**Mid-Term Report**

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# Conservation of *Lophira alata*, an economically important and vulnerable tree species in Nigeria

By

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# 1. Introduction

Biological diversity has been greatly threatened by habitat loss induced by species exploitation, farming, and continual habitat destruction; thus, it is imperative to protect our endangered species, and preserve the remaining forest enclaves, in the face of changing climates. *Lophira alata* (Ochnaceae) commonly known as red ironwood and locally referred to as Ekki in Nigeria. The distribution range of this important timber species in tropical West Africa has been threatened by overexploitation and logging. The species is characterized by dense humid evergreen forests at low altitudes, but sometimes found in altitudes reaching 1000m (Doumenge & Sene, 2012). In Nigeria, it is valued for its economic and medicinal importance (Wahab, 2015; Babawale et al., 2016). Unlike in Cameroon where it is reported to be common, widespread and regenerates easily (Doumenge & Sene, 2012), it is evidently not the case in other parts of its range including Nigeria, where it appears to be currently restricted to Cross River National Park (CRNP). However, an assessment of its conservation status by the International Union for Conservation of Nature and Natural Resources (IUCN) reported that the species is vulnerable (VU), and this has not been updated since 1998 (Africa Regional Workshop, 1998).
Consequently, there is a need for immediate conservation plans and population monitoring of

*L. alata* given the restricted range of the species, and its vulnerability resulting from human activities and poor natural regeneration rates. The target species is not only an economic species in Southern Nigeria but also one of the most exploited forest trees of tropical Africa; with its earliest export record of timber dating back to the 16th century when it was sold from Ghana to the United Kingdom for use as keels in the construction of ships. In response to its conservation,

*L. alata* thus needs improved protection and management of its remaining habitats. This study is also supported by the Management of CRNP in protecting the range distribution of *L. alata from* human encroachment, through conservation awareness campaigns. During our previous surveys, we could not account for the detailed population status of this species which will help to formulate conservation measures of the red ironwood in its natural habitat in Nigeria. This was the fundamental basis for our conservation project.

### 1.2. Objectives

1. To carry out an in-depth species re-assessment aimed at documenting the population status and distribution of *L. alata* across localities.

2. Identify threats (current and potential) affecting the survival of the species, habitat management, and reintroduce the species into its natural habitats through reforestation. programmes.

3. To project habitat suitability and range expansion.

4. Improve the level of conservation education through the enactment of conservation programmes in the area.

# 2. Methodology

### 2.1. Study area

The present study was carried out in CRNP (http://nigeriaparkservice.org/?p=140), which located in Southern Nigeria (Figure 1), and one of the oldest rainforests in tropical Africa. The study area harbors high species richness and an avalanche of endemic species. The site has a total land area of 4,000 $km^2$ and is divided into two divisions namely: Okwangwo (latitude 6°04′/ 6°28′ N longitude 9°02′/ 9°27′ E) and Oban (latitude 5°00′ / 6°00′ N and longitude 8°20/8°55′ E). The study was

conducted within the Oban Division of the park because the focal species (red ironwood) can only be found in this division of the park. The study area remains one of the richest biodiversity hotspots in Tropical Africa and the World at large and accommodates some rare and endemic species of Africa. Apart from the focal species, we recorded other important species such as *Carapa procera, Coula edulis, Diospyros mespiliformis, Enanthia chlorantha, Garcinia smeathmannii, Guibourtia ehie, Irvingia gabonensis, Klainedoxa gabonensis, Maesobotrya barteri, Parkia bicholor, Piptadeniastrum africanum, Pycnanthus angolense, Sterculia rhinopetala,* and *Uapaca togoensis*. This is reflective of the habitat richness of the site and supports its recent designation as a biosphere reserve by UNESCO.

