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DISTRIBUTION OF AFRICAN GREY PARROTS (*Psittacus erithacus*) LINNACUS, 1758 IN OKOMU NATIONAL PARK, NIGERIA

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Abstract

This study investigated the distribution of African Grey Parrots (*Psittacus timneh*) in Okomu National Park, Nigeria as influenced by the habitat and anthropogenic activities. Data were collected by random sampling from 18 compartments of approximately 1.6 km2 and with structured questionnaires on the use of various forest habitats, anthropogenic activities and African Grey Parrots in the Park. Data obtained were time seen, preferred compartment and vegetation, activities of the Parrot and level of participation in Park patrol. The data were analyzed using descriptive statistics and the results revealed that 85% of the 615 Parrots sighted were in the dense vegetation with highest frequency of occurrence (134) in the evening (6:10 - 6:52 pm). Population distribution was highest (320) and least (28) in compartments 55 and 62 respectively with roosting (28.1%) and perching (0.30%) as the highest and least activities respectively., Timber extraction and illegal hunting constituted the highest anthropogenic activities compared to tourism (14.3%) to implicate habitat degradation (96.4%) as major threat to the even population distribution of this IUCN-threatened wildlife species in the Park. Therefore, the need to strengthen the daily patrol with more public enlightenment campaign for the conservation of the Okomu National Park for increased population viability cannot be overemphasized.

Keywords: Parrots, compartment, habitat, conservation, population distribution, park

Introduction

The African Grey Parrot (Psittacus erithacus) and Timneh Grey Parrot (Psittacus timneh), are the two species by phenotypic differentiation; with the African Grey Parrot distributed across the lowland moist forest of West and Central Africa, ranging from south-eastern Cote d'Ivoire and Ghana, eastwards;through Nigeria, Cameroon, Gabon, the Republic of Congo, northern Angola and the Democratic Republic of Congo (Juniper and Parr, 2003; Collar, 2013). It is a frugivorous and obligate cavity nester that depends on a diversity of large trees with large natural hollows to breed and provide food year-round (Tamungang and Cheke, 2012; McGowan, 2001 and Clemmons, 2003). The strong preference for very tall trees as nesting and roosting, a variety of fruits, nuts and seeds for feeding with a marked preference for oil palm (Elaeis guineensis) fruits has been reported as critical for the survival, incubation and fledging (Annorbah et al., 2016; Tamungang and Ajayi, 2003).

The global popularity as a pet coupled with the ease of capture has annually accounted for the significant decline of African Grey Parrot in the trade market since 1975. Gross exports of over 1.3 million wild birds from 18 States have qualified the African Grey Parrot as one of the most traded CITES-listed birds in African International pet trade. Population declines have been linked to a range of factors in addition to capture for the pet trade (Wright et al., 2001) to include hunting for food, persecution as crop pests and disease (Gartrell et al., 2005). The increasing significant threat led to a re-categorization of Africa Gray Parrot as Vulnerable on the IUCN Red List of Threatened Species on the basis that "the extent of the annual harvest for international trade, in combination with the rate of ongoing habitat loss, means it is now suspected to be undergoing rapid declines over three generations of 47 years (Birdlife International, 2015).

Parrots are a highly threatened taxon, but quantifying their degree of threat may be challenging. Measures of abundance and range sizes are the base of any evaluation of extinction risk and, in turn, of the prioritization of conservation effort (Mace et al., 2008). Despite parrots' endangered status, little is known about the size of their populations in the wild, and density estimates are available only for 25% of the world species, regardless of their conservation status or biogeographically region (Marsden and Royle, 2015). Parrots (Order Psittaciformes) are one group of bird species that are heavily exploited for the international pet trade (TRAFFIC, 2008). Parrots are one of the bird's species in the world that face high risk of extinction owning to habitat destruction, degradation and loss and degradation due to agricultural expansion, climate change, hunting and trapping decimate population viability of some species of parrot.

However, a direct relationship between the status of parrots and existing primary forest stand have been reported as a critical contributory factor that may either

lead to a decline or boost in the viable population (Clemmons, 2003). Therefore, deforestation can have different effects on parrot populations, and the mutual interactions of these may exacerbate tendencies to severity (Didham et al., 2007). Changes in food resource availability and accessibility have been linked to the decline of wild populations as a result of poor roosting sites with available water and mineral salt licks (Snyder et al., 2000 Lee et al., 2010) thus qualifying the fragmentation of tropical forests as caused and rapidly followed by the establishment of human settlements and increase in direct exploitation of resources (Wilkie et al., 2000).

