE (r = -.50, P = 0.033). A very high negative correlation that was highly significant was found between CP and NFE (r = -.77, P = 0.001). Average correlations that were significant were found between Ash and NFE (r =.47, P = 0.45) and Ash and ADL (r =.52, P =.029). The correlation between NDF and ADF was highly positive and significant (r = .79, P = .001)

4.4.6.2. Correlation of Nutrient Content of Rainy Season's Mona Monkeys' Foods in University of Lagos

Many nutrients' contents of rainy season's mona monkeys' foods in UNILAG were either positively or negatively correlation as shown in the highlighted matrix on Table 43. The full matrix of these correlations is shown on Appendix 25. There was a very highly negative and significant correlation between DM and Ash (r = -.87, P = 0.006). Very highly negative and significant correlations were also found between DM and: NDF, ADF and ADL with respective r and P values of -.83, -.87 and -.96; .011, .005 and .001. The correlation between CP and NFE was very highly negative and significant (r = -.95, P = .001) (Figure 10).There was a high but negative correlation between EE and CF (r = -.78, P = .019).

A very high and positive correlation was found between Ash and ADL (r = .89, P = .003). The regression line of this relationship is shown on Figure 11. There were positive and high correlations between the fibre fractions: NDF and ADF (r=.91, P= .002); NDF and ADL (r =.83, P=.010).

Table 42: Correlation summary of the nutrients' content of dry season's mona monkeys' foods inUniversity of Lagos

Correlated nutrients	R	P	Inference
DM and EE	-.50*****	.033	Average negative correlation and sig. at *P*<0.05.
CP and NFE	-.77******	.001	Very high negative correlation and sig. at *P*<0.01.
NFE and Ash	-.47*****	.045	Low negative correlation but sig. at *P*<0.05.
Ash and ADL	.52*****	.029	Average positive correlation and sig. at *P*<0.05.
NDF and ADF	.79******	.000	Very high positive correlation and sig. at *P*<0.01.
NDF and ADL	.53*****	.027	Average positive correlation and sig. at *P*<0.05.
ADF and ADL	.70******	.003	Very high positive correlation and sig. at *P*<0.01.

*.Correlation is sig. at the 0.05 level (1-tailed).**. Correlation is sig. at the 0.01 level (1-tailed). DM= Dry matter, CP= Crude protein, EE= Ether extract, NFE= Nitrogen free extract, NDF= Neutral detergent fibre, ADF= Acid detergent fibre, and ADL= Acid detergent lignin

Table 43: Correlation summary for the nutrient content of rainy season's mona monkeys' foods in University of Lagos

Correlated nutrients	R	P	Inference
DM and Ash	-.87**	.006	Very high negative correlation and sig. at P<0.01.
DM and NDF	-.83*	.011	Very high negative correlation and sig. at P<0.05.
DM and ADF	-.87**	.005	Very high negative correlation and sig. at P <0.01.
DM and ADL	-.96**	.000	Very high negative correlation and sig. at P<0.01.
CP and NFE	-.95**	.000	Very high negative correlation and sig. at P<0.01.
EE and CF	-.78*	.019	Very high negative correlation and sig. at P<0.05.
EE and NDF	-.74*	.029	Very high negative correlation and sig. at P<0.05.
Ash and NDF	.76*	.024	Very high positive correlation and sig. at P<0.05.
Ash and ADF	.83*	.010	Very high positive correlation and sig. at P<0.05.
Ash and ADL	.89**	.003	Very high positive correlation and sig. at P<0.01.
NDF and ADF	.91**	.002	Very high positive correlation and sig. at P<0.01.
NDF and ADL	.83*	.010	Very high positive correlation and sig. at P<0.05.
ADF and ADL	.94**	.001	Very high positive correlation and sig. at P<0.01.

*.Correlation is significant at the 0.05 level (1-tailed). **.Correlation is significant at the 0.01 level (1-tailed). DM= Dry matter, CP= Crude protein, EE= Ether extract, CF= Crude fibre, NFE= Nitrogen free extract, ADL, Acid detergent lignin, ADF= Acid detergent fibre and NDF= Neutral detergent fibre

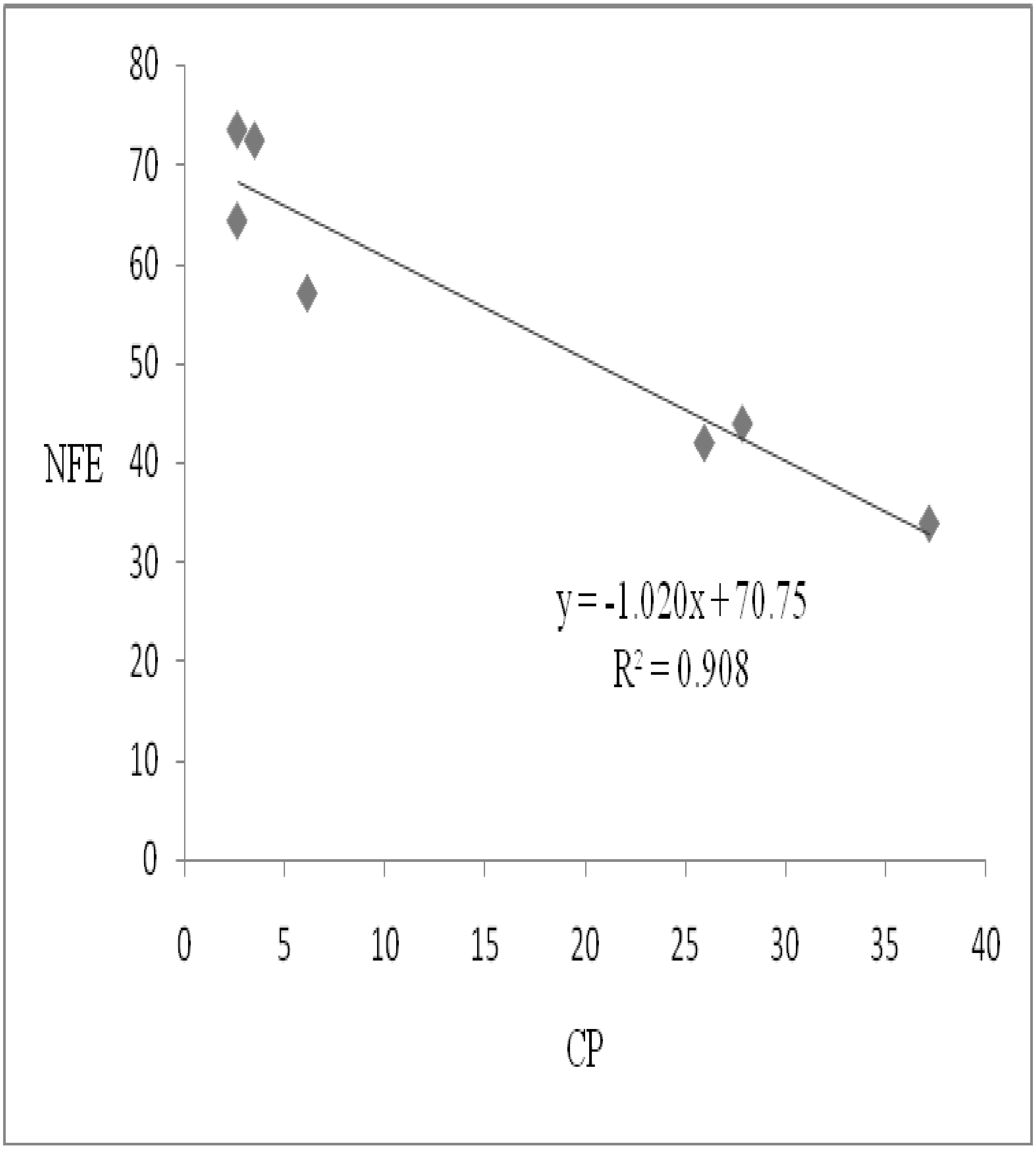

Figure 10: Regression line of Nitrogen Free Extract on Crude Protein of rainy season's foods of mona monkeys in University of Lagos

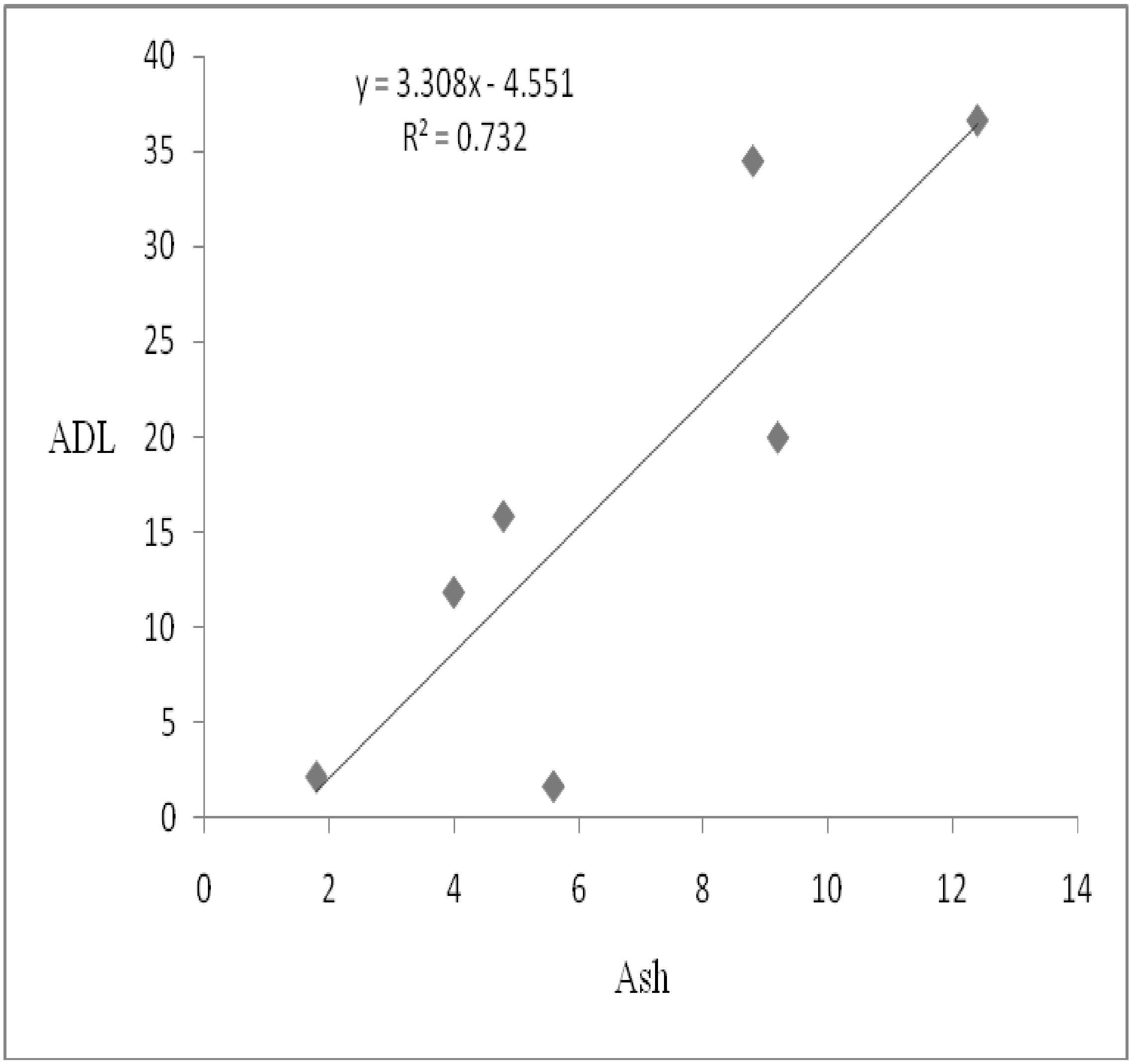

Figure 11: Regression line of Acid Detergent Lignin on Ash of rainy seasons' Foods of mona monkeys in University of Lagos

4.4.6.3. Correlation of Nutrient Content of Dry and Rainy Seasons' Mona Monkeys' Foods in Lekki Conservation Centre

The Pearson's correlation between the nutrients contents of mona monkeys' foods in LCC is shown in Table 44, and the full matrix is on Appendix 26. There was a high and significant negative correlation between EE and NFE (r =-.71, P = 0.011). A positive and significant correlation was found between EE and NDF with r =.67 and P=0.018; and between NDF and ADF (r= .61, P=0 .032).

4.4.6.4. Correlation of Nutrient Content of Dry Season's Mona Monkeys' Foods in Okomu National Park

The correlation between nutrients found in foods that mona monkeys in ONP consume during the dry season is shown on Table 45, but the full matrix is on Appendix 27. Most of the correlation coefficients (r) between the nutrients were low and/or negative and not significant. However, there was a very high negative correlation that was marginally significant between NFE and CF (r = -.81, P = 0.051).

4.4.6.5. Correlation of Nutrients Content of Rainy Season's Mona Monkeys' Foods in Okomu National Park

The correlation coefficients between the nutrients of foods mona monkeys in ONP consumed is presented on Table 46. The matrix where they were extracted is on Appendix 28. There was a very high negative correlation that was significant ($P < 0.05$) between Ash and ADL (r= -.74, P= 0.037). The regression line that depicts this relationship is shown on Figure 12. This implies that high ash content in the diet would mean lower cell wall material in the form of lignin. NDF and ADF had a very high and positive correlation that was significant (r= .85, P= 0.008).

Table 44: Correlation summary for nutrients' content of dry and rainy seasons' mona monkeys' foods in Lekki Conservation Centre

Correlated nutrients	R	P	Inference
EE and NFE	-.71*	.011	Very high negative correlation and sig. at *P*<0.05.
EE and NDF	.67*	.018	Very high negative correlation and sig. at *P*<0.05.
NDF and ADF	.47^	.081	Average positive correlation and sig. at *P*<0.10.
ADF and ADL	.61*	.032	Average positive correlation and sig. at *P*<0.05.

*. Correlation is significant at the 0.05 level; (1-tailed).**^.** Correlation is significant at 0.10 level (1-tailed). DM= Dry matter, CP= Crude protein, EE= Ether extract, CF= Crude fibre, NFE = Nitrogen free extract, ADL = Acid detergent lignin, ADF= Acid detergent fibre, and NDF= Neutral detergent fibre

Table 45: Correlation summary for the nutrients' content of dry season's mona monkeys' foods in Okomu National Park

Correlated nutrients	r	P	Inference
CP and Ash	.74	.090	Highly positively correlated and Significant at 0.10
NFE and CF	-.81	.051	Highly negatively correlated and marginally significant at P =0.05 level
NDF and ADF	.75	.084	High positive correlation and sig. at 0.10.
Ash and HC	.82*	.046	Very high positive correlation and sig. at 0.05 level
ADF and CS	.91**	.007	Very high positive correlation and sig. at 0.05 level

*. Correlation is significant at the 0.05 level CP= Crude protein, CF= Crude fibre, NFE= Nitrogen free extract, ADF= Acid detergent fibre and NDF= Neutral detergent fibre, HC= Hemicellulose, CS= Cellulose

Table 46: Correlation summary for the nutrients' content of rainy season's mona monkeys' foods in Okomu National Park

Correlated nutrients	r	P	Inference
DM and NFE	-.69	.059	Negatively correlated and significant at $P<0.10$.
CP and NFE	-.67	.071	Negatively correlated and significant at $P<0.10$.
EE and NFE	-.94**	.084	Very high negative correlation and sig. at $P<0.001$.
NFE and CS	-.72*	.043	Very high negative correlation and sig. at $P<0.05$.
Ash and NDF	-.74*	.037	Very high negative correlation and sig. at $P<0.05$.
Ash and ADF	-.82*	.014	Very high negative correlation and sig. at $P<0.05$.
Ash and ADL	-.74*	.037	Very high negative correlation and sig. at $P<0.05$.
NDF and ADF	.85*	.008	Very high positive correlation and sig. at $P<0.05$.
ADF and ADL	.79*	.020	Very high positive correlation and sig. at $P<0.05$.

*- Correlation is significant at the 0.05 level (2-tailed); **- Correlation is significant at the 0.001 level (2-tailed). DM= Dry matter, CP= Crude protein, EE= Ether extract, NFE= Nitrogen free extract, NDF= Neutral detergent fibre, ADF= Acid detergent fibre, ADL= Acid detergent lignin, CS= Cellulose

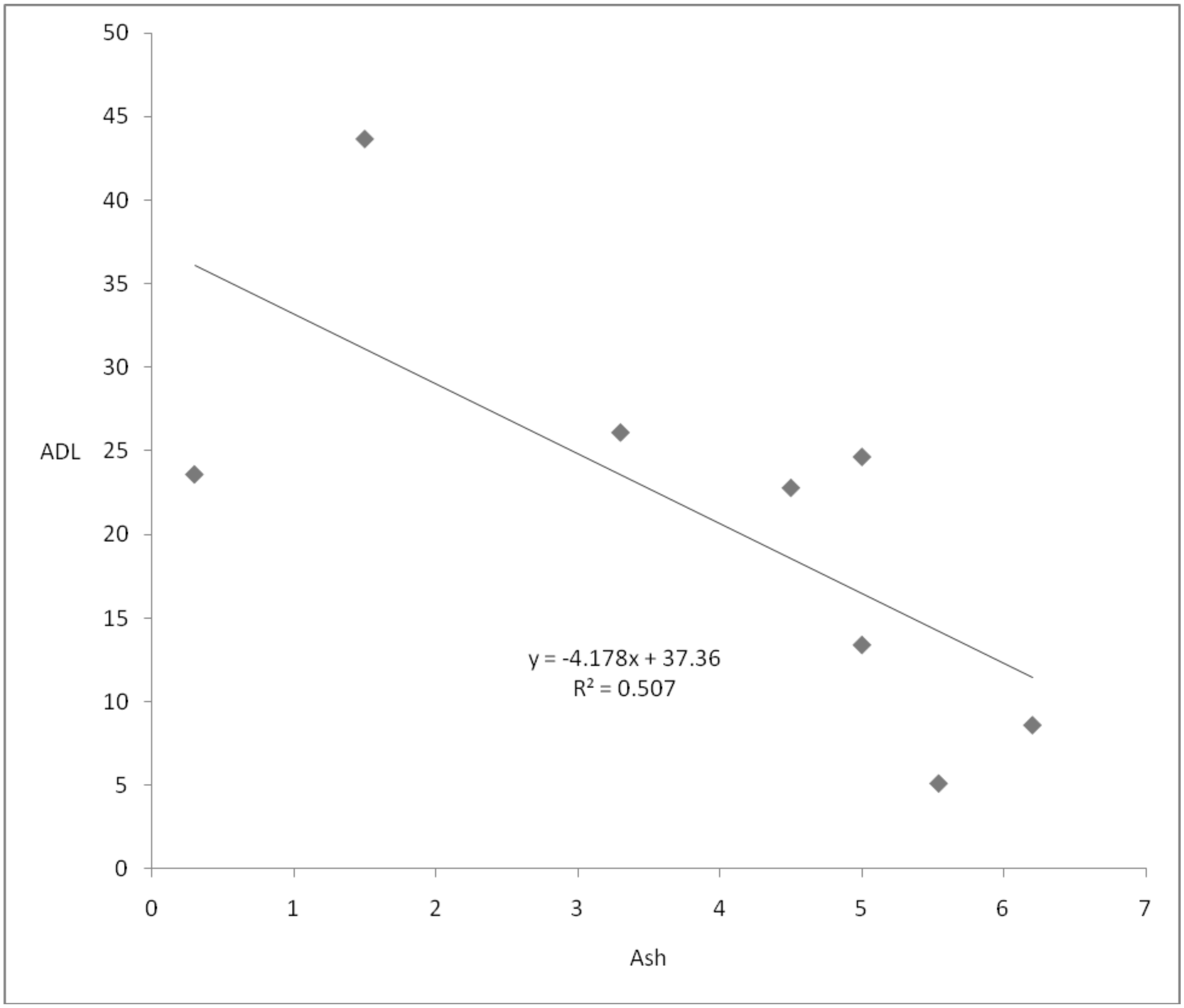

Figure 12: Regression line of acid detergent lignin on ash of rainy season's foods in Okomu National Park

4.4.7. Amino Acids Profile of the Mona Monkeys' Food Plants in University of Lagos

The amino acids profiles of the food plants had similar pattern. Histidine, methionine, phenylalanine, proline, cysteine and threonine had values below 5g/100g protein. Other amino acids had values between 5-10g/100g protein. All the amino acids had values that were below 11g/100g protein.

4.4.7.1. Amino Acids Profile of the Dry Season's Mona Monkeys' Foods in University of Lagos

The amino acids profile of dry season's foods of mona monkeys' in UNILAG is shown on Figure 13 and the values are on Appendix 29. *Avicennia germinans* had the highest glutamine value of 10.23g/100g protein while *Terminalia catappa* the least cysteine content of 0.48g/100g protein.

4.4.7.2. Amino Acids Profile of the Rainy Season's Mona Monkeys' Foods in University of Lagos

The amino acids content of the rainy season's foods of mona monkeys in UNILAG is shown on Figure 21 and the values on Appendix 30.

4.4.7.3. Amino Acid Profile of the Dry and Rainy Seasons' Mona Monkeys' Foods in Lekki Conservation Centre

The amino acids profile of dry and rainy seasons' mona monkeys' foods in LCC is shown on Figure 22, while their values are on Appendix 31. The essential AAs that were below 5%/100g protein were histidine, threonine, valine, methionine, isoleucine and pheynylalanine. Serine, proline, glycine and cysteine are the non essential AAs that were less than 5%/100g protein.

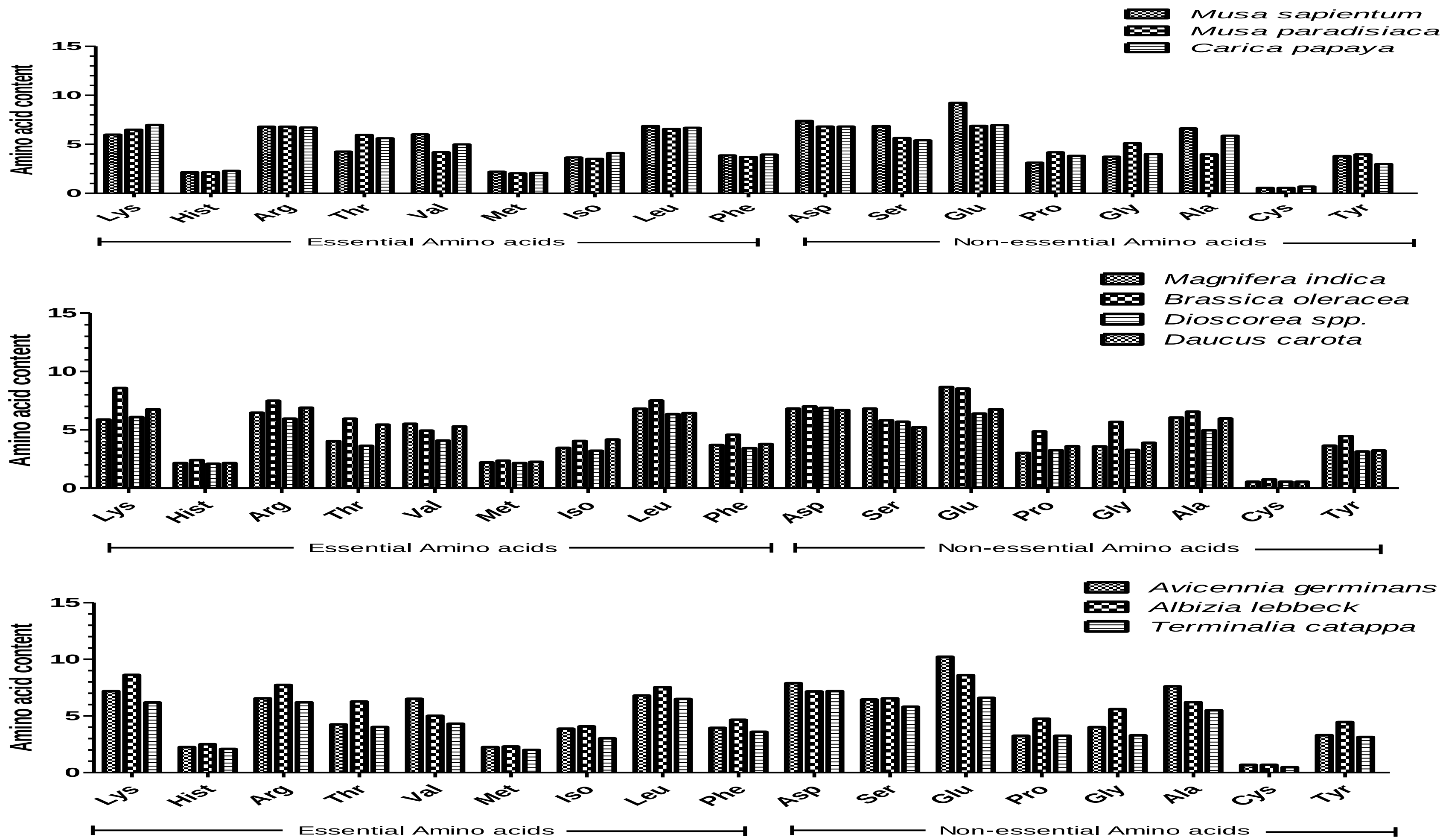

Figure 13: Amino acid profile of dry season's mona monkeys' foods in University of Lagos

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine, Leu=Leucine, Phe= Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glucine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine

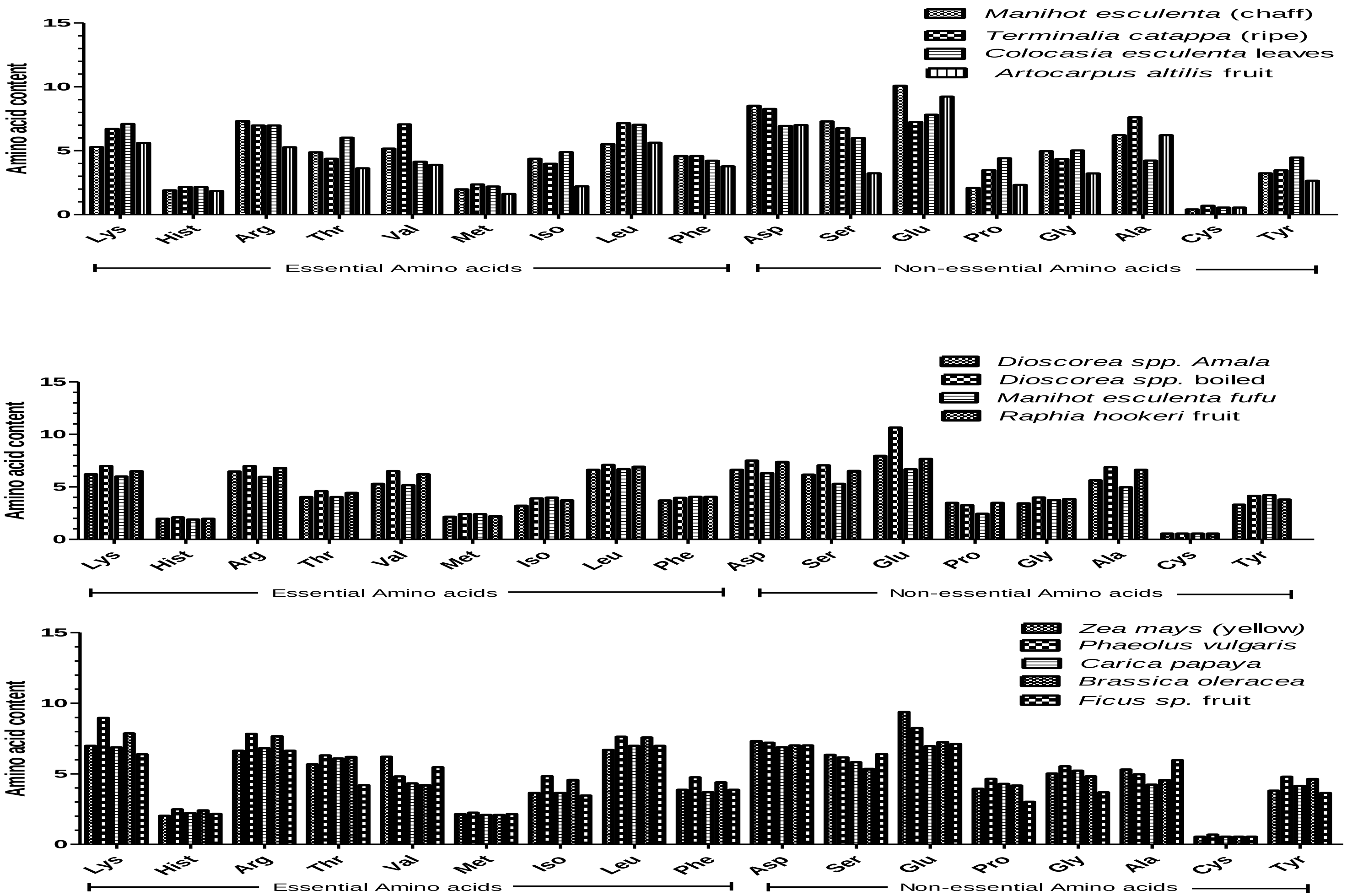

Figure14: Amino acids profile of rainy season's mona monkeys' foods in University of Lagos

Lys = Lysine, Hist = Histidine, Arg = Arginine, Thr = Threonine, Val = Valine, Met = Methionine, Iso = Isoleucine, Leu = Leucine, Phe = Phenylalanine, Asp = Asparagine, Ser = Serine, Glu = Glucine, Pro = Proline, Gly = Glycine, Ala = Alanine, Cys = Cysteine, Tyr = Tyronine

4.4.7.4. Amino Acids Profile of the Dry and Rainy Season's Mona Monkeys' Foods in Okomu National Park

The AA profile of mona monkeys' foods in ONP is shown on Figure 16. The values are shown on Appendix 32. Lysine, arginine and leucine are the essential AAs that were more than 5%/100g protein. Cysteine with values that ranged between 0.41 and 0.55 for all the foods was the least.

4.4.8. Amino Acids Profile of the Mona Monkeys' Most Preferred and New Foods

The amino acids profile of the most preferred foods, and the novel foods of mona monkeys are shown on Figure 17.The values of the amino acids are shown on Appendix33.Glutamine was the only AAs that had values above 10%/100g protein. The amounts of AAs for these foods were above amounts for other foods. Histidine, methionine and cysteine had lower values than 5%/100g protein.

