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ARTICLE

Implications of Environmental and Social Impact Assessment (Esia) Of Power Project on Biodiversity at Victoria Island, Lagos; Nigeria

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Abstract:
The resources at the Victoria Island project site are integrated and multi-sectoral, requiring a participatory approach model for biological diversity planning and resource control despite the urgent need for development. A reconnaissance survey was conducted for the preliminary identification of environmental sensitivities. The inventory of fauna was conducted using both direct and indirect observations. The IUCN Red List was prioritized and duly considered to determine species status. The inventory revealed the presence of mollusk (Archachantina spp), insect groups (three families: Pieridae, Papilionidae, Nymphonidae)), reptilian species found on the site are Red-headed Agama Lizard and Common House Gecko, two urban birds of prey: Yellow Billed kite (Milvus migrans) and Common kestrel (Falco tinuculus). The presence of Ficus spp and other fecal indices indicate the presence of Fruit bats, including Straw-colored fruit bats (Eidolon helvum). The natural habitat that would be impacted includes mostly human built-up environment and the flora and fauna components that constitute relatively high biodiversity, as listed above, and critical habitat for the fauna species, including avifauna (birds), reptiles, and host of rodents. The essence is to balance socio-economic development with environmental utilization since the former is the major threat to biodiversity conservation. Therefore, the following mitigation measures were suggested; to carry out a comprehensive survey of species at the site, conversion of the plot of land (Buffer area) into a mini botanical garden, and collaboration efforts with Non-Governmental Organizations (NGOs) to conduct regular biodiversity studies.
Keywords: Land use management, Environmental and Social Impact, Wildlife resource and utilization.

1 | INTRODUCTION

In response to the increasing demand for stable electricity supply to the urban dwelle dwellers like Lagos, a 30MW Victoria Island Embedded Power Project by Elektron Limited, to be located in Eti-Osa Local Government Area, Lagos State, Nigeria. The preamble to the Convention on Biological Diversity recognizes biodiversity as a resource of intrinsic value, over which States have have sovereign rights and the responsibility to protect (UNDP, 2002). This call for a request for an environmental and social impact assessment (ESIA) that has jurisdictions to develop and implement biodiversity law, with the objectives of ensuring the conservation and sustainable use of biodiversity, as well as the equitable distribution of the benefits and costs derived from it.

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Biodiversity in Nigeria is seriously under the threat of extinction from climate change, economic development, land use changes from agriculture, invasive species, pollution, crude oil exploration and exploitation, and canalization that has threatened mainly the mangroves. Likewise, deforestation, desert encroachment, overhunting, land use, road and residential building construction, and many others also have a monumental effect on biological diversity. It is the fear of species extinction that could be emanating from the poor attitude of both government and the citizenry towards the protection of biodiversity in Nigeria that has necessitated this work so that conservation practices would be implemented and taken seriously in the country to avoid a catastrophe of species extinction in the nearest future. This is because Africa and Nigeria, in particular, have rich and varied biological resources that form natural wealth on which their socio-economic system is based [Nwachukwu, 2000; Daura, 2000].

According to UNDP, natural habitats in Africa are being lost through anthropogenic activities of man, such as over harvesting of resources, most notably timber, and more than 21 million hectares of forest have been lost since 1970 (UNDP, 2002). Other threats to terrestrial habitat include bush fire, especially in the savannah, soil preparation for agriculture, overfishing, deforestation, roads, residential and commercial centers construction, and supply of regular electricity like this30MW Victoria Island Embedded Power Project.

In Nigeria, most people are unaware that many of our biological resources are threatened by intense pressure from various human-related activities. For example, two bird species, the Bannerman's Weaver Ploceus bannermani and the White-throated Mountain Babbler Kupeornis gilberti, are threatened by the loss of patches of their highland forest habitats on the Obudu and Mammbilla Plateaus, the only locations where they are found in the country.

2 | STUDY AREA

The project study area is the Victoria Island Power IPP at the current EKEDC Offices situated off Ahmadu Bello Way in Victoria Island, associated with the site's development. The study of both the terrestrial flora and fauna in the environment/ Wildlife inventory was carried out by two Wildlife Experts.

Table 1. Transects position and their coordinates

Transects	Coordinates	Elevation	Descriptions
1	N06.42493^0 E003.412007^0 to N06.42494^0 E003.41187^0	34 24	Car park and Administrative area
2	N06.42518^0 E003.41229^0	40	Staff union office and Power transmission area
3	N06.42250^0 E003.41251^0	33	The canal runs through the premises
4	N06.42554^0 E003.41169^0 to N06.42505^0 E003.41160	52 40	Buffer area (Piece of land owned by Lagos State govt.)

