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Rosewood (*Pterocarpus erinaceus)* as a de facto forest common for local communities in Ghana

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This paper discusses how rosewood as a common-pool resource is managed and utilized at the local community level in the wake of aggravated exploitation of the resource for export to feed external markets. Non-probability sampling technique coupled with focus group discussion was used to collect primary data from two administrative districts in the transitional zone between the savannah and high forest in Ghana. In all, researchers interacted with 96 respondents in a survey and 77 participants in focus group discussions in 6 communities. The results indicate that the governance structure and management strategy for the sustainable use of rosewood and other forest commons are ineffective in the studied communities. Illegal rosewood harvesting thrived due to weak institutional structures, poor community knowledge of the value of rosewood logs in the international market and poor public knowledge about a ban on the harvesting and export of rosewood. Sustainable management and utilization of rosewood and other forest commons on village lands (lands outsider protected areas) could be improved if local communities are empowered and given technical support to manage forest resources on their lands. The conduct of natural capital accounting in forest resources and communicating the result to local communities could help residents appreciate the true value of forest resources and probably aspire for a greater quota of benefits. With a better understanding of the value of a forest, residents may be motivated to protect it from unsustainable use.

Key words: Institutional structures, natural resource use, sustainable management, illegal logging.

INTRODUCTION

Pterocarpus erinaceus Poir, a rosewood species, is a deciduous tree of African savannas and dry forests. It is usually found in open dry forests of semiarid and sub-humid lands with a mean annual rainfall of 600–1200 mm

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and mean annual temperature ranging from 15 to 32°C (Adjonou et al., 2020). The tree thrives on all soil types,preferably light to medium, free-draining, acid to neutral soils. It is drought tolerant thus has resilience towards the yearly savanna bush fires (Adjonou et al., 2019). Generally, rosewoods are hardwood species used to produce expensive furniture patronized by the elite class mostly in Asia (Zhu, 2020). The wood is also useful in the production of railway slippers, musical instruments, recreational products (e.g. chess pieces), and decorating the interior of ships. Rosewoods are species with significant economic importance to local communities across Africa (Dumenu, 2019; Ahmed et al., 2016; Dumenu and Bandoh, 2016). The use of rosewood species for fodder, charcoal, carving tools and instruments, building materials, and medicine are common in West African countries such as Cote d'Ivoire, Ghana, Nigeria, and Togo (Ahmed et al., 2016).

In Ghana, *P. erinaceus* occurs in ten out of sixteen administrative regions, namely; Ashanti, Bono East, Bono, Ahafo, Northern, North East, Savannah, Upper East, Upper West, and Oti regions. Ahafo region is said to have the highest volume of rosewood and in 2013 was estimated to have contributed about 70% of total rosewood production in the country (TIDD/FC, 2014). *P. erinaceus* has traditionally been exploited by local people in the savannas of Ghana mainly for charcoal and fuelwood production (Dumenu, 2019; Dumenu and Bandoh, 2016). *P. erinaceus* is also important in northern Ghana for the construction of musical instruments and farm tools such as the xylophone and the hand-hoe, respectively (Dumenu and Bandoh, 2016). As a leguminous tree, it has nitrogen-fixing ability and its foliage is a nutritious fodder for animals (Dumenu, 2019). It is also a medicinal plant used in concoctions for treating various diseases among residents in the areas where it occurs in Ghana. Until 2005, the greatest use of rosewood was for charcoal, produced mainly by women in the northern sector of Ghana (Bosu, 2014), thus the rate of exploitation was low. Commercial exploitation of the species began when international demand for it increased. In a space of 10 years (2003-2013), an estimated 111,110 m^3 of rosewood had been exploited in Ghana (Dumenu and Bandoh, 2016). The estimated figure does not account for the high incidence of illegal harvesting. In 2014, Ghana was ranked second to Nigeria in Africa and fourth in the world among top suppliers of rosewood logs to China by volume (Treanor, 2015). A high incidence of illegal harvesting of rosewood in Ghana occurs as a result of poor regulation of harvesting (Bosu, 2013). *P. erinaceus* is not a traditional timber species in Ghana and so regulating its exploitation is not as strict as it is for the traditional timber species in the high forest zone. Though permits are often given to timber contractors to exploit *P. erinaceus,* monitoring to ensure compliance is often weak or non-existent (Saibu, 2016).

Dumenu and Bandoh (2016) point out the species has become vulnerable due to its population structure and relatively slow growth rate. They conclude that the level of exploitation before a ban in 2014 was unsustainable. Due to indiscriminate commercial logging of rosewood, the Ministry of Lands and Natural Resources through the Forestry Commission imposed a series of bans on the harvesting, issuance and processing of the Convention on International Trade in Endangered Species (CITES) permits for the export of the species. (Abdul-Rahaman et al., 2016). The first ban was imposed in July 2014 while the second and third bans were declared in March 2019 and July 2021, respectively (MLNR, 2021; Abdul-Rahaman et al., 2016). The first ban was lifted in August 2017, ostensibly to salvage lying logs in regions where the species occur. The ban was reimposed as a result of poor enforcement and continuous illegal exploitation of rosewood. The latest ban imposed in 2021 is described as an outright ban on the harvesting and export of rosewood. While this ban is in force, all confiscated rosewood shall be auctioned only to players in the domestic market, and no rosewood acquired through such auctions shall be permitted for export, as was the case in previous bans. This implies, the Forestry Commission (the mandated state regulatory body) would not issue CITES permits to export Rosewood, whether the wood was acquired legally or otherwise (MLNR, 2021). Apart from ecological imbalances that could occur in the wake of rosewood extinction, some local livelihoods may be lost as the plant is important for economic activities such as charcoal production and the carving of tools and instruments. However, implementation of the ban was reported to be ineffective due to corruption and lack of enforcement of regulations (Abdul-Rahaman et al., 2016). Other reasons could be lack of community consultations and limited knowledge about the potential of the species for producing items of high economic value.

