Dynamics of Rosewood (*Pterocarpus erinaceus*) exploitation in savanna lands of Taraba State Nigeria

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The demand for *Pterocarpus erinaceus*, popularly known as African rosewood has grown significantly in recent years, particularly in Asia. This has led to high levels of illegal logging resulting in serious forest degradation across Taraba State. Although logging of forest trees have been going on in the state throughout the post-colonial era, the increasing spate of logging witnessed in recent times in the state is unprecedented. This high exploitation of *P. erinaceus* is like a rush gold in which the activity is highly organized in a coordinated network that has defied all existing forestry regulations in the state. This study examines the environmental impacts of the increased logging of rosewood trees in Taraba State Nigeria. Survey and participants' observation and structured questionnaires were used to collect data for the study. The findings of the study reveals that about 2,250 stands of *P. erinaceus* trees are felled weekly and 132,600 stands felled annually in one single location (Mayo Kam). Large forest areas have been opened up by the indiscriminate exploitation of logs, especially areas on the hilltops and along the major rivers where these trees are found. The findings of the study show that the logging activities have subsided drastically in most of the early sites of production as a result of depletion of the specie and the activities have shifted to other sites within the state especially Gasha-ka LGA where the largest National Park in west Africa, Gashaka-Gumti National Park is located. It is feared that the commercial exhaustion of *P. erinaceus* trees at the local level, can lead to focus on other endemic rosewood species, such as *Diospyros crassiflora* or *Dalbergia melanoxylon*, triggering new vicious cycles of intensive exploitation of the resource and expansion of illegal practices in the State. Field observation shows that logging activities have reduced in most of the early sites of the production. This reduction could be attributed to the depletion of the specie in the area. As the species are depleted, activities shift to other sites within the State. This has resulted in loss of biodiversity, animal fodder and important timber resources in the State. The paper recommends for total ban of rosewood exploitation and strict enforcement of the forestry regulation in the state.

**Key words:** Environmental, impact, *Pterocarpus erinaceus*, rosewood and savanna.

**INTRODUCTION**

The savanna land of west Africa is well endowed with abundant forest resources. One of the important forest tree of the west African savanna land that have multiple uses is *Pterocarpus erinaceus*. *Pterocarpus* means “winged fruit,” from the Greek “pteron” (wing) and “karpos” (fruit). *P. erinaceus* is a rosewood species, a deciduous legume tree of African savannas and dry forests famous for producing one of the finest woods in its native region (Bosu, 2013). It is a deciduous tree with a high, open, few-branched crown; usually growing 12 - 15 m tall with some specimens reaching 25 m (Burkil, 2004). It also produces leafy fodder high in protein, which makes an excellent animal feed crucial for the survival of livestock during the dry season. The tree produces showy and attractive golden-yellow flowers and has considerable potential as an ornamental. Demand for luxury furniture made of rosewood has soared among China’s burgeoning middle class at an unprecedented rate, particularly since 2010. This has resulted in high demand for rosewood, thereby driving
illegal and unsustainable logging on an alarming scale in some of the world’s most endangered forests in Southeast Asia and, increasingly, Africa and Latin America. Not only is China the top market for rosewood imports; it is also by far the biggest consumer (Bosu, 2013). In 2014, more than 30,000 Chinese companies traded in *P. erinaceus* products, generating domestic retail revenues of over $25 billion (Aiyetan, 2016).

Aiyetan (2016) observed that since 2011, the Chinese traders in search for rosewood have moved from one west African country to the other as each country erected stiffer controls and regulations or as the forestry resources are being depleted. It started with the Gambia which became the largest exporter of rosewood from the sub-region to China but supplies soon dwindled following an export ban in that country, forcing the traders to look at, in turn, Guinea Bissau, Togo, Benin, Ghana and, most recently, Nigeria (Bosu, 2013). Timber merchants working for Chinese businessmen are moving from one state to another in Nigeria depleting the rosewood resources in the forests, leaving blighted and raped landscapes without minding the enduring effects of unrestrained harvesting of the product on the environment (Aiyetan, 2016). By the end of 2015, Nigeria had become the single largest exporter of the rosewood logs to China, accounting for 45% of total imports to the country (Aiyetan, 2016).