Table 2. Geo-referencing of the sample site in Victoria Island with sampled species

Location (Description)	Coordinate points	Elevation (ft)	Species associated	Spp Status
Office front Open space	N06.42493^0 E003.412007^0	34	Laughing dove	
Buffer Vegetation area (Back of office) (Piece of land owned by Lagos State govt.)	N06.42554^0 E003.41169^0 N06.42511^0 E 003.41160^0 N06.42494^0 E003.41187^0	52 27 24	 Grey plantain eater Senegal coucal, Barbet	
End of the Buffer (50-70metres)	N06.42505^0 E003.41160	40	Lizard, squirrel, snakes	
Transformer side	N06.42555^0 E003.41190^0 N06.42556^0 E033.41176^0	52 36	Lizard Butterfly caterpillar	
Fence	N06.42518^0 E003.41229^0	40	Laughing dove	
Security housing	N06.42250^0 E003.41251^0	33	Nest of dove	
Tower (Telecom)	N06.42467^0 E003.41206^0 N06.42516^0 E003.41195^0	36 77	Speckled pigeon Pied crow, Cattle egret, Laughing dove, Yellow bill kite. Sikra, Barbet.	
Wall fence/Barrack	N 06. 42478^0 E003.41217^0	45	Intermediate Cattle Egret	
Stack Elec. Poles (Refuse side)	N06.42480^0 E003.41211^0	12	Male and female Agama lizard	
	N06.42478^0 E003.41208^0	79	Red eye dove Piacpiac	

Methodology of Wildlife assessment

Three methodological approaches were applied and adopted distinctly for aspects of terrestrial and avifauna biodiversity:

• The field survey;

• The consultations of the population; and

• The review of publicly available technical and scientific literature.

Habitat Description

The project site is a fragmented vegetation patch located in the middle of the city, surrounded by housing estates with significant human presence, with fewer diversity of flora that supports fauna diversity. However, the site hosts urban adapters and species that are less affected by human influence. The inventory of fauna was conducted using both direct and indirect observation and information from nearby occupants. Observed species were identified using text, literature, and online references. IUCN Red-list is prioritized and duly considered to determine species status.

Wildlife inventory of the project site

1, Reconnaissance survey was carried out for the purpose of preliminary identification of environmental sensitivities

2, Reconnaissance survey was followed by a biodiversity inventory mission for 3 days from 11 to 13 October 2021, conducted by one flora expert

and two wildlife experts, including a professor. The roaming survey method (Direct and indirect survey) was adopted for field observations. It involves traversing the environment by listing all the animal species in the plots. This technique suits fast inventories, difficult-to-penetrate sites, or long-running observations. According to Hoffman et al. (2010), the direct and indirect method of wildlife survey was employed and Ake Assi (2002) model was used to confirm the taxa. Additionally, consultations with communities that are potentially impacted by the project were used to complete the fauna and flora inventory.

Table 3. Model of species collection and observation at the site

Taxon	Method	Principle
Insect	Direct observation	Collection of pictures
Mollusca	Direct observation	Documentation of indices such as shells
Reptilia	Direct and indirect observation	Critical lookout for burrows, tracks, slough Information from workers around
Ave	Direct observation *Seen *heard	The direct observation requires the use of binoculars and a telescope Observation of Nests
Mammalia	Direct observation	Observation of indices (droppings, leftover, track)

3 | RESULTS

Mollusca

The inventory revealed the presence of mollusk (snail) Archachantina spp on the project site with the availability of one empty shell found in the buffer area (Forest belonging to Lagos State Government).

Plate 1: Indices of Mollusk

INSECTA

Two insect groups were encountered during the field survey. Six butterfly species in three families (Pieridae, Papilionidae, Nymphonidae) were identified using "Butterflies of West Africa" by Torben and Larsen (2014). These butterfly species are the least concerned.

