FINAL REPORT OF THE BESNET PROJECT

CONDUCT SCOPING/ASSESSMENT OF POLLINATORS, POLLINATOR SERVICES AND THREATS TO POLLINATORS IN 3 SELECTED SITES IN NIGERIA

Submitted by

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Introduction:

In addressing the threat and decline in pollinators and pollinator services they provide for nature, people, and climate can only be achieved with the knowledge and interconnectivity mapping of sites/habitat and the role communities plays in ensuring their long-term conservation. The team made visits to Nigeria's protected areas (PAs) which have been identified as the major host of pollinators in the country especially being safe haven for pollinator species like bees, butterfly, birds, etc. The visit assisted the team to understand the significant pollinators' role in food production system, climate change mitigation, and habitat improvement for conservation of biological diversity while working with three national parks, to empower local people in Support Zone Communities (SZCs) of these PAs to safeguard pollinator species while developing a sustainable framework that best monitor, record, and report/update the information on pollinator and pollinator services in these sites. A total of 9 pollination ranges were identified across the 3 national parks within the scope of this study. The Oban Pollination Range in Cross River National Park has the most richness of pollinator while the Oyo-Ile Pollination Range has the lowest species richness and pollinator services based on our ranking. The most significant challenges peculiar to all the protected areas pollination area is insecurity and the role of collaboration with military forces inorder to counter terrorism in the Parks is required to secure their future.

A 2.1.2 Identification and Scoping assessment of identified sites

To build on the site identification and scoping, site support groups were established in the 3 national parks for pollinator and pollinator service monitoring activity and trained them on the data collection, identification, recording e.t.c.

Three Community-based Monitoring Groups (which include local women and youth, NP research staff, local CBOs) were established in the targeted National Park. A total of 45 volunteers across the 3 National Parks acquired the basic skill of pollinator monitoring and reporting.

We identified a total of 9 Pollination Ranges across the 3 Protected Area that we visited and they are listed below:

- Old Oyo National Park – 5 Pollination Ranges
- Kainji Lake National Park – 2 Pollination Ranges
- Cross River National Park - 2 Pollination Ranges

We present below map of each National Parks with their respective Pollination Ranges with a careful description of the challenges and opportunities that these ranges offer pollinators and the ecosystem.