The area covers about 3,000km$^2$ and is contiguous with Korup National Park in Eastern Cameroon. It has rugged terrain, an elevation of >1,000 m in mountainous areas, and annual precipitation above 3500 mm (Ogunjobi et al., 2010). The vegetation physiognomy is moist tropical forests with canopy layers. Although some areas within the study site have been degraded owing to experienced human activities (agricultural practices, bush burning, deforestation, hunting, illegal logging, etc.) including the buffer zone which have resulted to secondary regrowth forest.

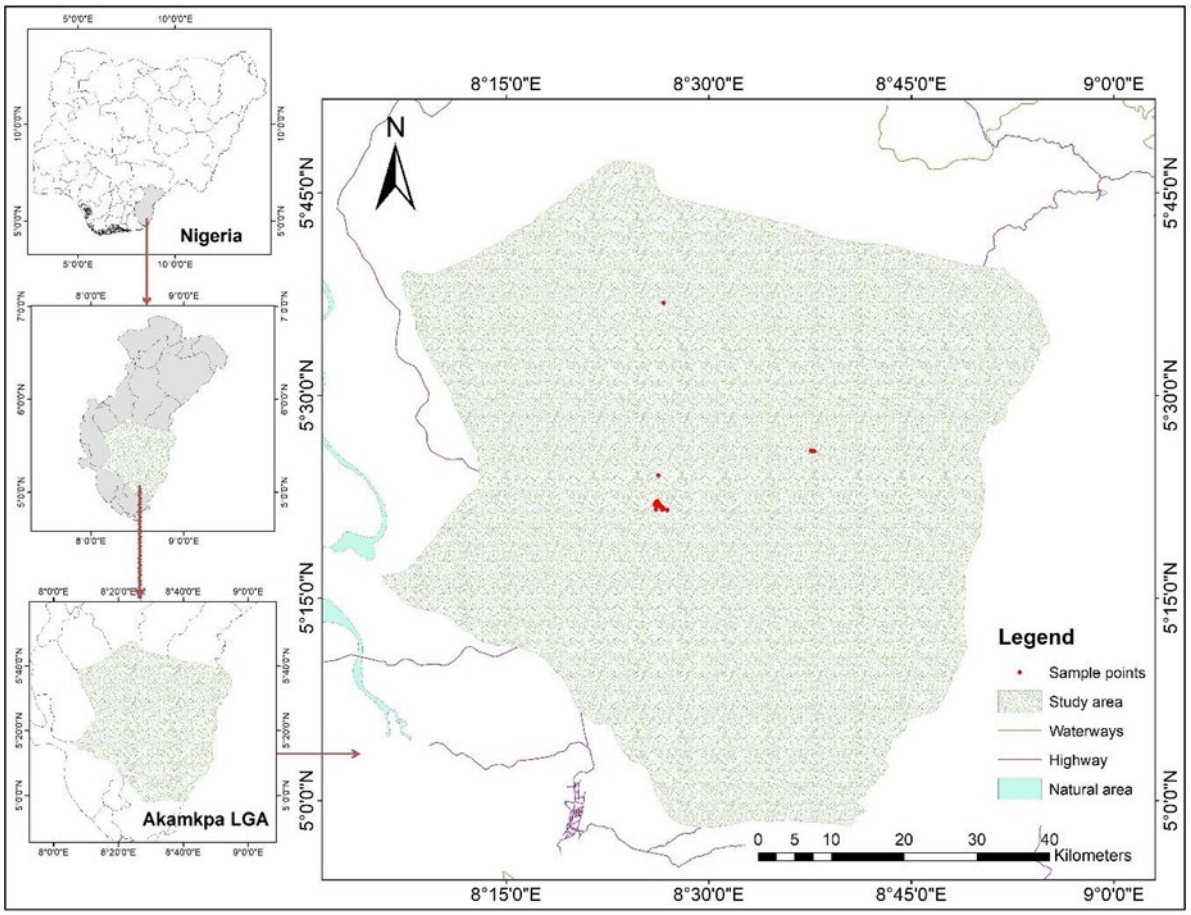

Figure 1. Location map of the study area

## 2.2. Data collection

The present study was undertaken within the Cross River National Park (CRNP), located in southern Nigeria. The study area was initially surveyed for two weeks in September, and an extensive field work took place between September and December 2022, while taking into cognizance the outlined activities, viz: preliminary investigation of the area, establishment of tree nurseries and training of local people, collection of wildlings, measurement of tree parameters, conservation education and awareness.