Table 4. Insect's observation at the site

Butterflies	Common name	Scientific name	Variable (No)	IUCN RED-list status
	African spirit	*Leptosiaalcesta (Pieridae)*	1	LC
	Citrus Swallow tail	*Papiliodemodocus* (*Papilionidae*)	1	LC
	Egg fly	*Hypolimnasbolina*(*Nymopholidae*)	1	LC
	Little Commodore	*Junoniasophia* (Nymphalidae)	2	LC
	Night brown	*Melanitisleda* (*Nympholidae*)	1	LC
	African Emigrant	*Catopsiliaflorella*(*Pieridae*)	*	LC

LC: Least Concern; *: Not sighted but significant

Plate2: Little Commodore Junoniasophia (Nymphalidae)

Amphibians and Reptile

Throughout the assessment period, no amphibian (Toad and frog) was encountered. The reptilian species found on the site are the Red-headed Agama lizard and the Common House Gecko. These two species are abundant and are considered Least Concern according to the IUCN Red List of Threatened Species. Due to habitat and the site indices, potential amphibians include the Flat-backed toad (Sclerophrys maculata) and Common African Five-lined skink (Trachylepsis quinqueteniata).

Table 5. Amphibians and reptiles composition at the site

Family	Common name	Scientific name	Variable (No)	IUCN RED-list status
Amphibian				
Bufonidae	Flat backed toad	Sclerophrys maculate	*	LC
Reptilian				
Scincidae	African Five-lined skink	Trachylepsisquinqueteniata	*	LC
Agamalidae	Read-headed Agama	Agama agama	5	LC
Geckonidae	Common house gecko	Hemidactylus frenatus	2	LC

LC: Least Concern; *: Indication of presence but not sighted

A B

Plate3: A: Male Read-headed Agama Lizard; B: Female Read-headed Agama Lizard Agama agama

Aves

A list of the diversity of bird species of the project site is presented in Table XX. During the inventory, a total of 20 bird species across 14 families were identified (heard and seen) and documented. The dominant family on the site is Ardeidae, with three species (Cattle egret, intermediate egret, and Purple Heron).

Two urban birds of prey, Yellow Billed kite (Milvus migrans) and Common kestrel (Falco tinuculus), were recorded on the site, both belonging to different families, Accipitridae and Falconidae, respectively. Two dove species made the list of bird diversity of the site. A nesting Laughing dove (Spilopelia senegalensis) was sighted in the roof crevice of a building on sight, while a Red-eyed dove (Spilopeliasemi tocuata) was seen and heard. Pied crow (Corvus albus), Common bulbul (Pycnonotus babartus), and others are common. Other frequently sighted urban bird species, such as Western Grey Plantain eater, Sunbird, and Swift, were recorded.

All bird species recorded on the project site were Least Concern according to the IUCN Red list except for the African Grey Parrot (Psittacus erithacus), a species in the family Psittacidae which is Endangered (E). This parrot is listed as endangered on the Red list and scheduled in the appendix I of CITES (Convention of International Trade on Endangered Species)

Table 6. Avi-fauna composition at the site and biodiversity status

Family	Scientific Name	Common name	Variable (No)	IUCN RED-list status
Ardeidae	*Ardeapurpurea*	Purple Heron	1	LC
	Bulbulcu ibis	Cattle egret	2	LC
	Ardea intermedia	Intermediate egret	3	LC
Accipirtidae	*Milvusmigrans*	Yellow billed kite	6	LC
Falconidae	*Falco tinuculus*	Common Kestrel	2	LC
	Columba guinea	Speckled pigeon	4	LC
Columbidae	*Spilopeliasemitocuata*	Red eyed Dove	3	LC
	Spilopelia senegalensis	Laughing dove	5	LC
Paittacidae	*Psittacus erithacus*	African Grey Parrot	2	E
Musophagnidae	*Criniferpriscator*	Western Grey-Plantain Eater	3	LC
Cuculidae	*Centropus senegalensis*	Senegal coucal	1	LC
Apodidae	*Cypsiurusparvus*	African Palm swift	7	LC
	Apus affinis	Little swift	8	LC
Bucerotidae	*Lophocerosnasutus*	African Pied hornbill	2	LC
Pycnonotidae	*Pycnonotus barbatus*	Common Bulbul	3	LC
Turdidae	*Turdiospelios*	African thrush	1	LC
Nectariniidae	*Cinnyrischloropygius*	Olive bellied sunbird	1	LC
Corvidae	*Colvusalbus*	Pied crow	4	LC
	Ptiosthomusafer	PiacPiac	5	LC
Sturnidae	*Lamprotornispurpureus*	Purple Starling	6	LC