The Chinese demand, coupled with both extensive timber extraction, and intensive has not only threatened extinction of this highly valued rosewood, but has also given rise to complex, organized crime networks that facilitate this trade with impunity. The harvesting and trade in rosewood involves a complex web of actors and trade value chains, coupled with a weak forest regulatory frameworks as well as weak monitoring and enforcement regimes (Bosu, 2013) evidenced in most West African countries and Nigeria in particular. Its effects are also felt in surrounding local and indigenous forest communities, many of whom rely on rosewood for fuel, medicine, and income even as they are induced with money by traders to harvest and transport the logs.

The rosewood timber is exported for making musical instruments, furniture and decorative items such as chess pieces, due to its unusual heartwood. The rich red color of rosewood, as well as the hardness explains why it has always been highly prized. It takes a long time to grow and mature, making it vulnerable to unsustainable harvesting. Thus, it takes a long time to replace logged trees.

The recent discovery and exploitation of *P. erinaceus* species in Savanna lands of Taraba State has generated a lot of concern. The high rate of exploitation of this forest tree species and the large traffic flow of this wood timber across the state is a source of concern because of its likely consequence to the environment. Despite the fact that logging activities in the area are mostly through illegal operations and permit and conveyance arrangements, not much has be done by way of research to understand the dynamics of this indiscriminate exploitation of the rosewood and its associated environmental impact to the affected areas. This study therefore examines the dynamics, causes and impact of the increase in logging of rosewood trees in Taraba State of Nigeria.

**Description of study area**

Taraba state is located in the north eastern part of Nigeria. It lies between latitude 6° 30’ and 8° 30’ north of the equator and between longitude 9° 00’ and 12° 00’ east of the Greenwich meridian. The state shares boundaries with Bauchi and Gombe states in the north, Adamawa state in the east, and the Republic of Cameroon in the south. The state is bounded along its western side by Plateau, Nassarawa and Benue states (Figure 1). The state has a land area of 60,291 km² with a present population of about 2.8 million people (projected from the 2006 National Population Census). It is divided into sixteen Local Government Areas (LGAs) and three senatorial districts (Taraba north, central and south). Taraba state is regarded as Nature’s Gift to the Nation because of its abundant natural resource endowment. The state is well endowed with abundant solid mineral resources, surface water resources, arable and grazing land. The major occupation of the people of Taraba state is agriculture. The state is blessed with climate and vegetation types that cut across the country, ranging from a more humid climate and forest vegetation in the south to a more seasonal wet and dry climate and savanna vegetation in the north.

Within the state, *P. erinaceus* is found mostly in central senatorial district. High densities of *P. erinaceus*, can be found between Ardo Kola, Mutum Biyu, Gassol, Bali, Gashaka, Donga, Kurimi, Ussa and Takum LGAs (Figure 1). The vegetation in these areas can be described as fairly undisturbed guinea savannah ecosystem dominated by open savannah woodland. Patches of gallery forest are found along Rivers Taraba and Donga which are the main drainage system in the area.

The savanna lands of the central part of Taraba state which holds the last remnant patches of forests have been besieged by platoons of illegal merchants who either come with their own chainsaw operators from the southern part of the country, or engaged local young men to fell rosewood to service their illegal rosewood trade. The particular rosewood species which is the target for the current illegal forest exploitation in the study area is the *P. erinaceus* commonly known as the African Rosewood. Until the last quarter of 2011, Rosewood was not a commercially exploited species of tree in the state. Although Rosewood is noted for its fine wood working
properties, and fodder for livestock, it was not the target for local illegal chainsaw lumber operations, which was widespread in the central and southern part of the State. Instead *eucalyptus* and melina trees were the most commercially exploited trees for local electrical poles and timber needs. This plants grow very fast (mature within 5-6 years) and very tall, suitable for electrical poles.
MATERIAL AND METHODS