Although several studies have described the extent and nature of exploitation in Ghana (Aabeyir et al., 2011; Bosu, 2013; Treanor, 2015; Ansah, 2015; Dumenu and Bandoh, 2016), there is limited information on the socio-economic role of rosewood in local communities' livelihood and the impact of the recent extensive exploitation on their livelihood. The effects of governance and management of rosewood as a common-pool forest resource have not also been nuanced. This study is aimed at understanding the local context for governance, management, and exploitation of rosewood in the forest-savanna transitional zone in Ghana. Such understanding could inform decisions towards the design of strategies for sustainable management and utilization of the species and other forest commons in Ghana. Specifically, the study examines characteristics of the resource user group (the local communities), the socioeconomic importance of *P. erinaceus* to local communities, and institutional arrangements in place for the governance, management, and utilization of rosewood as a common-

pool resource.

Theoretical framework

The study is based on the common property theory (CPT). The CPT is essentially a corpus of literature from different disciplines that tries to explain the historical and contemporary institutional governance and management of valued natural resources such as forests, fisheries, oceans, atmospheric sinks, and even genetic material (Trejos and Flores, 2021; Pokrant, 2010). The CPT was fundamentally developed to get an understanding of the problems of managing valuable resources that are open to the use of all (principle of the difficulty of exclusion of users). One person's use of such common-pool resources reduces what is available to other users (principle of subtractability or rivalry), and usually, overuse/misuse and degradation occur in the long run (Slaev and Collier, 2018).

The study of forests as a common property has been one of the central scholarly approaches for developing the CPT, as many of the earliest contributions focused on forest studies (NRC, 1986; Singh, 1986; McCay and Acheson, 1987; Berkes, 1989; Stanley, 1991). This may be partly because forests produce multiple products that are of interest to many stakeholders for different purposes. Particularly, scholars have shown keen interest in the relevance of forests to the livelihoods of multitudes of rural residents across the world (Agrawal, 2007). Forests serve as important livelihood resources for local communities in agrarian and developing areas where much of subsistence still come from the natural environment (Widianingsih et al., 2016). Institutional arrangements for governance and management of forests are becoming more complex in contemporary times due to its multiple roles for global conservation and local livelihoods (Thompson, 2018), which often introduce more competing interests. It is therefore difficult to design lasting solutions to governance and management problems emanating from the use of forest commons because landscapes, demographics, development processes, and political alliances keep changing with time (Nightingale, 2019).

Agrawal (2001) posits that four clusters of variables are important for the successful governance of forest commons: the characteristics of the resource system, the user group, the institutional arrangements, and the external environment. These categories have been used in other empirical efforts to examine how governance-related variables affect forest conditions (van Laerhoven et al., 2020). The categories are also conveniently viewed as socio-political and economic variables (represented by 'user group'), biophysical and edaphic factors (represented by the cluster of variables classified as 'resource system's characteristics), and demographic, market, macro-political, and other contextual factors (represented by the category of factors termed 'external environment') (van Laerhoven et al., 2020). How these variables or factors are made to interact with each other to produce desirable results is what is termed institutional arrangements.

Characteristics of the resource system

In a broader sense, resource characteristics relevant to governance and management of common-pool resources include the boundaries, whether the resource is mobile, the extent to which resource units can be stored, rate and predictability of flow of benefits from the resource system, and ease of monitoring resource conditions (Nightingale, 2019; Agrawal, 2007). These are characteristics that help resource users to institutionalize governance through rules and regulations. While it is possible to change some of these features with technology and institutional arrangements (e.g. forest size, forest boundary, and ease of monitoring), others are almost impossible to alter (e.g. whether the resource is mobile). Biophysical characteristics such as soils, topography, fire, and pests are often considered in research on forest change and deforestation, but little attention has been paid to the significance of these factors on the management of forests commons. Even scholarly works that engage biophysical variables to give an understanding of forest conditions often end up using property rights, socio-economics, or politics to explain outcomes (Newton et al., 2015).

User group

In analyzing user group characteristics, researchers have often considered the size, boundary, level of heterogeneity of the group, interdependence among group members, and level of dependence on forest resources (Newton et al., 2015; van Laerhoven et al., 2020). Group size and heterogeneity may have a great impact on forests commons since they affect the ability of the group to take collective action. Disputes are often associated with governance decisions when a group is large and/or has poorly-defined boundaries (Hemant et al., 2019). Group heterogeneity usually occurs along ethnicity, indigeneity, gender, religion, wealth, and many other socially-defined groups, depending on the context and locality. The effect of heterogeneity on the governance of forests commons is always contested since the variables involved are many and influence each other. However, a significant portion of literature in this field suggests that almost invariably, group members with superior economic and political power often have a greater say in the governance of forest commons and gain a greater share of benefits accruing from the resource (van Laerhoven et al., 2020).

Institutional arrangements

Institutional arrangements can be a pivotal factor in the governance and management of forest resources. Research on how different institutional set-ups affect forest conditions has been of great interest to researchers in the sector since the concept of forests commons emerged. The output from this research has helped clarify understanding of how rules affect the behavior of forest users. It is generally recognized that when rules are locally made and can easily be understood and enforced, they are likely to lead to effective governance (Hemant et al., 2019). Again, such rules should be able to cover a wide range of possible violations, deal with potential conflicts, and instill accountability in resource users and officials. Although these rules are helpful, their better form will come from good policies, and effective implementation will be influenced by local and national politics (Merino-Saum et al., 2018).