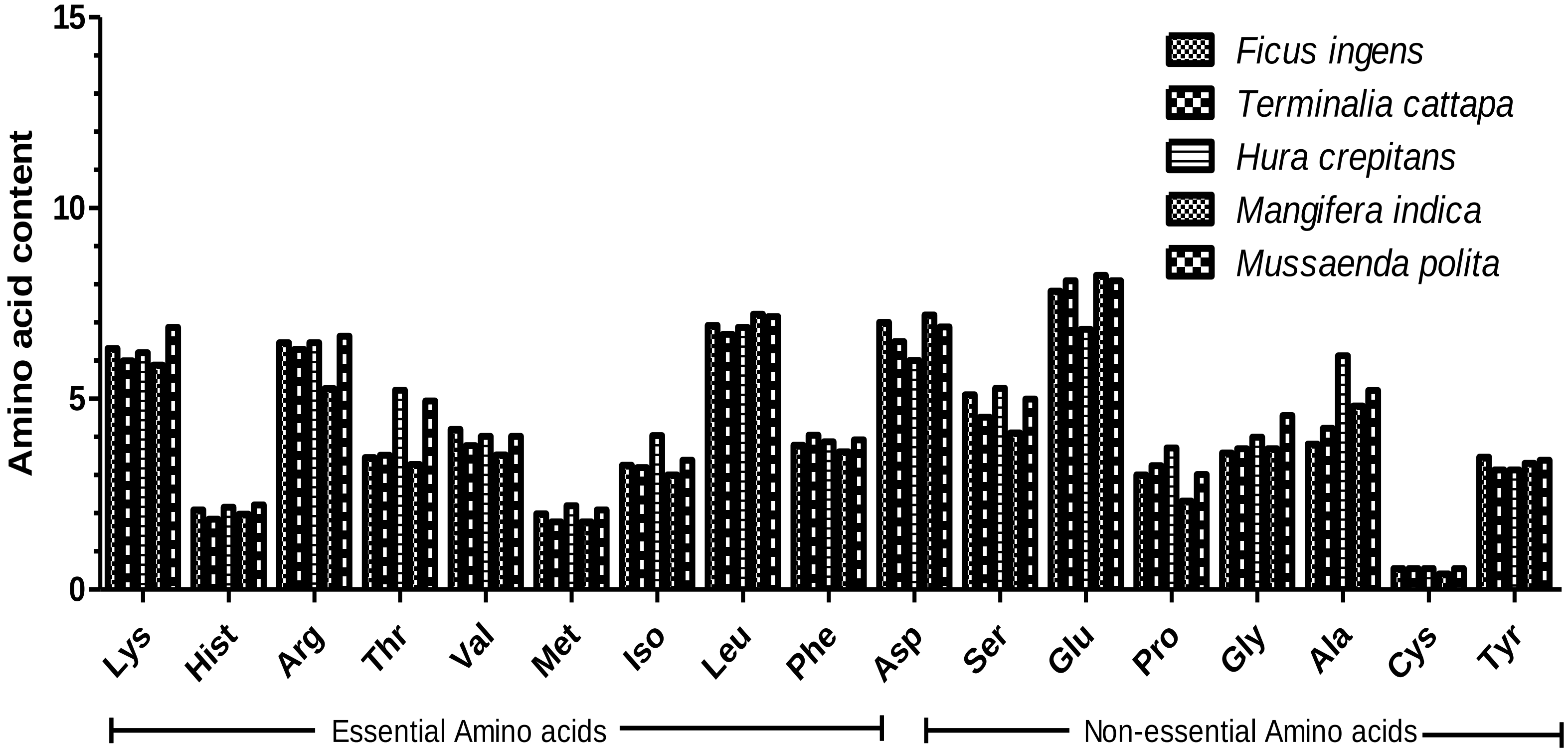

Figure 15: Amino acids profile of dry and rainy seasons' mona monkeys' foods in Lekki Conservation Centre

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine, Leu=Leucine, Phe= Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glutamine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine.

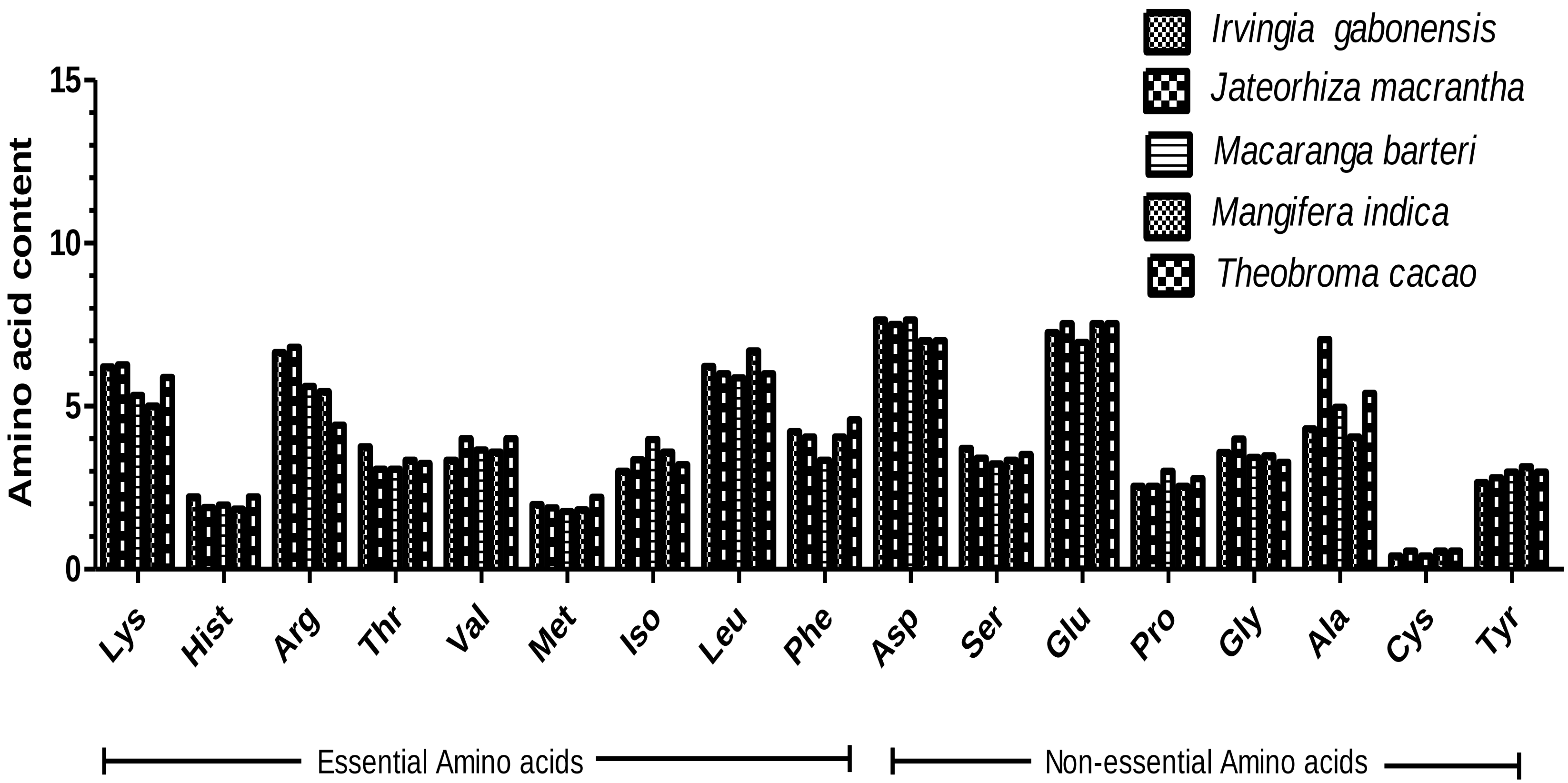

Figure 16: Amino acids profile of dry and rainy seasons' monamonkeys' foods in Okomu National Park

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine, Leu=Leucine, Phe= Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glutamine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine.

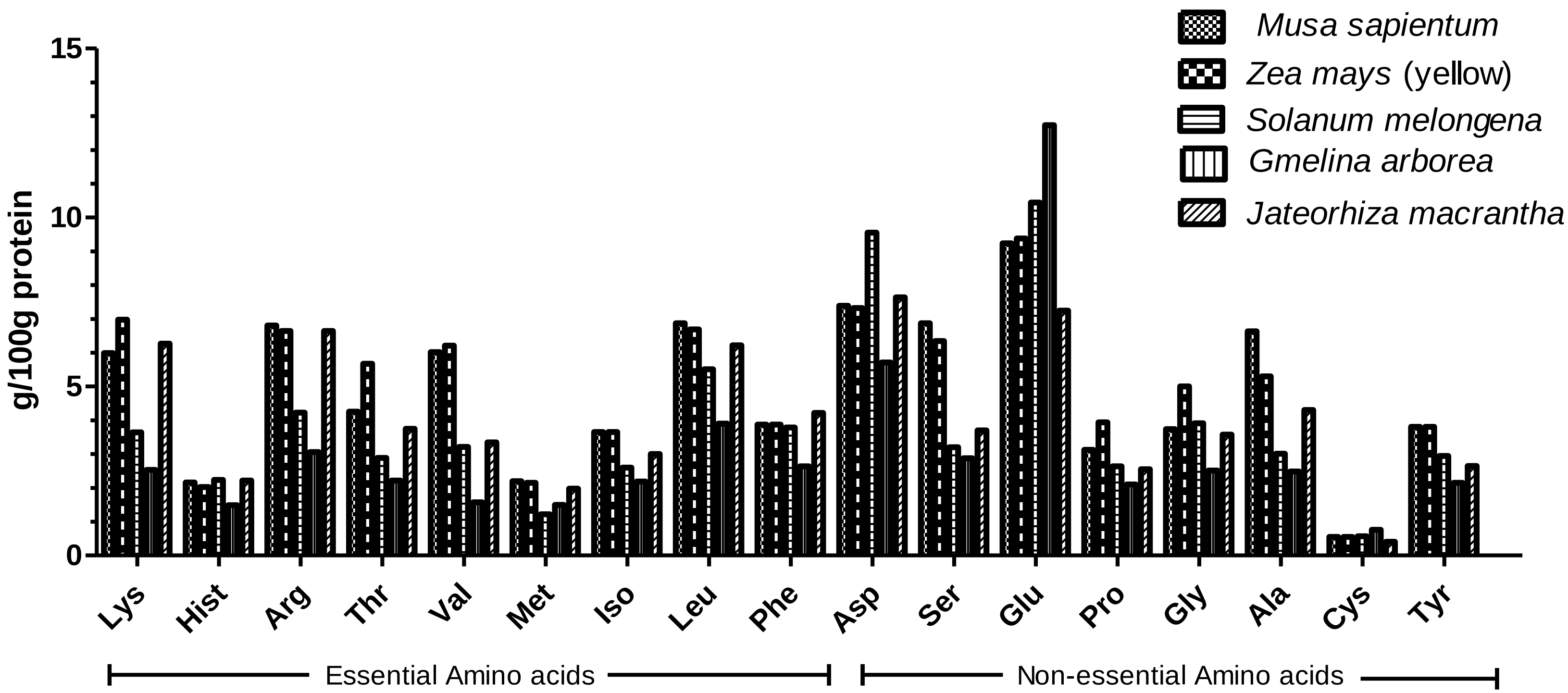

Figure 17: Amino acids profile of mona monkeys' preferred foods (obtained from University of Lagos' Zoological Garden) and the two new foods (*Gmelina arborea* and *Jateorhiza macrantha*)

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine, Leu=Leucine, Phe= Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glutamine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine.

4.4.9 ASSESSMENT OF MONA MONKEYS' FOOD PREFERENCE

4.4.9.1. Coefficient of Preference of Batch One Foods

The mona monkeys' COP for foods offered in Batch One is shown on Table 47. All the foods apart from *Arachis hypogeae* (ground nut) had COP values that were above unity for all the days (*Carica papaya* was less than unity on Day 1). *Musa sapientum* had the highest COP value of 1.66.

4.4.9.2. Coefficient of Preference of Batch Two Foods

The mona monkeys' COP for foods offered in Batch Two is shown on Table 48. On Day One, only *Carica papaya* and *Musa sapientum* had COP above 1. For the three days, *Ananas comosus* and *Ipomea batatas* had COP that were below 1, while *Musa sapientum* had COP above 1. On the average, *Musa sapientum* had the highest COP value of 1.70.

4.4.9.3. Coefficient of Preference of Batch Three Foods

The mona monkeys' COPvalues for foods offered in Batch Three is shown on Table 49. Bread had the least COP value for all the days. This was followed by *Terminalia catappa*. *Mangifera indica* and *Solanum melongena* had COP values that were above unity for the three days, while the latter had the highest COP value of 1.78.

Table 47: Coefficient of preference of foods offered in Batch One to mona monkeys

Food Sample	Day 1	Day 2	Day 3	Ave. COP
Arachis hypogeae	0.62	0.21	0.00	0.28
Carica papaya	0.85	1.22	2.05	1.37
Mangifera indica	1.61	1.40	1.14	1.38
Musa sapientum	1.55	1.96	1.48	1.66

COP= Coefficient of Preference

Table 48: Coefficient of preference of foods offered in Batch Two to mona monkeys

Food Sample	**Day 1**	**Day 2**	**Day 3**	**Ave. COP**
Carica papaya	1.79	0.91	1.49	1.40
Musa sapientum	1.34	1.67	2.08	1.70
Ananas comosus	0.67	0.91	0.3	0.63
Ipomea batatas	0.3	0.30	0.12	0.24
Zea mays (fresh)	0.9	1.21	1.01	1.04

COP= Coefficient of Preference

Table 49: Coefficient of preference of foods offered in Batch Three to mona monkeys

Food Sample	Day 1	Day 2	Day 3	Ave. COP
Bread	0.44	0.69	0.89	0.67
Terminalia catappa	0.87	1.19	0.89	0.98
Mangifera indica	1.88	1.13	1.44	1.48
Solanum melongena	1.81	1.98	1.56	1.78

COP= Coefficient of Preference

4.4.9.4. Coefficient of Preference of Batch Four Foods

The mona monkeys' COP for foods offered in Batch Four is shown on Table 50. *Irvingia gabonensis* had the highest average COP value of 1.8. This was followed by *Terminalia catappa*with a COP value of 1.11. *Zea mays* (fresh) and *Artocarpus altilis* had the least COP values of 0.81 and 0.28 respectively.

4.4.9.5. Reacceptability Coefficient of Preference

Themona monkeys' re-acceptability COP is on Table 51. Only *Carica papaya* had COP value that was below unity. *Musa sapientum*, fresh *Zea mays*, and *Solanum melongena* had COP values that were on the average above unity, but in a declining order. The preference was in the order of *Musa sapientum*>*Zea mays*>*Solanum melongena*.

Table 50: Coefficient of preference of foods offered in Batch Four to mona monkeys

Food Sample	**Day 1**	**Day 2**	**Day 3**	**Ave. COP**
Irvingia gabonensis	1.62	2.06	1.71	1.8
Terminalia catappa	0.34	1.09	1.91	1.11
Zea mays (fresh)	1.7	0.54	0.19	0.81
Artocarpus altilis	0.34	0.31	0.19	0.28

COP= Coefficient of Preference

Table 51: Coefficient of preference of foods offered to mona monkeys for the re-acceptability trial

Food Sample	**Day 1**	**Day 2**	**Day 3**	**Ave. COP**
Musa sapientum	1.38	1.02	1.5	1.30
Zea mays (fresh)	1.06	1.29	0.96	1.10
Solanum melongena	1.35	0.88	1.03	1.09
Carica papaya	0.65	0.81	0.51	0.66

COP= Coefficient of Preference

4.4.10. Correlation of Food Preference and Nutrient Composition

Correlation matrix between mona monkeys' foods with COP values ≥ 1 and proximate composition is presented on Appendix 34. There was a significantly negative correlation between crude fibre (CF) and the COP of the food items ($r = -0.84$, $P = 0.018$). There were other negative relations that were not significant ($P > 0.05$). The Pearson correlation results indicate that COP did not have significant correlation with any of the fibre fractions NDF, ADF, ADL, HC and CEL at 5% significance level (Appendix 35).

4.5. DETERMINATION OF PEOPLE'S ATTITUDES TOWARDS MONA MONKEY CONSERVATION

Three hundred and ninety (390) people responded to the questionnaires: 235 from UNILAG, 67 from LCC and 88 from ONP. Responses to 'Strongly Agreed' and 'Agreed' were combined presented as 'Agreed', 'Disagreed' and 'Strongly Disagreed' were presented as 'Disagreed'. The Cumulative Percent as showed in their respective Appendices were used for result presentation.

4.5.1. People's Attitude to Mona Monkeys' Conservation in University of Lagos

4.5.1.1. Descriptive Statistics of Biodata of Respondents

The biodata of respondents from UNILAG is shown on Table 52. A total of 235 people responded to the questionnaire: 63.0% were males, 34.0% were females, while 3.0% did not indicate their gender. Age categories shows that 70.6% of the respondents were between 20-30 years, 12.8% were between 31-40 years, 5.1% were above 41 years while 11.5% did not indicate their age. Educational qualifications of the respondents were: Senior Secondary

School Certificate (SSSC) holders, 27.2%, Ordinary National Diploma (OND), 4.7%, Higher National Diploma (HND), 10.6%, First degree 37.9%, MSc. holders, 3.8%, while ‘Others’ and ‘No response’ groups were 9.8% and 6.0% respectively.

Table 52: Bio-data of Respondents in University of Lagos

Variable	Frequency (N=235)	Percentage
Sex		
Male	148	63.0
Female	80	34.0
No response	7	3.0
Age (Years)		
20-30	166	70.6
31-40	30	12.8
41 and above	12	5.1
No response	27	11.5
Educational Qualification		
Senior Secondary School Certificate	64	27.2
Ordinary National Diploma (OND)	11	4.7
Higher National Diploma (HND)	25	10.6
First Degree (B.Sc.)	89	37.9
M.Sc.	9	3.8
Others	23	9.8
No response	14	6.0

4.5.1.2. Descriptive Statistics of Likert Statements in University of Lagos

For all the Likert results presented below, percentages for Strongly Agree and Agree were summed as Agree, while those for Disagree and Strongly Disagree became Disagree.

4.5.1.2.a. Likert Statements on Attitude, Beliefs and Culture of Respondents to Mona Monkeys' Conservation in University of Lagos

The respondents' level of agreement or disagreement to the Likert statements on attitude and beliefs and mona monkeys' conservation in UNILAG is shown on Table 53a. 76.4% of the respondents agreed that wild animals including mona monkeys are nature's gift to man and a means of their livlelihood, while only 23.6% disagreed. However, a higher percent, 76.1% agreed that the mona monkeys and other wild animals disturb people and raid farm lands, but 22.8% disagreed. For use for medicinal purposes 66.7% disagreed, while 33.3% agreed. Regarding awareness by people that the mona monkeys should not be killed any how, 48.9 % agreed that people are aware, while 50.9% disagreed.

4.5.1.2.b. Likert Statements on Orientation about Hunting and Poaching on Mona Monkeys in University of Lagos

The orientation about hunting and poaching of mona monkeys of respondents in UNILAG is shown on Table 53b. 'Hunting of wild animals, and mona monkeys inclusive as an age long human profession', and 'Commercial hunting as a source of income to hunters' were both agreed to by 88.8% of the respondents while 12.2% disagreed. Wild animals and mona monkeys' hunting for subsistence contritbutes to the nutrition of the hunters' families was agreed by 66.5%, while 33.5 % disagreed. Illegal hunting (poaching) was agreed by 62.2%

to cause local extinction of mona monkeys while 37.8% disagreed with that statement. Only 26.1% agreed that hunting of monkeys is illegal while 73.9% of thr respondents disagreed.

Table 53a: Number and percent of respondents on their attitude, beliefs and culture on mona monkeys' conservation in University of Lagos

Statements on attitude, beliefs and culture On mona monkeys' conservation	Strongly Agree No. (%)	Agree No. (%)	Disagree No. (%)	Strongly Disagree No. (%)
The mona monkeys in my location are protected by our traditional beliefs.	35.0 (15.3)	67.0 (29.3)	36.0 (15.7)	91.0 (39.7)
Traditional beliefs make people to fear mona monkeys.	25.0 (10.8)	103.0 (44.6)	27.0 (11.7)	76.0 (32.9)
Our people love mona monkeys and would want to keep them as pets than kill them.	45.0 (19.5)	100.0 (43.3)	32.0 (13.9)	54.0 (23.4)
People in my area use monkeys for medicinal purposes.	30.0 (13.3)	45.0 (20.0)	49.0 (21.8)	101.0 (44.9)
Wild animals including mona monkey are nature's gift to man and a means of our livelihood.	65.0 (28.4)	110.0 (48.0)	21.0 (9.2)	33.0 (14.4)
Mona monkeys and other wild animals disturb our people and raid their farm lands.	60.0 (25.5)	119.0 (50.6)	17.0 (7.3)	36.0 (15.5)
Our local people are aware of the usefulness of nature and mona monkey conservation.	33.0 (14.0)	84.0 (35.7)	35.0 (15.2)	78.0 (33.9)
People are aware that monkeys should not be killed any how.	40.0 (17.0)	75.0 (31.9)	40.0 (17.1)	79.0 (33.8)

Table 53b: Number and percent of respondents on their orientation about hunting and Poaching of mona monkeys in University of Lagos

Statements on orientation about hunting and poaching of mona monkeys	Strongly Agree No. (%)	Agree No. (%)	Disagree No. (%)	Strongly Disagree No. (%)
Hunting of wild animals, mona monkeys inclusive is an age long human profession.	91.0 (39.2)	115.0 (49.6)	7.0 (3.0)	19.0 (8.2)
Hunting wild animals and mona monkey for subsistence contributes to the nutrition of the hunters' families.	51.0 (21.9)	104.0 (44.6)	33.0 (14.2)	45.0 (19.3)
Commercial hunting of wild animals and mona monkey is a source of income to the hunters.	81.0 (35.1)	124.0 (53.7)	8.0 (3.5)	18.0 (7.8)
People in my location kill monkeys' because the meat is tasty to them.	22.0 (9.7)	66.0 (29.1)	59.0 (26.0)	80.0 (35.2)
Hunting of monkeys is illegal in my location.	16.0 (7.1)	43.0 (19.0)	58.0 (25.7)	109.0 (48.2)
Illegal hunters caught in my location are tried in our office or court.	8.0 (3.5)	26.0 (11.5)	81.0 (35.7)	112.0 (49.3)
Illegal hunting of mona monkeys in my area could cause them to become locally extinct.	51.0 (22.2)	92.0 (40.0)	00.0 (00.0)	87.0 (37.8)

4.5.1.2.c. Likert Statements on Respondents' Views Regarding the Roles of Governments in Mona Monkeys' Conservation in University of Lagos

The views of respondents in UNILAG about governments' roles in mona monkeys' conservation is shown on Table 53c. 'It requires the efforts of law enforcement agencies for people to keep conservation rules and stop poaching' was agreed by 84.6%, while 15.4% disagreed with that. Poor maintenance and management of protected areas could lead to loss of wild life and mona monkeys was agreed by 84.5% of respondents, but only 15.5 % disagreed. It was agreed by 82.7% that when PAs are well taken care of, the staff will be committed to protecting the natural resources. However, 17.3 % disagreed with that statement. 'It is only when policies are made about the protection of mona monkeys in my location that the animals would be conserved' was agreed by 78.9% of respondents, but 21.0% disagreed with that statement. Government has PAs for wild animals' and mona monkeys' conservation was agreed by 68.2%, but 31.9% disagreed. On the adequacy of financial investments by government in wild animal conservation, 24.9% agreed while 75.1% disagreed with the statement.

Table 53c: Number and percent of respondents on their views about governments' roles in mona monkeys' conservation inUniversity of Lagos

Statements on views about governments' roles in mona monkeys' conservation	Strongly Agree No. (%)	Agree No. (%)	Disagree No. (%)	Strongly Disagree No. (%)
Government has protected areas for wild animals' and mona monkeys' conservation purposes.	59.0 (25.8)	97.0 (42.4)	27.0 (11.8)	46.0 (20.1)
Governments' involvement in nature conservation through Game Reserves/National Park has greatly helped in the conservation of mona monkey.	58.0 (25.4)	117.0 (51.3)	19.0 (8.3)	34.0 (14.9)
Financial investment by government in wild animal conservation has been adequate.	15.0 (6.7)	41.0 (18.2)	74.0 (32.9)	95.0 (42.2)
Governments' special (protected) areas for wildlife seem to be adequately maintained and managed.	22.0 (10.0)	50.0 (22.6)	52.0 (23.5)	97.0 (43.9)
Poor maintenance and management of our protected areas could lead to loss of wild animals and mona monkeys.	91.0 (40.3)	100.0 (44.2)	19.0 (8.4)	16.0 (7.1)
When protected areas are well taken care of, the staff will be committed to protecting the natural resources.	69.0 (30.7)	117.0 (52.0)	18.0 (8.0)	21.0 (9.3)
Government has made rules on nature conservation.	36.0 (16.1)	106.0 (47.3)	30.0 (13.4)	52.0 (23.2)
The wild life habitats in my location have rules on how the place should be used.	33.0 (15.0)	77.0 (35.0)	45.0 (20.5)	65.0 (29.5)
It is only when policies are made about the protection of mona monkeys in my location that the animals would be conserved.	76.0 (33.3)	104.0 (45.6)	22.0 (9.6)	26.0 (11.4)
The law enforcement agencies in my area have succeeded in making people value mona monkeys and wild animals.	23.0 (10.2)	60.0 (26.7)	65.0 (28.9)	77.0 (34.2)
It requires the efforts of law enforcement agencies for people to keep conservation rules and stop poaching.	100.0 (45.5)	86.0 (39.1)	21.0 (9.5)	13.0 (5.9)

4.5.1.3. Inferential Statistics of Likert Statements of Respondents in University of Lagos

4.5.1.3.a. Effects of Personal Factors on Attitude towards Mona Monkeys' Conservation in University of Lagos

The effects of personal factors on the attitude of respondents towards mona monkeys' conservation in UNILAG is shown on Table 54a. Sex, age, and educational level had P values of 0.685, 0.157, and 0.266 respectively; none of which was significant ($P \leq 0.05$). The implication was that sex, age, and educational level did not affect the attitude, beliefs and culture of respondents in UNILAG on mona monkeys' conservation.

4.5.1.3.b. Effects of Personal Factors on Orientation about Hunting and Poaching on Mona Monkeys' Conservation in University of Lagos

The effect of personal factors on respondents' orientation about hunting and poaching on mona monkeys' conservation in UNILAG is shown on Table 54b. The respective P values for sex, age, and educational level were 0.149, 0.945 and 0.469 respectively. None of these were significant at $P \leq 0.05$, thus implying that the sex, age, and educational level of respondents in UNILAG did not affect their orientation about hunting and poaching of mona monkeys.

4.5.1.3.c. Effects of Personal Factors on Views about Governments' Roles in Mona Monkeys' Conservation in University of Lagos

The ANOVA result of the effect of personal factors of UNILAG's respondents' on views about governments' roles in mona monkeys' conservation is shown on Table 54c. The respective P values for sex, age, and educational level were 0.750, 0.274, and 0.430. None of these were significant, implying that sex, age and educational level did not affect the respondents' knowledge about environmental protection.

Table 54a: Effects of personal factors on attitude towardsmona monkeys' Conservation in University of Lagos

Variables	P-Value	Inference
Sex	0.685	NS
Age	0.157	NS
Educational Level	0.266	NS

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and EducationalLevel) S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

Table 54b: Effects of personal factor on orientation about hunting and poaching of mona monkeys in University of Lagos

Variables	**P-Value**	**Inference**
Sex	0.149	NS
Age	0.945	NS
Educational Level	0.469	NS

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level), S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

Table 54c: Effects of personal factors on views about governments' roles in mona monkeys' conservation in University of Lagos

Variables	P-Value	Inference
Sex	0.750	NS
Age	0.274	NS
Educational Level	0.430	NS

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level), S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

4.5.2. People's Attitude to Mona Monkeys' Conservation in Lekki Conservation Centre

4.5.2.1. Descriptive Statistics of Biodata of Respondentsin Lekki Conservation Centre

The biodata of respondents at LCC is shown on Table 55. Male respondents were 50.7%, females were 29.9%, while 19.4% did not indicate their gender. The majority, 40.3% were in the 20-30 years age group, 35.8% on age group 31-40, 6.0% were above 41, while 17.9% did not indicate their age. Considering educational qualification, 40.3% of the respondents had SSSC, 13.4% and 14.9% had OND, and HND respectively. Those with first, and masters' degree were 10.4% and 9.0% respectively.

Table 55: Biodata of Respondents from Lekki Conservation Centre

Variable	Frequency (N=67)	Percentage
Sex		
Male	34	50.7
Female	20	29.9
No response	13	19.4
Age (Years)		
20-30	27	40.3
31-40	24	35.8
41 and above	4	6.0
No response	12	17.9
Educational Qualification		
Senior Secondary School Certificate	27	40.3
Ordinary National Diploma (OND)	9	13.4
Higher National Diploma (HND)	10	14.9
First Degree (B.Sc.)	7	10.4
M.Sc.	6	9.0
No response	8	11.9

4.5.2.2. Descriptive Statistics of Likert Statements in Lekki Conservation Centre

4.5.2.2.a. Likert Statements on Attitude, Beliefs and Culture of Respondents to Mona Monkeys' Conservation in Lekki Conservation Centre

The respondents' agreement or disagreement to the Likert statements on attitude and beliefs and mona monkeys' conservation in LCC is shown on Table 56a. The statement 'Wild animals including mona monkeys are nature's gift to man and a means of our livelihood' was agreed to by 77.6% of the respondents, while 22.4% disagreed. Whereas 31.3% agreed that mona monkeys are protected by our local beliefs, 68.7% disagreed. On the statement 'Local beliefs make people to fear mona monkeys', 32.9% agreed, while 67.2% disagreed. It was agreed by 39.4% of the respondents that 'People in my area use monkeys for medicinal purposes', while 60.6% disagreed. This high level of disagreement to the last three issues above could probably mean that the respondents in LCC do not have strong local beliefs on the conservation of mona monkeys.

4.5.2.2.b. Likert Statements on Orientation about Hunting and Poaching on Mona Monkeys in Lekki Conservation Centre

The the frequency and percentage of responses in LCC on orientation about hunting and poaching of mona monkeys is shown on Table 56b. On hunting as an age long human profession, 83% of the respondents agreed while 13.4% disagreed. People kill monkeys because the meat is tasty was agreed by 31.3% while 68.7% disagreed to that reason. On the statement 'Illegal hunters caught in my location are tried in our office or court', 64.2% agreed to that, while 34.3% disagreed. While 59.1% agreed that 'Hunting of monkeys is illegal in my location', 40.9 disagreed to the statement. Hunting is actually illegal in this location as a Strict Nature Reserve.