Transect lines were cut within the park, and sample plots of 50m$^2$ were laid along each line. These

sample plots were alternated with a spacing of 25m (Figure 2). Individual stands of *L. alata* were carefully counted within each plot while identified associated species were also noted accordingly. The diameter at breast height (DBH) and height of each stand of *L. alata* were measured using a diameter tape and Spiegel Relascope respectively. GPS coordinates of each occurrence point were also taken using a hand-held GPS device.

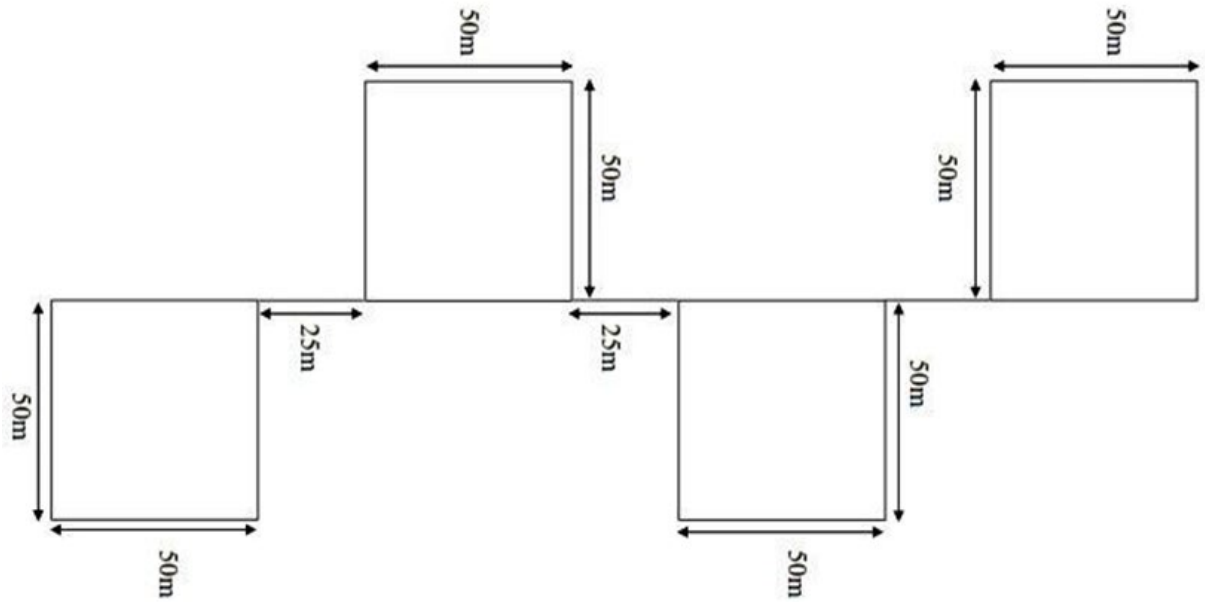


Figure 2. Transect line and dimension of sampled plots.

Conservation awareness and conservation education took place at the premises of the CRNP, and as well in the three major host communities (Aking, Netim, and Nsan) and all the small villages within the study area. Community leaders and youths were educated on the need to conserve the focal species and protect its natural habitat while depending on the forest for their livelihood. Pupils of the visited schools were also educated on the importance of biodiversity conservation amid changing climates.

Within the study area, indigenous knowledge about the focal species was gathered through 300 structured designed questionnaires which were administered to the rural people who were familiar with the species.