The external environment

External environment regarding governance and management of forest commons are context-specific, and often refers to demographic, cultural, technological, and market-related factors. Other factors include the nature of state agencies, international aid flows, and the level of involvement of other actors and forces such as NGOs (Agrawal, 2007). Though some scholars consider external issues as less important compared to institutional matters (Nkhata et al., 2012; Young, 1994), others are of the view that changes in population and market forces are equally important in influencing forest condition (Bray et al., 2006; Power, 2006). Technological innovation has the potential to increase the efficiency of harvesting and processing of forest products, but it can also disrupt institutional mechanisms that defined and held together forests' commons (Hemant et al., 2019). For example, technology makes it easy for individuals to exploit forest common resources beyond sustainable levels and run stocks depleted. Foreign inflows into developing countries that go with conditions may also catalyze the depletion of forest resources. For instance, the International Monetary Fund loans to Ghana in the 1980s promoted the wood processing industry which in turn encouraged excessive logging and for that matter deforestation (Oduro et al., 2015).

MATERIALS AND METHODS

The study area

The study was conducted in two districts, Kintampo North and Nkoransa North in the Kintampo Forest Districts (GFD) of the Bono East Region of Ghana (Figure 1). Kintampo North is located between latitudes 8° 45'N and 7° 45'N and longitudes 1° 20'W and 2° 1'E with a population of 95,480 (GSS, 2014). Nkoransa North is located within longitude 10 10' and 10 55' W and latitude 70 20' and 70 55' N. The district has a population of 65,895 (GSS, 2014). Both districts are located in the forest-savannah transition zone of Ghana with the wet-semi equatorial type of climate and mean annual temperature and rainfall of 27°C and 1,800 mm, respectively. The rains occur in two seasons; from May to July and from September to October. The vegetation is savanna woodland with scattered trees including *Acacia* species*, Anogeissus leiocarpus, P. erinaceus,* and *Vitellaria paradoxa.* The soils are predominantly savanna orchrosols (richer in organic matter and nutrients). Traditionally, the local economy is agrarian with agriculture engaging 60% of households (GSS, 2014). Agricultural production is largely under rain-fed conditions and common crops grown include yam, maize, cassava, and groundnuts.

Kintampo and Nkoransa North Districts in the Kintampo Forest District are major areas for the production, collection, and transportation of charcoal. Farmers generally supplement farming with charcoal production as a significant source of income to support their families. The population of most trees is severely declined near townships and may be found only some 20 km away. Rosewood exploitation is highly prevalent in the area.

Sampling technique and sample size

The KFD was selected for the study because there was widespread rosewood harvesting in the area. To effectively achieve the aim of the study through the methods employed, three communities each were purposively selected based on the extent of rosewood harvesting activities (Campbell et al., 2020). The selected communities include Bonsu, Dotobaa, and Brahoho in the Nkoranza North District and Dawadawa No. 2, Busuama, and Portor in the Kintampo Municipal. Households represented sampling units and 16 households were selected from each community using the linear snowball sampling technique (Anieting and Mosugu, 2017). This sampling technique was chosen because rosewood loggers do not form a population that can easily be identified. They are scattered but they know each other. In all, 96 household representatives were interviewed. Residents who lived in the community for more than 10 years and were involved in the rosewood business were targeted.

Methods of data collection

Secondary data for the study was collected by reviewing relevant literature from various sources including the internet, hardcopy books in libraries, and documents from government institutions. Primary data was collected using focus group discussions (FGD) and non-probability sampling techniques (snowball sampling). The FGDs involved residents who were in rosewood businesses, landowners, farmers, and community leaders. One FGD was held in each of the six communities in the two administrative districts and the number of participants ranged from from ten to fifteen. Seventy-seven (77) individuals participated in the FGDs. The checklist of questions to guide the discussions centered on the governance, management, and utilization of forest resources in general and rosewood in particular. Other questions were around the importance of rosewood to residents in the community, especially those involved in the exploitation of rosewood for sale to merchants who exported the logs. Finally, there were questions on land tenure and land use rights in the communities visited.

Other questions targeted at people who were into rosewood exploitation for traditional economic uses such as charcoal production and carving, and those who were logging the species mainly for timber to sell to merchants engaged in exporting

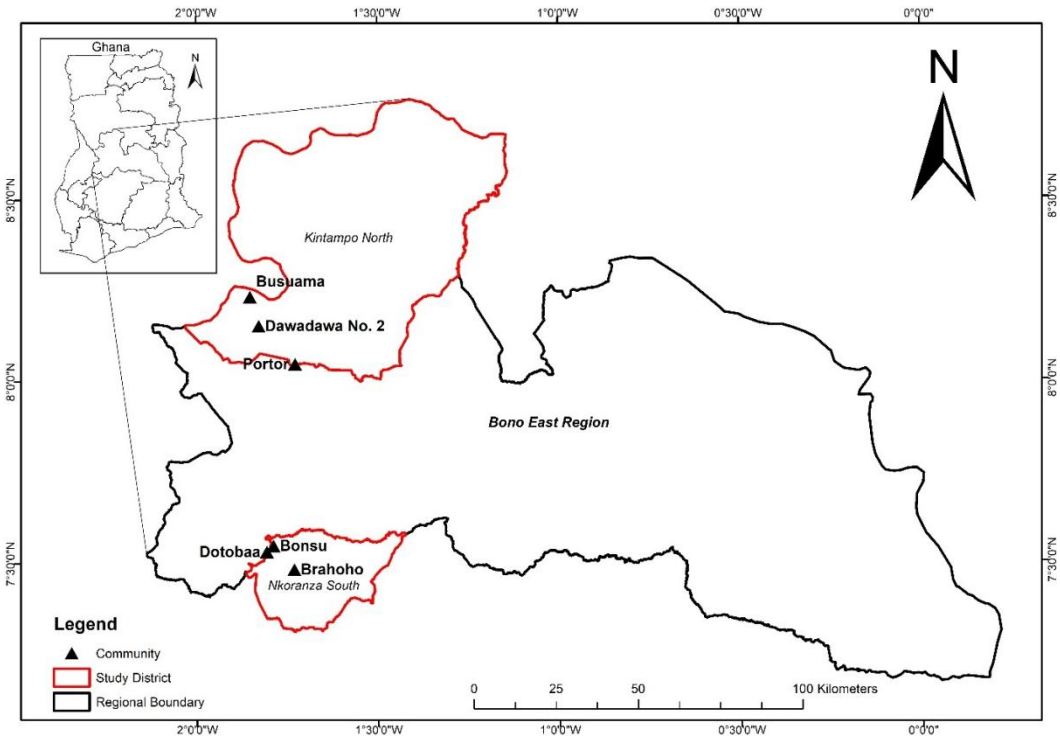

Figure 1. Map of the study area showing study districts and communities.