The survey design method was adopted in this study. This involved the use of interviews, participant observation and questionnaires were used to collect data for the study. The research questionnaire was structured to obtain information on the environmental impact of the indiscriminate exploitation of *P. erinaceus* in the study area. During the fieldwork, the respondents were interviewed. Selection of respondents based only those who are directly or indirectly involved in the activity were selected and administered with questionnaires. This was done to eliminate people who might not have adequate information of the timber production. The random sampling and availability technique was employed in the selection of respondents. The structured interview schedule was administered to the timber producers wherever they were found as they were not stationed at a place. The structured interview schedule was designed to capture information on species of trees usually preferred, reasons for the preference, problems associated with tree wood felling, transportation and trading and means of achieving sustainability in timber production activity or otherwise. Descriptive statistics were used to analyze the data to generate results. Secondary materials were also used in this study.

Results and Discussion

The result of the study revealed that although logging of forest trees have been going on in Taraba state since the post-colonial era as a result of its rich natural endowment of forest resources, the increasing spate of logging witnessed in recent times in the State is unprecedented. The results revealed that the state has never witnessed an explosion in indiscriminate felling of forest trees which is selective and targeted at *P. erinaceus*, popularly known as the African rosewood and *Madobiya or Madrid* in Hausa language (local name) before now. The timber exploitation which started in Bali LGA has spread to other communities in the state as shown in Figure 1. This high exploitation of *P. erinaceus* is like a rush gold in which the activity is highly organized in a coordinated network that have challenged all existing forestry regulations in the state. This explains the difficulty of having statistics of the volume of logs exploited in the last 3 years in Taraba state. The study shows that in most West African countries where this large scale exploitation of *P. erinaceus* has taken place, it has created serious environmental problems such as in Mali, Burkina Faso and Gambia where shortage of fresh leaves from the species used for fodder has been reported (CITES, 2015). This has made some west African countries like Senegal to write to Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) requesting for the inclusion of *P. erinaceus* into the list of endangered species of flora (CITES, 2015). The study also shows that there were existing forestry regulation banning the exploitation and export of timber (including Rosewood) which was reinforced by the government in the last administration between 2007 and 2009 in the state. The Taraba state (Control of Chainsaws) Law 2003 provides that "No person shall use any chainsaw for felling any tree in the state unless he shall first have applied and obtained from the Ministry of Environment and Solid Minerals in the state a license in the form as prescribed in the schedule of this Law" (Aiyetan, 2016). Apart from getting a license for felling logs, such a person also has to get a license to establish sawmill for the industrial utilization of the forestry resources. Violators of this law are liable upon conviction to a fine of ₦50,000 or a jail term of five years. Despite the existence of this provision, the illegal and indiscriminate exploitation of the Rosewood has continued in the state so much so that it is feared that the state may be the next state to suffer total depletion of its Rosewood resources in the country (Aiyetan, 2016).

Harvesting operations

Felling activities

The felling of rosewood trees involved the use of chainsaws. In certain cases, local axes were available just in case the chainsaw failed for one reason or the other. The lucrativeness of the log wood exploitation made local business to acquire chainsaws. Some local community members acquired their own chainsaw while others hired it which they use in operating and cutting down rosewood for the buyers. Felling activities were carried at any location irrespective of accessibility. Most of the locations of the rosewood trees are on hilltops. The trees are cut and roll down the hill. There are people whose work is to roll the logs downhill. The rollers are paid ₦1,500 (USD 5.5) per log of wood successfully rolled down the hill. In this way, every place was logged for as long as Rosewood trees were located in those areas. Depending on the density of rosewood trees in the particular areas this activity can be done in a day. Where the density of rosewood trees is low, they take two days. Felled Rosewood trees are cut into 2.1 meter logs and then moved to dumping areas (Figure 2). These logs are then further shaped into rectangular shapes with the help of a wood mizer.

Transportation systems and routes dumping and packing

Several means of transport were employed in moving the
logs from their stumpage points to dumping areas and then finally to transporting the logs out of the dumping areas for onward transport to the major trading points in Lagos. Open tipper trucks were used for transporting logs from their stumpage points to the various dumping area (Figure 3). The harvested rosewood were often times harvested and transported illegally in the dark of the night passing several forestry check points and shipped out of the country through our own ports to rosewood markets mainly in Asia as observed by Bosu (2013).