Nigeria has experienced extremely high rates of forest loss from 234,233 to 216,270sqkm between 2009 and 2020 (FAO 2021) and resultant fragmentation patches likely to increase the travel distances that parrots have to cover during flight. These resource patches ultimately become disconnects among populations living among parchment forests with serious implications on breeding capacity, nesting grounds and survival instinct. Natural regeneration by enrichment plantings among large trees containing suitable nesting cavities for parrots have been shown as extremely slow process (Manning et al., 2013) to restoring degraded forest areas for conservation.

Between 2000-2010, Nigeria, which has seen a major decline in parrot numbers, had one of the highest rates of deforestation globally of approximately 4% per annum (FAO, 2010; CITES, 2006). This high rates of deforestation have also been implicated in the virtual elimination of African Grey Parrots along the lowland rainforest belt in Africa with a 90-99% reduction in population observed in Ghana (Annorbah et al., 2016).

The Okomu National Park is one of the seven nationally protected areas in Nigeria. It is endowed with rich biodiversity including the Africa Gray Parrot, which translated its status from Wildlife Sanctuary to a national park, providing habitat for many species of mammals, birds, amphibians, insects and others irrespective of reported illegal cases of trespasses (Meduna et al., 2009). It is against this background that this study was carried out to determine by survey the current distribution and abundance African Grey Parrot and the impact of anthropogenic activities on its distribution in Okomu National Park.

Materials and Methods

Description of study area

The study was carried out in Okomu National Park formally known as Okomu wildlife sanctuary. The park is situated within a lowland rainforest ecosystem area of approximately 1,082 km² in the Okomu Forest Reserve in Ovia South-West Local Government Area of Edo State, in Nigeria. It is 45 km West of Benin City with a land area of approximately 181 km2 and lies between latitude 6°14'57.55" N and 6°24'55.64" N and longitudes 5°09'28.09" E and 5°20'15.51" E (Ijeomah et al., 2015).

The park contains the last relics of lowland rainforest ecosystem in southwestern Nigeria, with annual rainfall between 1524 and 2540 mm. It is endowed with a complex assemblage of flora and fauna species (Ejidike, 2007). The vegetation is semi-deciduous forest. The park has four ranges at Julius, Iguowan, Arakhuan and Babui creeks. The Park was carved out from Okomu Forest Reserve that was gazetted in 1935 but as wildlife sanctuary by the then Bendel State Government gazetted in 1986. . It became a full-fledged National Park in 1999 (Akinsorotan et al., 2011).

The adjoining forest edges to the Okomu forest reserve represent strong encroachment in routes for the degradation of the Park as the Edo State Government relies heavily on the forest concessions as notable source of internally generated revenue.

Data collection

Data was collected from 18 of the 54 compartments in BC10 by random sampling. Each compartment had an average of 1.6 km^2. Data from the forest rangers were collected from the park using thirty structured questionnaires to gather information on anthropogenic activities in the forest and African Grey Parrots. Data collection was conducted following the systematic transect sampling procedure (Legault et al., 2013 Marsden and Royle, 2015) by walking through established transect line of 400m that is perpendicular from the bird(s) location and recorded for each sighting encounter. Data were collected from 6h00-11h30 and from15h00-20h00 each day.

Results and Discussion

Population of African Grey Parrot observed in vegetation types

The results of the population and time observation of African Grey Parrots observed in the study area are as presented in Figures 1 and 2 respectively. A total number of 615 African Grey Parrots were observed in the study area with approximately 524 (85%) found in dense forest areas while 91(15%) individuals of Parrots were observed in the open vegetation (Figure 1).

The frequency of occurrence with respect to observation times of African Grey parrots are presented in Figure 2. The highest number of parrot (134) was observed between 6:10 - 6:52 pm. This was followed by 105 (6:11 - 6:51 am) and 83 (7:30 – 7:38 pm). The lowest numbers of 4 and 7 parrots were observed between 10:06 – 10:17 am and 11:00 – 11:26 am respectively.

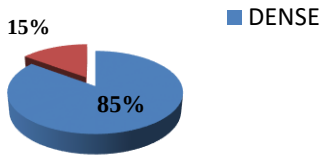

Figure 1: Distribution of African Grey Parrot observed in vegetation types in Okomu National Park

Occurrence frequency of African Grey parrots observed in Compartments

The results of descriptive statistics on distribution frequencies of African Grey parrots in the Compartments under study are as presented (Figure 3). The results showed that the highest number (320) of parrot was observed in compartment 55. This was followed by compartment 44 (68) and compartment 28 (47) while the lowest number (2) was observed in compartment 62 with no Parrot in compartments 29, 30 and 73 during the period of the study.