Table 1. Age category of respondents in the Kintampo Forest District.

Age category	Number of respondents (N = 96)	Percent
20 - 29	8	8.3
30 - 39	23	24.0
40 - 49	37	38.5
50 - 59	25	26.0
60+	3	3.1
Total	96	100

the logs. For this, 16 individuals were interviewed in each of the six communities giving a total of 96 respondents. Going by the sampling technique employed, the first respondent were identified through a tipoff. The first respondent then volunteered information about the next potential respondent and the process repeated until we got the required number of 16 respondents in each community. Where a potential respondent would not grant an interview, researchers would fall back on previous interviewees to suggest new potential respondents. The questionnaire was structured into four sections covering demographic information of respondents, governance issues, management structures in place for the exploitation of rosewood, the extent of exploitation, perception of availability of rosewood for timber and perceived drivers of the extensive exploitation of the resource.

Perception of the relative distribution of rosewood compared with other important species in the study area was assessed. Questions in this section measured the perception of respondents on the abundance of rosewood, relative to other species that were used as substitutes for rosewood in the study communities.

Data analysis

Statistical Package for Social Sciences (SPSS) version 20 and Microsoft Excel were used to produce descriptive statistics. The results have been presented in tables, graphs and text.

RESULTS

Demographic information of respondents: Characteristics of the resource user group

A total of 96 respondents were interviewed with 57.3% of them being male and 42.7% being female. Almost 90.0% of all respondents were in the active working-age bracket (30 - 59 years) as this is the energetic group that is involved in farming activities (Table 1).

Over half of the total respondents (63.5%) have had some form of formal education with the majority (50.0%) ending at the junior high school (JHS) level and only 12.5% proceeding to the senior high school (SHS) level. About one-third (36.5%) had no formal education and only one respondent had tertiary education. The ethnicity of respondents was well mixed, as natives and non-natives occurred almost equally with 53.1 and 46.9%, respectively. Since the study area is agrarian, the majority of respondents (87.5%) were farmers while 5.2 and 7.3% were engaged in charcoal production and other trades, respectively. Other trades mentioned included petty trading, agriculture machinery operation, and over-the-counter chemical selling. However, residents who had farming as their main occupation also engaged in other livelihood activities to supplement their income. They take up these activities (e.g. charcoal production, hunting, construction labor work, etc.) when they have downtime from their farming activities.

Importance of rosewood as a traditional resource: The resource base

Per the views of respondents, rosewood has a substantial function in local communities in the Kintampo Forest District as it is recognized as an essential customary resource by 75% of the respondents. Although international demand for rosewood made it an instant export commodity in Ghana, it appeared many residents in the study area did not know the international market value of the species. Many attested that demand for rosewood logs in their communities had gone up sharply, it became clear in the FGDs, that few people knew about the international demand and value of the species which made it an instant export commodity. Consequently, landowners continue to lease out concessions as if they were going to be used for traditional production activities like charcoal production. However, people who joined the brisk rosewood business as loggers, loaders, guides, etc., were happy with their earnings because according to them it was far better than proceeds from charcoal production. It appeared that most young men and women who worked for rosewood merchants in the communities were hitherto involved in charcoal production. As rosewood continued to diminish in the Kintampo Forest District, residents shifted to the use of alternative tree species to produce traditional tools and equipment like gunstocks and pestles.

In terms of traditional benefits derived from rosewood, 61% of the respondents indicated that rosewood was often harvested as a raw material for various purposes including charcoal production, carpentry works to produce door and window frames, and carving of gunstocks and agricultural tools. However, only 18% of respondents indicated that they made income from the sale of rosewood logs to merchants, suggesting that the involvement of residents in the rosewood business was minimal. The majority of loggers and merchants may have been outsiders. A small number of the respondents (7%) however opined that rosewood was important as fodder for animals, whilst 13% placed value on the species for its ecological role of nitrogen fixation.

Rosewood abundance in the local communities: The resource system

Based on the perception of respondents, rosewood was reported to be the least abundant among local species occurring in the Kintampo Forest District. Figure 2 shows the perceived abundance of rosewood in comparison with other tree species occurring in the studied areas. Residents revealed that it was becoming difficult to get rosewood for traditional uses like charcoal production and fodder harvesting for livestock. This development started putting pressure on other tree species that are used alternatively for charcoal. For example, due to the increasing scarcity of rosewood, it was revealed at an FGD that many charcoal producers who preferred rosewood had shifted to Kane (*A. leiocarpus*) as alternative species for charcoal production. This shift may put pressure on Kane too and the combined pressure on *P. erinaceus* and *A. leiocarpus* may trigger rapid deforestation and ecological imbalance in the Kintampo Forest District.

Combretum glutinosum and *Terminalia mollis* were perceived to be more abundant than *P. erinaceus* because the former are alternatives to the latter for charcoal production. Hence, respondents compared the availability of species usually used for producing customary items. The perceived reduction in stand density of rosewood was attributed to its over-exploitation. Few respondents attached importance to the resource for its new status as an export commodity. This is apparently due to a lack of knowledge of its value shift from low demand timber to high demand timber. However, no stocks were taken on the species, and for that matter, actual volumes were not known to inform sustainable levels of exploitation.