Table 56a: Likert Statements on attitude, beliefs and culture of respondents to mona monkeys' conservation in Lekki Conservation Centre

Statements on attitude, beliefs and culture On mona monkeys' conservation	Strongly Agree No. (%)	Agree No. (%)	Disagree No. (%)	Strongly Disagree No. (%)
The mona monkeys in my location are protected by our traditional beliefs.	9.0 (13.4)	12.0 (17.9	18.0 (26.9)	28.0 (41.8)
Traditional beliefs make people to fear mona monkeys.	3.0 (4.5)	19.0 (28.4)	25.0 (37.3)	20.0 (29.9)
Our people love mona monkeys and would want to keep them as pets than kill them.	8.0 (11.9)	21.0 (31.3)	21.0 (31.3)	17.0 (25.4)
People in my area use monkeys for medicinal purposes.	7.0 (10.6)	19.0 (28.8)	20.0 (30.3)	20.0 (30.3)
Wild animals including mona monkeys are nature's gift to man and a means of our livelihood.	23.0 (34.3)	29.0 (43.3)	11.0 (16.4)	4.0 (6.0)
Mona monkeys and other wild animals disturb our people and raid their farm lands.	15.0 (22.4)	21.0 (31.3)	23.0 (34.3)	8.0 (11.9)
Our local people are aware of the usefulness of nature and mona monkey conservation.	13.0 (19.7)	18.0 (27.3)	19.0 (28.8)	16.0 (24.2)
People are aware that monkeys should not be killed anyhow.	10.0 (14.9)	18.0 (26.9)	14.0 (20.9)	25.0 (37.3)

Table 56b: Likert Statements on orientation about hunting and poaching on mona monkeys' conservation in Lekki Conservation Centre

Statements on orientation about hunting and poaching of mona monkeys	Strongly Agree No. (%)	Agree No. (%)	Disagree No. (%)	Strongly Disagree No. (%)
Hunting of wild animals, mona monkeys' inclusive is an age long human profession.	29.0 (44.6)	27.0 (41.5)	7.0 (10.8)	2.0 (3.1)
Hunting wild animals and mona monkey for subsistence contributes to the nutrition of the hunters' families.	5.0 (7.7)	20.0 (30.8)	16.0 (24.6)	24.0 (36.9)
Commercial hunting of wild animals and mona monkey is a source of income to the hunters.	12.0 (17.9)	28.0 (41.8)	15.0 (22.4)	12.0 (17.9)
People in my location kill monkeys because the meat is tasty to them.	7.0 (10.4)	14.0 (20.9)	16.0 (23.9)	30.0 (44.3)
Hunting of monkeys is illegal in my location.	13.0 (19.7)	26.0 (39.4)	15.0 (22.7)	12.0 (18.2)
Illegal hunters caught in my location are tried in our office or court.	18.0 (27.3)	25.0 (37.9)	17.0 (25.8)	6.0 (9.1)
Illegal hunting of mona monkey in my area could cause them to become locally extinct.	16.0 (23.9)	23.0 (34.3)	16.0 (23.9)	28.0 (41.8)

4.5.2.2.c. Likert Statements on Views on Governments' Role in Mona Monkeys' Conservation in Lekki Conservation Centre

The views of respondents in LCC about governments' roles in mona monkeys' conservation is shown on Table 56c. The statement 'It requires the efforts of law enforcement agencies for people to keep conservation rules and stop poaching' had 75.8% agreement, while 24.2% disagreed. When 77.4% agreed that government has PAs for wild animals and mona monkeys conservation purpose, 22.6% disagreed. To the statements 'Poor maintenance and management of our protected areas could lead to loss of wild animals and Mona monkeys', and 'When protected areas are well taken care of, the staff will be committed to protecting the natural resource', both had agreement values of 73.0%, while 27.0% disagreed. The response to these last two statements were similar, implying that PAs need to be taken care of and well maintained and managed if wild life including mona monkeys would not be lost. On financial investment by governments in wild animal conservation been adequate, 29.0% agreed while 70.9% disagreed. It was agreed by 68.8% of the respondents that government has made rules on nature conservation, but 31.1% disagreed to the statement. 'It is only when there are policies made about the protection of Mona monkey in my location that the animals would be conserved', was agreed by 67.7% of the respondents while 32.2% disagreed. The statement 'The law enforcement agencies in my area have succeeded in making people value mona monkeys' and wild animals', was agreed by only 36.5%, while 63.4% disagreed.

Table 56c: Likert Statements on Views about Governments' roles in Mona Monkeys' Conservation in Lekki Conservation Centre

Statements on views about governments' roles in mona monkeys' conservation	Strongly Agree No. (%)	Agree No. (%)	Disagree No. (%)	Strongly Disagree No. (%)
Government has protected areas for wild animals' and mona monkey conservation purposes.	12.0 (19.4)	36.0 (58.0)	7.0 (11.3)	7.0 (11.3)
Governments' involvement in nature conservation through Game Reserves/National Park has greatly helped in the conservation of mona monkey.	17.0 (27.4)	23.0 (37.1)	13.0 (21.0)	9.0 (14.5)
Financial investment by government in wild animal conservation has been adequate.	2.0 (3.2)	16.0 (25.8)	27.0 (43.5)	17.0 (27.4)
Governments' special (protected) areas for wildlife seem to be adequately maintained and managed.	10.0 (16.9)	17.O (28.8)	21.0 (35.6)	11.0 (18.6)
Poor maintenance and management of our protected areas could lead to loss of wild animals and mona monkeys.	26.0 (41.3)	20.0 (31.7)	11.0 (17.5)	6.0 (9.5)
When protected areas are well taken care of, the staff will be committed to protecting the natural resources.	13.0 (20.6)	33.0 (52.4)	9.0 (14.3)	8.0 (12.7)
Government has made rules on nature conservation.	16.0 (26.2)	26.0 (42.6)	16.0 (26.2)	3.0 (4.9)
The wild life habitats in my location have rules on how the place should be used.	23.0 (37.1)	19.0 (30.6)	9.0 (14.5)	11.0 (17.7)
It is only when there are policies made about the protection of Mona monkey in my location that the animals would be conserved.	20.0 (32.2)	17.0 (27.4)	14.0 (22.6)	11.0 (17.7)
The law enforcement agencies in my area have succeeded in making people value mona monkeys' and wild animals.	14.0 (22.2)	9.0 (14.3)	28.0 (44.4)	12.0 (19.0)
It requires the efforts of law enforcement agencies for people to keep conservation rules and stop poaching.	30.0 (45.5)	20.0 (30.3)	15.0 (22.7)	1.0 (1.5)

4.5.2.3. Inferential Statistics of Likert Statements in Lekki Conservation Centre

4.5.2.3.a. Effect of Personal Factors on Attitude towards Mona Monkeys' Conservation in Lekki Conservation Centre

The ANOVA of the effect of personal factors of respondents on their attitude towards mona monkeys' conservation is shown on Table 57a. The respective P values for sex, age, and educational level were 0.996, 0.986, and 0.793. None of these were significant, implying that sex, age and educational level did not affect respondents' attitude towards wildlife conservation.

4.5.2.3.b. Effect of Personal Factors on Orientation about Hunting and Poaching on Mona Monkeys in Lekki Conservation Centre

The effects of sex, age, and educational level on orientation about hunting and poaching on mona monkeys were not significant as shown by their respective P-values of 0.094, 0.066, and 0.534 (Table 57b). It could be deduced that sex, age, and educational level of LCC respondents did not affect their orientation about hunting and poaching on mona monkeys.

4.5.2.3.c. Effect of Personal Factors on Views about Governments' Roles in Mona Monkey Conservation in Lekki Conservation Centre

The ANOVA result of the effect of personal factors of LCC respondents on their views about governments' roles in mona monkeys' conservation is shown on Table 57c. The respective P values for sex, age, and educational level were 0.026, 0.346, and 0.883. Sex had a significant P value, implying that the respondents' sex affected their views about governments' roles in mona monkeys conservation. Age and educational level were not significant, implying that age, and educational level did not affect the respondents' views about governments' roles in mona monkeys' conservation.

Table 57a: Effect of personal factors on attitude towards mona monkeys' conservation in Lekki Conservation Centre

Variables	**P-Value**	**Inference**
Sex	0.996	NS
Age	0.986	NS
Educational Level	0.793	NS

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level)

S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

Table 57b: Effect of personal factor on orientation about hunting and poaching on Mona monkeys' conservation in Lekki Conservation Centre

Variables	P-Value	Inference
Sex	0.094	NS
Age	0.066	NS
Educational Level	0.534	NS

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level)

S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

Table 57c: Effect of personal factor on views about governments' roles in mona monkeys' Conservation in Lekki Conservation Centre

Variables	**P-Value**	**Inference**
Sex	0.026	S
Age	0.346	NS
Educational Level	0.883	NS

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level) S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

4.5.3. People's Attitude to Mona Monkeys' Conservation in Okomu National Park

4.5.3.1. Descriptive Statistics of Respondents' Biodata

The biodata of respondents at the ONP is shown on Table 58. A total of 88 responses were obtained from LCC: males made up 77.3% while 14.7% were females. Those within ages 20-30 were 37.5% while those in 31-40 made up 33.0%. SSSC holders made up 48.9%. OND, HND, First degree, Others, and No response groups were 8.0%, 2.3%, 13.6%, 12.5% and 14.8% respectively.

Table 58: Biodata of Respondents in Okomu National Park

Variable	Frequency (N=88)	Percentage
Sex		
Male	68	77.3
Female	13	14.7
No response	7	8.0
Age (Years)		
20-30	33	37.5
31-40	29	33.0
41 and above	12	13.6
No response	14	15.9
Educational Qualification		
Senior Secondary School Certificate	43	48.9
Ordinary National Diploma	7	8.0
Higher National Diploma	2	2.3
First Degree	12	13.6
Others	11	12.5
No response	13	14.8

4.5.3.2. Descriptive Statistics of Likert Statements in Okomu National Park

4.5.3.2.a. Likert Statements on Attitude, Beliefs and Culture of Respondents to Mona Monkeys' Conservation in Okomu National Park

The respondents' agreement or disagreement to the Likert statements on attitude and beliefs onmona monkeys' conservation in ONP is shown on Table 59a. Mona monkeys and other wild animals disturb people and raid farms had the highest agreement of 89.6%, while only 10.3% disagreed. This implied that as a PA surrounded by farm lands, the wildlife must be causing some harm on farms. 'Wild animals including mona monkeys are nature's gift to man and a means of our livelihood' had a 81.4% agreement as compared to 18.6% that disagreed. The statement about people's awareness that monkeys should not be killed was agreed by 76.8% of the respondents, while 23.2% disagreed. On the awareness of the usefulness of nature and mona monkeys' conservation, 75.3% agreed, but 24.6% disagreed. This awareness is expected from a National Park and its community members. 'People in my area use monkeys for medicinal purposes', was agreed by only 25.3% of the respondents, while 74.7% disagreed.

4.5.3.2.b. Likert Statements on Orientation about Hunting and Poaching on Mona Monkeysin Okomu National Park

The percentage of responses in ONP on orientation about hunting and poaching of mona monkeys is shown on Table 59b. All the seven statements on hunting and poaching had over 60% agreement level in this location. These imply that this location has high prevalence of hunting and poaching. 'Illegal hunters when caught are tried in the office or court' was agreed by 92.0% of the respondents, but 8% disagreed. Commercial hunting of wild animals and mona monkeys was a source of income to the hunters was agreed by 91.9%, while 8.0% of the respondents disagreed. It was agreed by 88.4% of respondents that illegal hunting of mona monkeys could cause them to become locally extinct, but 11.6% disagreed with the statement. Regarding hunting as been illegal in this location, 85.0% agreed, whild 14.9% disagreed with the statement. It was agreed by 78.6% of the respondents that hunting as an age long profession, but 21.5% disagree. ‘Hunting wild animals and mona monkeys contributes to the nutrition of the hunters’family was agreed by 72.4%, while 27.6% of the respondents disagreed with the statement.

Table 59a: Number and percent of respondents on their attitude, beliefs and culture on mona monkeys' conservation in Okomu National Park

Statements on attitude, beliefs and culture On mona monkeys' conservation	Strongly Agree No. (%)	Agree No. (%)	Disagree No. (%)	Strongly Disagree No. (%)
The mona monkeys in my location are protected by our traditional beliefs.	26.0 (31.0)	23.0 (27.4)	17.0 (20.0)	18.0 (21.4)
Traditional beliefs make people to fear mona monkeys.	16.0 (18.6)	13.0 (13.1)	36.0 (41.9)	21.0 (24.4)
Our people love mona monkeys and would want to keep them as pets than kill them.	33.0 (39.3)	18.0 (21.4)	20.0 (23.8)	13.0 (15.5)
People in my area use monkeys for medicinal purposes.	10.0 (12.0)	11.0 (13.3)	41.0 49.4)	21.0 (25.3)
Wild animals including mona monkey are nature's gift to man and a means of our livelihood.	33.0 (38.4)	37.0 (43.0)	7.0 (8.1)	9.0 (10.5)
Mona monkeys and other wild animals disturb our people and raid their farm lands.	45.0 (51.7)	33.0 (37.9)	2.0 (2.3)	7.0 (8.0)
Our local people are aware of the usefulness of nature and mona monkeys' conservation.	24.0 (28.2)	40.0 (47.1)	11.0 (12.9)	10.0 (11.8)
People are aware that monkeys should not be killed anyhow.	33.0 (38.4)	33.0 (38.4)	15.0 (17.4)	5.0 (5.8)

Table 59b: Number and percent of respondents on their orientation about hunting and poaching of mona monkeys in Okomu National Park

Statements on orientation about hunting and poaching of mona monkeys	**Strongly Agree** No. (%)	**Agree** No. (%)	**Disagree** No. (%)	**Strongly Disagree** No. (%)
Hunting of wild animals, mona monkeys' inclusive is an age long human profession.	46.0 (54.8)	20.0 (23.8)	13.0 (15.5)	5.0 (6.0)
Hunting wild animals and mona monkey for subsistence contributes to the nutrition of the hunters' families.	34.0 (39.1)	29.0 (33.3)	14.0 (16.1)	10.0 (11.5)
Commercial hunting of wild animals and mona monkey is a source of income to the hunters.	43.0 (49.4)	37.0 (42.5)	4.0 (4.6)	3.0 (3.4)
People in my location kill monkeys because the meat is tasty to them.	30.0 (34.5)	25.0 (28.7)	22.0 (25.3)	10.0 (11.5)
Hunting of monkeys' is illegal in my location.	49.0 (56.3)	25.0 (28.7)	6.0 (6.9)	7.0 (8.0)
Illegal hunters caught in my location are tried in our office or court.	60.0 (69.0)	20.0 (23.0)	3.0 (3.4)	4.0 (4.6)
Illegal hunting of mona monkeys in my area could cause them to become locally extinct.	40.0 (46.5)	36.0 (41.9)	5.0 (5.8)	5.0 (5.8)

4.5.3.2.c. Likert Statements on Views on the Role of Governments on Mona Monkeys' Conservation in Okomu National Park

The views of respondents in ONP about the role of governments on mona monkeys' conservation is shown on Table 59c. In this location, all statements on the role of governments in mona monkeys' conservation had at least 60% agreement level. Governments' involvement in nature conservation through Game Reserves/National Park has greatly helped in the conservation of mona monkeys, was agreed by 93.2% of the respondents, while only 6.8% disagreed. On the statement 'Government has made rules on nature conservation', 93.1% agreed, but 6.9% disagreed with the statement. When PAs are well taken care of, the staff will be committed to to protecting the natural resources, was agreed to by 91.8% of the respondents, but 8.3% disagreed. Governments have PAs for wild animals' and mona monkeys' conservation, was agreed by 90.7% of the respondents, whereas 9.3% disagreed on the statement. It was agreed by 89.8% of the respondents that that poor maintenance and management of our protected areas could lead to loss of wild animals and mona monkeys, but 10.2% disagreed. Even though 85.6% agreed that wildlife habitats in their location has rules on how it should be used, but 14.4% disagreedt, it was agreed by 89.6% of respondents that it requires law enforcement agencies for people to keep conservation rules and stop poaching, but 10.5 % disagreed with this latter statement.

Table 59c: Number and percent of respondents on their views about role of governments in mona monkeys' conservation in Okomu National Park

Statements on Views about Governments roles in Mona monkey Conservation	Strongly Agree No. (%)	Agree No. (%)	Disagree No. (%)	Strongly Disagree No. (%)
Government has protected areas for wild animals' and mona monkey conservation purposes.	57.0 (66.3)	21.0 (24.4)	5.0 (5.8)	3.0 3.5)
Governments' involvement in nature conservation through Game Reserves/National Park has greatly helped in the conservation of mona monkey.	66.0 (75.0)	16.0 (18.2)	1.0 (1.1)	5.0 (5.7)
Financial investment by government in wild animal conservation has been adequate.	23.0 (27.1)	30.0 (35.3)	19.0 (22.4)	13.0 (15.3)
Governments' special (protected) areas for wildlife seem to be adequately maintained and managed.	37.0 (43.5)	21.0 (24.7)	7.0 (8.2)	20.0 (23.5)
Poor maintenance and management of our protected areas could lead to loss of wild animals and mona monkeys.	50.0 (56.8)	29.0 (33.0)	3.0 (3.4)	6.0 (6.8)
When protected areas are well taken care of, the staff will be committed to protecting the natural resources.	52.0 (61.2)	26.0 (30.6)	1.0 (1.2)	6.0 (7.1)
Government has made rules on nature conservation.	44.0 (50.6)	37.0 (42.5)	4.0 (4.6)	2.0 (2.3)
The wild life habitats in my location have rules on how the place should be used.	34.0 (41.0)	37.0 (44.6)	8.0 (9.6)	4.0 (4.8)
It is only when there are policies made about the protection of Mona monkey in my location that the animals would be conserved.	34.0 (41.5)	33.0 (38.8)	7.0 (8.2)	11.0 (12.9)
The law enforcement agencies in my area have succeeded in making people value mona monkeys' and wild animals.	28.0 (32.2)	36.0 (41.4)	12.0 (13.8)	11.0 (12.6)
It requires the efforts of law enforcement agencies for people to keep conservation rules and stop poaching.	57.0 (66.3)	20.0 (23.3)	1.0 (1.2)	8.0 (9.3)

4.5.3.3. Inferential Statistics of Likert Statements in Okomu National Park

4.5.3.3.a. Effect of Personal Factors on Attitude towards Mona Monkeys' Conservation in Okomu National Park

The effect of personal factors on attitude towards mona monkeys' conservation in ONP is shown on Table 60a. The effects of sex and age on attitude were not significant (P = 0.435 and 0.114 respectively) whereas the effect of educational level was significant (P = 0.021). It could be deduced that sex and age did not affect the attitude of respondents in ONP towards mona monkeys' conservation, whereas their educational level significantly did.

4.5.3.3.b. Effect of Personal Factors on Orientation about Hunting and Poaching on Mona Monkeys' Conservation in Okomu National Park

The effect of personal factors on orientation about hunting and poaching on mona monkeys' conservation is shown on Table 60b. The effects of sex and educational level on attitude were not significant (P = 0.185 and 0.681 respectively) whereas the effect of age was significant (P= 0.035). From the outcome, it could be deduced that gender and educational level did not affect respondents' attitude toward wildlife conservation whereas the age of respondents significantly influenced their attitude towards conservation of wildlife.

4.5.3.3.c. Effect of Personal Factors on Views about Governments Roles in Mona Monkeys' Conservation in Okomu National Park

The effects of personal factors on respondents' views about the roles of governments on mona monkeys' conservation is shown on Table 60c. Sex and educational level did not significantly affect the respondents' perception (P = 0.460 and 0.340 respectively), but age did significantly affect the people's perception ($P = 0.024$). This implied that in ONP, only the respondents' age affected their views about governments' roles in wildlife conservation.

Table 60a: Effect of personal factors on attitude towards mona monkeys' conservation in Okomu National Park

Variables	P-Value	Inference
Sex	0.435	NS
Age	0.114	NS
Educational Level	0.021	S

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level)

S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

Table 60b: Effect of personal factors on orientation about poaching on wildlife conservation in Okomu National Park

Variables	P-Value	Inference
Sex	0.185	NS
Age	0.035	S
Educational Level	0.681	NS

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level)

S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

Table 60c: Effect of personal factors on views about the roles of governments on wildlife conservation in Okomu National Park

Variables	P-Value	Inference
Sex	0.460	NS
Age	0.024	S
Educational Level	0.340	NS

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level)

S: Significant ($P \leq 0.05$), NS: Not Significant ($P > 0.05$)

4.5.4. Comparison of Primary Data from the Three Study Locations

4.5.4.1. Descriptive Statistics of Respondents' Biodata from University of Lagos, Lekki Conservation Centre, and Okomu National Park

The highest number of respondents (235) was from UNILAG, followed by ONP (88) and LCC (67). Comparisons of the biodata of respondents from the three locations showed that more males responded than females (Figure 18), age group 21-30 had the highest number of respondents (Figure 19). Senior School Leaving Certificate (SSCE) holders were the highest among the respondents, although in UNILAG, BSc. holders were the highest in number (Figure 20).

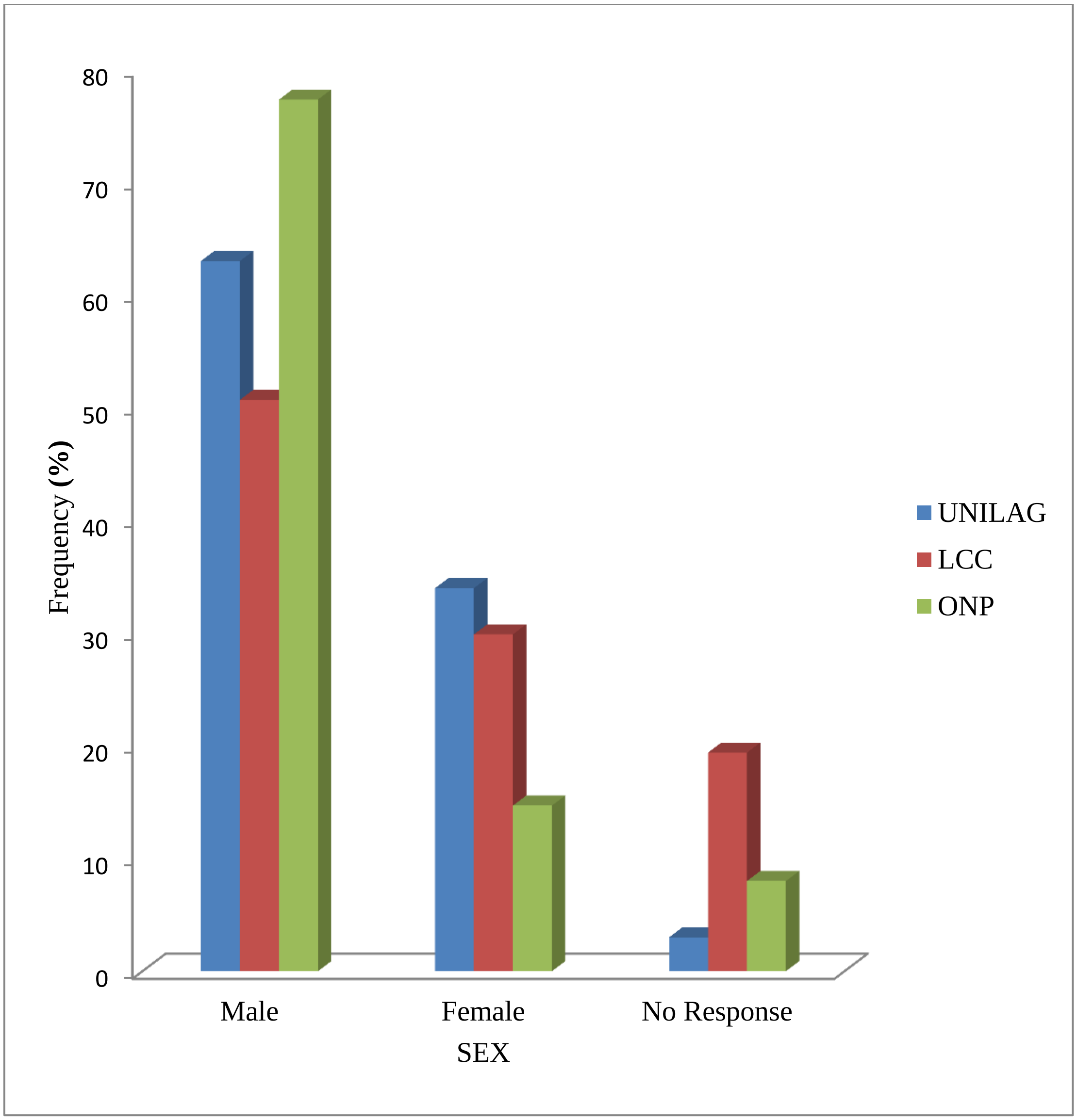

Figure 18: Sex of respondentsin the three locations.

UNILAG= University of Lagos, LCC= Lekki Conservation Centre, ONP= Okomu National Park

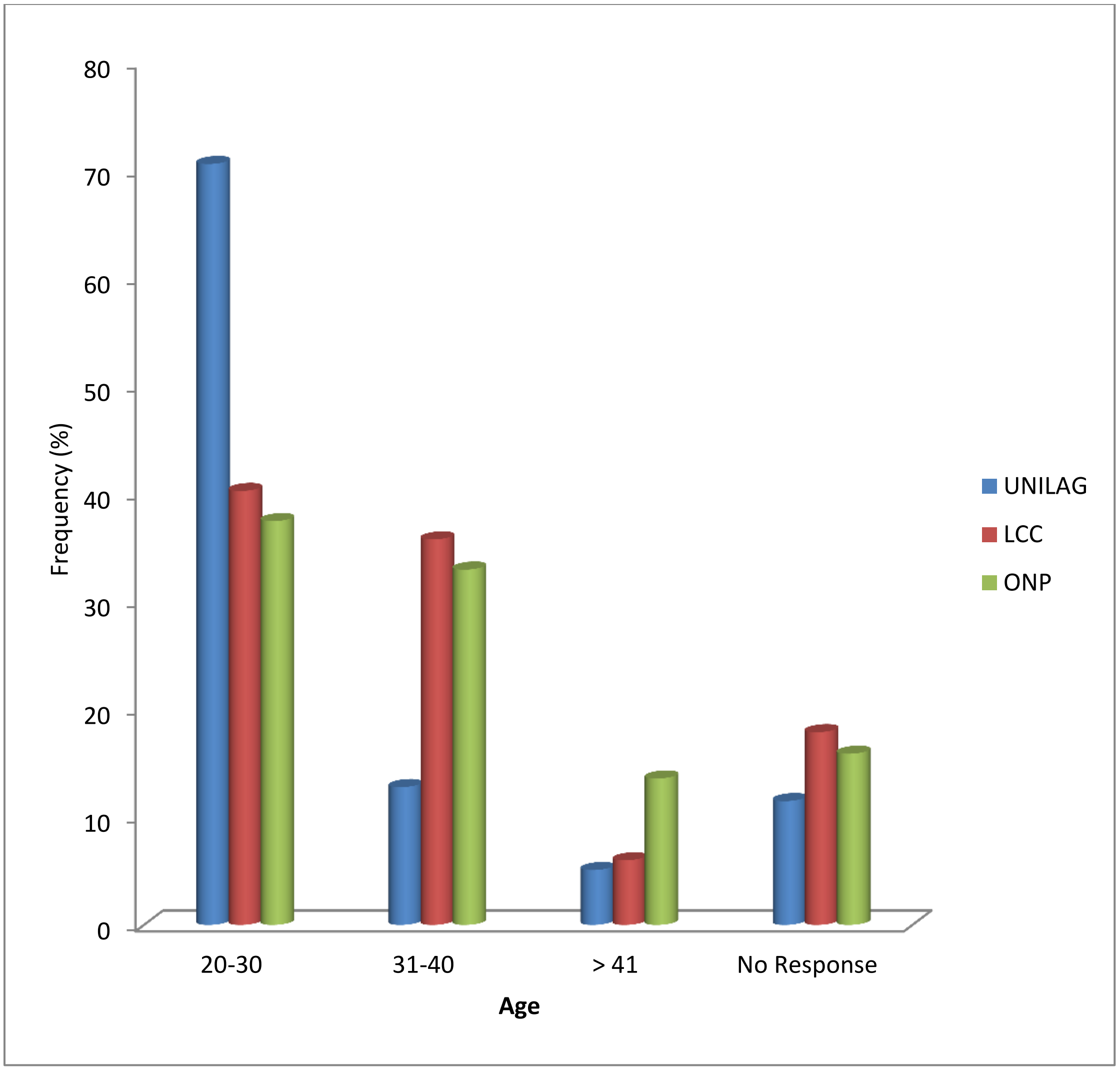

Figure 19: Age distribution of respondents from the three locations

UNILAG= University of Lagos, LCC= Lekki Conservation Centre, ONP= Okomu National Park

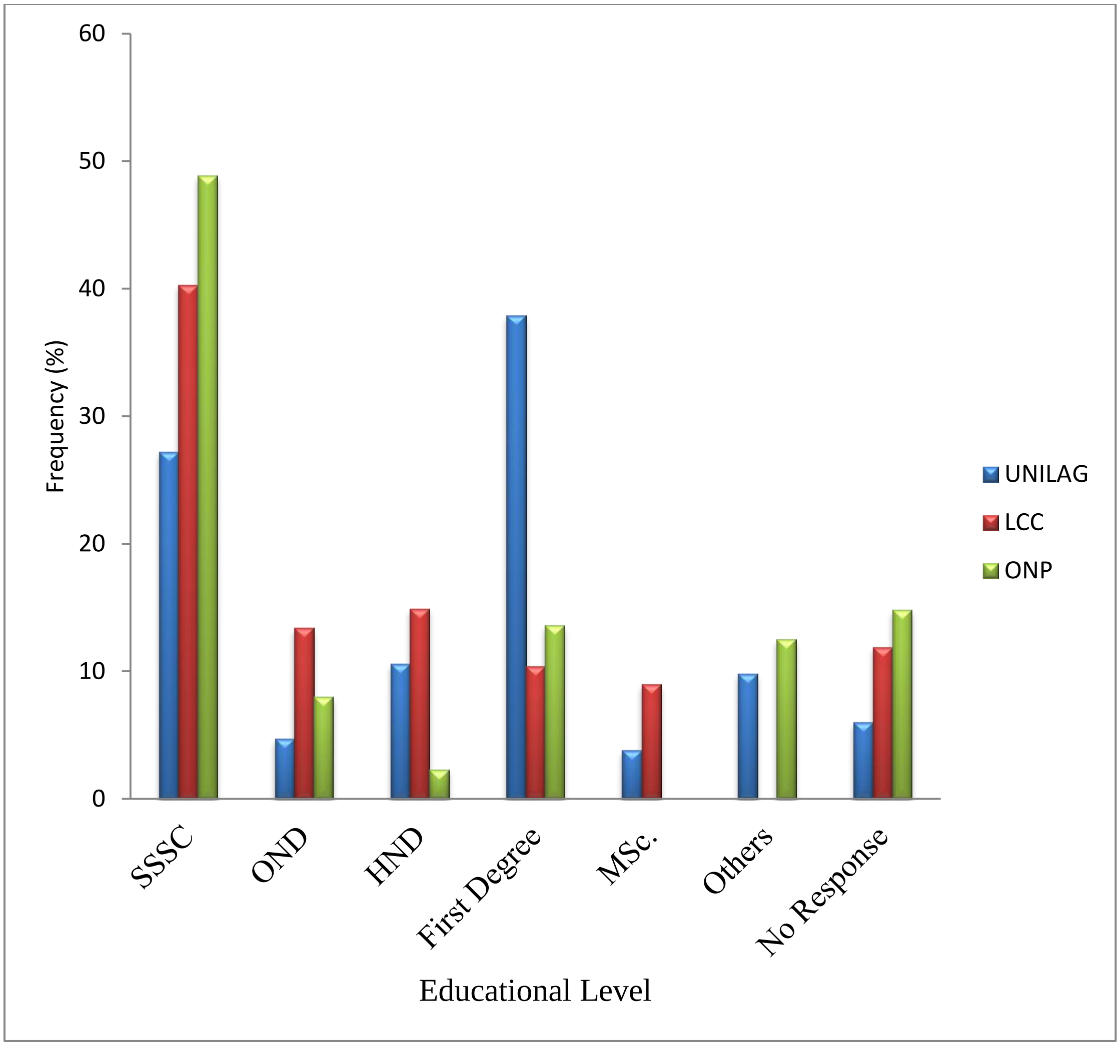

Figure 20: Educational qualification of respondents from the three locations

UNILAG = University of Lagos, LCC = Lekki Conservation Centre, ONP = Okomu National Park

4.5.4.2. Descriptive Statistics of Respondents to Likert Statements in University of Lagos, Lekki Conservation Centre, and Okomu National Park

4.5.4.2.a. Responses to Likert Statements on Attitude, Beliefs and Culture on Mona Monkeys' Conservation in University of Lagos, Lekki Conservation Centre, and Okomu National Park

The combined responses from the three locations on attitude and beliefs on mona monkeys' conservation is shown on Table 61a. Wild animals and mona monkeys as natures gifts to man and a means of his livelihood was agreed by 76.1% of the respondesnts while 21.8% disagreed. Seventy five point two percent of respondents agreed that wild animals and mona monkeys includive disturb people and raid farm lands, while 24% disagreed. The responses to other statements had agreement or disagreement ranges that were not as wide as the two above.