1. OLD OYO NATIONAL PARK POLLINATION RANGES

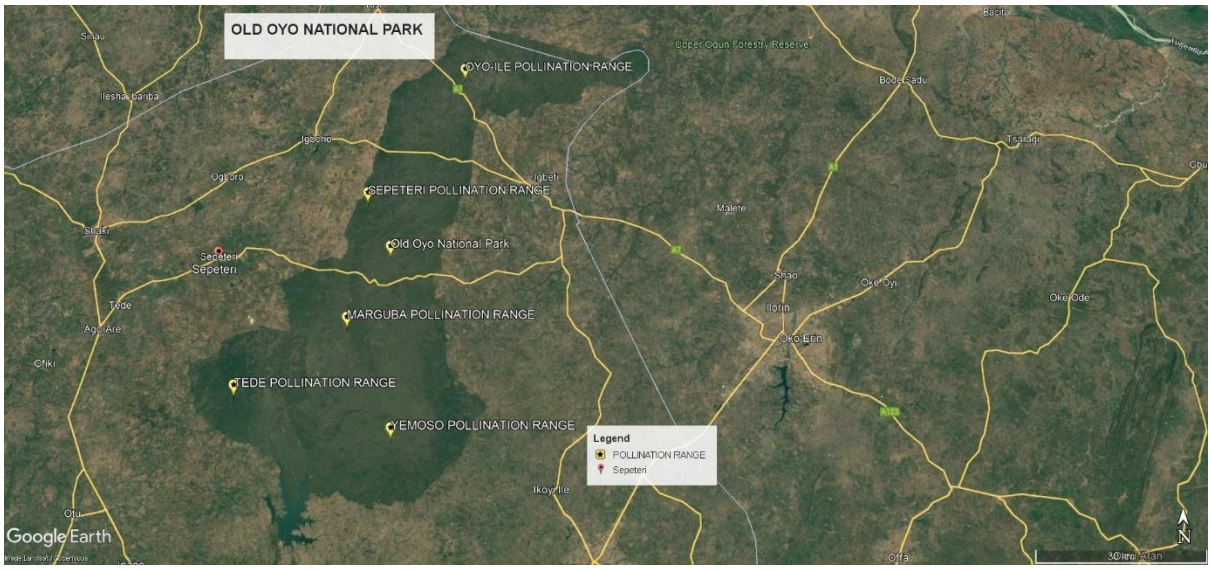

Fig 1: Map of Old Oyo National Park and its 5 Pollination Ranges

Oyo-Ile Pollination Range is located at the northernmost sector of the Park and occupying between 18-22% of the total land cover of the National Park. It is known for its high prevalence of encroachment activities by predominantly farmers support zone communities of Old Oyo, Banni, Fate, Agbona, Kosigi, and Sooro. This range has one of the remnants of Baobab, figs, Ixora species, and Hibiscus species in the area which draws several butterfly species into the range.

Sepeteri and Marguba Pollination Ranges are estimated to be the largest ranges covering almost 55% of the National Park and sitting in the median area of the Park. The anthropogenic threats in these ranges vary from cattle grazing, subsistence farming, and largescale insecurity. Despite this menace, these ranges still have a good population of pollinator species of plants, fruit bat species, bee species, and birds. The protection activity of the National Park in these ranges is reflective of the enormous pollination species that still remain at the year of our study in this Park. It is the most pollinator-rich ranges in the Park known till today.


Protected Area Staff and Community Volunteers during a Training session

Tede and Yemoso Pollination Ranges occupies the posterior and the anterior part of the southern block of the national park respectively covering about 25% of land size. The ranges are one of the areas rich in bird and butterfly pollinator species known in the Park. Due to their small sizes relative to other pollination ranges in the Park, they are well protected against insecurity that is ravaging the support zone communities of the Park.