Institutional arrangements: Governance and management of rosewood as a common-pool resource

Interaction with local authorities and key informants revealed that before the sharp increase in demand for rosewood, there were no rules in place for its harvesting. This is because the level of exploitation of the resource was considered to be at sustainable levels thereby warranting no limitation to exploitation. Typical with the exploitation of common-pool resources in Ghana, neither national nor local-level authorities have any working

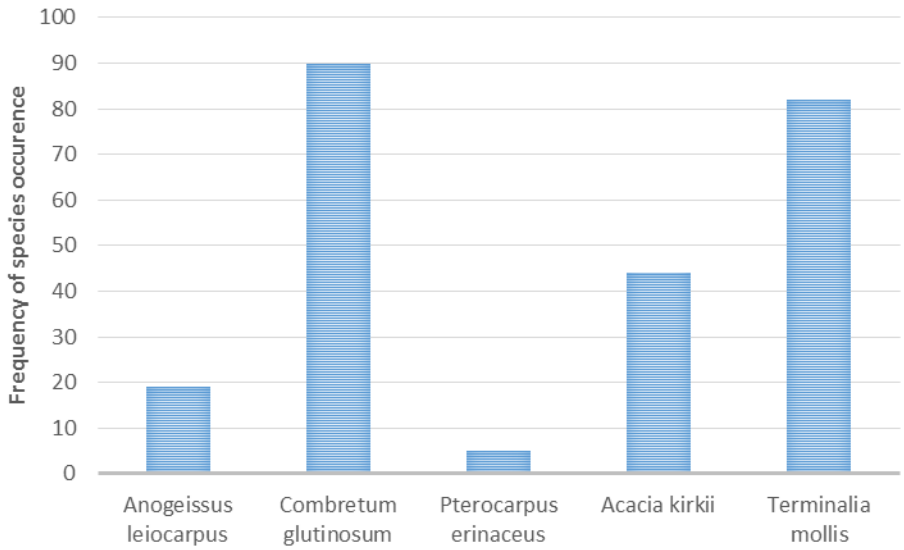

Figure 2. Perception of residents on the occurrence of *Pterocarpus erinoceus* compared with other similar naturally occurring species at same locations.

governance structures to regulate harvesting levels and the sharing of benefits accruing from rosewood. Trees occurring in off-reserve areas in Ghana are held in trust by the president for the people and therefore the Forestry Commission is the statutory institution with the responsibility to manage and regulate the exploitation of such trees. However, by convention, citizens at the local community level do not need to apply for any permit before exploiting trees as a customary resource for their day-to-day needs. This situation, therefore, makes trees and other resources in off-reserve areas in Ghana appear as common-pool resources. However, during the rush for rosewood, some traditional authorities (chiefs) arrogated to themselves the power of issuing felling permits to individuals and groups for fees and royalties. After the ban was placed on the harvesting and export of rosewood, some kind of loose management structure was put in place for government agencies and the local communities (Table 2). However, monitoring and enforcement of the ban and other forest regulations were still poor as the illegal acts of felling and trading in rosewood continued under fake and inappropriate salvage permits. It would appear that some government officials in charge of the regulation and some elites in the local communities were behind the illegal harvesting of the species. Salvage Permits were issued to some contractors to cover their illegal activities. Salvage Permits usually state the particular species, number, diameter classes of threes to be salvaged in an identified area within a stipulated time frame. However, some players in the rosewood business alleged that none of the specifics mentioned above were clearly stated in the permits issued to contractors to 'salvage' rosewood. Residents also reported that fresh cutting was made in the name of the salvage permits which is illegal.

External environment: Factors that influence over-exploitation of rosewood

Major factors that led to the extensive exploitation of rosewood were identified as market-related and poor resources governance (regulation). Figure 2 presents details of the reasons for the over-exploitation of rosewood. As wood quality may be the main factor driving the high demand for rosewood in the international market, residents in the KFD might not have been privy to this fact because they could not link wood quality to the rising demand for rosewood logs in their communities. Almost two-thirds of respondents cited harvesting 'to sell logs for income' as the main reason for the over-exploitation, yet only 4% of respondents indicated that rosewood was in high demand for its wood quality (Figure 3). Demand for rosewood from external markets was therefore the major driver of overexploitation of the species in the KFD.

As a sign of poor resource governance, even information on the ban on rosewood exploitation was not effectively communicated to the local communities since over two-thirds (68%) of respondents did not know there was such a ban. The use of rosewood for socio-cultural purposes remains minimal since rosewood is used with other species for these purposes (e.g. carving and charcoal production).

Efficiency of public education on forest policies and sustainable use of forest resources

It was discovered from the FGDs that residents of the studied communities had little knowledge about laws and policies about the sustainable use of forest resources in

Table 2. Misshape governance and management structure put in place when a ban was imposed on rosewood exploitation.