4.5.4.2.b. Orientation of Respondents on Hunting and Poaching in University of Lagos, Lekki Conservation Centre, and Okomu National Park

The responses on orientation to hunting and poaching and mona monkeys' conservation for UNILAG, LCC, and ONP combined is shown on Table 61b. Eighty four point one percent agreed that hunting is an age long profession, but 13.6% disagreed. This implies that people will continue to hunt either as a source of income which 83.4% agreed on, while 15.4% disagreed or subsistence as source of protein which 62.3% agreed, but 36.4% disagreed. Illegal hunting could cause mona monkeys to become extinct locally was agreed by 66.1% of the respondents while 32.1% disagreed.

Table 61a: Number and percent of respondents on their attitude, beliefs and culture on mona monkeys' conservation in University of Lagos, Lekki Conservation Centre and Okomu National Park

Statements on attitude, beliefs and culture on mona monkeys' conservation	**Strongly Agree** No. (%)	**Agree** No. (%)	**Disagree** No. (%)	**Strongly Disagree** No. (%)
The mona monkeys in my location are protected by our traditional beliefs.	70.0 (17.9)	102.0 (26.2)	136.0 (34.9)	72.0 (18.5)
Traditional beliefs make people to fear mona monkeys.	44.0 (11.3)	135.0 (34.6)	132.0 (33.8)	73.0 (18.7)
Our people love mona monkeys and would want to keep them as pets than kill them.	86.0 (22.1)	139.0 (35.6)	91.0 (23.3)	66.0 (16.9)
People in my area use monkeys for medicinal purposes.	47.0 (12.1)	75.0 (19.2)	162.0 (41.5)	90.0 (23.1)
Wild animals including mona monkey are nature's gift to man and a means of our livelihood.	121.0 (31.0)	176.0 (45.1)	44.0 (11.3)	41.0 (10.5)
Mona monkeys and other wild animals disturb our people and raid their farm.	120.0 (30.8)	173.0 (44.4)	46.0 (11.9)	47.0 (12.1)
Our local people are aware of the usefulness of nature and mona monkey conservation.	70.0 (17.9)	142.0 (36.4)	105.0 (26.9)	64.0 (16.4)
People are aware that monkeys should not be killed any how.	83.0 (21.3)	126.0 (32.3)	119.0 (30.5)	59.0 (15.1)

Table 61b: Number and percent of respondents on their orientation about hunting and poaching of mona monkeysin University of Lagos, Lekki Conservation Centre and Okomu National Park

Statements on orientation about hunting and poaching of mona monkeys	**Strongly Agree** No. (%)	**Agree** No. (%)	**Disagree** No. (%)	**Strongly Disagree** No. (%)
Hunting of wild animals, mona monkeys' inclusive is an age long human profession.	166.0 (42.6)	162.0 (41.5)	34.0 (8.7)	19.0 (4.9)
Hunting wild animals and mona monkey for subsistence contributes to the nutrition of the hunters' families.	90.0 (23.1)	153.0 (39.2)	83.0 (21.3)	59.0 (15.1)
Commercial hunting of wild animals and mona monkey is a source of income to the hunters.	136.0 (34.9)	189.0 (48.5)	34.0 (8.7)	26.0 (6.7)
People in my location kill monkeys' because the meat is tasty to them.	59.0 (15.1)	105.0 (26.9)	132.0 (33.8)	85.0 (21.8)
Hunting of monkeys is illegal in my location.	78.0 (20.0)	94.0 (24.1)	127.0 (32.6)	80.0 (20.5)
Illegal hunters caught in my location are tried in our office or court.	86.0 (22.1)	94.0 (24.1)	127.0 (32.6)	80.0 (20.5)
Illegal hunting of mona monkey in my area could cause them to become locally extinct.	107.0 (27.4)	151.0 (38.7)	60.0 (15.4)	65.0 (16.7)

4.5.4.2.c. Respondents' Views About Governments Roles in Mona Monkeys' Conservation in University of Lagos, Lekki Conservation Centre, and Okomu National Park

The views of respondents in UNILAG, LCC and ONP about the roles of governments on mona monkeys' conservation is shown on Table 61c. Governement has protected areas for wild animals' and mona monkeys' conservation purposes was agreed by 72.3%, while 24.4% disagreed. Seventy six point two percent agreed that 'Governments' involvement in nature conservation through Game Reserves/National Park has greatly helped in the conservation of mona monkey', but 20.5% disagreed about it. However, 81% agreed that poor management and maintenance of PAs could lead to loss of wild animals and mona monkeys, 14.8% disagreed. 'It is only whenpolicies are made about the protection of mona monkeys in my location that the animals would be conserved'was agreed by 72.8% of the respondents while 23.4% disagreed. Eighty point two percent of the respondents agreed that 'It requires the efforts of law enforcement agencies for people to keep conservation rules and stop poaching', although 15.1% disagreed.

The magnitude of each of the three subscales in each locality on a 100 point gradation is shown on Figure 28. In UNILAG, LCC and ONP, 68.23%, 81.5% and 49.57% respectively had positive attitude towards mona monkeys' conservation, while 82.50%, 65% and 27.2% in the respective locations were of the notion that mona monkeys were hunted or poached. Concerning the roles of governments on mona monkeys' conservation, 75.47%, 79.43% and 35.6% respectivley in UNILAG, LCC and ONP agreed.

Table 61c: Number and percent of respondents on their views about role of governments in mona monkeys' conservationin University of Lagos, Lekki Conservation Centre and Okomu National Park

Statements on views about role of governments in mona monkeys' conservationin in three locations	**Strongly Agree** **No. (%)**	**Agree** **No. (%)**	**Disagree** **No. (%)**	**Strongly Disagree** **No. (%)**
Government has protected areas for wild animals' and mona monkey conservation purposes.	128.0 (32.8)	154.0 (39.5)	58.0 (14.9)	37.0 (9.50)
Governments' involvement in nature conservation through Game Reserves/National Park has greatly helped in the conservation of mona monkey.	142.0 (36.2)	156.0 (40.0)	43.0 (11.0)	37.0 (9.5)
Financial investment by government in wild animal conservation has been adequate.	40.0 (10.3)	87.0 (22.3)	131.0 (33.6)	114.0 (29.2)
Governments' special (protected) areas for wildlife seem to be adequately maintained and managed.	69.0 (17.7)	88.0 (22.6)	128.0 (32.8)	80.0 (20.5)
Poor maintenance and management of our protected areas could lead to loss of wild animals and mona monkeys.	167.0 (42.8)	149.0 (38.2)	22.0 (5.6)	36.0 (9.2)
When protected areas are well taken care of, the staff will be committed to protecting the natural resources.	134.0 (34.4)	176.0 (45.1)	30.0 (7.7)	33.0 (8.5)
Government has made rules on nature conservation.	96.0 (24.6)	169.0 (43.3)	59.0 (15.1)	48.0 (12.3)
The wild life habitats in my location have rules on how the place should be used.	90.0 (23.1)	133.0 (34.1)	84.0 (21.5)	58.0 (14.9)
It is only when there are policies made about the protection of Mona monkey in my location that the animals would be conserved.	130.0 (33.3)	154.0 (39.5)	44.0 (11.3)	47.0 (12.1)
The law enforcement agencies in my area have succeeded in making people value mona monkeys' and wild animals.	65.0 (16.7)	105.0 (26.9)	101.0 (25.9)	104.0 (26.7)
It requires the efforts of law enforcement agencies for people to keep conservation rules and stop poaching.	187.0 (47.9)	126.0 (32.3)	15.0 (3.8)	44.0 (11.3)

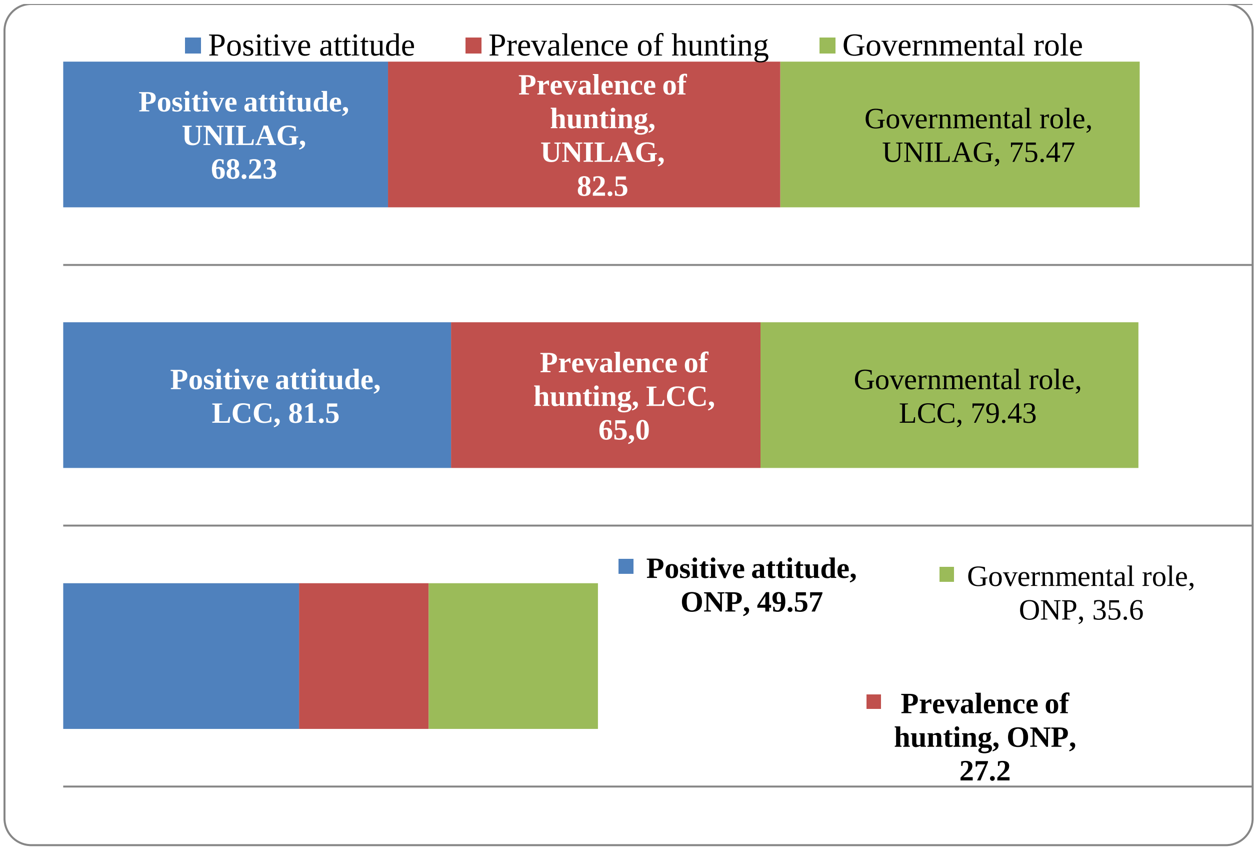

Figure 21: Plot showing variation of the three factors between the three study locations

UNILAG= University of Lagos, LCC= Lekki Conservation Centre, ONP= Okomu National Park

4.5.4.3. Inferential Statistics of Compared Primary Data from the Three Study Locations

4.5.4.3.a. Effects of Personal Factors and Locality on Attitude towardsMona Monkeys' Conservation

The ANOVA of the effects of personal factors and locality on the attitude of the respondents in the three study locations towards mona monkeys' conservation is shown on Table 62a. P values of 0.795 and 0.680 for sex and age respectively were not significant ($P \leq 0.05$). This implied that sex and age did not affect respondents' attitude towards mona monkeys' conservation. Educational level with P=0.042 was significant, implying that it affected respondents' attitude towards mona monkeys' conservation. Locality with P<0.001 was highly significant, implying that location affected respondents' attitude towards mona monkeys' conservation.

4.5.4.3.b. Effect of Personal Factors and Locality on Orientation about Hunting and Poaching on Mona Monkeys inUniversity of Lagos, Lekki Conservation Centre, and Okomu National Park

The ANOVA of the effects of personal factors and locality on orientation about hunting and poaching on mona monkeys is shown on Table 62b. Sex, age and locality were highly significant at P< 0.001. Educational level was significantly different at P <0.007. This implied that the orientation of respondents about hunting and poaching ofmona monkeys were strongly affected these four variables.

4.5.4.3.c. Effects of Personal Factors and Locality on Views about Governments' Roles in Mona Monkey Conservation: University of Lagos, Lekki Conservation Centre, and Okomu National Park

The ANOVA of effects of personal factors and locality on views about governments' roles in mona monkey conservation is shown on Table 62c. All the P values for sex, age, educational level and locality were significant ($P < 0.05$). This could imply that all the four variables did significantly affect the respondents' views about governments' roles in mona monkeys' conservation.

Table 62a: Effects of personal factors on attitude towards mona monkeys' conservation in University of Lagos, Lekki Conservation Centre and Okomu National Park

Variables	P-Value	Inference
Sex	0.795	NS
Age	0.680	NS
Educational Level	0.042	S
Locality	<0.001	S***

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level)

S: Significant ($P \leq 0.05$); S ***: Significant ($P \leq 0.001$); NS: Not Significant ($P > 0.05$)

Table 62b: Effects of personal factors and locality on orientation about hunting and poaching on mona monkeys' conservation inUniversity of Lagos, Lekki Conservation Centre and Okomu National Park.

Variables	P-Value	Inference
Sex	< 0.001	S***
Age	< 0.001	S***
Educational Level	0.007	S**
Locality	< 0.001	S***

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level)

S: Significant ($P \leq 0.05$); S ***: Significant ($P \leq 0.001$); S **: Significant ($P \leq 0.007$)

Table 62c: Effects of personal factors and locality on views about the roles of governmentinmona monkeys'conservation in University of Lagos, Lekki Conservation Centre and Okomu National Park

Variables	P-Value	Inference
Sex	0.002	S***
Age	< 0.001	S***
Educational Level	0.036	S
Locality	< 0.001	S***

P-Value: Probability value for the t-statistic (sex) and F-statistic (Age and Educational Level)

S: Significant ($P \leq 0.05$), S ***: Significant ($P \leq 0.001$)

4.5.4.4. Okomu National Park's Record of Offences (Secondary Data) Analysis

From the records of Park Offences and Prosecutions, the type and frequency of offences per year was summarized and shown on Figure 29. Farming had the highest occurrence of 24. This was followed by hunting and logging, Park entry, and collection of non-timber forest products (NTFP). Yearly number of arrests in the Park is shown on Figure 30. The highest number of arrests with a figure of 37 was recorded in 1999. This was followed by 2003. Thereafter, there was a consistent decline in the arrest rate.

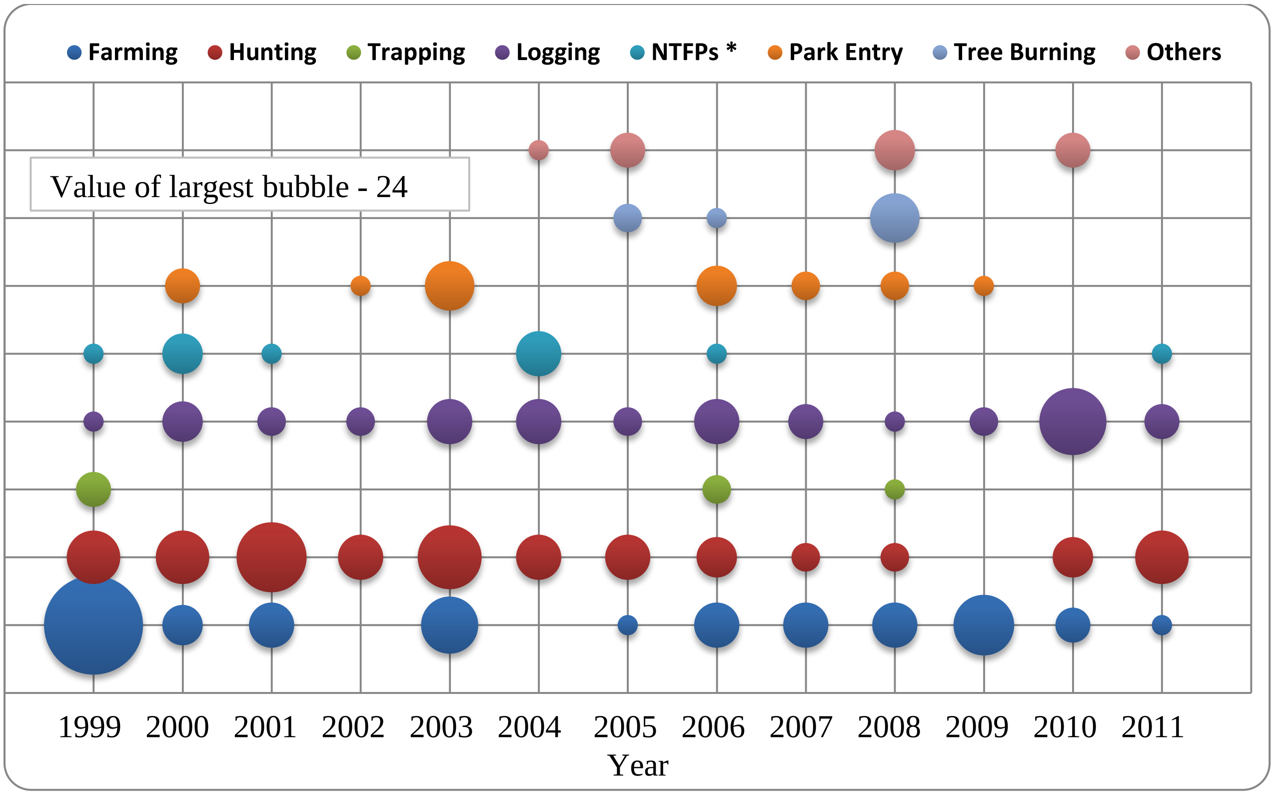

Figure 22: Bubble plot showing the type and numberof illegal activity in ONP (1999 – 2011). * NTFPs stand for Non-Timber Forest Products

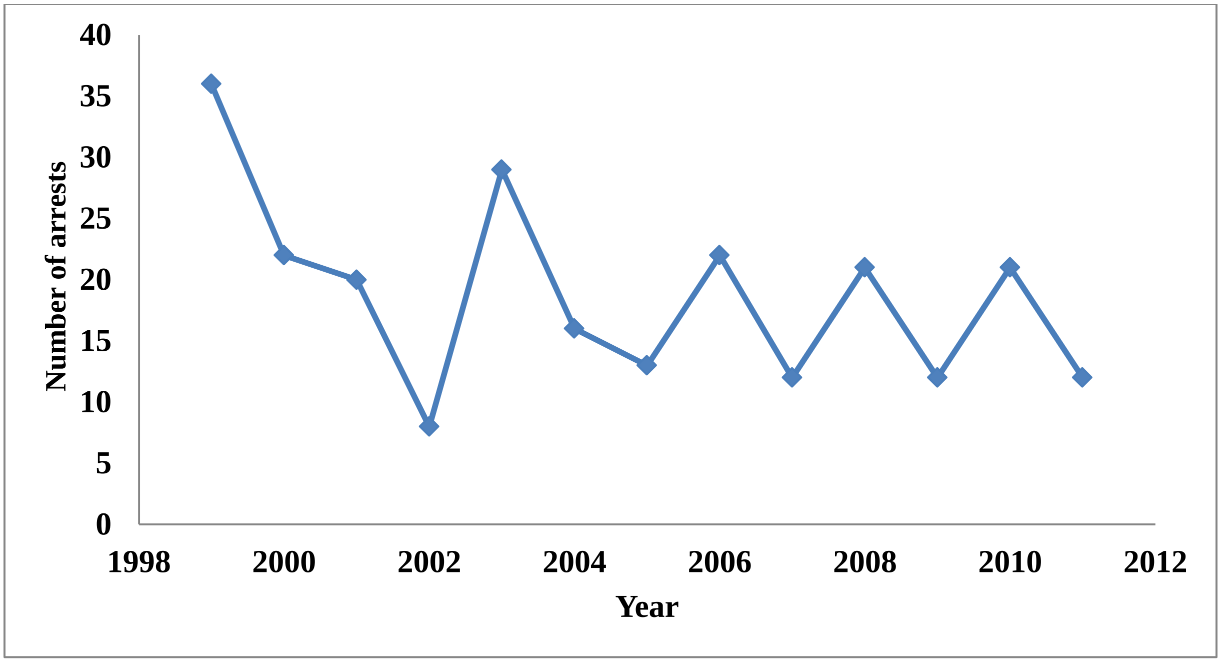

Figure 23: Yearly Number of Arrests in Okomu National Park (1999-2011)

CHAPTER FIVE

5.0. DISCUSSION

The weather records in all the three locations showed high rainfall and humidity. The minimum and maximum temperatures were within the range for the tropics. This implies that the mona monkeys thrives in areas with high environmental moisture. Apart from direct effect on the animal, adequate weather condition is a critical parameter in plant phenology and consequently food availability for them. Seasonal variation in temperature and rainfall affect the availability of edible plant parts for NHPs (Strier, 2011).

As a global hotspot for primate species, Nigeria's great diversity of primates is found in the Gulf of Guinea forests of Cross River State and adjacent areas in Cameroon (Hahn, 2013). These areas are generally moist and are made up of lowland rainforests, mangroves and highlands that harbour these primates, one of which is the mona monkeys (Oates *et al*., 1992).

The mona monkeys in the three locations accessed fed on a variety of diets: fruits (which constituted 56% of the diet), seeds, nuts, leaves, flowers, saps and gum exudates. Other studies of Cercopithecines' diets in genral and mona monkeys in particular show that fruits, flowers, seeds and nuts are the major components, with arthropods, lizards and birds' eggs complementing (Nowak, 1999; Matsuda, 2007; Kingdon *et al*., 2013). As an arboreal animal, often jumping from one tree top to the other, and ranging over long distances in search of food, a ready source of energy as commonly found in the simple sugars of fruits would be the first preference (Lambert, 2007). Fruits are also less bulky, thereby occupying less space in the alimentary canal. As a monogastric animal, its guts are adapted to less bulky foods.

The challenge of a high fruity diet is the low oils and protein (Lambert, 2007). The mona monkeys must obtain these nutrients from oil and protein rich diets such as nuts and seeds (as found in*Elaeis guineensis*, and*Raphia hookeri*, which were available in all the three locations; and *Tetracarpidum conophorum*and *Irvingia gabonensis* which were found only in ONP), leaves, and arthropods.

It was observed from the three locations that on average, 54% of the foods mona monkeys ate are consumed by man. The foods consumed by both species included fruits of *Anacardium occidentale*, *Carica papaya*, *Mangifera indica*, *Musa spp.*, and *Psidium guajava*. Similar dietary resources were reported by Kingdon *et al*., (2013) to be ingested by the mona monkey.

In UNILAG, mona monkeys accessed four categories of foods: wild, raided provisioned/assorted, and scavenged foods. The wild foods included *Alchornea cordifolia, Avicennia germinans, Elaeis guineensis, Ficus spp., Raphia hookeri,* and *Terminalia catappa*. *Alchornea cordifolia* and *Avicennia germinans* were recorded in the mangrove forest community of the University of Lagos (Adekanmbi and Ogundipe, 2009). Their acts of raiding homes and shops to steal food and provisions respectively could put them at risk of being caught and killed. Such raids led to the death of two monkeys in 2012. As an urban habitat, the monkeys seem to have adapted to eating foods offered or left over by humans, thereby making them feed like domesticated animals. They fed on all types of human foods including those they scavenged at dumps sites. This might imply that the foods they obtained from the wild could not sustain them. Over the years their habitat has been fragmented and converted to other human uses such as infrastructures so that few wild food resources remain.

In Awka, the Anambra State Capital, Nigeria, mona monkeys especially populations living in close proximity to human settlements accessed foods from the wild, raided family fruit gardens and ate left over of human foods found in littered compounds. They sometimes jumped across fences into people's gardens to raid *Anacardium occidentale*, *Carica papaya*, *Dacrodes edulis*, *Mangifera indica*, *Musa sapientum* and *Psidium guajava* (Nwufoh, 2011). Scavenging for food seems to be a feeding strategy the mona monkeys in urban habitas have adapted for their survival.

Dioscorea spp., *Elaeis guineensis*, *Mussaenda polita* and *Paullinia pinnata* were some of the wild foods identified asmona monkeys' diets in this location that were also indicated as mona monkeys' diet in Lama Forest Reserve, Bénin Republic (Matsuda, 2007). Apart from *Elaeis guineensis* and *Blighia sapida,* the other wild foods were not consumed by man. Foods in the other three categories are used by man. This puts the mona monkey in urban habitats like UNILAG to be a potential food competitor with man. This food habit habituates/domesticates thereby making them eat what their counterpart in wild habitats may not accept. Moreover, acceptance of 'provisioned' foods predisposes them to danger of being killed through poisoning. It also exposes them to the risk of being hunted since they are forced while searching for food to be in close proximity to man.

Habitat fragmentation could affect primate food availability either by reducing the number of available foods or making accessibility difficult due to removal of forest corridors. Mona monkeys' wild foods such as *Alchornea cordifolia, Ficus spp., Mussaenda polita,* and

Raphia hookeri were destroyed when their habitat at UNILAG was fragmented through clearing and conversion (Olaleru and Egonmwan, 2012). The introduction of food plants sources through food plots could ameliorate the problem.

In LCC, *Anacardium occidentale*, *Elaeis guineensis*, *Mangifera indica*, *Xylopia aethiopica* and *Vitex doniana* were some of the foods found in the Reserve and which were similar to those reported by Ejidike *et al.*,(2010) and Nwufoh, (2011) as mona monkey foods in Okomu National Park and Awka respectively. The presence of *Anacardium occidentale*, *Mangifera indica*, *Polyathia longifolia* trees in this location was a sign of previous human habitation of the place. *Mangifera indica* is one of the plants raised in home gardens (Betti, 2004). *Anacardium occidentale*, *Carica papaya*and *Mangifera indica* though useful to man, are exclusively used by the animals. As a Strict Nature Reserve, the off take of these fruits by humans is prohibited.

Okomu National Park had unique array of mona monkeys' foods not found in any of the other two places. As a lowland rainforest, it had foods that were climbers, shrubs and trees, some of which included *Annona glabra*, *Barteria nigritiana*, *Musanga cecropioides* and *Pycnanthus angolensis*. Jablonski *et al.*, (2006) described the tropical rainforest as cradle of diversity, stating that besides the tropical forest having the most species, they are likely the primary source of diversity on Earth.The Okomu Forest Reserve was very rich in animal and plant species due to its situation in the lowland rainforest (Anadu and Oates, 1982).Two foods not known in literature as component of the mona monkey diet were found in this forest, i.e, *Gmelina arborea* and *Jateorhiza macrantha*.

Gmelina arborea is native to Asiatic countries and primates in those countries have been reported to use it for food (mona monkeys are found only in African countries). It is an exotic plant in Nigeria. In Ghana, it made up 8.4% of the diet of *Colobus vellerosus* (Teichroeb and Sicotte, 2009). In order to cut the cost of feeding and as an alternative food to the conventional livestock feeds especially monogastrics, it has been suggested as an unconventional source of feed for swine production (Annongu and Folorunso, 2003).

Jateorhiza macrantha is a climber that is associated with dense and humid rainforest. Its usefulness is not limited to mona monkeys alone. It has been reported to have values among the Edo people who apply leaf sap, mixed with other medicines, to stop bleeding during pregnancy (Burkill, 1997).