# 3. Results

*Objective 1: To carry out an in-depth species re-assessment aimed at documenting the population status and distribution of L. alata across localities.*

### 3.1. Species distribution

A total of 24 plots of $50m^2$ were sampled for the distribution of *L. alata* within the study area (Akamkpa and Oban division). Our survey showed that 13 plots had less than 50 stands of *L. alata,* while 11 plots had above 50 stands. A total of 1,244 individual stands were observed (Table 1) and the percentage occurrence varies across the sampled plots (Figure 3). Our study revealed that the population of red iron wood is abundant in Akamkpa than in the Oban area.

**Table 1. Distribution of *L. alata* in each sampled plot**

| Plots | Locality | Longitude | Latitude | No. of *L. alata* |
|---|---|---|---|---|
| 1 | Erukot | 8.433556 | 5.365139 | 12 |
| 2 | Erukot | 8.434528 | 5.367222 | 98 |
| 3 | Erukot | 8.434917 | 5.368028 | 58 |
| 4 | Erukot | 8.435639 | 5.368528 | 73 |
| 5 | Erukot | 8.436083 | 5.369056 | 64 |
| 6 | Erukot | 8.436639 | 5.369528 | 131 |
| 7 | Erukot | 8.436917 | 5.36875 | 153 |
| 8 | Erukot | 8.437611 | 5.401361 | 149 |
| 9 | Erukot | 8.438028 | 5.366167 | 75 |
| 10 | Erukot | 8.438944 | 5.365472 | 116 |
| 11 | Erukot | 8.440028 | 5.364222 | 103 |
| 12 | Erukot | 8.441083 | 5.362944 | 6 |
| 13 | Erukot | 8.437389 | 5.363669 | 12 |
| 14 | Erukot | 8.438222 | 5.363833 | 94 |
| 15 | Erukot | 8.440667 | 5.362222 | 5 |
| 16 | Erukot | 8.443722 | 5.360333 | 12 |
| 17 | Erukot | 8.4445 | 5.359222 | 2 |
| 18 | Oban | 8.625833 | 5.614417 | 22 |
| 19 | Oban | 8.630167 | 5.431 | 6 |
| 20 | Oban | 8.627694 | 5.431056 | 8 |
| 21 | Oban | 8.629417 | 5.431722 | 9 |
| 22 | Oban | 8.629222 | 5.431306 | 12 |
| 23 | Oban | 8.610972 | 5.44775 | 15 |
| 24 | Oban | 8.629361 | 5.447111 | 9 |
| Total | | | | 1,244 |