Policy action	Responsible institution	
	Government (Forestry commission)	**Traditional community**
Official ban on commercial exploitation	To be imposed by the state mandated body; the Ministry of Lands and Natural Resources through the Forestry Commission	To be educated on the guidelines of the ban. To support state actors in implementing the ban
Official permit issued for salvage harvesting	To be issued by the Forestry Commission	Traditional leaders to help state actors in checking permits of loggers and fishing out illegal operators
Harvesting of wood from dead trees for fuel	Extreme and dubious cases to be reported to state actors	To be monitored by local actors, e.g. chiefs and other community leaders
Harvesting of only branches from live trees for firewood	Guidelines to be given by the Forestry Commission	Local actors, e.g. chiefs and other community leaders to monitor and ensure compliance with the guidelines

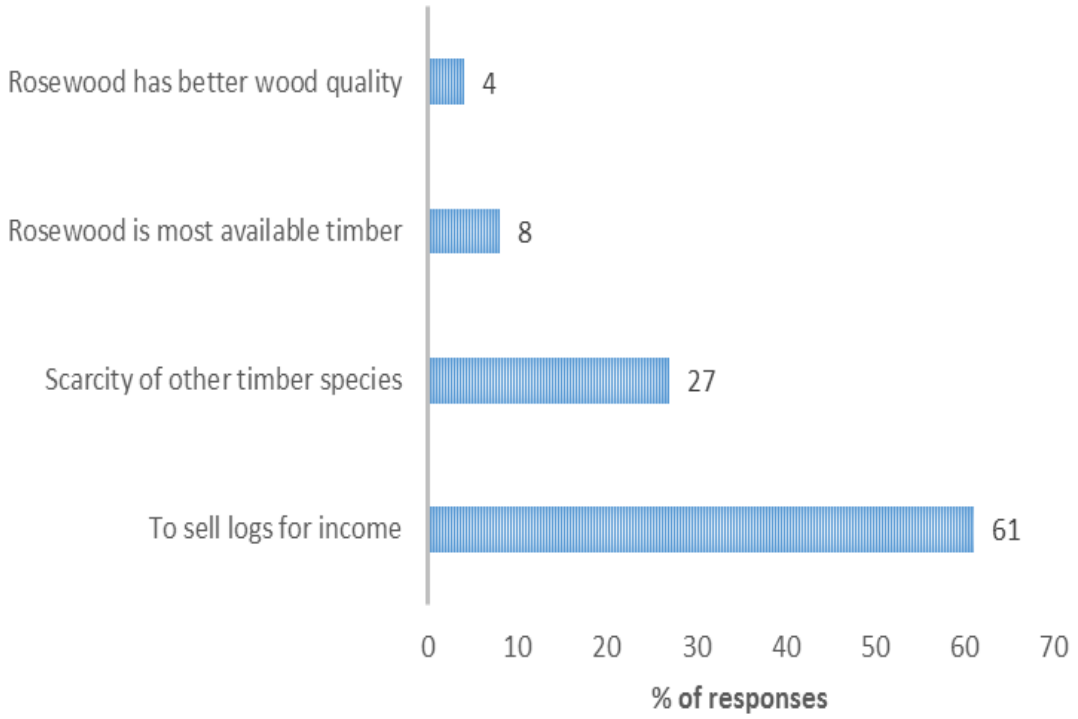

Figure 3. Residents' perception of the reasons for rosewood extensive exploitation in the Kintampo Forest District.

the country. Many revealed that they did not know it was important to regulate the harvesting of trees outside logging concessions or state-owned protected areas. Rosewood until its value shift, was considered a low-valued timber species since it was only used for traditional exploits such as fodder, medicine firewood, and charcoal production. When demand for it increased in Asia and its status changed from low-priced to high-priced timber, many of the resource owners (local communities) did not know about it. Timber merchants took advantage and

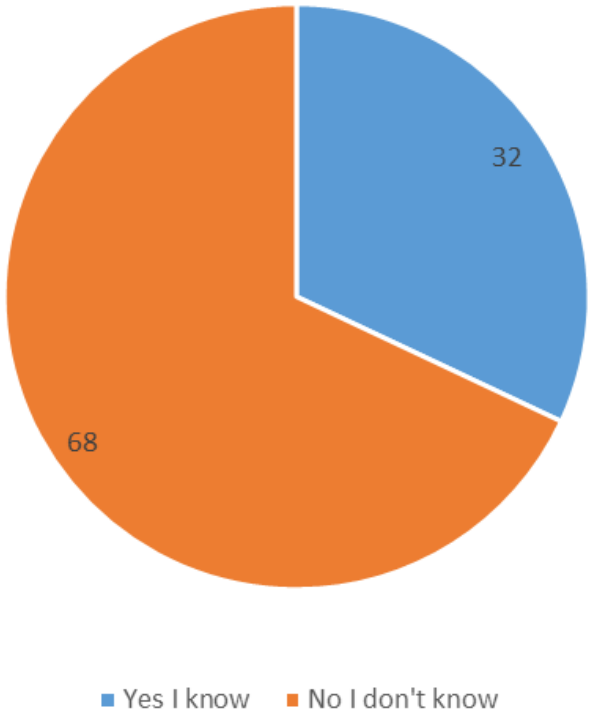

Figure 4. Respondents' knowledge about the ban on the harvesting and export of rosewood in Ghana.

bought concessions at ridiculously low prices from local landowners. The merchants also got cheap labor from residents which led to overexploitation of the resource. When the government banned the harvesting and export of rosewood, few residents in rosewood endowed communities knew about it (Figure 4).

This facilitated the continuous illegal logging of the species. It appeared that communication of the ban was carried mainly in the print media (national newspapers) which are hardly consumed by rural residents. A more efficient communication could have been through local radio stations in local dialects.

DISCUSSION

The resource user group (the local communities)

Findings of the current study reveal that local communities in the KFD are heterogeneous in terms of ethnicity which may explain why there is no traditional resource management system in place to check the exploitation of forest resources including rosewood. Some ethnic groups in northern Ghana (e.g. the Dagbamba and Tallensi) do have well-structured political institutions with oversight responsibility on how forest and wildlife resources are managed and exploited on traditional lands (Bonye, 2007). The presence of such structures in the communities within the KFD could help check the over-exploitation of rosewood in the area. Heterogeneity of a group may not promote what Nkhata et al. (2012) described as collective identity, which refers to the common meaning, experiences, and expectations that drive the group's attitude towards the management and utilization of a resource.