The foods types were similar to mona monkey foods listed by Ejidike and Salawu (2009), Ejidike *et al.*, (2010), and Nwufoh (2011). *Elaeis guineensis, Ficus exaspirata, Psidium guajava*, and *Spondias mombin* were some of thediets Matsuda (2007) also identified as foods of themona monkey in Lame Forest Reserve, Bénin Republic.The presence of *Mangifera indica*, *Gmelina arborea*, *Psidium guajava*, *Caricapapaya* (cultivated plants) and other introduced species suggests the former use of the place as settlement for some indigenous people.

Foods such as *Elaeis guineensis*, *Musa paradisiaca*, and *Theobroma cacao* were raided from nearby farms that share border with the Park. Mona monkeys and other mammals regularly raid crops along forest edges (Naughton-Treves *et al.*, 1998; Matsuda, 2007). These include *Musa spp*., *Mangifera indica, Theobroma cacao, Artocarpus altilis, Elaeis guineensis* and *Zea mays* (Kingdon *et al*., 2013). Crop raiding by wildlife is not a new phenoment on. It is a situation in which wild animals move from their natural habitat to an agricultural land to feed on the produce that farmers grow for their consumption. It is a source of conflict between wildlife and farmers which has led to the persecution of wildlife by man (Warren, 2003; Distefano, 2005). It also causes economic loss to the farmers and could generate negative attitude towards wildlife and conservation in general.

Themona monkey food plants found in UNILAG and LCC were relatively similar. Though the Sorensis coefficient of similarity was low, it was higher than that between either of these two locations and ONP. This similarity in food type could be attributed to the similar habitat types of the two locations, fresh water swamps (Orebamjo, 1968; Osinubi, 2007). These two locations had similar rainfall and humidity patterns. It was also in these two locations that mona monkeys had access to and ate composite foods such as pastries which were either provisioned or raided. This was an evidence of the mona monkeys' close proximity and interaction with people, being urban and semi- habitats.

Seasonality of the mona monkeys' foods ensured that they had something to eat during either season. Due to their proximity to human beings, the monkeys in the UNILAG location had access to human foods that were found during both seasons. They obtained these either at dump sites or through 'provisioning' and sometimes raiding of homes. This adaptive foraging strategy might have contributed to their persistence in this location which was degraded in terms of wild food resources. Perhaps the mona monkey has a high resilience in disturbed habitats. In Korup National Park, Cameroon, putty-nose (*Cercopitheucus nictitans*) and mona monkeys were the only two species reported to have more resilience to human hunting (Linder and Oates, 2011).

There were more foods during the rainy season than dry season in UNILAG and ONP. In LCC, the number of foods was similar in both seasons, with foods like *Elaeis guineensis* and *Terminalia catappa* which made up 5% overlapping both seasons. In UNILAG, only 15% of the wild foods overlapped both dry and rainy seasons. Provisioning by humans and access to dump sites for human left over foods made the animals to have some variety in their diets all year round. These changes to food availability are often the driving force in primate densities (Worman and Chapman, 2006), provided hunting pressure does not have a compounding effect. Many case studies suggest quality, quantity and seasonal availability of food as the most important factors that limit fitness and primate population density (Chapman and Chapman, 1999; Gupta and Chivers, 1999; Peres, 1994). In many primate species, reproduction is timed to coincide with periods when food plants availability maximizes the chances of offspring survival (Knott, 1998; Meyers and Wright, 1993).

Due to the alternation of dry and rainy seasons in rain forests, the availability of plant reproductive and vegetative parts is irregular and induces periods of abundance and scarcity of food for consumers (Gautier-Hion, 1980; van Schaik *et al*., 1993). In wetter forests, seasonal peaks and troughs of fruit abundance as well as flowers and new leaves tend to be correlated with rainfall (Fleming *et al*., 1987; Whitesides, 1991). Fruiting peaks tend to occur at the end of the raining season or the beginning of the dry seasons (Fleming *et al*., 1987).

The semi-urban and wild habitats had more number of wild foods during the rainy season than dry. It is probably due to the integrity of the forests and the formal protection of the habitats. They are less degraded when compared to the urban habitat. It could also mean that most fruit trees produce fruits during the rains. A phenological study of the fruit plants in the three habitats is needed to ascertain the peak months of fruit availability and hence food abundance. In the wild habitat, snacks and human processed foods were not found in either of the seasons.

Seasonality of food is a common occurrence in the wild. Animals in captivity occasionally encounter fluctuations in food intake and body mass (Crissey *et al.*, 2003) due to provisioning. When food is scarce during the dry season, NHPs are known to switch over to what is available. For instance, in the dry season when fruit is scarce, emperor tamarins (*Saguinus imperator*) become intense nectar feeders (as supposed to their frugivory), even though it is at the expense of body weight loss (Terborgh, 1983; Crissey *et al*., 2003).

This research seems to be the first attempt in assessing the nutritional content of mona monkeys' foods in the three locations, although few studies have been conducted to determine the feeding ecology of the animal (Ejidike and Salawu, 2009; Ejidike *et al*., 2010; Nwufoh, 2011). At least 56% of the foods consumed by monamonkeys were fruits. Fruits tend to be high in nonstructural carbohydrates and low in protein (Milton, 1984). The CP content of fruits in University of Lagos was $6.75 \pm 0.41\%$ (n=10) and $8.79 \pm 2.73\%$ (n=11) for Okomu National Park fruits. These were similar to what Milton (1999) reported as the average crude protein content of $7.0 \pm 1.1\%$, for 7 Venezualan fruits eaten by red howler monkeys and$6.3 \pm 0.6\%$ for 8 species of wild fruits eaten by gorillas in Cameroon. They ate some nuts, flowers, tender leaves and twigs. Fruit provide animals with more readily accessible nutrients than leaves do. As a class, succulent wild fruits are high in energy but low in protein. Leaves, insects and other animal matter are the major sources of dietary protein for primates (Lambert, 2007).Cercopithecines readily consume a diversity of high fibre foods as well as easier to digest foods such as insects and fruits. This suggests their capacity to alternate between foods with differing structural and chemical attributes. They are known for their dietary flexibility and generalist strategy (Altmann, 1998; Chapman *e tal*., 2002).

The low CP values of fruits such as *Terminalia catappa*, *Musa sapientum*, and *Artocarpus altilis*, and the tubers such as *Dioscorea spp*. and *Manihot esculenta* were compensated for through the consumption of higher CP and EE found in seeds of *Pithecellobium dulce*, *Albizia lebbeck* and *Avicennia germinans*.

According to National Research Council, 2003, the estimated crude protein requirements (in dietary dry matter) of primate model species fed purified or semipurified diets, for maintenance of adult macaque and squirrel monkey (Family Cercopithecidae) were 8% and 8-21% respectively.The average nutrient values of food plants from the three locations for carbohydrates, ether extracts and crude protein as 52.79%, 19.95% and 10.86% respectively implies that the mona monkeys' diet is rich in energy (416.98 cal/g) but low in crude protein. Even though this level is above the 6.4-8% dietary dry matter of required protein for adult primates in captivity recommended by National Research Council (2003), it may barely be alright for free ranging primates.

Monkeys may not select fibrous foods but their food plants sources contain fibre which provides bulk to foods and occur as hemicellulose, cellulose, and lignin expressed as neutral detergent fibre (NDF), acid detergent fibre (ADF), and acid detergent lignin (ADL) respectively (National Research Council, 2003). Although no nutrients such as NDF and ADF at or near indicated concentrations appear to be positively related to gastrointestinal health, or to promote gastrointestinal health in howler monkeys, marmoset, tamarin, colobus, langur, lemur and chimpanzee after weaning (Crissey *et al.*, 2003, National Research Council, 2003).

The NDF content of the leafy foods was 52.25% ± 6.13 (n=3). Milton (1999) reported the average NDF content of Panamanian young leaves consumed by monkeys to be 35% indicating that wild leaves even when they are young, contain high levels of cell wall content. The neutral detergent fibre (NDF) and acid detergent fibre (ADF) estimated as adequate (dry matter basis) for post-weaning non human primates was 10-30% and 5-15% respectively (National Research Council, 2003).

Similarity in the pattern of amino acids profiles of the food plants studied would imply that irrespective of the food plants consumed by the monkeys, the nutritional benefits are similar.The very low values of some amino acids particularly sulphur containing methionine (the only sulphur containing essential amino acid) and cysteine (the only sulphur containing non-essential amino acid) in mona monkeys' foods could make them limiting. These two amino acids are involved in the synthesis of glutathione, an antioxidant. Cysteine is the rate limiting amino acid in glutathione synthesis (Reed and Orrenius, 1977; Wang *et al.*, 1997). Low amounts of methionine and cysteine is not peculiar to mona monkey foods. Plant sourced proteins are generally very low in these two amino acids. Nwabueze (2007) recorded low cysteine and methionine levels in African bread fruit (*Treculia africana*). Since the mona monkeys consumed animal foods, they could be making up for these amino acids from their animal based diets.However, for primate species with significant foregut fermentation like the colobines (colobus monkeys), their dietary amino acid requirements may vary from those with simple stomachs, like the cercopithecines (guenons) (National

Research Council, 2003). The former group will require lesser essential amino acids that the latter.

The most preferred food was *Musa sapientum*, followed by fresh *Zea mays* and then *Solanum melongena*. Each had coefficient of preference (COP) value that was above one. These food items met the condition reported by Karbo *et al.,* (1993); Bamikole *et al*., (2004); Babayemi (2007), that a food is preferred when the COP is greater than unity. As an omnivore, NHPs are regarded as generalists with flexible feeding habits. They do show some preference for either fruits (frugivores), leaves (folivores), seeds (gramnivores), exudates (gumnivores) or even animals (faunivores) (Lambert, 2007). It was observed that mona monkeys fed on whatever food item that was available. Should all foods be made available, the mona monkey has shown preference for these three.In livestock production, the preference and acceptability of a feedhas been used as a measure of voluntary feed intake which is a fast way of determining feed quality (Kalio*et al.*,2012; Sandoval-Castro*et al.*,2005).

Musa sapientum is very low in saturated fat, cholesterol and Na. It is also a good source of dietary fibre, Vit. C and K, and Manganese and a very good source of Vit B6 (nutritiondata.self.com, Nutrition facts and analysis for banana). Working with habituated olive colobus monkey (*Procolobus verus*) in Sierra Leone, Oates (1988) observed that the monkey preferred foods that had low fibre and tannin contents. However, this study shows that monkeys equally prefer some foods that are not necessarily low in fibre like *Musa sapientum*, fresh *Zea mays* and *Solanum melongena*.

Zea mays was the second preferred food. In the wild, three species of primates, olive baboon, redtail monkey and chimpanzees in four villages around Kibale National Park, Uganda, preferred to raid maize and/or bananas (Naughton-Treves, *et al*., 1998). In Lama Forest, Bénin Republic, *C. mona*, *C. aethiops* and *C. erythrogaster* were reported by local farmers to raid maize, bananas, and other food and cash crops on farms just outside the forest (Matsuda, 2007). In Ondo and Ekiti States, Nigeria, *C. mona* preferred cultivated crops that ranged from grains to berries, and fruits such as *Blighia sapida*, *Spondias spp*. and *Myrianthus* (Agbelusi *et al*., 1999).

The ready source of energy as is commonly available in fruits may also be a contributing factor to primates' preference for such foods. During the field studies, fruits made 56% of the mona monkey diets in the three locations. This was corroborated by findings from the controlled study where *Musa sapientum* and *Carica papaya* ranked first and fourth respectively. Most medium-sized forest guenons preferred fruits, especially sugar-rich pulpy fruits (Chapman *et al*., 2002). Succulent fruits are on the average low in fibre and and antinutritional substances. Habituated olive colobus monkeys (*Procolobus verus*) in Sierra Leone, for instance, preferred foods that had low fibre and tannin contents (Oates, 1988).

The most consumed foods free-ranging animals access may not be choicest, but the most available. There also may be differences in food choice based on varying physiologic conditions. Often there are large day to day fluctuations in food consumption within and among animals that are not readily explained.Primates generally select a diet rich in protein and carbohydrates and low in fibre (and tannins and alkaloids). This explains why primates have a varied diet, select the plant species and parts they do eat when preferred fruits are scarce (Chivers, 1986). For many primates, especially those living in tropical forests, fruit is a major part of the diet. When available, they make up 70%-90% of the diet; but when scarce, other items such as seeds, leaves, stems and invertebrates may predominate (Enstam and Isbell, 2007).

Food preference could be difficult to measure in the wild because of the variation in the availability of food items (Ganas *et al*., 2008). In this study, mona monkeys held in captivity were used for ease of food preference measure which allowed for controls. The disadvantage of controlled studies is that only few food options per experiment could be offered which does not represent what a wild animal experiences (Laska, *et al*., 2000; Remis, 2002). Foods in the diets of captive callitrichids are limited in types and varieties as compared to options in the wild. Studies with several laboratory species have shown that foods are not necessarily selected on the basis of nutrient content. Instead, given a limited variety of succulent foods, callitrichids may select those that are high in sugar, high in fat, or simply novel. Thus, it is important to offer foods that complement each other nutritionally (Crissey *et al*., 2003). Milton (1981) indicated that the critical determinants of dietary choice in animals may be internal rather than external. This suggests that food choice may be a digestive strategy in which animals maximize the nutrients they obtain to meet their needs by consuming not just the available foods, but that which they can efficiently digest.

In UNILAG and LCC, *Terminalia catappa* was observed to be frequently eaten as a wild food. In the captivity feeding trial, this fruit was not preferred. This could be due to the fact that the animal ate it fresh from the tree top, as compared to the ones offered, which were picked from the ground. Field observation showed that the mona monkey does not come down to pick its food droppings. The foods they picked from the ground were those offered by people or those sourced at dumpsites, a feeding strategy peculiar to the urban habitat.

The high negative correlation between COP and CF implies that CP will cause a reduction in COP values and vice-versa. Foods with high CF will have low COP or will not be consumed in high amounts. The mona monkeys' tolerance for strong fibrous materiasl is low, as a monogastric animal.

In UNILAG, a very high percentage (74.5%) agreed that the mona monkeys, together with other wild animals are nature's gift to man for his livelihood. Although, seen as a gift from nature to meet man's needs, 76.2% also regarded the mona monkey as a nuisance, disturbing people and raiding farms. Concerning hunting and poaching, 87.7% agreed that hunting of wild animals, monkeys inclusive as an age long profession. These explain why though the mona monkey population has been persistent but it seems to be declining. People reported that the monkey is no more as ubiquitous as it were some two – three decades ago. In fact 76.6% respondents agreed that it is only when policies are made about the protection of mona monkey in this location that the animals would be conserved, and that too, was agreed by 79.1% respondents, would require the efforts of law enforcement agencies for people to keep the conservation rules and stop poaching the animal.

The scenario in UNILAG is not unique since there is no formal policy on the protection or conservation of this population or its habitat. The killing of the animal would be regarded as hunting. Manywildlife in unprotected areas have been hunted to local extinction (extirpation) and the habitat degraded through human activities (Tooze and Baker, 2008, Ogunjinmi *et al*., 2012).

Gender wise, males made up 63% of the respondents in UNILAG. Those between ages 20 – 40 constituted 83.4% and those with secondary and tertiary education constituted 84.2%. These personal factors, sex, age and educational level did not have significant effect on the three variables used to determine the attitude of respondents to mona monkeys' conservation. This outcome could mean that the people were not interested in the existence of this wildlife or they see the animal as a competitor for habitat. The mona monkeys' habitat range has been fragmented and degraded of wild food resources through habitat conversion to infrastructural facilities.

In LCC, wild animals and mona monkeys were regarded by 77.6% of respondents as nature's gift to man and a means of his livelihood. Hunting was also regarded by 83% respondents as an age long profession. This location is already under formal protection as a Strict Nature Reserve. Thus, hunting is illegal and the mona monkeys enjoy maximum protection and conservation. However, 74.6% respondents agreed that the efforts of law enforcement agents are required for people to keep conservation rules. Perhaps the Reserve may be under pressure from community members for access to the resources contained therein.

Age and educational level did not have any significant effect ($P \geq$) on the three variables studied. Sex was not significantly different except for views on the roles of governments on the conservation of mona monkeys.

In ONP, all the seven statements on hunting and poaching had over 60% agreement level. These imply that this location has high prevalence of hunting and poaching. As a government institution, respondents in this location had a better appreciation of the roles the governments are expected to play to make conservation of wild life possible. There was very high level of agreement by respondents that governments' creation of PAs did help to conserve mona monkeys. However, there was also a high percent agreement that poor maintenance and management of PAs could lead to loss of mona monkeys. These two response levels could mean that although governments have created different PAs, there seems to be poor maintenance and management. The effects of the two actions tend to nullify each other thereby making the PAs to operate sub optimally in conserving and protectingmona monkeys and other natural resources.

From the inferential statistics of responses in ONP, it was deduced that gender and age did not significantly affect attitude towards wildlife conservation whereas the educational level of respondents significantly influenced their attitude towards conservation of wildlife. This was similar to the findings of Ogunjinmi *et al.,* (2012) who recorded a very high significant difference ($P < 0.01$) of the effect of education to environmental protection among respondents around Nigeria's protected areas. They also observed that age did not have any significant difference towards environmental protection, but gender did.

Males constituted 63%, 51%, and 77% of the respondents, while the females were 34%, 30%, and 15% respectively in UNILAG, LCC and ONP. The very high disparity between the number of males to females in ONP might be due the fact that most of the Park staffs were males. Meduna*et al.,*(2009) and Akosim *et al*., (2010) reported similar gender disparity in studies conducted in Lake Kainji, while Adetola and Adetoro (2013) observed the same gender disparity in Cross River National Parks.

It was when the Likert statements for all the locations were combined that statistically significant differences were observed. For effects of personal factors (sex, age and educational level) and locality on the attitudes of respondents to mona monkeys conservation, only educational level and locality were significant ($P \leq 0.05$). Effects of personal factors and locality on orientation about hunting and poaching, and views on the roles of the governments to mona monkeys conservation were all significantly different ($P \leq 0.001$). These implied that the factors had effects on the respondents' attitudes to mona monkeys conservation. Thus educating the different sexes and age groups on wildlife conservation with appropriate tools and media could positively change their attitude towards mona monkeys' conservation.

The significant effect of educational level and locality on respondents' attitude to mona monkeys' conservation were in agreement with the results obtained by Ogunjinmi *et al.*, (2012) where the effects of personal factor: gender and educational level significantly ($P \leq 0.01$) affected environmental attitudes of local community members in all the National Parks in Nigeria. However, it was at variance in terms of the effect of age, which was not significant in their study, but was significant in this study.

The highest arrests were in 1999. This was the year the Park was officially handed over by the Edo State Government to the National Park Service. The initial difficulty of nearby community members to desist from encroaching into the Park could have caused the high figures. Encroachment rate declined with time. Lowest arrests were recorded in 2007, 2009 and 2011. Payment of fine and enlightenment could have accounted for the decline. However, these records of encroachment into the Park imply that though designated as a National Park, people still desired and ventured accessing the natural resources contained therein. In Kainji Lake and Gashaka Gumti National Parks, there are enclaves within and villages around with members accessing the place and the resources (Akosim *et al*., 2010;

Ogunjinmi *et al*., 2012). In Nigeria, all PAs are surrounded by communities who continue to encroach on the areas through farming, grazing and other activities (Hahn, 2013).

Meduna, *et al*., 2009 reported the highest poaching arrest in Lake Kainji National Park in 1999, despite the fact that the Park has been in existence for a long time. Adetola and Adetoro (2013) working in Cross River National Park stated that the highest number of poaching arrests, 79, was recorded in the year 2008. In the same study, they reported that respondents accorded logging and hunting in the Park (poaching) as the topmost illegal activities, with 42.05% and 35.23% responses respectively.

The prevalence of encroachment by people into these National Parks for poaching, logging, collection of non timber forest products, among other illegal activities could be that the resources sought for in these protected areas have depleted or become scarce in other areas. Social and economic motives with widespread poverty in the support zone communities to the Parks could have been the major factor for the encroachment (Adetola and Adetoro, 2013). The introduction of Support Zone Community Programmes through the provision of alternative sources of livelihood to residents has been identified by Marguba (2002) as the way to enhance biodiversity conservation in Nigeria's National Parks.

The more encroached areas were those at the Park's edges. This could be due to the fact that these places were closer to human habitation and thus more easily accessible. More anti-poaching patrol teams with serviceable modern equipments could be deployed to such boundary areas to check the encroachment.

The highest number of arrests was that for farming. This was followed by hunting and logging. Adetola and Adetoro (2013) reporting on the threats to biodiversity conservation in

Cross River National Park had similar trends where logging was the highest illegal activity in the Park, followed by hunting and collection of non-timber forest products. The similarity could probably be that both Parks experience pressures from community members that are living in close proximity to the Parks, and whose livelihood depended on the resources therein before the area came under protection. Macdonald *et al*., (2012) made a similar observation in their studies in the Cross River National Park and Korup National Parks in Nigeria and Cameroon respectively. They reported that Parks were least effective in protecting against hunting compared with other threats.

Despite the past arrests and prosecution, encroachments and subsequent arrests are ongoing. The reasons offered by park rangers (personal communication) were that punitive measures were not heavy enough to deter future occurrences, and that often offenders are released too soon by the Park authorities. Meduna *et al*., (2009) stated that arrest as a major tool for law enforcement in Nigeria's protected areas has not been a deterrent to illegal activities in the protected areas, particularly National Parks. They alluded that frequent release of poachers by courts and mild penalties imposed by current wildlife laws may not prevent future encroachment into the Park.

CHAPTER SIX

6.0. SUMMARY OF FINDINGS

6.1. IDENTIFICATION AND CATEGORIZATION OF MONA MONKEYS' FOODS IN URBAN, SEMI-URBAN AND WILD HABITATS.

The study showed an increase in the percentage of wild mona monkeys' foods from the urban to wild habitats. Scavenging was peculiar to the urban habitat. Provisioning of composite foods occurred in both the urban and semi-urban habitats. Even though raiding was a phenomenon common in the three habitats, the highest number of raided foods occurred in the urban habitat.In the three study locations, mona monkeys were found to consume as part of their diets different parts of 64 plant species in 38 families. Of these, 56% were fruitsconfirming them as frugivorous omnivores.Other plant parts used as food included tender leaves, shoots, flowers, twigs and exudates. They are supplemented with animal protein from insects and other arthropods.In the urban, semi-urban, and wild habitats, fruits and seeds made up 70%, 75% and 80% of the mona monkeys' diet in respectively giving an indication that monkeys have a natural selection for nutritious and healthy diets. A good number of the foods were unique to each location, with five species: *Alchornea cordifolia*, *Elaeis guineensis*, *Ficus spp.*, *Mangifera indica* and *Raphia hookeri* that were common in all the location. The highest quotient of food similarity of 32.7% was between UNILAG and LCC; suggesting a similarity in vegetation of the two habitats. The foods in ONP were characteristic of the rainforest, and it was from this location that two novel foods were found. These foods: *Gmelinaarborea* and *Jateorhiza macrantha* were not cited in literature to be diet of the mona monkey.

6.2. SEASONAL AVAILABILITY OF MONA MONKEYS' FOODS IN URBAN, SEMI-URBAN AND WILD HABITATS.

There were higher numbers of foods during the rainy season than dry in all the three locations, with most foods occurring in either season, or few that were found in both. The wild habitat had the highest number of seasonal overlap foods. This seasonality in food availability was with respect to food plants accessed directly and not those provisioned or scavenged. The availability of foods in either seasons ensured that the animal had food to eat all the year round. The mona monkeys have been able to adapt to the changes in food regimes and degraded habitats.

6.3. NUTRIENT COMPOSITION OFMONA MONKEYS' FOODS AND THEIR FOOD PREFERENCE

The foods that were rich in CP included those from the Family Fabaceae, such as *Albizia lebbeck*, *Pithecellobium dulce*; leaves like *Brassica oleracea*, nuts like T*etracarpidium conophorum,* and *Theobroma cacao*. Fruits like *Carica papaya*, *Musa paradisiaca* and *Terminalia catappa,* were generally very low in CP. The EE values were high in T*etracarpidium conophorum*and *Theobroma cacao.*

The highest NFE was foundin *Artorcapus altilis*, *Dioscorea spp*., *Manihot esculenta* and *Musa paradisiaca*.The foods had on average 52.79% as NFE indicating that mona monkeys' foods are high in non-structural carbohydrates and thus high in energy.The EE (total fat) contents, another energy source averaged 19.94%.The gross energy value (cal/g) of the foods ranged from272.6 to 685.92. There was a very high negativecorrelation between CP and NFE.

The NDF was highest in *Jateorhiza macrantha*, *Musanga cecropioides* and *Terminalia catappa*. There was a positive correlation between ash and NDF, but a negative one between ash and ADL.

Nutrient composition showed dry season foods as having higher nutrients' values than rainy season, but these were not significant ($P < 0.05$). They did not differ too between locations EE that was significantly different ($P < 0.05$) between UNILAG and ONP. At $P \leq 0.10$, CF (difference was between UNILAG and ONP) and NDF (difference was between UNILAG and LCC) were significant.

There was a similar trend in the amino acid profile of the foods where dry season values were lower than rainy season. Among the essential amino acids, lysine, arginine, threonine, valine and leucine had higher values than histidine and methionine. Cysteine, histidine and methionine had lowest amino acid values that ranged from 0.41 to 2.22 g/100 g protein. The non-essential amino acids relatively had higher values than the essential. In all cysteine had the least content. Among the rainy season's foods, *Dioscorea spp*., *Manihot esculenta* and *Zea mays* had the highest glutamine content.

The mean of each of the nutrients in all the foods during the dry and rainy season and for the three locations were above the stated nutrient requirements for primates in captivity.

Based on the criterion that a preferredfood must have a COP of one, the declining order of preference was *Musa sapientum*>fresh raw *Zea mays>Solanum melongena.* The most preferred foods were cultivated plants. Wild foods such as *Irvingia gabonensis*, *Terminalia catappa* and *Tetracarpidium conophorum* were not accepted by the animals when in captivity. Perhaps these were not as fresh as the ones accessed in the wild or the scents exuded by these fruits were lost at the time they were offered.

6.4. DETERMINATION OF THE ATTITUDE OF PEOPLE TOWARDS THE CONSERVATION OF MONA MONKEYS' CONSERVATIONIN URBAN, SEMI-URBAN AND WILD HABITATS

There was a general consensus among the respondents that the mona monkeys and other wildlife is nature's gift to man and should be used for his livelihood through the age long hunting profession. This hunting could either be for subsistence for the hunter's family or commercially for income generation. Despite these benefits the animal was regarded as nuisance as it raids farms. It was also agreed that illegal hunting could lead to the local extinction of the mona monkeys and that protected areas have been created by government for the conservation of the mona monkey. Although there are laws on how these areas should be used, it would require law enforcement agents for them to be obeyed by people. Conservation policies would have to be put in place for the mona monkeys in unprotected areas to be conserved.

The educational level of members of the communities studied affected their attitudes towards mona monkey conservation, suggesting that educating the communities, through various media, could positively change their attitude towards mona monkeys' conservation.

Despite the protection of Okomu National Park, illegal activities such as farming, hunting and logging posed as threats to wildlife conservation.Arrests and prosecution reduced the Park's encroachment incidence. This suggests that equipping and remunerating the Park guards could enhance their commitment to park boundary surveillance and protection.

6.5. CONCLUSION

The mona monkeys has been found in Southwesten Nigeria to dwell in vegetative habitats with enough forests that provide food, water, shelter, and security from predators whether such forests are in urban, semi-urban or wild habitats. Ecologically, they are good seed dispersers and serve as predators of, and prey to other animals, thereby bringing balance in the food chain and ecosystem.

In an ecosystem where the mona monkey is the only non-human primate, as in the University of Lagos and Lekki Conservation Centre, they could be useful as keystone species. Their viability as a population could be an indicator of how productive the ecosystem is in providing their food resources and that of other animals like squirrel and birds that share food with them.

Some of the mona monkeys' foods are consumed by man. This makes the monkey a potential competitor with man for food. However, since their natural foods put them in a different food niche, ensuring that these wild foods are not destroyed through habitat destruction and/or fragmentation would reduce the competition for human foods. The discovery of two new mona monkeys' foods in ONP would make the mona monkeys to compete less with man as they access these and others yet to be discovered. In mona monkeys' habitats where *Musa sapientum,* the most preffered is absent, it could be introduced as food plots. This is a management strategy that would enrich the habitat and prevent the animals from raiding farms where they might be killed.

Gmelina arborea and *Jateorhiza macrantha* were unknown as component of the mona diet. The former has been utilized by other species of NHPs in Asian countries where the tree is native to. The latter is endemic to Edo State and other lowland rainforests. *Gmelina arborea* fruit was also utilized as food by Maxwell's duiker (*Cephalophus maxwelli*).

6.6. RECOMMENDATIONS

The followings are being recommended:

1. With increasing human population and the attendant pressure on land and natural resources, the conservation of mona monkeys should not be based on their IUCN status of "Least Concern". To forestall local extirpation, local conservation strategies would have to be adapted.
2. The mona monkeys in the University of Lagos seem to be a resilient population that have adapted to foods and feeding habits that strategically enable them cope with the drastic effects of habitat loss and fragmentation. Their resilience notwithstanding, this population is exposed to human beings and could pose as a health hazard through wildlife – human disease transmission (zoonosis). The monkeys should be protected.
3. Such a population that is critically exposed to humans should be translocated to a more secured and wild area where their survival could be guaranteed.   Such an area should have their food resources for a natural way of sustenance. They should not be taken to a zoological garden for their future well being will not be guaranteed in such a place. This is because of their large number for a zoological garden and such gardens are not well funded.
4. Alternatively, the University Management could demarcate their present habitat patchesfor protection so that Mona Monkey Colony could be raised and maintained for education and ecotourism. *In situ* conservation of this animal would have

educational and economic benefits. Through this, they would be protected from hunters and the protection of their habitat would not be inimical to conserving other non-sympatric wildlife species within their ecosystem.

5. Populations that are still in wild locations devoid of frequent human interference should be protected. These protected areas could be used for ecotourism. High fence to lessen intrusion by humans and reduce direct contact with the animal but allowing the animal to range freely would have to be used. There should be a plan for sustainable harvesting of the monkeys so that their population does not exceed the carrying capacity of the area and the food resources.
6. In Lagos State, vegetation types similar to those in UNILAG and LCC may harbour mona monkeys. The State government could survey freshwater swamps and mangrove forests for the animal with a view of protecting such areas and conserving the monkeys for sustainable harvesting, ecotourism and education.
7. The reoccurring arrests around ONP boundaries imply that the area would need more regular surveillance. The Federal government would need to give more incentives to the Park staff to elicit their commitment to the Parks' resources protection. They may have to be trained on how to combat Park encroachers. Arrested offenders would have to be prosecuted accordingly in order to deter future offences and offenders. Education and enlightenment programmes to communities by Park staff on the positive roles the resources play in the livelihood of the members could result to a change in attitude to Parks' resources and likely reduce encroachment into the Park.