The trailer load of the logs transported to Lagos through Kano-Lokoja – Ibadan – Lagos route as going through Markurdi in Benue state would end up being more expensive because of collection of illegal fees at military check points (Aiyetan, 2016).

Environmental impact of the Rosewood exploitation and trade in Taraba state

The findings from the study show that *P. erinaceous* species are being hunted by the local community members because of the monetary reward associated with the exploitation. Wherever the specie is found, it is felled, the distance and difficult terrain notwithstanding. The explorers that goes about in search of the location of rosewood normally get rewarded with token amount as commission which ranges between ₦10,000 to ₦50,000 (USD35 to USD180 - exchange rates ₦280 per USD $1). This selective logging of *P. erinaceous* has led to the depletion of almost mature tree stand in the local community where it is produced. The exploitation of the specie is spreading fast like wild fire into the neighboring communities in the state. The explorers travel long distances on motorbike to comb the forest. The distance could be up to 100 km or more in search of the location of *P. erinaceous*.

The depletion of this important specie of tree with multiple uses is a serious threat to the physical environment and human populations within the state and country at large. This has a multiplier effects on animal feed availability to support the growing livestock population and indirectly increasing conflict between crop farmers and cattle rearers. It will also lead to loss of medicinal values associated with the plant. Although the extent of illegal forest exploitation of the tree is difficult to quantify, their economic cost is likely to be large. Nine out of the 16 LGAs currently affected by rosewood exploitation in the State constitute 62.8% (37,668.13 km²) (Table 1) of the total land mass and 53.1% of the population of the state. It is feared that the exploitation will soon spread to the remaining LGAs as *Pterocarpus erinaceous* can be found in them.

Illegal logging has been identified as the main driver of degradation and loss of forests resources throughout the world. (European Commission 2008). In addition deforestation translates into a loss of the many environmental services that forests ecosystems provide (Bosu, 2013). Although, it is not easy to quantify the total area destroyed by these logging activities at the moment...
Figure 3. Processed Rosewood logs waiting for loading and transportation.

Table 1. Landmass and population of Rosewood exploitation local government areas (LGAs).

<table>
<thead>
<tr>
<th>S/No</th>
<th>LGA</th>
<th>Population</th>
<th>Land areas (sqkm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ardo kola</td>
<td>86921</td>
<td>2312.186</td>
</tr>
<tr>
<td>2</td>
<td>Bali</td>
<td>208935</td>
<td>9319.186</td>
</tr>
<tr>
<td>3</td>
<td>Donga</td>
<td>134111</td>
<td>3175.728</td>
</tr>
<tr>
<td>4</td>
<td>Gashaka</td>
<td>87781</td>
<td>8521.234</td>
</tr>
<tr>
<td>5</td>
<td>Gassol</td>
<td>244749</td>
<td>5665.131</td>
</tr>
<tr>
<td>6</td>
<td>Jalingo</td>
<td>139845</td>
<td>195.071</td>
</tr>
<tr>
<td>7</td>
<td>Kurmi</td>
<td>91531</td>
<td>4419.176</td>
</tr>
<tr>
<td>8</td>
<td>Takum</td>
<td>135349</td>
<td>2542.513</td>
</tr>
<tr>
<td>9</td>
<td>Ussa</td>
<td>92017</td>
<td>1517.904</td>
</tr>
<tr>
<td>10</td>
<td>Total</td>
<td>2,300736</td>
<td>37,668.13km²</td>
</tr>
</tbody>
</table>

Source: Oruonye and Abbas, 2011.

because of the rates of its spread, plant and animal species affected together with other indicators of change in this fragile savanna woodland, however, considering the practices involved in the felling activities, it is certain that a lot of deforestation and degradation has occurred within the short period that this activity has lasted as observed by Bosu (2013) in Ghana. The results of the study show that about 30 trailer loads of the log wood or more are transported from a single site Mayo Kam weekly. This gives an estimated 2,250 stands of *P. erinaceus* trees that are felled weekly and 132,600 stands felled annually. Invariably, not less than 400,000 stands of *P. erinaceus* trees have been felled in this single site in the last 3 years that the activity has thrived in the area. In Bali town on the other hand, over 100 trailers can be loaded in one day. The findings of the study show that the logging activities have subsided drastically in most of the early sites of the production as a result of depletion of the specie and the activities have shifted to other sites within the state especially Gashaka LGA where the largest National Park in West Africa, Gashaka-Gumti National Park is located.