2. KAINJI LAKE NATIONAL PARK POLLINATION RANGES

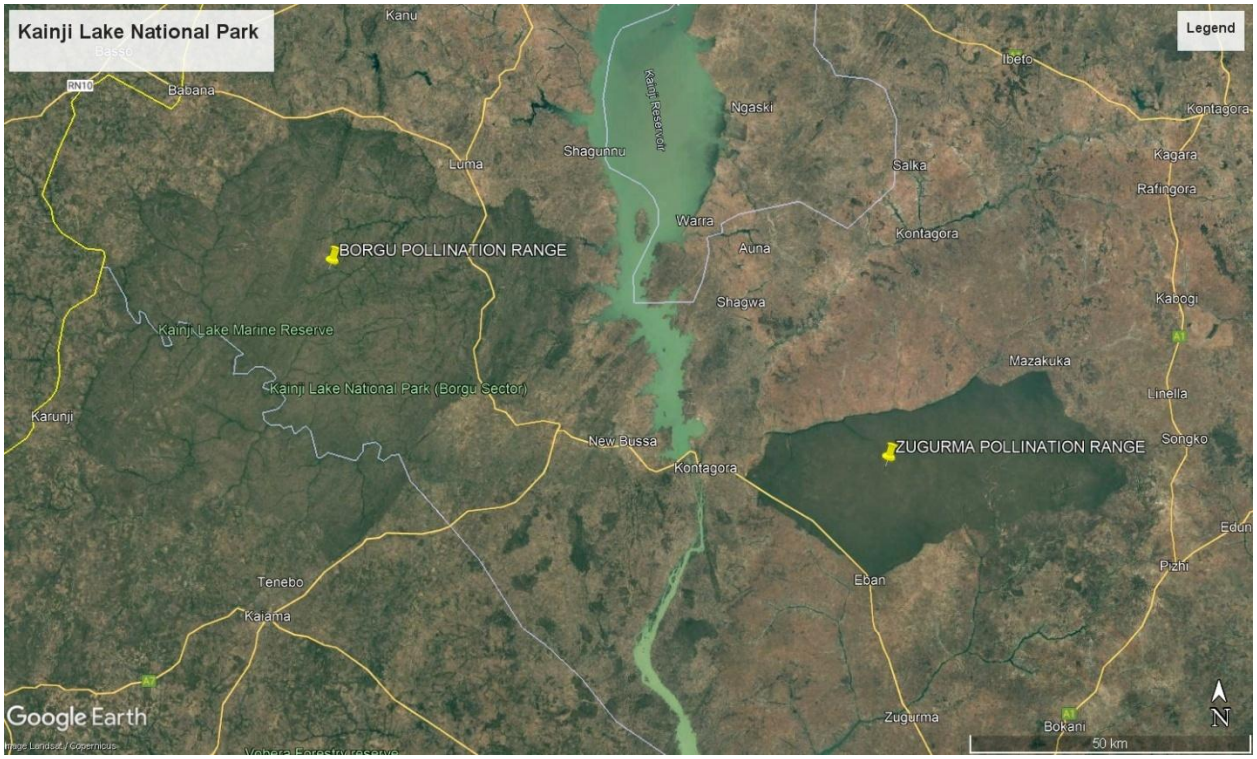

Fig 2: Map of Kainji Lake National Park and its 2 Pollination Ranges

The Kainji Lake National Park is in the northwestern part of Nigeria and spans approximately 5,382 square kilometers (2,078 square miles) across Niger and Kwara states. Birdlife in the park is diverse, with over 200 recorded species, including African fish eagles, herons, and pelicans, making it a prime destination for birdwatchers. Despite its ecological and cultural significance, Kainji National Park faces challenges such as poaching, overfishing, and habitat encroachment due to agricultural expansion. It is bedeviled with challenges of insecurity resulting from terrorism.

The Park is categorized into two pollination ranges – Borgu and Zugurma Pollination Ranges which are transversed by the Kainji Lake area- a wetland. The two pollination ranges have been largely depleted from encroachment and agricultural expansion but during our study, we recorded few pollination species including birds(bee-eaters, sunbirds etc), bees and beetle, bats and butterfly species. Because of the large size of the Borgu Pollination range, it is relatively more pollinator-diversed than the Zugurma Pollination Range. It is important to say that terrorism activity limited the scope of our study in this protected area especially as there were incidence of killing and kidnaping in the Park's support zone community. Focused grouped interviews conducted with the Park's staff and community grouped revealed that the Park is a repository of pollinator plant species ranging from Baobab, Fig tree, Hibiscus etc.

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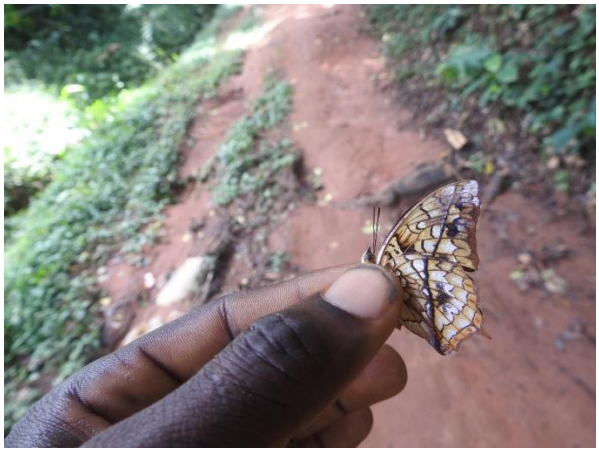
3. CROSS RIVER NATIONAL PARK POLLINATION RANGES

The Cross-river National Park lies in South - Eastern Nigeria and qualifies as a Pollination Range due to its biodiversity richness. It is divided into the Oban and Okwango Division. The Oban Division (2,800 sq. km) of CRNP lies north-east of the Cross River State capital, Calabar, inside a loop of the Cross River. It has the highest pollinator species richness relative to other National Park.

In Cross River National Park, Illegal logging is prevalence exposing endangered species and other pollinator species into vulnerable state. Other threats including poaching wildlife, agricultural expansion, and wildfire have caused devastating challenges to the Parks ecological integrity and survival of biodiversity. In this study, we interviewed community groups and major traditional leaders to understand the dynamic and complexity of these threats to the survival of pollinator species and human.