6.7. CONSERVATION MANAGEMENT PLAN FOR MONA MONKEYS IN URBAN HABITATS

Urban wildlife has the dual exposure to threats and benefits of city life. The threats ofhabitat loss and fragmentation, and the attendant loss of wild food resources, the health hazards of exposure to chemicals that cause air, water and vegetation pollution, and the danger of predation by human beings. The benefits are in terms of food provisinoning by people, and raiding of gardens and homes, which could result to human wildlife conflicts. The mona monkeys in urban habitats such as Lagos could be conserved for their ecological values, aetthetic, entertainment, ecotourism and educational purpose. In Lagos State, the mona monkey is found in Epe, Ikorodu, Lekki, Agili, University of Lagos, and Badagry. This management plan integrates the biological requirementsof the mona monkeys and the pressure emanating from human activities as an indication of their needs needs for the same space. To forestall local extinction, the following have to be carried out by the Lagos State Ministry of Environment, or the Nigerian Park Services:

1. Identification and demarcation/delineation of their specific home ranges must be carriedout by the stakeholders in collaboration with the immediate community members. This would also include the determination of the level of human activities within or surrounding this range. This identified zone is the conservation priority area.
2. Community members need to be informed about the conservation plan. This is to ensure that they are part of the whole conservation plan. Through this means the need for them to adjust their activities for the mutual benefits of the monkeys and man need to be explained.

3. Meeting of the stake holders: conservation officers and community members for deliberations on how the area should be used. Joint protection and access in to the area must be discussed, rules and regulations drawn up. This forms the conservation policy.
4. The conservation policy needs to be reviewed when necessary.
5. Once a place is under joint protection, access for the extraction of renewable resources would be at prescribed periods. Culling of old and perhaps sick monkeys would be at specified times. This exercise is to ensure that the population of the monkeys do that exceed the carrying capacity of the area. It is also intended for the sustainable utilization of the animal and the space.
6. In order to encourage for other benefits such as education, ecotourism and economic activities, facilities, conveniencies should be provided by the government. Community members should also benefits from the financial accruals of the project.
7. Non biodegrable waste mateteials should be properly disposed to checkmate the monkeys from accessmto such.

For the University of Lagos in particular, the following should be carried out so that the remaining population of mona monkeys is allowed to revive;

1. The University Management should be committed to the healthy conservation of this animal that has predated the institution. This is because this population is close to human dwellings and activities (Halls of Residence and classroom block). Should an outbreak of any zoonotic disease affect the animal, the community members would not be spared.

2. Since conservation of wildlife is capital intensive, there should be some financial plan for the conservation of the mona monkeys.
3. The remnants of vegetation where they range presently should be left untouched as their habitat. This will ensure natural recovery of the vegetation and restoration of the ecological processes that sustains the animal.
4. A conservation policy of the animal (including zero tolerance to killing of the monkey) and its habitat that includes punitive measures for deterrants should be drafted by the stakeholders. Through the implementation of the policy, prosecution of law breakers would be carried out.
5. All the University community members should be enlightened on the presence of the monkey and that the benefits we can derive through the sustainable use of the animal. Fliers, radio jingles could be used.
6. For the health and safety of the animal, unused foods should be disposed up in covered bins so that the animal do not scavenge at dump sites.

6.8. CONTRIBUTIONS TO KNOWLEDGE

1. This study has documented a comprehensive checklist of 64 plant species in 38 families that the mona monkeys in the three locations utilize as food.

2. The study identified *Gmelina arborea and Jateorhiza macrantha* as plants that have not been listed as mona monkeys' diets. Both have been reported to have medicinal values.

3. The study has documented the adaptive feeding ecology of mona monkeys in the urban habitat as a reason for their persistence in a degraded environment like the University of Lagos.

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APPENDICES

Appendix 1A: Diveristy of Living Primates

Infraorder	Family/Subfamily	Common names of some member species	Niche
LORIFORMES	Galagonidae	Galago (bushbaby)	A,N
	Loridae	Loris, potto	A,N
LEMURIFORMES	Cheirogaleidae		
	Cheirogaleinae	Dwarf and mouse lemur	A,N
	Phaerinae	Fork-marked lemur	A,N
	Daubentoniidae	Aye-aye	A,N
	Indriidae	Indris, Sifaka	A,N/D
	Lemuridae	Mongoose lemur,ruffed lemur	A,D/C
	Megaladapidae	Sportive lemur	A,N
TARSIIFORMES	Tarsiidae	Tarsier	A,N
PLATYRRHINI	Callitichidae	Marmoset, tamarin	A,D
	Cebidae		
	Alouattinae	Howler monkey	A,D
	Aotinae	Owl monkey	A,D/C
	Atelinae	Spider and wooly monkey	A,D
	Callicebinae	Titi monkey	A,D
	Cebinae	Capuchins, squirrel monkey	A,D
	Pitheciinae	Saki, Uakari	A,D
CATARRHINI	Cercopithecidae		
	Cercopithecinae	Baboon, guenon, macaque	A/T,D
	Colobinae	Colobus, langur, leaf monkey	A/T,D
	Hylobatidae	Gibbon, siamang	A,D
	Homonidae/Pongidae	Chimpanzee,orangutan, gorilla	A/T,D

Niche types: A, arboreal; T, terrestrial,; N, nocturnal; D, diurnal; C, cathemeral

Source: Cowlishaw and Dunbar (2000)

Appendix 1B: Non-Human Primates of Mainland Africa

Family Lorisidae	Common Name
Subfamily Lorisinae	
Arctocebus calabarensis	‘Angwantibo’
Perodicticus potto	Potto
Subfamily Galaginae	
Galago alleni	Allen's galago
Galago demidovii	Dwarf galago
Galago inustus	Eastern needle-clawed galago
Galago senegalensis	Senegal galago, or bushbaby
Galago thomasi	Thomas's galago
Galago zanzibaricus	Zanzibar galago
Galago elegamulus	Western needle-clawed galago
Galago crassicaudatus	Thick-tailed galago
Galago garnettii	Garnett's galago
Family Cercopilhecidae	
Subfamily Cercopithecinae	
Macaca sylvanus	Barbary macaque
Cercocebus atys	Sooty mangabey
Cercocebus torquatus	Red-capped mangabey
Cercocebus galeritus	Crested mangabey
Cercocebus albigena	Grey-cheeked mangabey
Cercocebus aterrimus	Black mangabey
Papio papio	Guinea baboon
Papio Anubis	Anubis baboon
Papio cynocephalus	Yellow baboon
Papio hamadryas	Hamadryas baboon
Papio ursinus	Chacma baboon
Mandrillus sphinx	Mandrill
Mandrillus leucophaeus	Drill
Theropithecus gelada	Gelada
Cercopithecus Diana	Diana monkey
Cercopithecus salongo	Salongo monkey
Cercopithecus neglectus	De Brazza's monkey
Cercopithecus hamlyni	Owl-faced monkey
Cercopithecus lhoesti	l'Hoest's monkey
Cercopithecus preussi	Preuss's monkey
Cercopithecus sp.	Harrison's monkey
Cercopithecus albogularis	Sykes's monkey
Cercopithecus mitis	Blue monkey
Cercopithecus nictitans	Putty-nosed guenon
Cercopithecus petaurista	Spot-nosed guenon
Cercopithecus sclateri	Sclater's guenon

Cercopithecus erythrogaster	White-throated guenon
Cercopithecus erythrotis	Red-eared guenon
Cercopithecus cephus	Moustached guenon
Cercopithecus ascanius	Red-tailed guenon
Cercopithecus campbelli	Campbell's monkey
Cercopithecus mona	Mona monkey
Cercopithecus *pogonias*	Crowned monkey
Cercopithecus aethiops	Green monkey, verve
Miopithecus talapoin	Southern talapoin
Miopithecus sp.	Northern talapoin
Allenopithecus nigroviridis	Allen's swamp monkey
Erythrocebus patas	Patas monkey
Subfamily Colobinae	
Procolobus [badius] badius	Western red colobus
Procolobus [badius] pennant	Pennant's red colobus
Procolobus [badius] rufomitratus	Peters' red colobus
Procolobus [badius] kirkii	Zanzibar red colobus
Procolobus [badius] gordonorum	Uhehe red colobus
Procolobus verus	Olive colobus
Colobus polykomos	Western black-and-white colobus
Colobus vellerosus	Geoffroy's black-and-white colobus
Colobus guereza	Guereza
Colobus satanas	Black colobus
Colobus angolensis	Angolan black-and-white colobus
Family Pongidae	
Pan troglodytes	Chimpanzee
Pan paniscus	Bonobos, pygmy chimpanzee
Gorilla gorilla	Gorilla

Source: Oates (1986).

Appendix 1C: List of Cercopithecus Monkeys

		Common name
Suborder	Haplorrhini	
Infraorder	Simiiformes	
Superfamily	Cercopithecoidea	
Family	Cercopithecidae	
Subfamily	Cercopithecinae	
Genus	Cercopithecus	
	Cercopithecus albogularis	Sykes' monkey
	Cercopithecus ascanius	Red-tailed monkey
	Cercopithecus campbelli	Campbell's monkey
	Cercopithecus cephus	Moustached guenon
	Cercopithecus denti	Dent's mona
	Cercopithecus diana	Diana monkey
	Cercopithecus doggetti	silver monkey
	Cercopithecus dryas	dryas monkey
	Cercopithecus erythrogaster	white-throated monkey
	Cercopithecus erythrotis	red-eared guenon
	Cercopithecus hamlyni	Hamlyn's monkey
	Cercopithecus kandti	Golden monkey
	Cercopithecus lhoesti	L'Hoest's monkey
	Cercopithecus lomamiensis	lesula monkey
	Cercopithecus lowei	Lowe's mona
	Cercopithecus mitis	blue monkey
	Cercopithecus mona	mona monkey
	Cercopithecus neglectus	de Brazza's monkey
	Cercopithecus nictitans	greater spot=nosed monkey
	Cercopithecus petaurista	lesser white-nosed monkey
	Cercopithecus pogonias	crested mona
	Cercopithecus preussi	creuss's monkey
	Cercopithecus roloway	roloway monkey
	Cercopithecus sclateri	Sclater's guenon
	Cercopithecus solatus	sun-tailed
	Cercopithecus wolfi	Wolf's mona

Source: http://pin.primate.wisc.edu/factsheets/links/cercopithecus

Appendix 1D: Primates in Nigeria

Family	Species	Common Name
Family: Lorisidae		
Genus: Arctocebus	*Arctocebus calabarensis*	Calabar angwantibo (LR/nt)
Genus: Perodicticus	*Perodicticus potto*	Potto (LR/lc)
Family: Galagidae		
Genus: Sciurocheirus	*Sciurocheirus alleni*	Bioko Allen's bushbaby (LR/nt)
Genus: Galagoides	*Galago demidovii*	Prince Demidoff's bushbaby (LR/lc)
	Galago thomasi	Thomas bushbaby (LR/lc)
Genus: Galago	*Galago senegalensis*	Senegal bushbaby (LR/lc)
Genus: Euoticus	*Euoticus pallidus*	Needle-clawed bushbay (LR/nt)
Family: Cercopithedae		
Genus: Erythrocebus	*Erythrocebus patas*	Patas monkey (LR/lc)
Genus: Chlorocebus	*Chlorocebus tantalus*	Tantalus monkey (LR/lc)
Genus: Cercopithecus	*Cercopithecus mona*	Mona monkey (LR/lc)
	C. erythrogaster	White-throated monkey (EN)
	C. erythrotis	Red-eared monkey (VU)
	C. nictitans	Spot-nosed monkey (LR/lc)
	C. pogonias	Crowed monkey (LR/lc)
	C. preussi	Preuss's monkey (EN)
	C. sclateri	Sclater's monkey (EN)
Genus: Lophocebus	*Lophocebus albigena*	Grey-cheeked mangabey (LR/lc)
Genus: Papio	*Papio Anubis*	Olive baboon (LR/lc)
Genus: Cercocebus	*Cercocebus torquatus*	Red-capped/collared mangabey (LR/nt)
Genus: Mandrillus	*Mandrillus leucophaeus*	Drill monkey EN
Subfamily: Colobinae		
Genus: Colobus	*Colobus guereza*	Mantled guereza (LR/lc)
	Colobus polykomos	King colobus (LR/nt)
	Colobus vellerosus	Ursine colobus (VU)
Genus: Procolobus	*Procolobus badius*	Red colobus (EN)
	Procolobus pennantii	Pennant's colobus (EN)
	Procolobus verus	Olive colobus (LR/nt)
Genus: Gorilla	*Gorilla gorilla*	Western Gorilla (EN)
Geuns: Pan	*Pan troglodytes*	Common chimpanzee (EN)

EN = Endangered; LR/lc = Lower Risk/least concern; LR/nt = Lower Risk/near threatened; VU = Vulnerable

Source: Primates https://en.wikipedia.org/wiki/List_of_mammals_of_Nigeria

Appendix 2: Letter of Permission to Conduct Research in Lekki Conservation Centre

Nigerian Conservation Foundation NCF
Lekki Conservation Centre, Km 19, Lagos-Epe Expressway, Lekki, Lagos, P.O. Box 74638, Victoria Island, Lagos, Nigeria.
Telephone: +234 - 1 - 4718693, 8923717, 8160091, 07028507912 Fax: +234-1-2642497.
E-mail: info@ncfnigeria.org. Website: www.ncfnigeria.org
For nature...for people...for Nigeria

26th March 2013

Dear Sir/Madam,

TO WHOM IT MAY CONCERN

Mrs Olaleru Fatsuma is a PhD candidate with the University of Lagos. The Lekki Conservation Centre (LCC) is one of her Study Sites for her PhD programme. Kindly grant her access and all necessary assistance for the period of her research at the Centre.

Thank you

Adetayo OKUNLOLA
Project Manager, LCC

Appendix 3: Letter of Permission to conduct Research in Okomu National Park

NATIONAL PARK SERVICE

Nnamdi Azikwe International Airport Expressway, P.M.B. 0258, Garki - Abuja.
Tel: [illegible]-09-6714926. E-mail: consgenparks@hotmail.com

Our Ref: NPH/GEN/121/VOL.XI/630

Date: 14th March, 2011

Prof. W. A. Makanjuola,
Head, Department of Zoology,
Faculty of Science,
University of Lagos,
Nigeria.

RE: LETTER OF PERMISSION TO USE OKOMU NATIONAL PARK

Please refer to your letter dated 25th November, 2010 on the above subject matter.

2. I am directed to inform you that approval has been granted for Olaleru, Fatsuma with matriculation number 979002184 to collect data for her research project titled "A comparative study of the effects of urbanisation, seasonal variation in ecology and nutritive values of feedstuffs on the conservation of mona monkey (Cercopithecus mona) in mangrove forests of Edo and Lagos States" in Okomu National Park, Udo.

3. As a policy of the Service, the student is to submit a copy of her findings to the National Park Service Headquarters.

4. Thank you.

Saidu Yohanna
For: Conservator-General

All Correspondence to the Conservator-General

Appendix 4: Chart for Mona Monkeys' Food and Feeding Habit Studies

Date:------------------- Location:--------------------------- GPS Cooridnates:----------------

S/NO	PLANT SPECIES FORAGING ON	PLANT PART CONSUMED

GPS = Global Position System

Appendix 5: Questionnaire to Determine People's Attitiude to Mona Monkeys' Conservation

Department of Zoology,

University of Lagos,

Akoka, Lagos.

8th May, 2012.

Dear Respondent,

I am a Ph. D research student, from the Department of Zoology, University of Lagos, currently undertaking a study on mona monkeys. Your location was selected for the study. The attached questionnaire was designed to elicit some information from you about the conservation of this wildlife. The work is purely for academic purpose.

Kindly fill in the appropriate information. I am counting on your sincerity in filling the questionnaire.

Thank you.

Yours sincerely,

FOlaleru

OLALERU, F. (MRS.)

Section A: Respondent's Biodata. Kindly tick or fill the spaces below appropriately.

1. Sex: Male ( ); Female ( ) 2. Age: 20-30 ( ); 31-40 ( ); 41 and above ( )
3. Educational Qualifications: SSSCE ( ); OND ( ); HND ( ); B. Sc. ( ); M. Sc. ( ); Others (specify)..

4. Place of Work .... 5. Type of Work.......................................

SECTION B: Attitude, beliefs and culture of people about mona monkey and nature conservation. Kindly tick an appropriate column.

S/N	STATEMENTS	Strongly Agree	Agree	Disagree	Strongly Disagree
6	The mona monkeys in my location are protected by our traditional beliefs.				
7	Traditional beliefs make people to fear mona monkeys.				
8	Our people love mona monkeys and would want to keep them as pets than kill them.				
9	People in my area use monkeys for medicinal purposes.				
10	Wild animals including mona monkey are nature's gift to man and a means of our livelihood.				
11	Mona monkeys and other wild animals disturb our people and raid their farm lands.				
12	Our local people are aware of the usefulness of nature and mona monkey conservation.				
13	People are aware that monkeys should not be killed anyhow.				

SECTION C: Hunting and Poaching Effects on Mona monkey Conservation

S/No	STATEMENTS	Strongly Agree	Agree	Disagree	Strongly Disagre e
14	Hunting of wild animals, mona monkeys' inclusive is an age long human profession.				
15	Hunting wild animals and mona monkey for subsistence contributes to the nutrition of the hunters' families.				
16	Commercial hunting of wild animals and mona monkey is a source of income to the hunters.				
17	People in my location kill monkeys' because the meat is tasty to them.				
18	Hunting of monkeys' is illegal in my location.				
19	Illegal hunters caught in my location are tried in our office or court.				
20	Illegal hunting of mona monkey in my area could cause them to become locally extinct.				

SECTION D: Government's Role in Nature and Mona monkey Conservation

S/No	STATEMENTS	Strongly Agree	Agree	Disagree	Strongly Disagree
21	Government has protected areas for wild animals' and mona monkeys' conservation purposes.				
22	Governments' involvement in nature conservation through Game Reserves/National Park has greatly helped in the conservation of mona monkeys.				
23	Financial investment by government in wild				

	animal conservation has been adequate.				
24	Governments' special (protected) areas for wildlife seem to be adequately maintained and managed.				
25	Poor maintenance and management of our protected areas could lead to loss of wild animals and mona monkeys.				
26	When protected areas are well taken care of, the staff will be committed to protecting the natural resources.				
27	Government has made rules on nature conservation.				
28	The wild life habitats in my location have rules on how the place should be used.				
29	It is only when there are policies made about the protection of Mona monkey in my location that the animals would be conserved.				
30	The law enforcement agencies in my area have succeeded in making people value mona monkeys' and wild animals.				
31	It requires the efforts of law enforcement agencies for people to keep conservation rules and stop poaching.				

Appendix 6: Format Used forRecording of Offences, Arrests and Prosecution in Okomu National Park

S/No	Name of Suspect	Date of Arrest	Area of Arrest	Offence Committed	Legal Action	Remarks

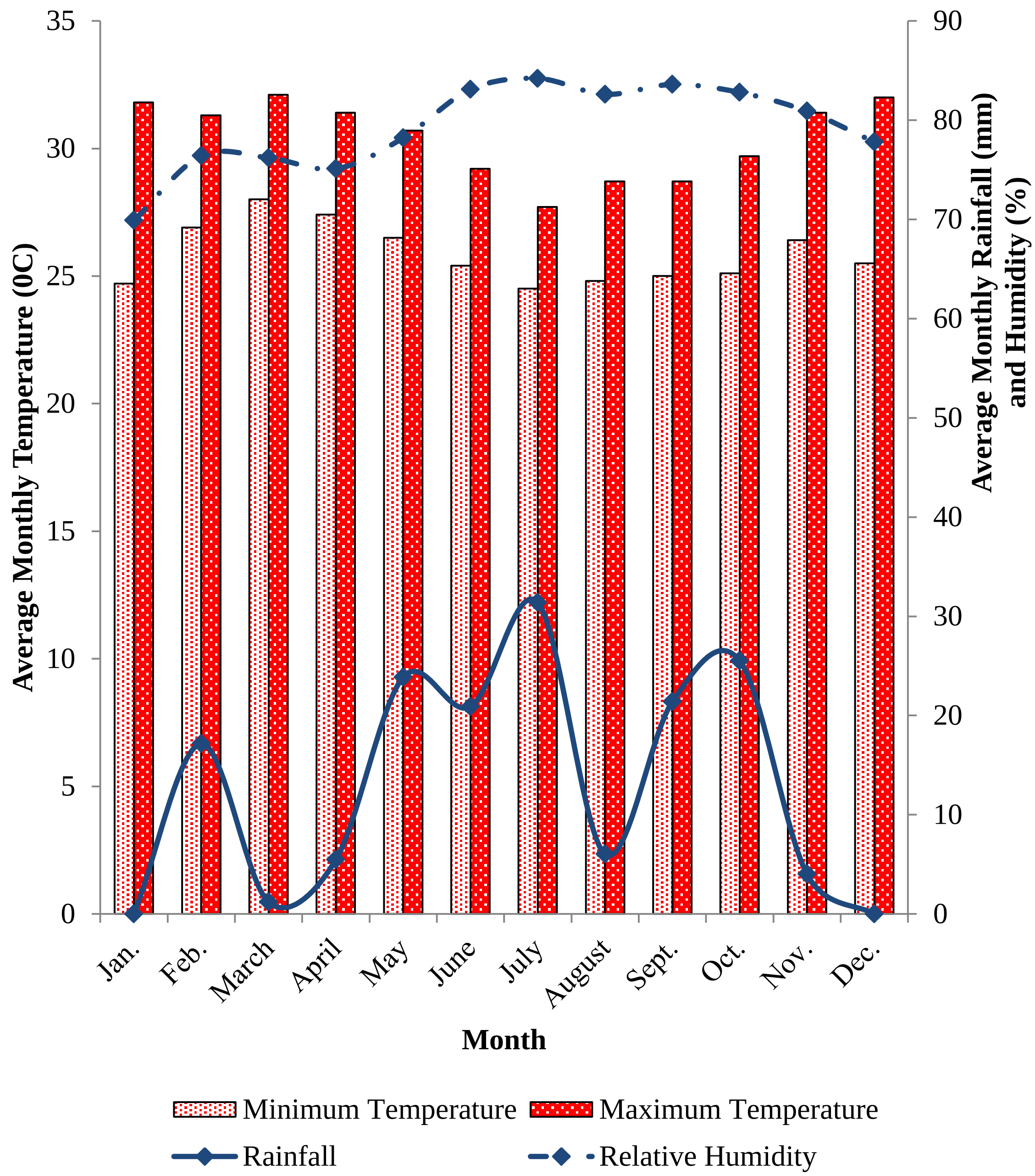
Appendix 7: Mean Annual Weather Data for University of Lagos, Lekki Conservation Centre and Okomu National Park

Parameter	UNILAG	LCC		ONP	
	2011	2011	2012	2011	2012
Rainfall (mm)	13.08	12.98	34.83	18.16	13.78
Humidity (%)	79.23	79.06	81.02	81.96	83.38
Minimum Temperature (^oC)	25.85	25.31	25.30	23.07	22.95
Maximum Temperature (^oC)	30.39	30.77	30.5	31.79	31.35

Source: Nigeria Institute of Meteorology, Oshodi, Lagos.

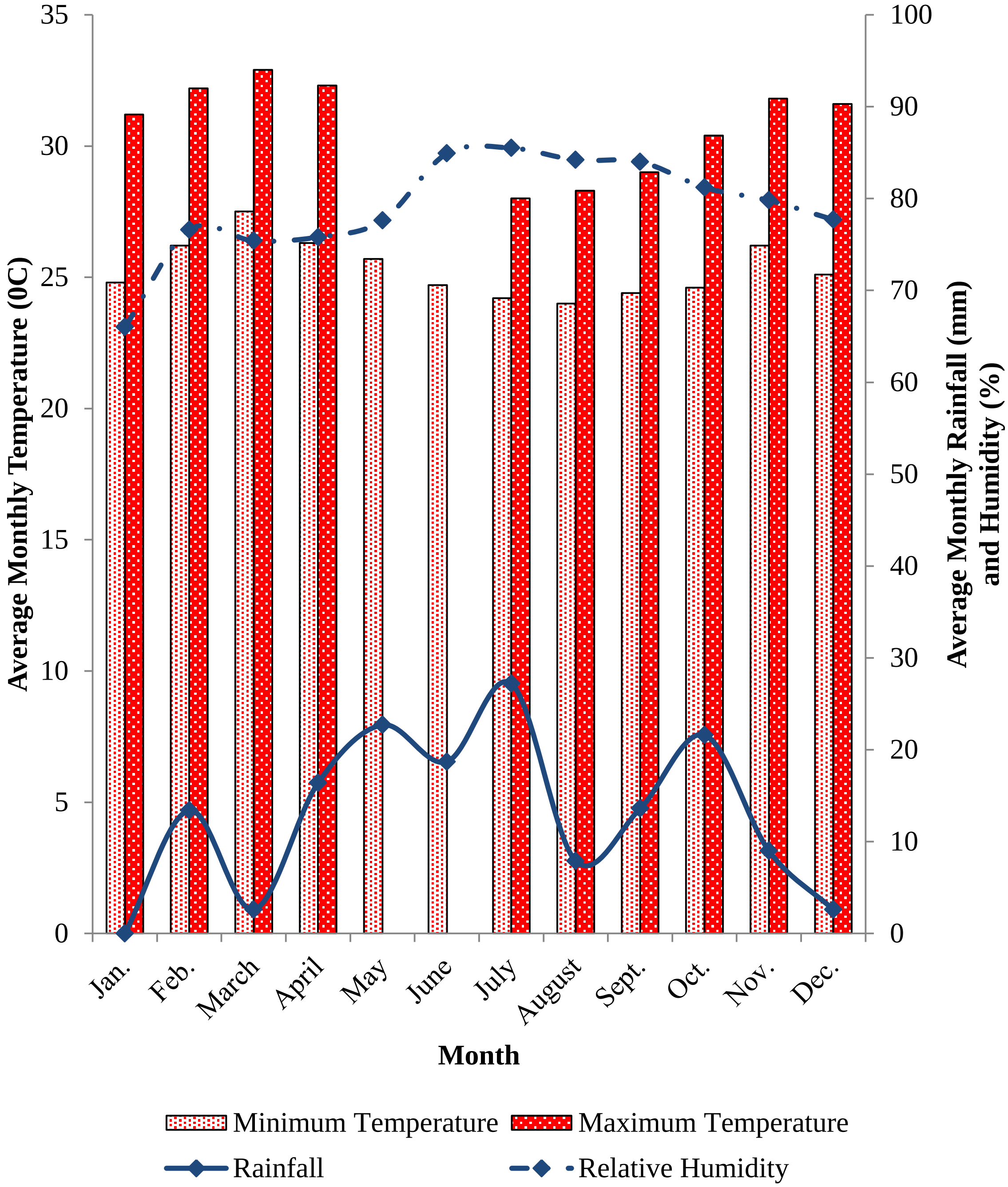
UNILAG = University of Lagos; LCC = Lekki Conservation Centre; ONP = Okomu National Park.

Appendix 8: Average Monthly Rainfall, Relative Humidity, and Maximum and Minimum Temperature for University of Lagos, 2011



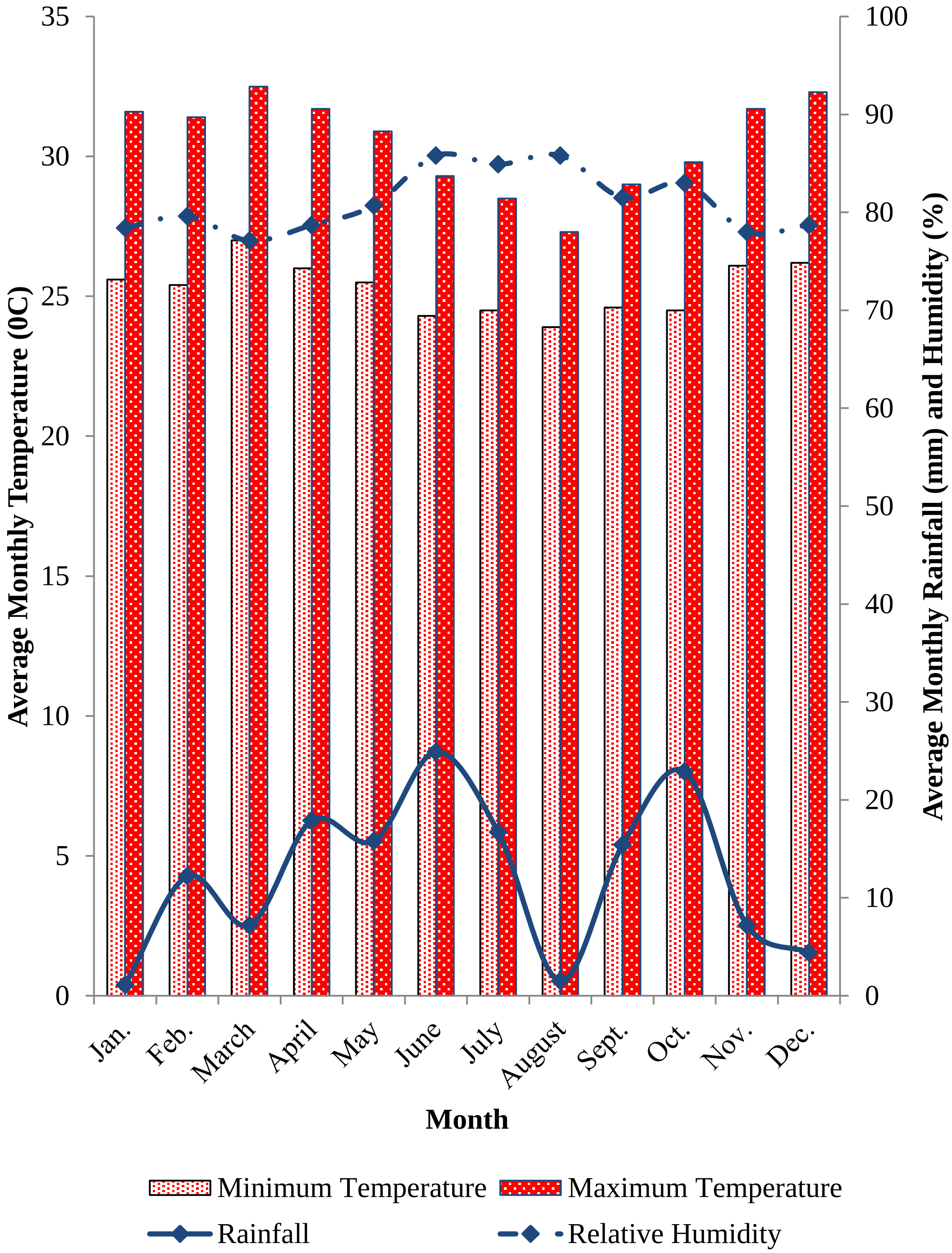
Source: Nigeria Institute of Meteorology, Oshodi, Lagos.