Large forest areas have been opened up by this indiscriminate exploitation of logs, especially areas the hilltops and along the major rivers in the area where these trees grow very well. There is need for land cover
change detection to ascertain the extent of land that have been deforested or degraded from the indiscriminate log wood exploitation in the State. Bosu (2013) observed that rosewood trees constitute an important shade tree in woodland savanna landscape and as such, targeted felling of this tree will mean high surface area temperatures in places previously shaded by these trees, with implications for wildlife, understory saplings and fuel high fire intensity. Several numerical experiments on deforestation have shown that temperature rises significantly and precipitation decreases as a result of deforestation.

**Loss of biodiversity**

Many small pockets of forests which hitherto serve as habitat for wildlife species have now been destroyed by the indiscriminate log wood exploitation. It is difficult at the moment to estimate the impact of these activities on game species (Bosu, 2014). The noise from chainsaw activities, felling of shade and foraging trees contributes to scaring the animals away. The logging activities has also left behind a lot of residual waste because the merchants are only interested in just about six meters bole length of the tree, especially considering the fact that very tall trees branch at heights of 10 meters or even less (Bosu, 2014). This residual waste will serve as ready fuel for the fires during the dry season. Fire intensity in these districts is likely to increase with its attendant social, economic and ecological impacts.

The indiscriminate exploitation of rosewood in the state has the potential of reducing the carbon sequestration capacity of the woodland savanna ecosystem, increasing carbon emissions and reducing carbon sinks in this fragile ecosystem. This will exacerbate the problem of climate change already faced in the state.

**Destruction of alternative trees**

The selective exploitation of the *P. erinaceus* trees in the state can lead to increase pressure on alternative trees which will be destroyed too to meet future demand for fodder and timber resources. Thus, once the various populations of *P. erinaceus* are commercially exhausted at the local level, there is concern that commercial networks will focus on other endemic rosewood species, such as *Diospyros crassiflora* or *Dalbergia melanoxylon*, triggering new vicious cycles of intensive exploitation of the resource and expansion of illegal practices (Bosu, 2013).

**Conclusion**

This study has examined the dynamics of rosewood exploitation in Taraba State Nigeria. The results of the study revealed that the high exploitation of *P. erinaceus* is like a rush gold in which the activity is highly organized in a coordinated network that challenged all existing forestry regulations in the state. The findings of the study reveals that about 2,250 stands of *P. erinaceus* trees are felled for week and 132,600 stands felled annually in one single location. Large forest areas have been opened up by the indiscriminate exploitation of logs, especially areas the hilltops and along the major rivers in the area where these trees grow. It is feared that the commercial exhaustion of *P. erinaceus* trees at the local level, can lead to focus on other endemic rosewood species, such as *Diospyros crassiflora* or *Dalbergia melanoxylon*, triggering new vicious cycles of intensive exploitation of the resource and expansion of illegal practices in the State. The findings of the study show that logging activities have subsided drastically in most of the early sites of the production as a result of depletion of the specie and the activities have shifted to other sites within the state. This has resulted in loss of biodiversity, animal fodder and important timber resources in the state.

**Recommendations**

Based on the findings of the study, the following recommendations are proposed:

1) The government can do well by completely banning the exploitation and trade in the rosewood tree. This will require some political will and commitment on the part of the government to ensure that operations to collect abandoned logs at stump site does not lead to fresh cutting as the cycle has always been.

2) To forestall the future incidence of commercial exploitation of a particular species or ecosystem, the government should empower the forestry department to fully enforce the forestry laws and policies in Nigeria and Taraba State.

3) There is need to strictly enforce the forestry legislation in order to stop the menace of rosewood harvesting and trade.

**REFERENCES**


October 2015.