Cymothoe hypatha



Charaxes pleione

Emergence of *Pyrrochalcia iphis*

Egg of *Pyrrochalcia iphis*

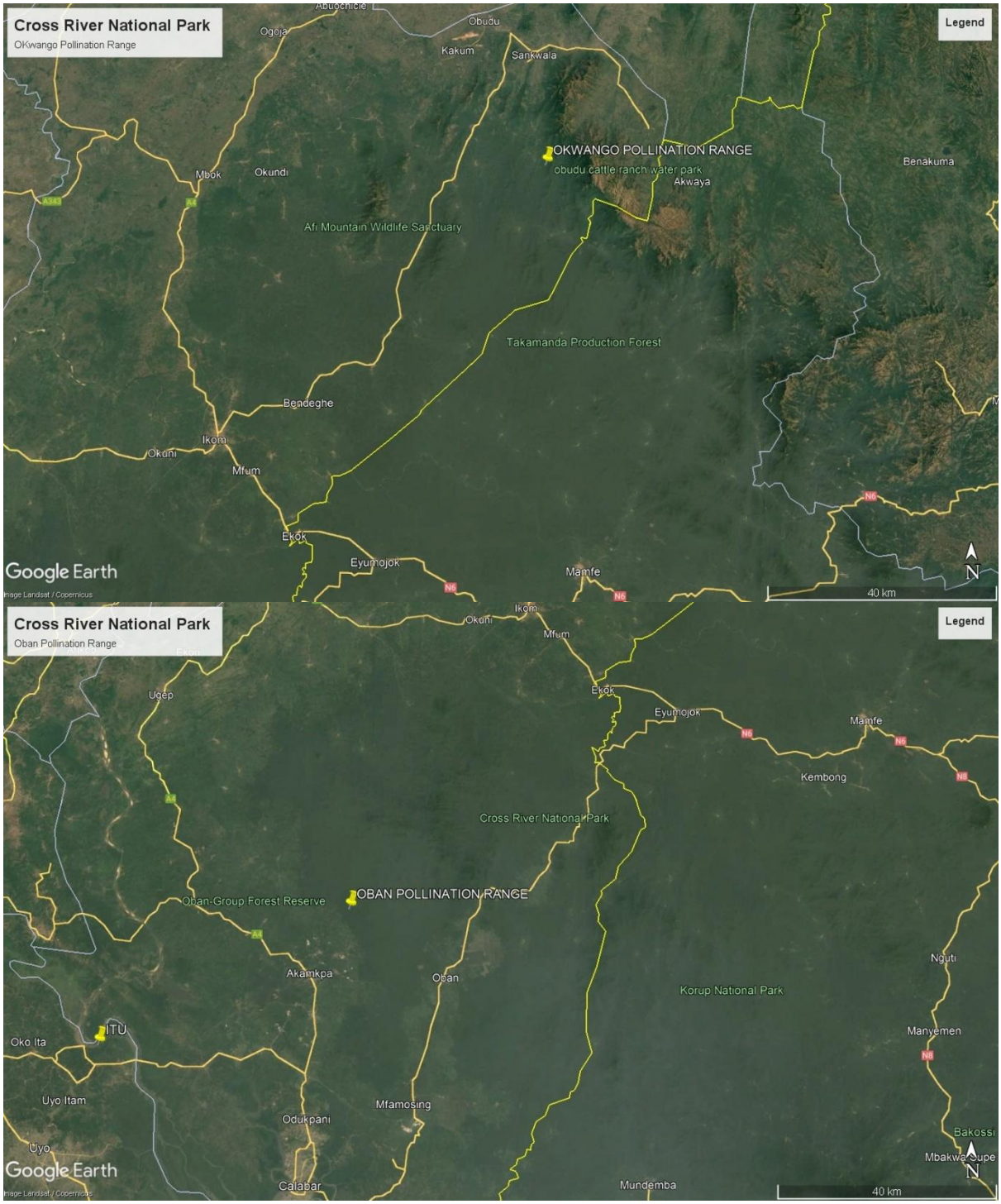


Fig 3: Map of Cross River National Park and its 2 Pollination Ranges

A 2.1.4 Identify Plants species/Pollinator habitats in the community that encourage pollination

Habitats for pollinator species as identified in the 3 project sites varies from grassland ecosystem, streams and wetlands, riparian forest, watershed areas, open and close canopy forest area, dense montane forest ecosystem

In general, the 6 habitats that were identified across the 3 protected area has a total of 168 pollinator species (birds, butterfly, bee, plants, and insects) were recorded.