Appendix 9: Average Monthly Rainfall, Relative Humidity, and Maximum and Minimum Temperature for Lekki Conservation Centre, 2011



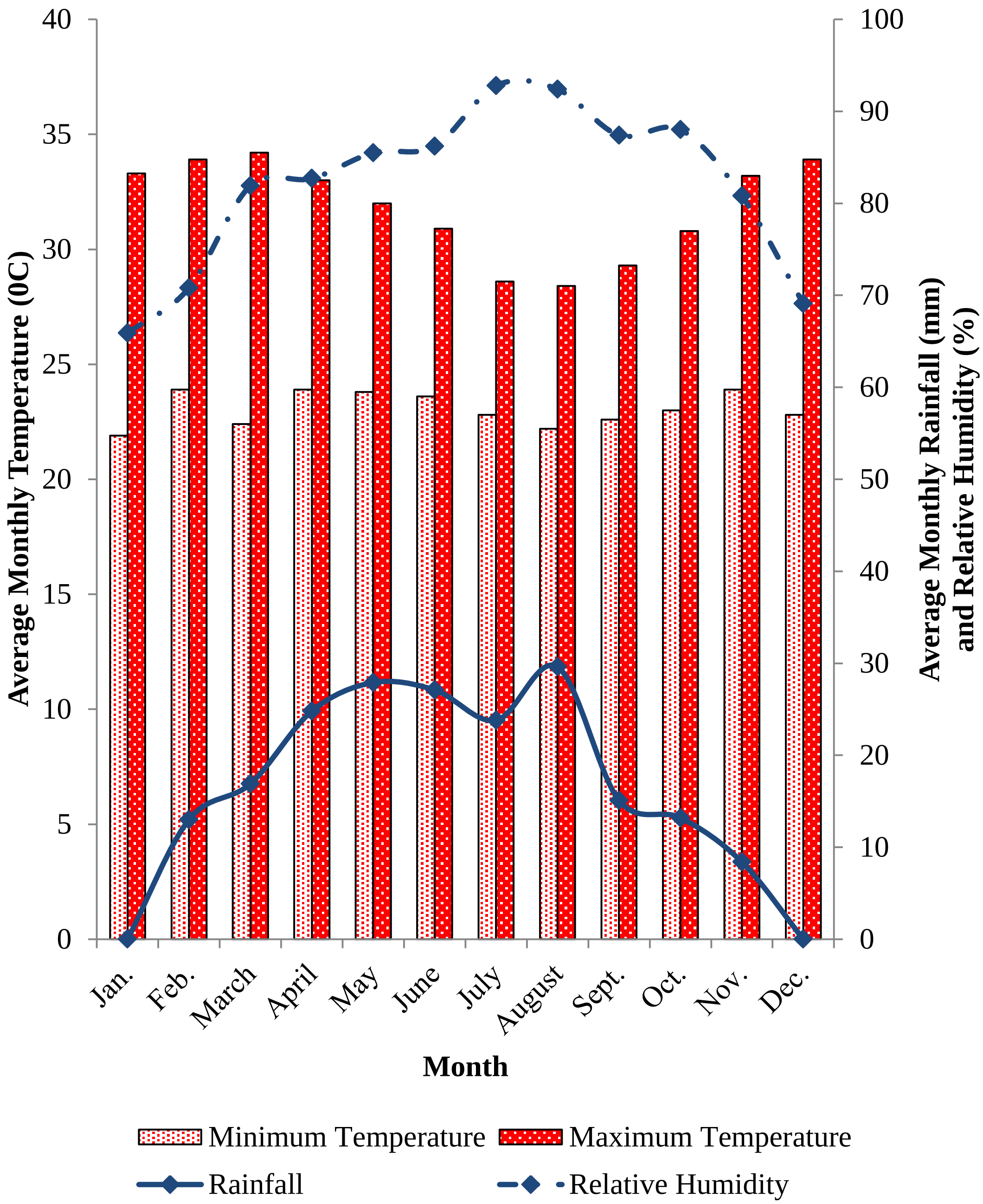
Source: Nigeria Institute of Meteorology, Oshodi, Lagos.

Appendix 10: Average Monthly Rainfall, Relative Humidity, and Maximum and Minimum Temperature for Lekki Conservation Centre, 2012



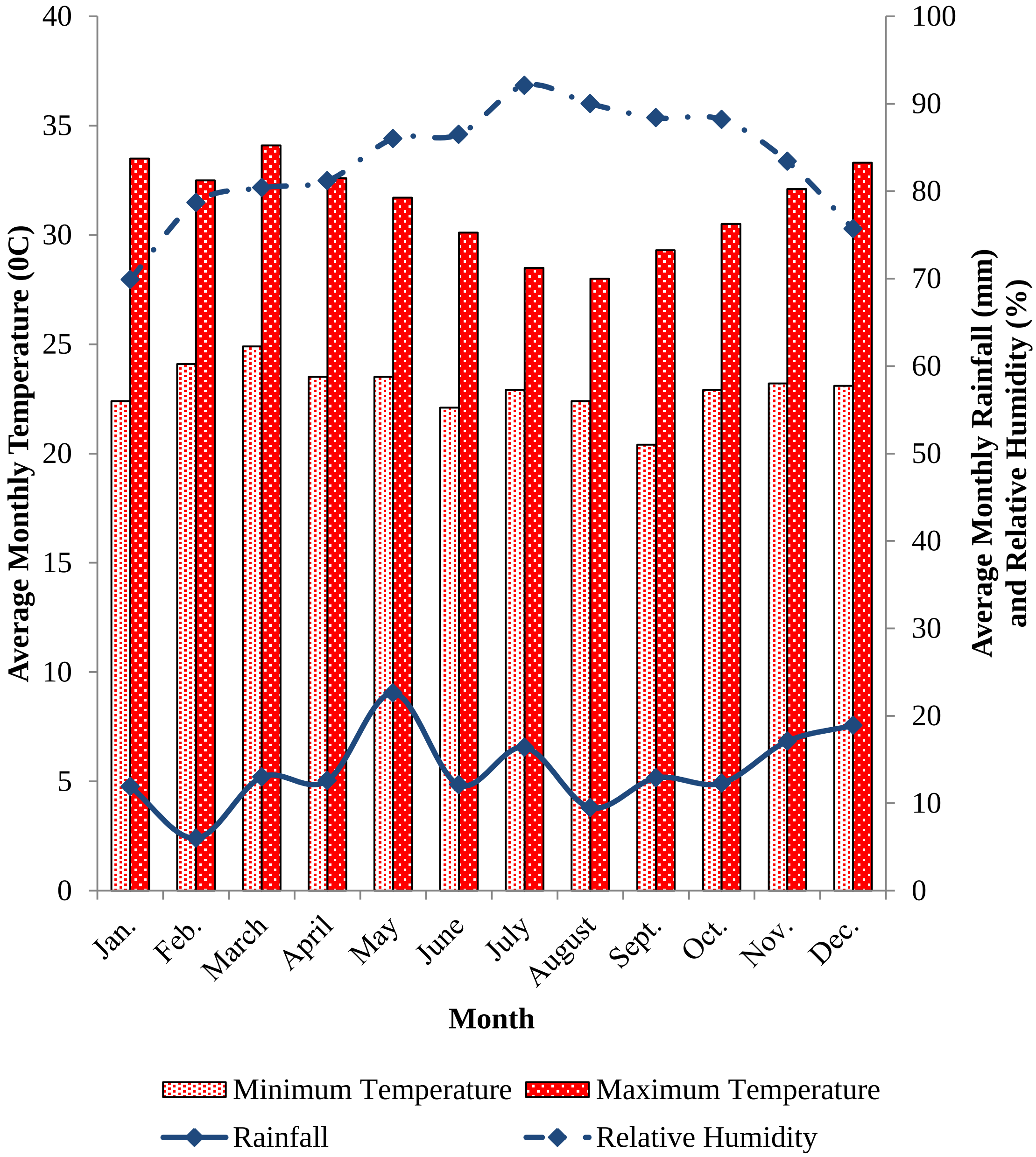
Source: Nigeria Institute of Meteorology, Oshodi, Lagos.

Appendix 11: Average Monthly Rainfall, Relative Humidity, and Maximum and Minimum Temperature for Okomu National Park, 2011



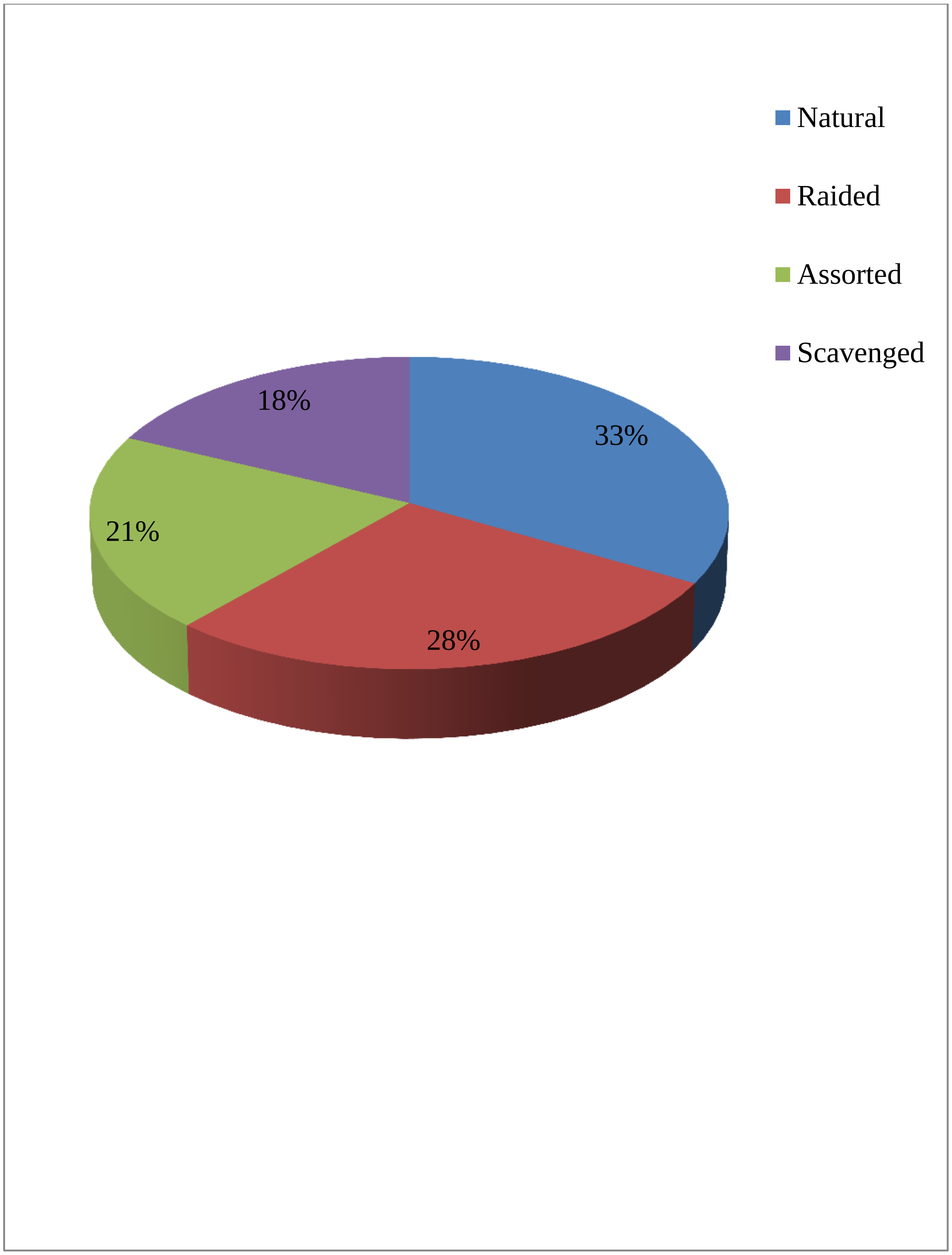
Source: Nigeria Institute of Meteorology, Oshodi, Lagos.

Appendix 12: Average Monthly Rainfall, Relative Humidity, and Maximum and Minimum Temperature for Okomu National Park, 2012



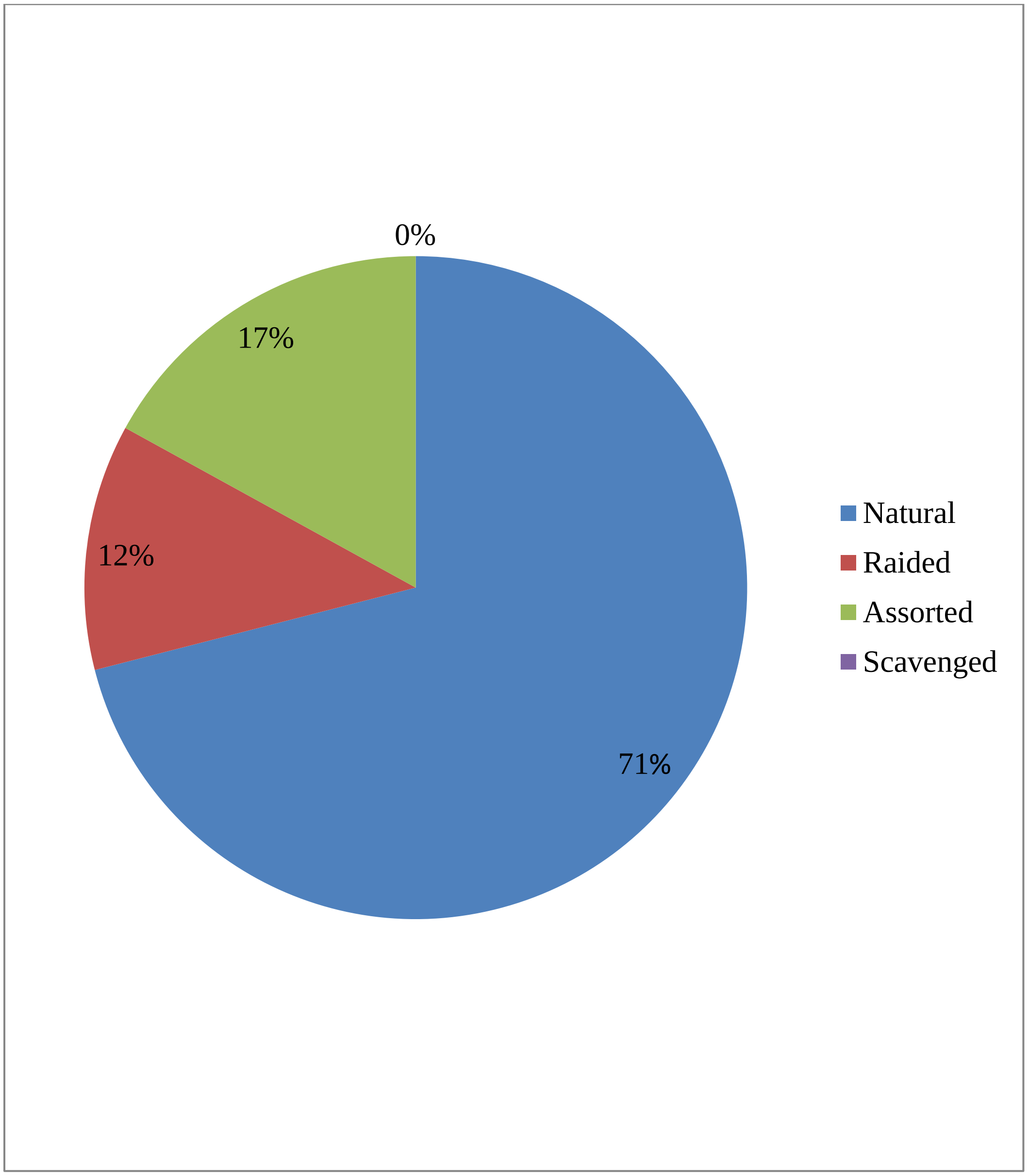
Source: Nigeria Institute of Meteorology, Oshodi, Lagos.

Appendix 13: Percent Composition of Mona Monkeys' Food Categories in University of Lagos

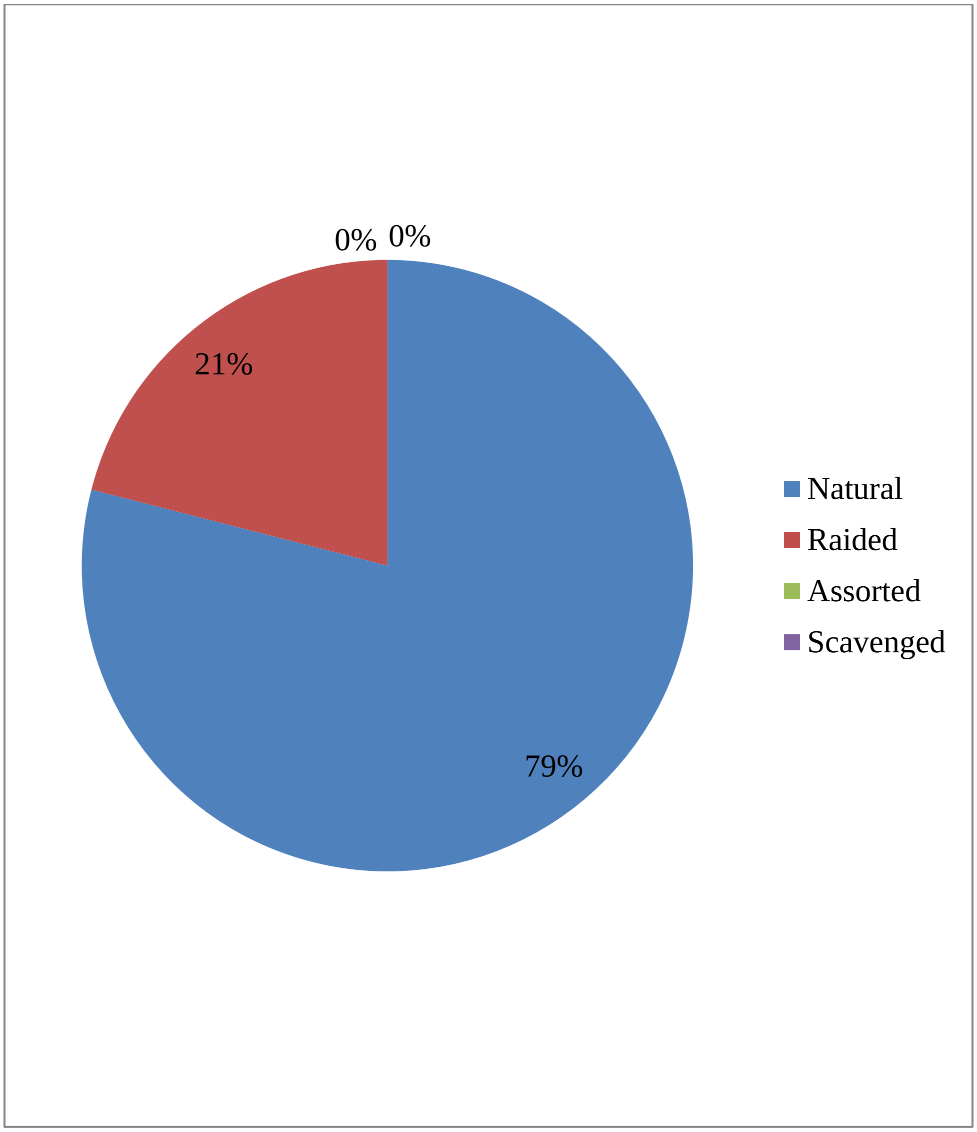


Appendix 14: Percent Composition of Mona Monkeys' Food Categories

in Lekki Conservation Centre



Appendix 15: Percent Composition of Mona Monkeys' Food Categories in Okomu National Park



Appendix 16: A Checklist of the Presence of the MonaMonkeys' Foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

SPECIES	UNILAG	LCC	ONP	SPECIES	UNILAG	LCC	ONP
Albizia lebbeck	√	x	x	*Ipomea cairica*	√	x	x
Alchornea cordifolia	√			*Irvingia gabonensis*	x	x	
Anacardium occidentale	x		x	*Jateorhiza macrantha*	x	x	
Annoana glabra	x	x		*Macaranga barteri*	x	x	
Anthocleista djalonensis	√		x	*Malus domestica*	√	x	x
Anthocleista vogelii	√		x	*Mangifera indica*	√		
Artocarpus altilis	√	x	x	*Manihot esculenta*	√	x	x
Avicennia genminas	√	x	x	*Murraya paniculata*	x		x
Barteria nigritiana	x	x		*Musa paradisiaca*	√	x	
Blighia sapida	√	x	x	*Musa sapientum*	√	x	
Brachystegia spp.	x	x		*Musanga cecropioides*	x	x	
Brassica oleracea	√	x	x	*Mussaenda polita*	√		x
Carica papaya	√	x		*Myrianthus arboreus*	x	x	
Chrysobalanus ellipticus	x		x	*Oryza sativa*	√	x	x
Chrysobalanus icaco	x		x	*Paullinia pinnata*	√	x	x
Chysophyllum africanum	x	x		*Phaseolus vulgaris*	√	x	x
Citrulus lunatus	√	x	x	*Pithecellobium dulce*	√	x	x
Citrus sinensis	√	x		*Psidium guajava*	x	x	
Cocos nucifera	√		x	*Polyathia longifolia*	x		x
Colocasia esculenta	√	x	x	*Pcynanthus angolensis*	x	x	
Dacryodes edulis	x	x		*Raphia hookeri*	√		
Daucus carota	√	x	x	*Senna siamea*	√	x	x
Duranta repens	x	x		*Spondias mombin*	x	x	
Dioscorea spp.	√	x	x	*Staudtia stipitata*	x	x	
Elaeis guineensis	√			*Sterculia oblongata*	x	x	
Ficus congensis	√	x	x	*Strombosia pustulata*	x	x	
Ficus exaspirata	x	x		*Terminalia catappa*	√		x
Ficus ingens	x		x	*Theobroma cacao*	x	x	
Ficus mucuso	x	x		*Tetracardium conophorum*	x	x	
Gmelina arborea	x	x		*Vitex doniana*	√		x
Hura crepitans	x		x	*Xylopia aethiopica*	x		
				Zea mays	√	x	x

√ = Present in the location; x = Absent in the location

Appendix 17: Descriptive Analysis for Nutrient Composition of Dry Season's Mona Monkeys' Foods fromUniversity of Lagos, Lekki Conservation Centre, andOkomu National Park

Nutri. (%)	Location	N	Mean	Std. Deviation	Std. Error	Min.	Max.
DM	UNILAG	14	79.4700	8.27566	2.21176	61.92	89.15
	LCC	2	81.2300	6.26497	4.43000	76.80	85.66
	ONP	6	84.3783	8.78330	3.58577	68.41	94.01
	Total	22	80.9686	8.21336	1.75109	61.92	94.01
CP	UNILAG	14	12.1157	10.04109	2.68359	.88	37.19
	LCC	2	9.1900	3.09713	2.19000	7.00	11.38
	ONP	6	6.3433	5.76760	2.35461	.00	17.06
	Total	22	10.2755	8.80790	1.87785	.00	37.19
EE	UNILAG	14	14.9657	4.49837	1.20224	7.60	22.20
	LCC	2	19.0800	.67882	.48000	18.60	19.56
	ONP	6	21.6333	12.64510	5.16234	11.80	45.80
	Total	22	17.1582	7.73938	1.65004	7.60	45.80
CF	UNILAG	14	9.8686	5.97652	1.59729	1.20	21.40
	LCC	2	8.8000	5.37401	3.80000	5.00	12.60
	ONP	6	15.4167	18.20136	7.43068	2.50	52.00
	Total	22	11.2845	10.44836	2.22760	1.20	52.00
Ash	UNILAG	14	6.0964	3.17469	.84847	2.10	11.20
	LCC	2	3.7000	.70711	.50000	3.20	4.20
	ONP	6	7.1250	3.84314	1.56896	2.60	13.00
	Total	22	6.1591	3.25955	.69494	2.10	13.00
NFE	UNILAG	14	56.9536	12.85882	3.43666	33.81	75.96
	LCC	2	59.2300	8.44285	5.97000	53.26	65.20
	ONP	6	54.7700	22.19865	9.06256	22.82	81.55
	Total	22	56.5650	14.99265	3.19644	22.82	81.55
NDF	UNILAG	14	46.3900	22.09596	5.90539	9.00	72.10
	LCC	2	60.1500	2.19203	1.55000	58.60	61.70
	ONP	6	50.6333	15.18389	6.19880	27.80	69.70
	Total	22	48.7982	19.35101	4.12565	9.00	72.10
ADF	UNILAG	14	34.0593	12.26219	3.27721	6.00	45.00
	LCC	2	43.9300	7.17006	5.07000	38.86	49.00
	ONP	6	34.2067	13.93257	5.68795	24.48	61.06
	Total	22	34.9968	12.25200	2.61214	6.00	61.06
ADL	UNILAG	14	17.8693	7.66621	2.04888	1.61	30.46
	LCC	2	29.7800	.89095	.63000	29.15	30.41
	ONP	6	21.0533	5.18593	2.11715	12.60	27.71
	Total	22	19.8205	7.43251	1.58462	1.61	30.46

Appendix 18: Analysis of Variance for Nutrients Composition of Dry Season's Mona Monkeys' Foods from University of Lagos, Lekki Conservation Centre, and Okomu National Park

Nutri (%)	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
DM	Between Groups	101.336	2	50.668	.732	.494
	Within Groups	1315.308	19	69.227		
	Total	1416.643	21			
CP	Between Groups	142.538	2	71.269	.911	.419
	Within Groups	1486.624	19	78.243		
	Total	1629.162	21			
EE	Between Groups	194.845	2	97.423	1.741	.202
	Within Groups	1063.013	19	55.948		
	Total	1257.858	21			
CF	Between Groups	142.862	2	71.431	.631	.543
	Within Groups	2149.672	19	113.141		
	Total	2292.534	21			
Ash	Between Groups	17.747	2	8.874	.821	.455
	Within Groups	205.371	19	10.809		
	Total	223.118	21			
NFE	Between Groups	35.650	2	17.825	.072	.931
	Within Groups	4684.723	19	246.564		
	Total	4720.374	21			
NDF	Between Groups	359.125	2	179.562	.455	.641
	Within Groups	7504.569	19	394.977		
	Total	7863.694	21			
ADF	Between Groups	175.655	2	87.828	.561	.580
	Within Groups	2976.689	19	156.668		
	Total	3152.344	21			
ADL	Between Groups	260.804	2	130.402	2.755	.089
	Within Groups	899.283	19	47.331		
	Total	1160.087	21			

Appendix 19: Descriptive Statistics for Rainy Season's Nutrient Composition of Mona Monkeys' Foods fromUniversity of Lagos, Lekki Conservation Centre,andOkomu National Park

Nutri. (%)	Location	N	Mean	Std. Deviation	Std. Error	Min.	Max.
DM	UNILAG	7	76.5214	8.14190	3.07735	65.63	85.37
	LCC	8	83.8050	6.16468	2.17954	76.91	93.67
	ONP	8	82.5162	6.96706	2.46323	71.86	89.77
	Total	23	81.1400	7.46152	1.55583	65.63	93.67
CP	UNILAG	7	15.1286	14.68981	5.55222	2.63	37.19
	LCC	8	8.0325	7.41614	2.62200	.44	22.31
	ONP	8	9.2988	9.82698	3.47436	1.75	31.94
	Total	23	10.6326	10.79886	2.25172	.44	37.19
EE	UNILAG	7	14.8371	3.54744	1.34081	10.80	20.46
	LCC	8	18.3625	7.48044	2.64473	11.00	31.80
	ONP	8	28.2825	15.62054	5.52269	12.20	51.40
	Total	23	20.7400	11.51965	2.40201	10.80	51.40
CF	UNILAG	7	8.0714	4.42294	1.67171	3.00	14.40
	LCC	8	12.5025	6.80827	2.40709	4.40	26.80
	ONP	8	16.1375	8.49402	3.00309	8.70	35.00
	Total	23	12.4183	7.35423	1.53346	3.00	35.00
Ash	UNILAG	7	6.6571	3.63449	1.37371	1.80	12.40
	LCC	8	5.6075	3.17409	1.12221	.10	9.40
	ONP	8	3.9175	2.06457	.72994	.30	6.20
	Total	23	5.3391	3.07869	.64195	.10	12.40
NFE	UNILAG	7	55.3057	15.73614	5.94770	33.81	73.57
	LCC	8	55.4950	10.26370	3.62877	40.84	71.28
	ONP	8	43.6512	23.97820	8.47758	2.40	69.65
	Total	23	51.3178	17.79807	3.71115	2.40	73.57
NDF	UNILAG	7	41.1371	22.29844	8.42802	14.30	76.20
	LCC	8	58.6775	8.66133	3.06224	44.64	71.40
	ONP	8	52.4250	10.69670	3.78185	38.60	65.10
	Total	23	51.1643	15.77901	3.29015	14.30	76.20
ADF	UNILAG	7	26.3800	20.32277	7.68128	3.60	62.60
	LCC	8	35.4538	9.59530	3.39245	17.11	43.82
	ONP	8	30.2225	10.39822	3.67632	13.60	47.40
	Total	23	30.8726	13.80382	2.87829	3.60	62.60
ADL	UNILAG	7	17.4743	14.05034	5.31053	1.60	36.61
	LCC	8	18.7775	7.01579	2.48046	7.53	29.24
	ONP	8	20.9925	12.11478	4.28322	5.11	43.67
	Total	23	19.1513	10.88018	2.26867	1.60	43.67

Appendix 20: Inferential Statistics for Nutrients Composition of Rainy Season's Mona Monkeys' Foods in University of Lagos, Lekki Conservation Centre, and Okomu National Park