Lack of a well-defined user group (the members of a community in this case) is a characteristic of communities in the KFD. Generally, in Ghana, local community authorities do not keep a register of people in a community and so outsiders can easily move into the territory of a village and take any resource without notice. Interactions with participants in FGDs revealed that the majority of people who engaged in rosewood logging in the KFD were outsiders, and many of them cut rosewood without the knowledge of village authorities and landowners. Though rosewood is recognized as an important customary resource, dependence on it as the main source of traditional livelihood is low. The majority of people in the KFD are into farming as against charcoal production, carving, and carpentry that involve the use of rosewood as raw material. Even for those who use rosewood in their main livelihood activities, there are other species used as substitutes and complements for the purposes mentioned above, and this may explain why residents in the KFD did not give any special attention to rosewood until the mad rush for it. Agrawal (2007) suggests that the degree of dependence of a group on a forest resource could be proportional to the attention

given to the resource in terms of its management. The general lack of knowledge about the value of forest resources in Ghana may be due to a lack of valuation of natural resources to put a market value on them. It is easy for people to appreciate the importance of a resource when they can put a monetary value on it (Christie et al., 2012). Apart from traditional uses of forest and wildlife resources, residents (especially those in rural communities) hardly know the economic value of forest resources.

Rosewood as a forest common of importance to the community

Rosewood is very well recognized as an important customary resource in communities within the KFD. However, it was indicated through FGDs that characteristics relevant for effective governance of forest commons are not known for rosewood in the local communities. Agrawal (2007) recognized some resource characteristics relevant to effective governance of forest commons as the size of the resource base, the boundaries, whether the resource is mobile, the extent to which resource units can be stored, rate and predictability of flow of benefits from the resource base, and ease of monitoring the resource conditions. Local communities in the KFD like others in Ghana, who use traditional resources without any structured management systems, do not take cognizance of these characteristics and this allows outsiders easy access to common-pool resources. It became clear after discussions with the local communities that, abundance and distribution of rosewood within the village lands were not known. This suggests that the value of the resource could not be estimated, hence the apparent lack of attention on its exploitation mainly by outsiders. Dumenu and Bandoh (2016) reported that even the Forestry Commission which is the state organization entrusted with the management of forest resources did not have actual volumes of rosewood anywhere in the country. Lack of physical landmarks indicating the boundaries of village lands also contributes to the inability of communities to monitor the exploitation of common-pool resources like trees. In the studied communities, residents could not agree on exact points where they share boundaries with neighboring communities, making it difficult to know if rosewood loggers at the periphery are intruding in particular village lands. In some cases, the majority of residents are settler-farmers who do not know about land boundaries and may also have little or no interest in trees because they have no right to use the trees.

Governance issues in the management of rosewood

There were no regulations for harvesting or permissible harvest levels for rosewood species in the various communities that the study covered. There is no sustainable harvest threshold for any species in areas outside logging concessions and forest reserves in Ghana (Lund et al., 2012) and local communities are not given the power to monitor harvest levels of timber species. Community ownership rights and applicability of customary laws to surface land are well recognized in the constitution (Article 267(1)), where community lands are referred to as ‘stool/skin’ lands. However, it is only the president of the republic who has the power to decide how standing timber resources on these community lands (stool/skin lands) should be used. This power is usually exercised by the Forestry Commission, the state institution in charge of managing forest and wildlife resources. This handicaps communities on decisions of how forest resources on land should be managed and exploited.

Nonetheless, during the mad rush for rosewood in the KFD, elite members of some communities tried to assume governance responsibilities over the resource to take advantage of the situation. Community leaders such as chiefs, youth leaders, assembly persons (local government representatives), opinion leaders, and even chairpersons of political parties, tried to collect and share rent and royalties from rosewood loggers. These leaders were only interested in collecting and sharing benefits and not monitoring whether rosewood was being harvested at sustainable levels. In an attempt to effect a ban on rosewood exploitation in 2014, some misshape governance structure was put in place with roles for the Forestry Commission and local communities. However, the roles were not new but the insistence on existing regulations in the Timber Resources Management Regulation of 1998 (LI 1649). The Forestry Commission had the responsibility to enforce the ban, be stringent in issuing and monitoring salvage permits, and ensure only dead wood of rosewood is harvested. Local communities, on the other hand, were to ensure that only branches of rosewood could be harvested for traditional uses such as fodder and making of tools and that only dead wood was taken for charcoal and firewood. Even this interim arrangement was not effective according to Saibu (2016) who reported that illegal logging continued unabated especially in the northern part of the country.

Push factors of overexploitation of rosewood in the KFD

External factors that catalyzed over-exploitation of rosewood in the KFD and for that matter in Ghana, are encapsulated in the other factors including governance, management, and market-related factors. The main factor cited for the over-exploitation was the high demand for rosewood logs in external markets (e.g. China) which triggered price hikes for the commodity in Ghana. This corroborates the report of Bosu (2013) which indicates that the high demand for rosewood in China and other