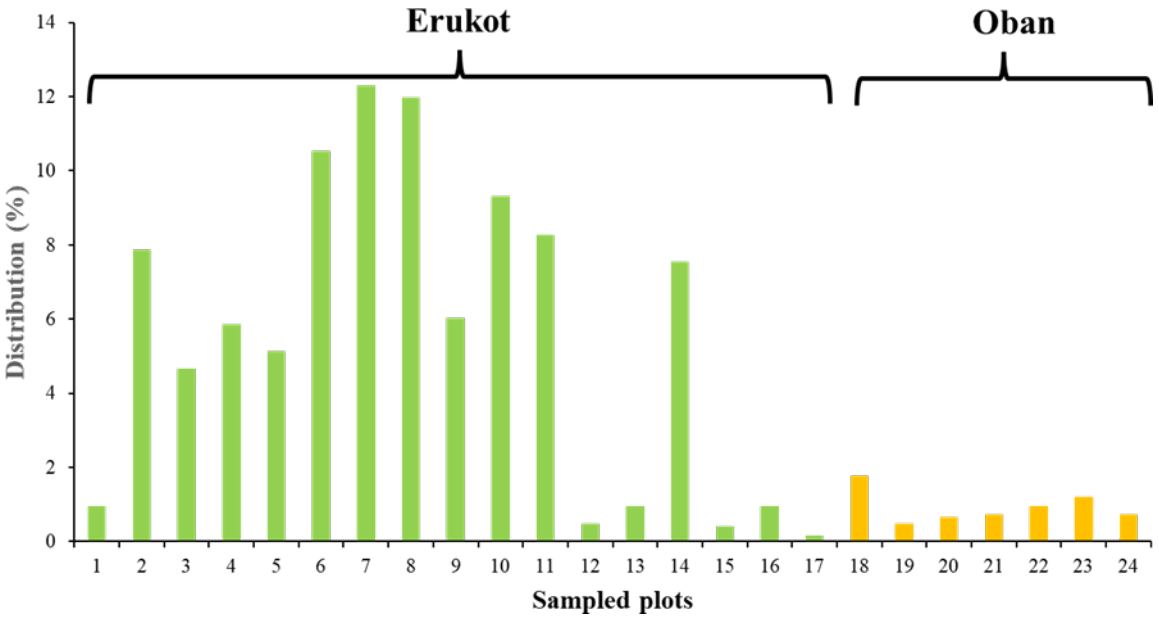

Figure 3. Percentage distribution of *L. alata* in each sampled plot

Figure 4: Field sampling for data collection (**a**) Establishment of the sampling of plots and (**b**) measurement of tree parameters

*Objective 2: Identify threats (current and potential) affecting the survival of the species, habitat management, and reintroduce the species into its natural habitats through re-afforestation programmes.*

### 3.2. Habitat and ecology of *L. alata*

The habitat of the focal species is characterized by emergent trees with closed canopies with numerous woody climbers and shrubs. As observed in this study, *L. alata* can reach a height of 38m and girth of 400m (details will be included in the final report). Notable associated tree species include *Cleistopholis patens, Funtumia elastica, Macaranga barteri, Maesobotrys guineensis, and Pycnanthus angolense.* Most commonly found woody climbers include *Cissus arguta Motandra guineensis and Secamone afzelli*. From the in-situ observation, the red ironwood is faced with conversion of forest land into segmented farming areas for agricultural purposes, logging, and exploitation of non-timber forest products such as medicinal plants (Annex 3) and beekeeping (for honey production). Thus, our observations agreed with those of the respondents, who also noted that the remaining stands of *L. alata* are threatened by logging, timber exploitation, bush burning, and harvesting of plant parts for medicinal uses. Our next activity will be species distribution modelling.

### 3.3. Local knowledge and excerpts from administered questionnaires about *L. alata*

Indigenous knowledge about the focal species as obtained using structurally designed questionnaires, showed that men were more involved in the activities posing threats to *L. alata.* Out of the 300 questionnaires that were completed, most of the respondents had secondary education, and aged between 41-50 years. The red ironwood is harvested for its wood, which is used in the construction of bridges, canoes, railway sleepers, and other furniture. On the other hand, the bark, leaves and roots of *L. alata* are utilized in traditional medicine for the treatment of several ailments such as cough, headache, pile, and stomachache.

We found that *L. alata* regenerated or occurred naturally within the study area while only a few (<5%)

are found in their farms. This may imply that the species is deliberately eliminated for agricultural purposes and was further reported that it is becoming difficult to come across mature stands in recent times. Again, an indication of illegal logging activities within the study area.

Responses from the administered questionnaires also revealed that only a few have been planted in the last ten years. Hence, the respondents supported the attempt to increase the availability of *L. alata* within the study area and suggested re-afforestation and stoppage of illegal fellers from invading the park, and constant monitoring of the area by the park officers. Others suggested the implementation of certain forest laws to guide against logging. Generally, respondents encourage the conservation of *L. alata* to ensure availability for the future generation.

*Objectives 4: Improve the level of conservation education through the enactment of conservation.*

We conducted conservation education and iterated on the economic and ecological importance of the *L. alata*. This included the secondary school pupils and neighboring communities. The students were engaged in class teaching and quizzes to evaluate their involvement in the project while the community leaders were first trained prior to the general conservation. It is worth mentioning that all the stakeholders largely supported the project and rendered help during the visit.