Bird Species of Pollinator: Village weavers, Veilot's black-weaver, Black-headed weaver, Blue-billed malimbe, Black flycatcher, Red flycatcher, little bee-eater, Black-bee eater, Blue-checked bee-eater, Streaky headed seed eater, and several species of sunbird with particular prevalence of long-tailed sunbird.

Bees and Butterfly:
Bee species of Pollinator: Honeybee, stingless bee, carpenter bee, and leafcutter bee were recorded. Butterfly species are African Giant Swallowtails, Blue-banded swallowtail, Commonblue, African Monarch, *Pyrrochalcia iphis,* Zebra Swallowtail, *Cymothoe hypatha, Charaxes Pleione,* Forest King Charraxes, and Diadem butterfly etc. A comprehensive list of butterfly sited in the three protected area is presented in Table 1 below.

Bat Species of pollinator: Straw-coloured Fruit bat, Little collared fruit bat, Hammer-headed fruit bat, Franquet's Epauletted fruit bat, Angolan Fruit Bat, and Peter's Dwarf Epauletted Fruit Bat.

Pollinator Plant Species:
The following were identified to be pollinated by all the pollinator species. Baobab, wild banana, African sausage tree, figs, Ixora species, Hibiscus, Lantana camara, Vernonia species, Trifolium (clover), Leguminous plants, *Calitropis procera*, Ascepias (milkweed), *Acridocarpus* sp etc.

A Case of a butterfly and its Pollinating plants
Pyrrochalcia iphis (African Giant Skipper) is found in the grassland area of the Okwango sector of the Cross River National Park and rarely penetrates into the forest swamp. The life cycle of *Pyrrochalcia iphis* begins when a gravid female lay eggs on the leaves of *Acridocarpus* sp. at the early start of the rainy season. The flowers of Acridocarpus sp. are also visited by ants and bees. Oviposition is done in the early hours of the day during sunlight. The less visible white patches of eggs are attached to the freshly stem and buds. The first Larva instar emerge in about 4days. It is about 3.07mm in length. It moves away from the buds downwards and find a place on the freshly leave and begin to feed on the leaves. The caterpillars rest openly on leaves in small groups until the final instar which is solitary. Caterpillars of the final instar rest singly, aligned with their heads upwards, on leaves that hang down from their base. The final larva instars stop feeding, later stops moving and may reach a length of 56.22mm and 4.23mm wide. Caterpillar forms a spin shelter in preparation for the pupa stage which is formed afterwards and is about 26.6mm and 5.47mm wide. The pupa which is bright yellow with vertical spins begins to turn black as the butterfly forms. The butterfly emerges in 5 to 7 days leaving the pupa crystals behind

A 2.1.6. Development of framework for documenting scoping outcomes and development of scoping report

The consultant developed a tool for collection and monitoring pollinator species in each of the protected area. This includes the recording sheet which staff of National Parks were

trained on its use and use of pollinator counting techniques. This project established or re-activated a Research and Monitoring Unit within the National Parks and also incorporated the local community members into this Unit. This provided opportunity for community members to contribute to the development of a robust database for pollinator species in a citizen science approach. The Unit conduct regular monitoring activities and a joint monthly activity involving the community members.

APPENDIX 1

DATA MONITORING SHEET FOR POLLINATOR AND POLLINATION SERVICE				
Location ID:			*GPS:*	*Date:*
Pollination Service:	Pollinator sighted:	Species Qty (#):	Plant species:	Threat:

Recording Sheet for Pollinator Monitoring

RANKING OF POLLINATION RANGES ACROSS THE 3 PROTECTED AREAS

POLLINATION RANGE
Oban Pollination Range
Sepeteri Pollination Range
MarguBa Pollination Range
Okwango Pollination Range
Borgu Pollination Range
Yemoso Pollination Range
Tede Pollination Range
Zugurma Pollination Range
Oyo-Ile Pollination Range

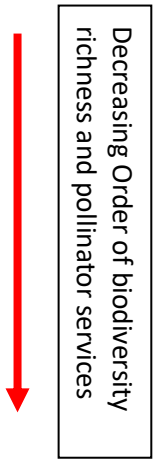


Table 1: List of Observed Butterfly Species across the 3 Protected Area in Nigeria.