EN: endangered; ED: Critically Endangered; LC: Least Concern

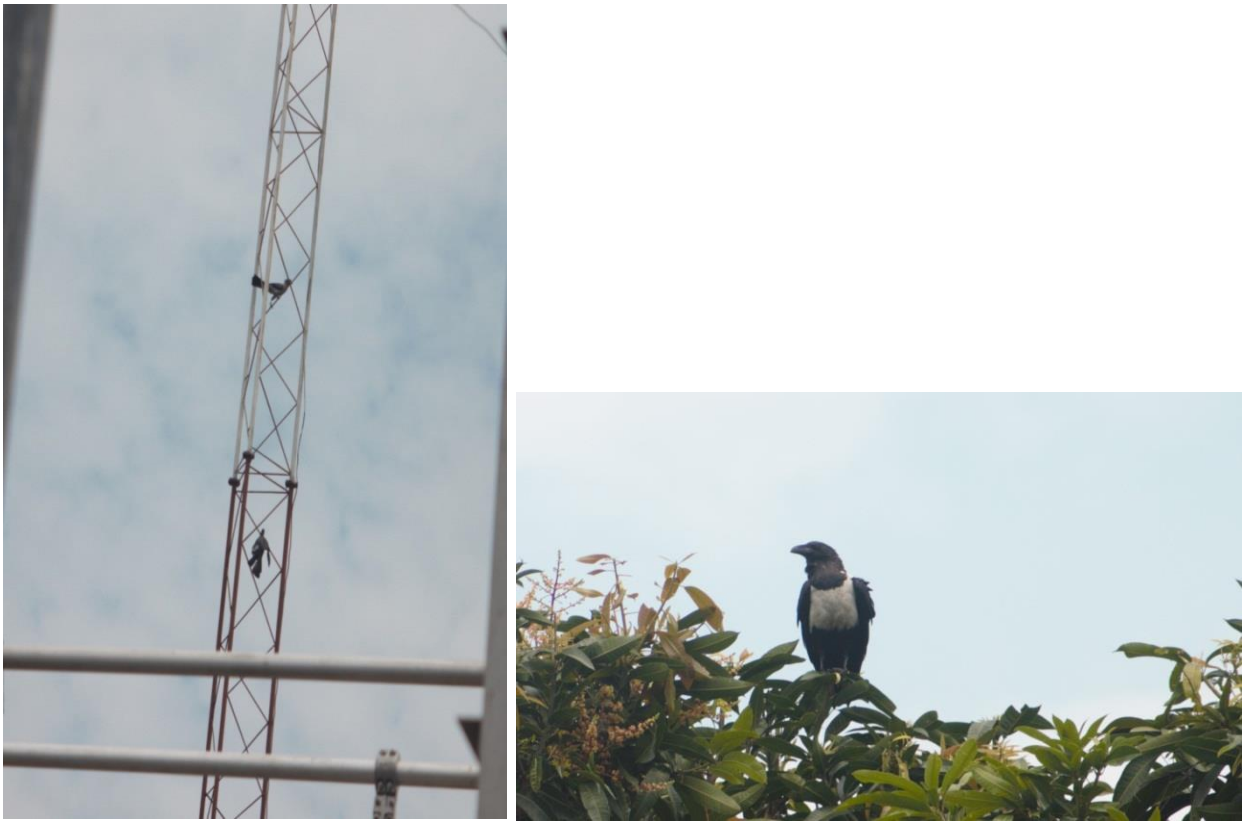

Plate4: A. Grey Plantain eater (*Criniferpriscator*); B. Pied Crow (*Colbusalbus*)

A B

Plate 5 A: Nesting Laughing dove (Spilopelia senegalensis); B: Intermediate Egret (Ardeainter media) walking on the fence of the proposedc site

Mammals

No large Mammals were seen or heard during the assessment. However, the presence of Ficus spp and other fecal indices indicate the presence of Fruit bats such as Straw-colored fruit bat (Eidolon helvum) activities at night.

The conservation status of the species Eidolon helvum is classified as Near-threatened (NT), while other possible species of the site are listed as Least Concern (LC) according to IUCN.

Family	Common name	Scientific name	Variable (No)	IUCN Redlist status
Scuridae	Squirrel	*Xerus erythropus*	*	LC
Nesomyidae	Giant Pouched rat	*Cricetomysgambianus*	*	LC

LC: Least Concern; *: Not sighted but significant indices

Biodiversity Action Plan of Resources at Victoria Island

The biodiversity action plan for the resources at the Victoria Island project site is an integrated, multi-sectoral, participatory approach model for biological diversity planning. It is a process by which the proponent plans to conserve biological diversity through sustainable use of its components and the fair and equitable sharing of the benefits arising from the utilization of genetic resources in the site by outlining and addressing the threats to their biodiversity and biodiversity resources.