Nutri (%)	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
DM	Between Groups	221.289	2	110.644	2.205	.136
	Within Groups	1003.546	20	50.177		
	Total	1224.835	22			
CP	Between Groups	209.814	2	104.907	.891	.426
	Within Groups	2355.723	20	117.786		
	Total	2565.537	22			
EE	Between Groups	744.241	2	372.120	3.421	.053
	Within Groups	2175.213	20	108.761		
	Total	2919.454	22			
CF	Between Groups	242.983	2	121.492	2.566	.102
	Within Groups	946.880	20	47.344		
	Total	1189.864	22			
Ash	Between Groups	28.905	2	14.452	1.609	.225
	Within Groups	179.618	20	8.981		
	Total	208.523	22			
NFE	Between Groups	721.124	2	360.562	1.154	.335
	Within Groups	6247.841	20	312.392		
	Total	6968.965	22			
NDF	Between Groups	1168.107	2	584.054	2.711	.091
	Within Groups	4309.387	20	215.469		
	Total	5477.495	22			
ADF	Between Groups	312.561	2	156.280	.806	.461
	Within Groups	3879.437	20	193.972		
	Total	4191.998	22			
ADL	Between Groups	47.925	2	23.962	.187	.830
	Within Groups	2556.396	20	127.820		
	Total	2604.321	22			

Appendix 21: Descriptive Statistics of Nutrient Content of Mona Monkeys Foods for both Seasons inUniversity of Lagos, Lekki Conservation Centre, and Okomu National Park

Nutr. (%)	Location	N	Mean	Std. Deviation	Std. Error	Min.	Max.
DM	UNILAG	21	78.4871	8.15059	1.77860	61.92	89.15
	LCC	10	83.2900	5.92435	1.87345	76.80	93.67
	ONP	14	83.3143	7.53147	2.01287	68.41	94.01
	Total	45	81.0562	7.74862	1.15510	61.92	94.01
CP	UNILAG	21	13.1200	11.50611	2.51084	.88	37.19
	LCC	10	8.2640	6.63936	2.09955	.44	22.31
	ONP	14	8.0321	8.19127	2.18921	.00	31.94
	Total	45	10.4580	9.76559	1.45577	.00	37.19
EE	UNILAG	21	14.9229	4.11486	.89794	7.60	22.20
	LCC	10	18.5060	6.60793	2.08961	11.00	31.80
	ONP	14	25.4329	14.30192	3.82235	11.80	51.40
	Total	45	18.9889	9.91048	1.47737	7.60	51.40
CF	UNILAG	21	9.2695	5.46255	1.19203	1.20	21.40
	LCC	10	11.7620	6.45739	2.04201	4.40	26.80
	ONP	14	15.8286	12.89982	3.44762	2.50	52.00
	Total	45	11.8640	8.91481	1.32894	1.20	52.00
Ash	UNILAG	21	6.2833	3.25382	.71004	1.80	12.40
	LCC	10	5.2260	2.92206	.92404	.10	9.40
	ONP	14	5.2921	3.26943	.87379	.30	13.00
	Total	45	5.7400	3.15941	.47098	.10	13.00
NFE	UNILAG	21	56.4043	13.50550	2.94714	33.81	75.96
	LCC	10	56.2420	9.60906	3.03865	40.84	71.28
	ONP	14	48.4164	23.05919	6.16283	2.40	81.55
	Total	45	53.8831	16.51372	2.46172	2.40	81.55
NDF	UNILAG	21	44.6390	21.74753	4.74570	9.00	76.20
	LCC	10	58.9720	7.69852	2.43449	44.64	71.40
	ONP	14	51.6571	12.29351	3.28558	27.80	69.70
	Total	45	50.0076	17.45393	2.60188	9.00	76.20
ADF	UNILAG	21	31.4995	15.34273	3.34806	3.60	62.60
	LCC	10	37.1490	9.49183	3.00158	17.11	49.00
	ONP	14	31.9300	11.70755	3.12897	13.60	61.06
	Total	45	32.8889	13.08677	1.95086	3.60	62.60
ADL	UNILAG	21	17.7376	9.87223	2.15430	1.60	36.61
	LCC	10	20.9780	7.73901	2.44729	7.53	30.41
	ONP	14	21.0186	9.45376	2.52662	5.11	43.67

Appendix 22: Inferential Statistics of the Nutrients' Content of Dry and Rainy seasons' Mona Monkeys' Foods in University of Lagos, Lekki Conservation Centre and Okomu National Park

Nutri. (%) variation	Source of	Sum of Squares	df	Mean Square	F	Sig.
DM	Between Groups	259.885	2	129.943	2.291	.114
	Within Groups	2381.923	42	56.712		
	Total	2641.808	44			
CP	Between Groups	279.334	2	139.667	1.498	.235
	Within Groups	3916.799	42	93.257		
	Total	4196.134	44			
EE	Between Groups	930.863	2	465.431	5.765	.006*
	Within Groups	3390.709	42	80.731		
	Total	4321.572	44			
CF	Between Groups	361.511	2	180.756	2.421	.101
	Within Groups	3135.340	42	74.651		
	Total	3496.851	44			
Ash	Between Groups	11.649	2	5.825	.572	.569
	Within Groups	427.552	42	10.180		
	Total	439.201	44			
NFE	Between Groups	607.511	2	303.755	1.120	.336
	Within Groups	11391.419	42	271.224		
	Total	11998.930	44			
NDF	Between Groups	1446.947	2	723.474	2.541	.091
	Within Groups	11957.196	42	284.695		
	Total	13404.143	44			
ADF	Between Groups	234.895	2	117.448	.676	.514
	Within Groups	7300.705	42	173.826		
	Total	7535.600	44			
ADL	Between Groups	119.334	2	59.667	.687	.509
	Within Groups	3650.108	42	86.907		
	Total	3769.442	44			

*. The mean difference is significant at the 0.05 level.

Appendix 23: Least Significant Difference of Nutrients Composition of Mona Monkeys' Foods by Comparison BetweenLocation

Nutrient (%)	Location 1	Location 2	Mean Diff (1-2)	Std. Error	Sig.	95% Conf. Interval	
						Lower bound	Upper Bound
DM	UNILAG	LCC	-4.80286	2.89341	.104	-10.6420	1.0363
	UNILAG	ONP	-4.82714	2.59836	.070	-10.0708	.4166
	LCC	ONP	-.02429	3.11803	.994	-6.3167	6.2682
CP	UNILAG	LCC	4.85600	3.71033	.198	-2.6317	12.3437
	UNILAG	ONP	5.08786	3.33197	.134	-1.6363	11.8120
	LCC	ONP	.23186	3.99837	.954	-7.8372	8.3009
EE	UNILAG	LCC	-3.58314	3.45217	.305	-10.5499	3.3836
	UNILAG	ONP	-10.5100*	3.10014	.002	-16.7663	-4.2537
	LCC	ONP	-6.92686	3.72016	.070	-14.4345	.5807
CF	UNILAG	LCC	-2.49248	3.31962	.457	-9.1917	4.2068
	UNILAG	ONP	-6.55905*	2.98111	.033	-12.5752	-.5429
	LCC	ONP	-4.06657	3.57733	.262	-11.2859	3.1528
Ash	UNILAG	LCC	1.05733	1.22586	.393	-1.4166	3.5312
	UNILAG	ONP	.99119	1.10085	.373	-1.2304	3.2128
	LCC	ONP	-.06614	1.32103	.960	-2.7321	2.5998
NFE	UNILAG	LCC	.16229	6.32755	.980	-12.6072	12.9318
	UNILAG	ONP	7.98786	5.68231	.167	-3.4795	19.4552
	LCC	ONP	7.82557	6.81877	.258	-5.9353	21.5864
ADL	UNILAG	LCC	-3.24038	3.58178	.371	-10.4687	3.9880
	UNILAG	ONP	-3.28095	3.21654	.314	-9.7722	3.2103
	LCC	ONP	-.04057	3.85984	.992	-7.8301	7.7489
ADF	UNILAG	LCC	-5.64948	5.06558	.271	-15.8722	4.5733
	UNILAG	ONP	-.43048	4.54902	.925	-9.6108	8.7498
	LCC	ONP	5.21900	5.45883	.345	-5.7974	16.2354
NDF	UNILAG	LCC	-14.33295*	6.48278	.033	-27.4157	-1.2502
	UNILAG	ONP	-7.01810	5.82171	.235	-18.7668	4.7306
	LCC	ONP	7.31486	6.98605	.301	-6.7836	21.4133

Appendix 24: Correlation Coefficient (r) between the Nutrient Contents of Dry Season'sMona Monkeys' Foods in University of Lagos

(Nut., %)	DM	CP	EE	CF	Ash	NFE	ADL	ADF	NDF
DM	1								
CP	-.182								
	.266								
EE	-.503*	-.069							
	.033	.407							
CF	.342	-.091	-.045						
	.116	.378	.439						
Ash	-.376	.232	.236	-.089					
	.093	.213	.208	.381					
NFE	.252	-.771**	-.333	-.356	-.469*				
	.192	.001	.122	.106	.045				
ADL	-.338	.430	-.104	.031	.516*	-.441			
	.119	.062	.362	.459	.029	.057			
ADF	-.341	.099	-.379	-.132	.285	.046	.698**		
	.116	.368	.091	.326	.161	.437	.003		
NDF	-.361	.037	-.284	-.059	.454	-.014	.526*	.785**	1
	.103	.450	.163	.420	.051	.481	.027	.000	

**. Correlation is significant at the 0.01 level (1-tailed).

APPENDIX 25: Correlation Coefficient (r) between the Nutrient Contents of Rainy Season's Mona Monkeys' Foods in University of Lagos

Nut.; N= 7	DM	CP	EE	CF	Ash	NFE	NDF	ADF	ADL
DM									
	1								
CP									
	-.048	1							
	.460								
EE									
	-.594	.142	1						
	.080	.381							
CF									
	.346	.081	-.784*	1					
	.224	.431	.019						
Ash									
	-.868**	-.153	.308	-.184	1				
	.006	.372	.251	.347					
NFE									
	.282	-.953**	-.209	-.138	-.106	1			
	.270	.000	.326	.384	.410				
NDF									
	-.826*	.164	.739*	-.473	.759*	-.363	1		
	.011	.362	.029	.142	.024	.212			
ADF									
	-.871**	.128	.546	-.449	.831*	-.308	.911**	1	
	.005	.393	.102	.156	.010	.251	.002		
ADL									
	-.961**	.154	.456	-.262	.893**	-.379	.832*	.939**	1
	.000	.371	.152	.285	.003	.201	.010	.001	

*.Correlation is significant at the 0.05 level (1-tailed).
**. Correlation is significant at the 0.01 level (1-tailed).

Appendix 26: Correlation Coefficient (r) between the Nutrient Contents of Mona Monkey' dry and rainy seasons' foods in Lekki Conservation Centre

Nut.; N=10	**DM**	**CP**	**EE**	**CF**	**Ash**	**NFE**	**ADL**	**ADF**	**NDF**
DM	1								
CP	-.286	1							
	.212								
EE	.073	-.084	1						
	.421	.409							
CF	.237	-.460	.223	1					
	.254	.090	.268						
Ash	-.459	.068	-.243	-.292	1				
	.091	.426	.249	.207					
NFE	.127	-.344	-.705*	-.418	.013	1			
	.363	.165	.011	.115	.486				
ADL	.214	.010	.057	-.476	-.229	.343	1		
	.276	.489	.438	.082	.263	.166			
ADF	.040	.023	.493	-.139	-.313	-.167	.606*	1	
	.457	.474	.074	.351	.190	.322	.032		
NDF	.133	-.457	.666*	-.033	-.375	-.006	.290	.478	1
	.357	.092	.018	.464	.143	.493	.209	.081	

Nut. = Nutrient;*.Correlation is significant at the 0.05 level (1-tailed).
**. Correlation is significant at the 0.01 level (1-tailed).

Appendix 27: Correlation Coefficient (r) between the Nutrient Contents of Mona Monkeys' Foods in the Dry Season in Okomu National Park

Nut.; N = 6	DM	CP	EE	CF	Ash	NFE	NDF	ADF	ADL
DM	1								
CP	.101	1							
	.848								
EE	.370	.196	1						
	.471	.710							
CF	.540	-.011	-.066	1					
	.269	.983	.901						
Ash	-.353	.744	.437	-.445	1				
	.492	.090	.386	.377					
NFE	-.454	-.567	-.096	-.809	-.119	1			
	.366	.241	.857	.051	.823				
NDF	-.336	-.010	.074	-.402	.386	.254	1		
	.515	.985	.889	.430	.450	.627			
ADF	-.064	-.274	-.347	-.276	-.185	.366	.753	1	
	.904	.599	.500	.597	.726	.476	.084		
ADL	.190	-.307	-.071	.562	-.307	-.345	.483	.489	1
	.718	.554	.893	.246	.554	.503	.331	.325	

Nut. = Nutrient;*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Appendix 28: Correlation Coefficient (r) between the Nutrient Contents of Rainy Season's Mona Monkeys'Foods in Okomu National Park

Nut.; N=6	DM	CP	EE	CF	Ash	NFE	NDF	ADF	ADL	HC	CS
DM	11										
	1										
CP	.613	1									
	.106										
EE	.646	.460	1								
	.084	.252									
CF	.163	-.237	.494	1							
	.699	.573	.213								
Ash	-.148	.074	.241	.162	1						
	.727	.862	.566	.701							
NFE	-.689	-.667	-.942**	-.464	-.283	1					
	.059	.071	.000	.247	.498						
NDF	.411	.531	.025	-.268	-.738*	-.150	1				
	.312	.176	.952	.520	.037	.723					
ADF	.462	.313	.207	-.023	-.816*	-.215	.846**	1			
	.249	.450	.623	.956	.014	.608	.008				
ADL	.122	-.030	-.226	-.348	-.737*	.266	.645	.788*	1		
	.774	.945	.591	.399	.037	.524	.084	.020			
HC	.023	.441	-.336	-.526	.098	.127	.320	-.225	-.174	1	
	.957	.274	.416	.181	.818	.764	.439	.593	.679		
CS	.430	.472	.645	.531	.086	-.723*	.103	.081	-.550	-.022	1
	.287	.238	.084	.176	.839	.043	.808	.849	.158	.958	

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Appendix 29: Amino acids Profile of Dry Season's Foods of Mona Monkeys in University of Lagos

Food Sample	Lys	Hist	Arg	Asp	Thr	Ser	Glu	Pro	Gly	Ala	Cys	Val	Met	Iso	Leu	Tyr	Phe
Albizia lebbeck	8.63	2.51	7.74	7.17	6.28	6.55	8.60	4.76	5.61	6.22	0.69	5.02	2.31	4.08	7.54	4.47	4.67
Avicennia germinans	7.20	2.25	6.55	7.89	4.26	6.46	10.23	3.25	4.02	7.62	0.69	6.52	2.25	3.88	6.81	3.31	3.96
Brassica oleracea	8.58	2.41	7.49	7.01	5.96	5.82	8.53	4.87	5.68	6.56	0.76	4.93	2.36	4.04	7.51	4.47	4.58
Carica papaya	6.98	2.29	6.72	6.82	5.62	5.41	6.96	3.83	4.00	5.88	0.69	4.99	2.09	4.11	6.69	2.98	3.96
Daucus carota	6.76	2.16	6.89	6.69	5.45	5.23	6.75	3.59	3.89	5.97	0.55	5.29	2.25	4.17	6.45	3.23	3.78
Dioscorea spp	6.10	2.09	5.96	6.88	3.63	5.70	6.39	3.25	3.28	4.97	0.55	4.08	2.15	3.20	6.34	3.14	3.43
Mangifera indica	5.88	2.16	6.47	6.82	4.03	6.82	8.67	3.02	3.58	6.05	0.55	5.52	2.20	3.46	6.81	3.64	3.70
Musa paradisiaca	6.49	2.16	6.81	6.82	5.96	5.64	6.89	4.18	5.12	3.98	0.55	4.20	2.04	3.52	6.57	3.97	3.70
Musa sapientum	5.99	2.16	6.81	7.39	4.26	6.87	9.24	3.13	3.74	6.63	0.55	6.02	2.20	3.65	6.87	3.81	3.87
Terminalia catappa	6.19	2.10	6.21	7.20	4.03	5.82	6.61	3.25	3.30	5.51	0.48	4.32	2.01	3.03	6.51	3.14	3.61

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine, Leu=Leucine, Phe = Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glucine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine

Appendix 30: Amino Acids Profile of Rainy Season's Foods of Mona Monkeys in University of Lagos

Food Sample	Lys	Hist	Arg	Asp	Thr	Ser	Glu	Pro	Gly	Ala	Cys	Val	Met	Iso	Leu	Tyr	Phe
Artocarpus altilis	5.61	1.84	5.27	7.01	3.63	3.23	9.24	2.32	3.22	6.21	0.55	3.89	1.61	2.22	5.63	2.65	3.78
Brassica oleracea	7.86	2.41	7.66	7.01	6.19	5.35	7.25	4.17	4.82	4.56	0.55	4.20	2.09	4.57	7.57	4.63	4.40
Carica papaya	6.87	2.22	6.81	6.88	6.08	5.82	6.96	4.29	5.22	4.23	0.55	4.32	2.09	3.65	6.98	4.14	3.70
Colocasia esculenta	7.09	2.16	6.98	6.94	6.02	5.99	7.82	4.41	5.02	4.23	0.55	4.14	2.20	4.89	7.04	4.47	4.22
Dioscorea spp.Amala	6.21	1.97	6.47	6.63	4.03	6.17	7.96	3.48	3.43	5.63	0.55	5.29	2.15	3.20	6.63	3.31	3.70
Dioscorea spp. (boiled)	6.98	2.09	6.98	7.51	4.60	7.05	10.66	3.25	3.99	6.88	0.55	6.51	2.41	3.91	7.10	4.14	3.96
Ficus Sp. Fruit	6.38	2.16	6.64	7.01	4.20	6.40	7.11	3.02	3.69	5.97	0.55	5.47	2.15	3.46	6.98	3.64	3.87
Manihot esculenta (chaff)	5.28	1.90	7.32	8.52	4.88	7.29	10.09	2.09	4.97	6.21	0.41	5.17	1.98	4.37	5.52	3.23	4.58
Manihot esculenta (fufu)	5.99	1.90	5.96	6.31	4.03	5.29	6.68	2.44	3.74	4.97	0.55	5.17	2.41	3.98	6.69	4.22	4.05
Phaseolus vulgaris	8.96	2.48	7.83	7.20	6.30	6.17	8.24	4.64	5.53	4.97	0.69	4.81	2.25	4.83	7.63	4.80	4.75
Raphia hookeri fruit	6.49	1.97	6.81	7.38	4.43	6.52	7.67	3.48	3.84	6.63	0.55	6.20	2.20	3.72	6.92	3.80	4.05
Terminalia catappa (ripe)	6.71	2.16	6.98	8.27	4.37	6.76	7.25	3.48	4.35	7.62	0.69	7.06	2.36	3.98	7.16	3.47	4.58
Zea mays (yellow)	6.98	2.03	6.64	7.32	5.68	6.35	9.38	3.94	5.02	5.30	0.55	6.21	2.15	3.65	6.69	3.81	3.87

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine, Leu=Leucine, Phe = Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glucine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine

Appendix 31: Amino Acids Profile of Dry and Rainy Seasons' Foods of Mona Monkeys in Lekki Conservation Centre

Food Sample	Lys	Hist	Arg	Asp	Thr	Ser	Glu	Pro	Gly	Ala	Cys	Val	Met	Iso	Leu	Tyr	Phe
Ficus ingens	6.32	2.09	6.47	7.01	3.46	5.11	7.82	3.01	3.58	3.81	0.55	4.20	1.98	3.26	6.92	3.47	3.78
Hura crepitans	6.21	2.16	6.47	6.00	5.23	5.28	6.82	3.71	3.99	6.13	0.55	4.02	2.20	4.04	6.87	3.14	3.87
Mangifera indica	5.88	1.97	5.27	7.20	3.28	4.11	8.24	2.32	3.69	4.81	0.41	3.53	1.77	3.00	7.22	3.31	3.61
Mussaenda polita	6.87	2.22	6.64	6.88	4.94	4.99	8.10	3.02	4.56	5.22	0.55	4.02	2.09	3.39	7.16	3.39	3.92
Terminalia cattapa	5.99	1.84	6.30	6.50	3.52	4.52	8.10	3.25	3.69	4.23	0.55	3.77	1.77	3.20	6.69	3.14	4.05

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine, Leu=Leucine, Phe = Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glucine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine

Appendix 32: Amino Acids Profile of Dry and Rainy Seasons' Foods of Mona Monkeys in Okomu National Park

Food Sample	Lys	Hist	Arg	Asp	Thr	Ser	Glu	Pro	Gly	Ala	Cys	Val	Met	Iso	Leu	Tyr	Phe
Irvingia gabonensis	6.21	2.22	6.64	7.64	3.75	3.70	7.25	2.55	3.58	4.31	0.41	3.35	1.98	3.00	6.22	2.65	4.22
Jateorhiza macrantha	6.27	1.90	6.81	7.51	3.07	3.41	7.53	2.55	3.99	7.04	0.55	4.01	1.88	3.36	5.99	2.81	4.05
Macaranga barteri	5.33	1.97	5.61	7.32	3.07	3.23	6.96	3.01	3.43	4.97	0.41	3.65	1.77	3.98	5.87	2.98	3.34
Mangifera indica	5.00	1.84	5.44	7.01	3.35	3.35	7.53	2.55	3.48	4.06	0.55	3.59	1.82	3.59	6.69	3.14	4.05
Theobroma cacao	5.88	2.22	4.42	7.45	3.24	3.52	7.53	2.78	3.28	5.39	0.55	4.01	2.20	3.20	5.99	2.98	4.58

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine, Leu=Leucine, Phe = Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glucine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine

Appendix 33: Amino Acids Profile of Mona Monkeys' Most Prefered, and Novel Foods

Food Sample	Lys	Hist	Arg	Thr	Val	Met	Iso	Leu	Phe	Asp	Ser	Glu	Pro	Gly	Ala	Cys	Tyr
Musa sapientum	5.99	2.16	6.81	4.26	6.02	2.20	3.65	6.87	3.87	7.39	6.87	9.24	3.13	3.74	6.63	0.55	3.81
Zea mays (Yellow)	6.98	2.03	6.64	5.68	6.21	2.15	3.65	6.69	3.87	7.32	6.35	9.38	3.94	5.00	5.30	0.55	3.81
Solanum melongena	3.64	2.24	4.23	2.89	3.21	1.22	2.60	5.51	3.79	9.55	3.20	10.45	2.64	3.91	3.01	0.57	2.95
Gmelina arborea	2.53	1.49	3.06	2.22	1.58	1.50	2.19	3.90	2.64	5.71	2.88	12.73	2.10	2.51	2.49	0.76	2.15
Jateorhiza macrantha	6.27	2.22	6.64	3.75	3.35	1.98	3.00	6.22	4.22	7.64	3.70	7.25	2.55	3.58	4.31	0.41	2.65

Lys=Lysine, Hist=Histidine, Arg= Arginine, Thr=Threonine, Val=Valine, Met=Methionine, Iso=Isoleucine,

Leu=Leucine, Phe = Phenylalanine, Asp=Asparagine, Ser=Serine, Glu= Glucine, Pro= Proline, Gly=Glycine, Ala=Alanine, Cys=Cysteine, Tyr=Tyronine

Appendix 34: Correlation of Coefficient of Food Preference and Proximate Composition of Mona Monkey Foods.

Correlations									**Descriptive**		
		COP	DM	CP	EE	CF	Ash	NFE	Mean	Std. Deviation	N
COP	Pearson Correlation	1	.227	-.325	.116	**-.840***	-.305	.626	1.2467	.17061	6
	Sig. (1-tailed)		.332	.265	.414	**.018**	.278	.092			
DM	Pearson Correlation		1	-.789*	-.569	-.545	.144	.815*	75.9433	10.74006	6
	Sig. (1-tailed)			.031	.119	.132	.393	.024			
CP	Pearson Correlation			1	.165	.524	.199	-.879*	7.7117	4.12335	6
	Sig. (1-tailed)				.377	.143	.353	.011			
EE	Pearson Correlation				1	.038	-.891**	-.168	14.0767	2.88001	6
	Sig. (1-tailed)					.472	.009	.375			
CF	Pearson Correlation					1	.315	-.860*	12.0233	3.93524	6
	Sig. (1-tailed)						.272	.014			
Ash	Pearson Correlation						1	-.259	7.2600	2.62374	6
	Sig. (1-tailed)							.310			
NFE	Pearson Correlation							1	58.9283	8.17230	6
	Sig. (1-tailed)										
*. Correlation is significant at the 0.05 level (1-tailed).											
**. Correlation is significant at the 0.01 level (1-tailed).											

Appendix 35: Correlation of Coefficient of Food Preference and Fibre Fraction Composition of Mona Monkey Foods.

Correlations											
		COP	NDF	ADF	ADL	HC	CEL	Mean	Std. Deviation	N
COP	Pearson Correlation	1	-.065	.411	-.403	-.517	.589	1.247	.171	6
	Sig. (1-tailed)		.451	.209	.214	.147	.110			
NDF	Pearson Correlation		1	.619	-.405	.546	.725	54.901	7.981	6
	Sig. (1-tailed)			.095	.213	.131	.051			
ADF	Pearson Correlation			1	.059	-.319	.601	37.207	7.053	6
	Sig. (1-tailed)				.456	.269	.104			
ADL	Pearson Correlation				1	-.551	-.763*	21.955	8.714	6
	Sig. (1-tailed)					.129	.039			
HC	Pearson Correlation					1	.234	17.695	6.614	6
	Sig. (1-tailed)						.328			
CEL	Pearson Correlation						1	15.252	10.883	6
	Sig. (1-tailed)									
*. Correlation is significant at the 0.05 level (1-tailed).										

Appedix 36: Conservation Action Plan for Mona Monkeys in University of Lagos

EXECUTIVE SUMMARY

The mona monkey (*Cercopithecus mona*) is the only non-human primate in the University of Lagos, Nigeria. This thesis recommends that in order to forestall local extirpation of the monkey, local conservation strategies would have to be adapted. This plan is meant to achieve that. It is the blue print for saving from extirpation, the remaining population of the monkey in its present habitat (*in situ* conservation). This management plan is species and location specific based on the status of the monkey in its local habitat, an urban habitat that has been fragmented and degraded. It is a five year plan (2016-2020) that would need to be reviewed after the planned actions have been executed. Ideally, this plan should have been developed through participatory processes by different stakeholders for broad identity and commitment. The present limitation notwithstanding it is hoped that it would be accepted and implemented by all stakeholders. Only then would it have been valuable and successful.

INTRODUCTION

The mona monkey population has persisted in the University of Lagos since the inception of the institution in 1962; other large mammals have become extirpated. Its persistence has been attributed to the generalist feeding habit and the animals' adaptation to other foods other that the wild sources. The population has dwindled over the years and the habitat have become degraded and fragmented through the conversion of the habitats to institutional infrastructures. The ecological, educational, and ecotourism potentials of the monkey have not been appreciated, assessed and utilized. Lest it becomes extirpated before these are accomplished, and also for its intrinsic value as part of nature, the following conservation and management plan of the monkey is been drawn up. It is a **Habitat and Population Recovery Plan.**

The Plan is presented as follows:

1. Status Review
2. Threat Analysis
3. Goal and Objectives
4. Actions to Accomplish the Objectives.

Status Review

There has been a dearth of information on the population density of the mona monkey in the University of Lagos. People generally speak vaguely of large numbers in several troops, and give a description of the previous habit ranges to include forests around Distant Learning Institute, Faculty of Science, Botanical and Zoological Garden area, Lagoon Front, Guest Houses, back of Faculty of Arts, New Hall, UBA Park, and Community Road. They were easily sighted at any time of the day. Presently, it is only in certain places (Faculty of Arts, New Hall, Faculty of Environmental Science, and St. Augustine College of Education) and designated times (early mornings just before they leave their sleeping places) that one might be lucky to sight them. Figure 2 of this thesis showed the habitat range of the monkey. Olaleru and Egonmwan (2012) gave an estimate of 60 individuals in four troops. The number might have reduced to less than 40 individuals.

Threat Analysis

The ultimate cause of the population decline is population explosion in the University of Lagos. At inception, there were less than one hundred students. Presently the University has over forty thousand students, apart from teaching, administrative and technical staff members. It has two primary schools and a secondary school, in addition to the staff quarters. The quest for land to build infrastructures has resulted in the conversion of the forests that used to be the monkeys habitat (home, school, play place, super market, grocery stores, pharmaceutical stores, and so on). Hunting through the use of traps and food poisoning has had its effect in causing the population to dwindle.

The major threats are:

a. Habitat destruction and fragmentation;
b. Scarce wild food resources;
c. Human predation through hunting;
d. Unhealthy environment;
e. Lack of another contiguous forest to escape to.

As an animal with slow recruitment rate from new births, and the threats listed above, its population is now confined to the little forest fragments on the northern fringes of the University. These areas witnessed two major habitat changes between January, 2012 and mid 2014: a destruction of a core habitat area around Guest Houses and a fragmentation that affected the major corridor between troops in University of Lagos and the one in St Augustine College of Education. This led to the exposure of the monkeys to more danger.

Goals and Objectives

The goals of this plan are to recover and protect the remaining forests for the exclusive use of the monkeys, and recover the monkeys' population to 150 individuals through zero tolerance to human predation. To achieve these goals, the following objectives would be undertaken:

i. Determine the safest and food resource rich portion of the fragments they currently utilize, and potential alternative habitats.
ii. Securing of area from the University to be used as mona monkey habitat.
iii. Reducing the populations' access to dumpsite, and incidence of farm/home raids.
iv. Determine their current population parameters (size, composition, and male to female ratio), and health status.

Actions to Accomplish the Objectives

In order to accomplish the objectives, the following actions would be taken by the different stakeholders:

1. The conservation biologists in the Faculty of Science would work in collaboration with environmental scientists to ascertain, and delineate the current habitats that serve the animals, and also discover potential alternatives should there be need for translocation of the animals. This should take two weeks.
2. A copy of the Plan would be forwarded to the University Management. This is to seek for the leadership of the management to take up the responsibility of providing

3. the logistics for the conservation of the monkeys, as the institution's natural resource. When the population recovers, the educational and ecotourism uses of the animal could then be harnessed. This might take tour weeks or more.
4. Dumpsites would be burnt three times in a week. This will discourage the monkeys from getting there.
5. Conservation biologists would conduct population census of the different troops. The will take two weeks.

Stakeholders: These are the parties that would be involved in executing this Plan. They include the University Management, conservationists in the different departments of the University, interested non-governmental organizations, and private partners.

Expected Outcomes

At the end of the first two years, the population of the monkeys should have increased to 75, if at least 15 adult females give birth every other year and they are able to grow them to weaning age.

Financial Support

The finances for this Plan would have to come from the University Management and the support of different interest groups outside the institution. However, the University would take the lead in the drive for fund raising. The conservation biologists together with the University's budgetary team would have to draw up a budget for the Plan.