Family	Species	KLNP	OONP	CRNP
Papilionidae	*Graphium latreillianus theorini*			
	Graphium leonidas	*	*	
	Graphium policenes	*	*	*
	Papilio cyproeofila	*	*	
	Papilio cynorta			*
	Papilio dardanus	*	*	*
	Papilio demodocus	*	*	*
	Papilio hesperus			*
	Papilio menestheus		*	*
	Papilio nireus	*	*	*
	Papilio phorcas			*
	Papilio sosia			*
Pieridae	*Appias epaphia*	*	*	
	Appias phaola			
	Appias sabina	*	*	
	Belenois calypso	*	*	
	Belenois theora	*	*	*
	Catopsilia florella	*	*	
	Colotis euippe		*	
	Eurema floricola	*		
	Eurema hecabe		*	
	Eurema seegalensis		*	
	Leptosia alcesta		*	
	Mylothris chloris		*	
	Mylothris rhodope	*	*	
	Mylothris schumanni	*		
	Nepheronia argia	*	*	
	Nepheronia thalassina	*	*	
Lycaenidae	*Eresiomera isca isca*			
	Euchrysops malathana			*
	Falcuna gitte			
	Falcuna libyssa			
	Hypolycaena antifaunus		*	
	Lampides boeticus			
	Liptena xanthostola			
	Leptosia alcesta	*		
	Leptotes pirithous	*	*	
	Lolaus sp.	*		
	Mimeresia libentina			
	Mimeresia maesseni		*	
	Oboronia pseudopunctatus			
	Pentila maculata			
	Thermoniphas micylus	*		

Riodinidae	*Abisara cameroonensis*			
Nymphalida	*Acraea aberhueri*			*
e	*Acraea acerata*			
	Acraea alciope			
	Acraea egina			
	Acraea elongata			
	Acraea jodutta			
	Acraea leucographa			
	Acraea lycoa	*		
	Acreae obliqua			
	Acraea penelope	*		
	Acraea polis	*		
	Acraea serena	*		
	Acraea translucida			
	Acraea zetes			
	Amauris damocles			
	Amauris niavius	*	*	*
	Amauris tartarea		*	
	Ariadne albifascia			
	Ariadne enotrea			
	Aterica galena	*	*	*
	Bebearia cocalia			*
	Bebearia cutteri			*
	Bebearia flaminia	*		
	Bebearia innocua	*		
	Bebearia mardania		*	
	Bebearia maximana	*		
	Bebearia nivaria		*	
	Bebearia omo	*		
	Bebearia oxione	*		
	Bebearia sophus	*	*	*
	Bebearia zonaria	*		
	Bicyclus anisops			
	Bicyclus dorothea	*	*	*
	Bicyclus ignobilis		*	
	Bicyclus italus			
	Bicyclus martius sanaos		*	
	Bicyclus madetes	*	*	
	Bicyclus sandace		*	
	Bicyclus smithi			
	Bicyclus vulgaris	*	*	*
	Byblia anvatara			
	Catuna angustatum	*	*	*
	Catuna crithea		*	*