This action plan is a complimentary component of the environmental and social impact assessment that is reported above, stating concretely and practically a series of measures making it possible to resolve the biodiversity challenges identified in the site. This project in which Elektron Energy has incorporated Victoria Island Power Limited (VI Power) as the project vehicle to develop the 30MW embedded generation plant. Victoria Island Power will provide uninterrupted power to blue-chip corporate clients under the Nigerian Electricity Regulatory Commission's (NERC) willing buyer/seller program.

This project will impact a large area of land of natural habitats, under which the high-voltage line will pass through various habitats that would be modified (forest plantations, crops, and cleared areas). The natural habitat that would be impacted includes mostly human-built-up environment together with the flora and fauna components that constitute relatively high biodiversity and critical habitat for the fauna species such as avifauna (birds), reptiles, and host of rodents. .

Therefore, this action plan will incorporate a complementary analysis of the issues in compliance with performance standard No. 6 of the IFC

1. The office environment (Eko Electricity Distribution Company (EKEDC)), consisting of fig trees and some bread-fruit trees, is a good host of garden birds such as speckled pigeon, cattle egret, little swift, red eye dove, and laughing dove, among others. These are good biological indicators of a healthy environment despite the series of hustles and bustles of this commercial center in Lagos Victoria Island. The project will definitely exert some level of impact on those species varying from mild to great, depending on the intensity of the project.
2. Observation was also made of a critically endangered species such as the grey parrot. This was least expected to be recorded but actually sighted in pairs (male and female). Though not nesting within the project site but roosting not far away from the eco-zone of the Victoria Island. The project will also invariably affect their habituation and existence around Victoria Island.
3. The project site presents negligible residual impacts on the habitat of sub-climax species, mostly succession species like Agama lizard and squirrel. This indicated that despite the heavy socio-economic built-up of the site on Victoria Island, these residual species would co-exist with the human activities of this kind of project.
4. Most of the species listed and encountered on the site are of Least Risk except parrot, which is in endangered status according to IUCN categories. These species and their habitats also contribute materially or spiritually to the well-being of the populations on Victoria Island. Thus, they (people and bio-resources) will be affected by the project because the biodiversity component that is available at the site provides "Ecosystem services" that are within the framework of Environmental Social Impact Assessment (ESIA). A healthy environment also indicates good healthy-human living conditions. The biota composition identified in the tables above has significant bio-centric and eco-centric quantification, which provide both direct and indirect values of the biodiversity and can be directly quantified in tangible form. Therefore, they should be integrated into Biodiversity Action Plan (BAP) following performance standard 6 of the IFCs requesting a "net gain" for critical habitats.

In conclusion, the importance of biodiversity as a natural resource cannot be over-emphasized because of the basic needs they satisfy and their role as the vital cultural heritage of the nation. Therefore, there must be a concerted effort by the government and citizens to make wise use of these natural resources to avoid their degradation and depletion. Rapid population growth, over-exploitation of resources, deepening poverty, weak institutional and legal framework need to be seriously addressed by integrating environmental and developmental objectives [BDCP, 2015, NCF, 2002]. These problems need to be seriously

addressed and mental education and transformation of its citizenry on the importance of biodiversity need to be given utmost attention. This is essential to balance socio-economic development with environmental utilization since the former is the major threat to biodiversity conservation. Ratification of international conventions and treaties and establishment of regional action plans need to be supported with human and financial resources to comply with obligations and implement activities and projects at the national and sub-national levels [(UNEP, 2002) and ELR 21st Century].

POSSIBLE MITIGATION MEASURES FOR BIODIVERSITY ACTION PLAN

1. A comprehensive survey of species at Victoria Island to determine their significance in terms of biodiversity composition and utilization rate to forestall sustainable conservation of the resources and relate them with increasing socio-economic development. This will provide baseline data on Biodiversity for planning and management.
2. Conversion of the plot of land (Buffer area that belongs to Lagos State Government) into a mini botanical garden that can serve as a biome for the development of Biodiversity Conservation and Development (Ex-Situ Conservation). This will preserve both remnants of flora and fauna in this ecological zone (Victoria Island) for future reference.
3. Collaboration efforts with non-governmental organizations (NGO), such as Nigeria Conservation Foundation (NCF) and other Governmental Organizations (GO) or academic institutions such as NEHOMA to carry out regular biodiversity studies. This will assist in the durability and longevity of the project monitoring.
4. The proponent should introduce the poverty reduction program for all or some of the major stakeholders or inhabitants in this area so that they will have a sufficient share of beneficial-advantage from the project situated within their community. This can be in the form of rebate rate of electricity charges or other forms of opportunity.

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