### 3.4 Seedlings production and species regeneration potential

As earlier noted, L. alata reaches a height of 38m and about 400m in girth. Many wildlings were found within the study area, and thus suggest that the focal species has a high regeneration potential, as also observed in a number of plots sampled. This can be maintained, and the focal species becoming more abundant than it is currently, only if more attention is given to the study area. To actualize a rapid regeneration of L. alata, seedlings were raised by the project team, and distributed to the host communities. Specifically, they were handed over to the youth leaders and community chiefs while others were planted by the team, in the schools visited and locations shown by the community head.

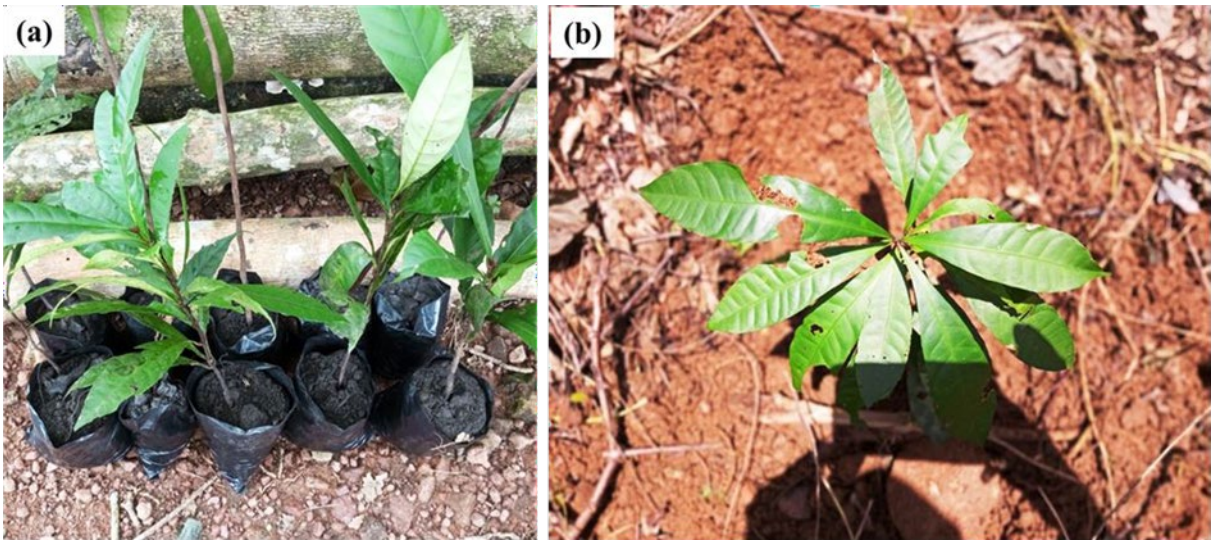

Figure 5: Reforestation program. (a) representatives of the purchased potted seedlings and (b) saplings planted for demonstration during the project.


Figure 6: Community-based conservation education. (**a-c**) involvement of the students during the project, (**d-e**) administration of questionnaires and (**f-g**) engagement of the community people during the community education.

## Acknowledgement

Many thanks to the management of Cross River National Park for granting access to the study site. We are also grateful to the rural people, particularly the community leaders for their cooperation and help. I especially thank the project team – Chukwuma, Emmanuel, Adewumi, Deborah, Odewo, Peter, and Agbo-Adediran, Adewale for their diligence, hardwork and commitment to the success of the project. We are very grateful to the Rufford Small Grant for funding project No: 38001-1.

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## Annexes


**(a)** Arrival of the project team to the study site, **(b-d)** engaging park officers in conservation awareness


**(a & b)** Engaging youth leaders in conservation strategies, and administration of questionnaires, (**c & e)** conservation awareness and education in some schools visited, and (**d)** involvement of the community leader in tree planting exercise.

Evidence of debarking of mature tree for medicinal purpose