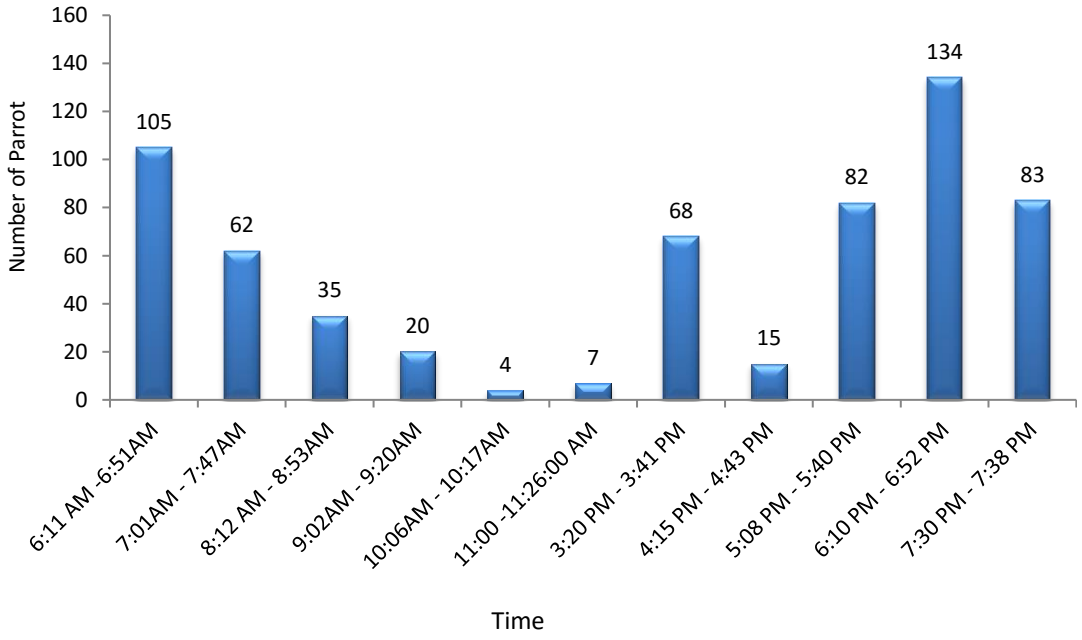

Figure 2: The frequency occurrence and time of observation of African Grey Parrots in Okomu National Park

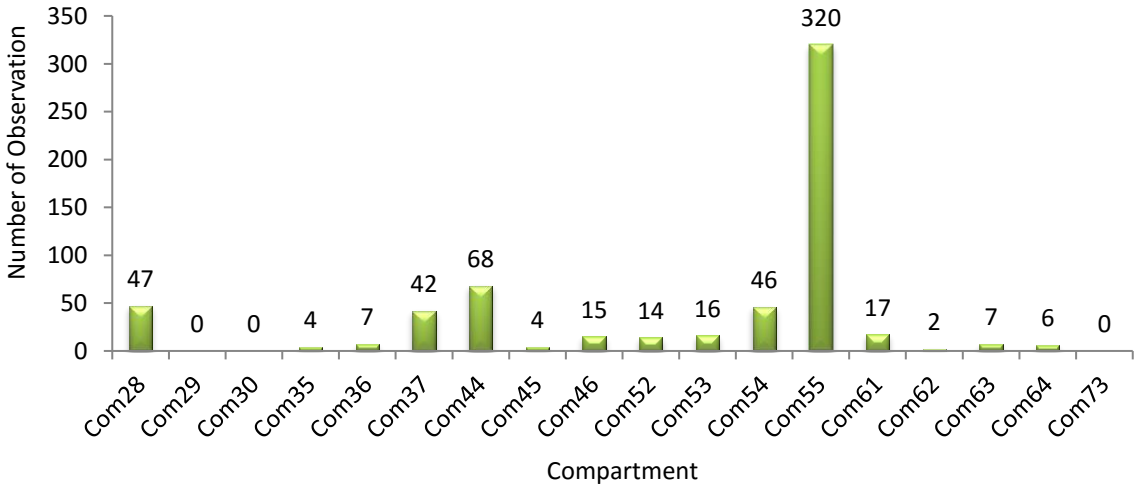

Figure 3: The occurrence frequency of African Grey Parrots in study compartments in Okomu National Park

Percentage occurrence of activities of African Grey Parrots

The various activities of the African grey parrots recorded during the time of observation are as presented (Table 1). The activities were observed and recorded while feeding, feeding and singing, flying and singing, nesting, overfly, overfly and singing, perching, perching and singing, perching and feeding and roosting. The roosting recorded the highest occurrence (173) while perching and singing (115) and flying and singing (92). Overfly, feeding and feeding and singing recorded was 83, 80 and 41 respectively while perching (2) and nesting (2) had the least occurrence.