external markets resulted in an unparalleled surge in the felling of the species in Ghana. Dumenu (2019) also reports that the highest export volume of rosewood logs in Ghana occurred in 2014, when China alone received 270,738 m^3. This made Ghana the second-highest exporter in Africa (after Nigeria) and the fourth-highest exporter in the world to the same destination. The devastative exploitation of rosewood thrived on the weakness of governance and management structures, which gave impetus to the actions of corrupt government officials and community leaders. The reports of Saibu (2016), as well as Dumenu and Bandoh (2016), indicate that officials of the Forestry Commission issued inappropriate salvage permits to contractors to fell rosewood when there was a total ban which criminalized harvesting, collecting of lying wood, and export of the commodity in 2014. Chiefs and other community leaders particularly in the north, also usurped powers of the president and authorized loggers to fell rosewood in their traditional areas (Saibu, 2016). The popular belief that rosewood is under pressure for its superior timber qualities did not quite reflect in this study because residents in the study area did not know about this fact, and only valued rosewood for its local uses. As Agrawal (2007) suggests, macro-political factors may directly or indirectly affect how forest resources are exploited in developing countries. Dogbevi (2019) suggests that the increasing in-flow of loans and grants from China to Ghana might have weakened Ghana's political will to stop Chinese involvement in the illegal exploitation of natural resources including rosewood. The export value of rosewood had never been known in Ghana until Chinese workers arrived in the country to start construction of a 400MW hydropower dam (Bui Dam) in the then Brong Ahafo Region in December 2009. The Chinese workers identified and started exporting rosewood that was part of felled trees in areas to be flooded by the new dam. The construction was the result of a US$562 million financial agreement signed between Ghana and China in 2007 (Otoo et al., 2013; Dogbevi, 2019).

Awareness of natural resource policies

Policies on the management and utilization of natural resources are hardly communicated to the masses who live with and use the resources. The current forest resources policy document (the 2012 Forest and Wildlife Policy) seems to have strategic action points to ensure sustainable and inclusive management and utilization of forest resources, yet the implementation process precludes local community education. This general dearth of information dissemination on natural resource policies contributed to the plundering of rosewood in local communities with little benefit to the resource owners. For instance, when demand for rosewood increased and the value of the species shifted from low to high in Ghana, local communities were not in the know. Even the Forestry Commission reneged on its duty to re-valuate the species and review its status of rosewood from low demand timber to high demand timber after it became an export commodity (Dumenu and Bandoh, 2016). The local communities, therefore, continued to compare proceeds from the commercial logging of the species to what was earned from charcoal production – the most popular traditional use of the species (Dumenu and Bandoh, 2016). This situation was exploited by rosewood merchants who made a fortune from the resource but paid paltry sums to local landowners who leased their lands out and residents who joined the value chain as loggers and loaders. Since rosewood became an export commodity in Ghana in 2005, its exploitation and export suffered three bans, the first in 2014, the second in 2017 and the third in 2021. However, only one-third of respondents in the current study indicated they ever heard about a ban on the harvesting and trade of rosewood in Ghana. Issues on natural resources management and utilization hardly gain adequate space in the media in Ghana. Natural resource policies in Ghana are mostly good but are often not widely communicated to the general citizenry. As a result, when criminals are engaged in illegal activities involving natural resources, they get away with it because many citizens do not know what constitutes legal and illegal activities in our environment.

Citizen participation in resource governance, management, and utilization are paramount for inclusive and environmentally sustainable development (Twum, 2019). This is seen as a necessary foundation for the political philosophy of pluralism in natural resources management (Gavin et al., 2018). However, no meaningful participation by citizens can happen without education and information dissemination on relevant resource policies. This is needed to empower citizens and make them cognizant of their rights and responsibilities in the sustainable management and exploitation of resources. Apart from strengthening relevant institutions and monitoring stakeholder activities effectively, it will be necessary to institute natural resources accounting in Ghana so that citizens can get to know the true value of resources in their environment. Knowing the value can serve as a motivating factor for them to protect and exploit forest resources sustainably and also demand an equitable share of benefits accruing from natural resources.

Conclusion

This study sought to examine the characteristics of the resource user groups, the socio-economic importance of *P. erinaceus* to local communities, and institutional arrangements in place for the governance, management,

and utilization of rosewood as a common-pool resource. It is clear that common-pool resources in non-protected lands are not managed at the community level but are only exploited. There is no management strategy for rosewood as a common forest resource and this led to unsustainable exploitation of the resource when the high demand for it in external markets triggered price hikes. Common-pool resources may become more sustainable if the central government devolves resource governance power and builds the capacity of local communities to manage forest commons in off-reserve areas in Ghana. The value of the resource base (forest resources) needs to be established through natural resources capital accounting and made known to local communities. If the real value of rosewood is made known to local communities they would likely get a bigger share of proceeds, thus ensuring equity in the distribution of benefits accruing from forest resources. This could also lead to locals using alternative tree species for traditional uses of rosewood such as charcoal production and harvest rosewood only for export. Perhaps reforestation schemes could be developed and would be more likely to be developed if locals knew the value of rosewood in the international market. Residents in local communities (as resource owners) may be motivated to protect natural resources from abuse and overexploitation if the benefits they derive rise significantly.

Community members as resource-user groups are not defined in the studied communities. This is a common phenomenon in Ghana which opens up common-pool resources at the community level to just anybody. The lack of proper governance and management of common-pool resources also makes it easy for elite few to arrogate ownership of such resources to themselves and therefore seek rent and royalties from other users. Chiefs and other community leaders were noted to have given concessions to rosewood loggers or charge rent and royalties but rendered no account of the proceeds to their communities. The value of rosewood as a timber resource was known to only a few in the communities. Therefore, no special attention was given to the species and its logging when the mad rush for it started. The conversion of rosewood from a non-timber forest product to a timber product was essentially triggered by demands in external markets. The illegal logging of the species went on due to weak institutional structures and non-enforcement of timber regulations in the country. The logging was reported to be at unsustainable levels, with potential negative effects on local livelihoods. Empowering local communities legally with defined responsibilities to put them at the forefront of managing forest resources in off-reserve areas could ensure sustainable management and utilization of forest common resources.

The study opens further research possibilities on the topic of rosewood as a forest common. We, therefore, recommend further research on (i) the best ways to disseminate information on policy relating to the use of forest resources at the local community level in Ghana; (ii) what is the possible impact on livelihoods in the case of a ban on the use of forest resources? (iii) what are the livelihood alternatives in the case of a ban on the use of forest resources for the local communities? and (iv) in the case of a ban, what would be the implication regarding the use of alternative species and/or biodiversity of the forest?

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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