Catuna oberthueri		*	
Charaxes etesipe	*		
Charaxes brutus		*	
Charaxes cedreatis			*
Charaxes cynthia			*
Charaxes eupale		*	*
Charaxes lucretius		*	
Charaxes pleione		*	
Charaxes tiridates		*	
Charaxes varanes			
Cymothoe beckeri			*
Cymothoe caenis			*
Cymothoe coccinata	*		*
Cymothoe confusa			
Cymothoe consanguis			*
Cymothoe egesta	*	*	
Cymothoe hesiodotus		*	
Cymothoe hypatha		*	
Cymothoe sangaris	*		*
Cynandra opis	*		
Cyrestis camillus		*	
Danaus chrysippus	*	*	*
Elymniopsis bammakoo		*	*
Eupheadra aureola			*
Euphaedra ceres	*	*	
Euphaedra edwardsii	*		
Euphaedra eleus			
Euphaedra fucora			*
Eupheadra harpalyca	*	*	*
Euphaedra hebes	*		
Euphaedra imperialis hecqui			
Euphaedra losinga		*	*
Euphaedra janetta	*		*
Euphaedra medon	*	*	
Euphaedra proserpina			*
Eupheadra themis	*	*	*
Euphaedra ravola			*
Euphaedra ruspina	*	*	*
Euphaedra zaddachii			
Euptera elabontas			*
Euriphene barombina	*	*	
Euriphene gambiae		*	
Euriphene tadema			*

Euryphura chalcis			*
Euryphura plautilla			
Eurytela hiarbas		*	
Gnophodes bestimena parmeno			
Hamanumida daedalus			
Harma theobene	*		
Hypolimnas anthedon	*	*	*
Hypolimnas misippus	*	*	*
Hypolimnas salmacis	*	*	*
Junonia cymodoce	*	*	
Junonia oenone	*	*	
Junonia sophia	*	*	
Junonia stygia	*	*	
Junonia terea	*	*	*
Kallimoides rumia			
Lachnoptera anticlia		*	
Melanitis leda		*	*
Neptis agouale			
Neptis alta	*		
Neptis melicerta		*	
Neptis metella			
Neptis mororsa			*
Neptis nicobule			
Neptis paula	*	*	
Neptis quintilla	*		
Neptis trigonophora			
Pentila maculata		*	
Palla decius			*
Palla ussheri		*	
Phalanta eurytis	*		*
Phalanta phalantha			
Precis octavia			*
Precis pelarga	*	*	
Protogoniomorpha parhassus		*	*
Protogoniomorpha temora			
Pseudacraea eurytus			
Pseudacraea lucretia			
Pseudacraea warburgi		*	
Pseudoneptis bugandensis ianthe			
Salamis cacta	*	*	*

	Sevenia amulia	*		
	Sevenia occidentallium	*		
	Ypthima albida			
	Ypthima sp		*	
Hesperiidae	*Celaenorrhinus galenus*			
	Coeliades forestan			
	Pyrrhochalcia iphis			
	Spialia ploetzi occidentalis			

THREAT MATRIX ACROSS THE 3 PROTECTED AREA

THREAT MATRIX			
CROSS RIVER NATIONAL PARK	**KAINJI NATIONAL PARK**	**OLD OYO NATIONAL PARK**	**DEGREE OF SEVERITY**
Poaching	**Insecurity**	**Insecurity**	**High**
Illegal logging of Section	**Poaching**	**Illegal logging of section**	**Low**
Hunting	**Grazing**	**Grazing**	**High**
Farming	**Farming**	**Farming**	**Medium**
Wild fire	**Hunting**	**Hunting**	**Medium**

RECCOMMENDATION:

1. In other to address the insecurity challenges threatening most of Nigeria's High Conservation Value sites which are pollination-rich zones, the National Park authority need to collaborate with the Nigerian Military Force to secure these zones for terrorism attack. The government should work out the legal modalities through the appropriation of National Parks to use weapons and ammunition equipped to fight terrorism.

2. The capacity of the National Parks should be built in pollination species monitoring and research alongside creating an integrated pollination data platform across National Parks. Our experience with this scoping exercise shows capacity gaps in identification and data collation on pollinators among staff of National Park. This is an area that the staff are very enthusiastic about learning and use those data as a decision tool in ensuring biodiversity value of the Park.

3. The National Park should prioritize the use of technology-driven surveillance and monitoring in their anti-poaching and research effort towards ensuring success. Most of the protected area visited during this study still relies only on patrolling

techniques which is currently limited by insecurity that plaques Parks often leaving some sector of the Parks ungoverned or not patrolled.

Appendix I: FIELD VISIT PICTURE GALLERY

Community-based Monitoring Groups at the Old Oyo National Park taking pollinator records

Bird species of Pollination importance

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