Table 1 : Activities on the percentage occurrence of African Grey Parrot

Activity	Total	Percentage (%)
Roosting	173	28.1
Perching and singing	115	18.7
Flying and singing	92	15.0
Overfly	83	13.5
Feeding	80	13.0
Feeding and singing	41	6.7
Perching and feeding	17	2.8
Overfly and singing	10	1.6
Perching	2	0.3
Nesting	2	0.3

Anthropogenic activities in the Park

The result presented in Table 2 showed that the human activity with the greatest negative impact on forested habitats was timber extraction (100%) > illegal hunting (89.3%) > Non-timber forest product collection (85.7%) > fuel wood collection (78.6%) > charcoal burning (14.3%) and tourism (14.3%) > livestock grazing (10.7%).

The impacts of human activities on the distribution of African Grey Parrots in the Park are presented in Table 3. The result revealed that habitat degradation (96.4%) > habitat loss (92.9%) > noise pollution (82.1%) > subsistence hunting of birds (71.4%) > habitat fragmentation (67.9 %). The least recorded is soil pollution.

Measures suggested by Rangers on mitigating human activities in the Park

The percentage of the measures in mitigating human activities in the park was obtained from the study area (Table 4). The results showed that Provision of patrol equipment (85.7%) had the highest percentage followed by Increase salary (75%) > constant patrol and monitoring (67.9%) > Intensive conservation (64.3%). While campaign (14.29%), education (28.6%) and staff training (39.3) showed the least mitigation in the Park.

Table 2 : Percentage of human interference in the Park

Activities	Frequency	Percentage (%)
Timber extraction	28	100
Illegal hunting	25	89.3
Livestock grazing	3	10.7
Charcoal burning	4	14.3
Fuel wood collection	22	78.6
NTFPS collection	24	85.7
Tourism	4	14.3

Table 3 : Effect of anthropogenic activities on the distribution of African Grey Parrots

Level of degradation	Frequency	Percentage (%)
Habitat degradation	27	96.4
Habitat fragmentation	19	67.9
Habitat loss	26	92.9
Noise pollution	23	82.1
Subsistence hunting of birds	20	71.4
Soil pollution	5	17.9

Table 4 : Measures in mitigating human activities in the park

Variables	Frequency	Percentage (%)
Intensive conservation	18	64.3
Education/enlightenment	8	28.6
Campaign	4	14.29
Staff training	11	39.3
Incentive/increase salary	21	75
Provision of patrol equipment	24	85.7

Discussion

The study revealed that 85% of African Grey Parrots population was observed in the dense vegetation while 15% in open vegetation which implied that the African Grey Parrots were more endemic in dense vegetation than open vegetation. This may not be unconnected with the fruigivore and cavity-nester nature that readily and intensively propels quest for rich food sources, suitable nesting and roosting sites in dense forest (Juniper and Parr, 2003). Furthermore, the highest number of parrot was observed between 6:10 - 6:52 pm and 6:11 - 6:51 am compared to the least number between 10:06 – 10:17 am and 11:00 – 11:26 pm showed that African Grey parrots are more active from 6h00-7h00 and 18h00-19h00 of morning and evenings respectively than middays and afternoons (10h00-11h30) probably due to the high level of anthropogenic activities that threaten habitat serenity and safety

during foraging (Tamungang and Cheke, 2009; Clemmons 2003).

Table 5: Tree species used by *Psittacus erithacus* in incidental flock observations in Okomu National Park at compartment 55 close to Arakhan stream

Tree species	Family	Mean DBH (cm)
Milicia excels	Moraceae	51
Terminalia ivorensis	Combretaceae	64
Entandrophragma cylindricum	Meliaceae	80
Terminalia ivorensis	Combretaceae	93
Trichilia monadelpha	Meliaceae	48
Nauclea diderrichii	Rubiaceae	39
Terminalia ivorensis	Combretaceae	76
Sterculia oblonga	Sterculiaceae	37
Lophira alata	Ochnaceae	77
Enthandrophragma cylindricum	Meliaceae	101
Terminalia ivorensis	Combretaceae	81
Khaya ivorensis	Meliaceae	115
Terminalia ivorensis	Combretaceae	92
Myrianthus arboreus	Urticaceae	54
Ceiba pentandra	Malvaceae	105
Terminalia ivorensis	Combretaceae	45
Anthocleista vogelii	Loganiaceae	61
Terminalia ivorensis	Combretaceae	58
Entandrophragma cylindricum	Meliaceae	87

DBH= Diameter at breast height

The observed high number of parrot in compartments 55 and 44 compared to the absence in compartments 29 and 3 showed that parrots were found mostly in compartment 55, near Arakhuan stream where roosting occurred averagely in large groups of approximately 100 – 200 population. This may not be unconnected with the dominance of *Terminalia ivorensis* (Black afara) and the top of *Entandrophragma cylindricum* (Sapelewood) that serves cavities and roosting platforms respectively. Compartment 44 at the forest edge in proximity to Okomu oil palm plantation, equally provides critical habitat that aided availability of nuts and pollinating insects. This agrees with Tamungang et al. (2016) that reported suitable preference of African Grey Parrots to roost on oil Palm trees (*Elaies guineensis*) found in a marshy site. Similarly, Martin et al. (2014b) showed that parrots use Palm trees and tall trees such as the silk cotton tree (*Ceiba pentandra*) close to the banks of the river for roosting. However, Parrots were not observed in compartments 29 and 30 probably due to noise and odor of frequent fire arms shootings from joint patrol of Rangers and Marine vigilantes stationed at the entrance park to ward off loggers and poachers.

Generally, this study indicated that roosting, perching, singing and flying activities are major parameters that determined the home range of the African Grey Parrot in a given place and time with the Okomu national Park. This is in agreement with the studies conducted by Reuleaux et al. (2014a) and Reuleaux et al. (2014b) in field observations on the feeding, breeding and roosting sites of African Grey Parrots observed when encountering a stationary flock of Grey Parrots during surveys. In addition, the study reported a good number noted the number of individuals, which aggregated for resting or sleeping.

The descriptive statistics revealed that timber extraction, illegal hunting, Non-Timbre Forest Product, fuel wood collection, charcoal burning, tourism and livestock grazing are the human activities that could have negatively affected Parrots distribution in Okomu National Park. This finding agrees with Musila and Sigue (2010) that reported timber extraction or illegal logging, firewood collection and charcoal burning as the greatest anthropogenic activities that are inimical to forest habitat conservation. These activities have the potential to change vegetation structure, habitats and create noise pollution that could affect the diversity, distribution and abundance of birds. Furthermore, the study also aligns with the findings of Veiga et al. (2013) that observed the continuous removal of dead wood by the surrounding community as probable contributory factor affecting the population density and distribution of cavity-nesting bird species such as woodpeckers due to the decline in quantity of holes.

The destruction, degradation and loss of tropical rainforests represent a potential source of threat to fruiting trees, potential nest cavities and decline in species richness that could lead Parrots to move in search of food resources. This underscores the need to enhance survival of forest stands within the local niches and communities as essential feeding habitats which can be lost completely in relatively short periods. Hence the availability of suitable nest-sites becomes a critical limiting factor for many parrot populations as it can significantly reduce recruitment for subsequent years (Manning et al., 2013).

Furthermore, subsistence hunting may have significantly reduced local populations of this species because it is currently restricted to forest habitats within observed compartments due to severe hunting in Park especially at forest edges. This scenario is similar to that reported by Perveen and Khan (2010) for cranes in northern Pakistan where climate change has been proposed as rival land-use change on tropical forest biodiversity conservation. This will also indirectly affect species by reducing the amount and availability of habitat since climate change causes range from shifts to higher latitudes and elevations, as species expand into areas that could become climatically suitable and contract from areas that become too warm to affects the phenology of species Wilson et al. (2007) leading to potential mismatches between interacting species, such as between pollinators and plants (Stenseth and Mysterud, 2002).

Based on this study, the main conservation strategies to mitigate detrimental anthropogenic activities on the habitat of African Grey Parrots and the Park, intensive conservation, education, enlightenment, campaign, staff training, increased salary, provision of patrol equipment and constant patrol and monitoring. Therefore, neighbouring community farmers should be educated on the need to practice agro-forestry as an intensive land use approach to reduce pressure through encroachment on forest resources while improving livelihoods with a view to protecting habitat for parrots' conservations.

Conclusion

The current habitat degradation in Okomu National Park represents a major threat to sustainable viable population of the African Gray Parrot. Compartments that were worse affected provided less activities especially nesting and roosting which have potentials to increase the population as well as distribution of Parrots overtime. Although the compartments at forest edges that are close to free forest areas appears attractive to a good number of parrots due to the existing Palm plantation, this constitutes additional challenge to the conservation. Therefore, the study highlighted the urgent need for development of multiple conservation strategies that can address the observed threats as a result of identified anthropogenic activities that are anti-conservation in the Park.

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