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Freshwater swamp forest use in the Niger Delta: perception and insights

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ABSTRACT

Forest ecosystems are increasingly seen as vital resources and elements for the sustenance of households across the African continent. However, the dynamics surrounding the forest use and consequent degradation are poorly understood across the different forest ecosystems in the Niger Delta region and Africa as a whole. These relationships still remain a challenge to the management and sustainable use of the Freshwater swamp forest in the Niger Delta region of Nigeria. This study presents an examination of the determinants and socioecological processes of forest use from 243 household surveys within 12 communities across the Niger Delta region. The results showed that the communities derived a major part of their sustenance from the forests and used the forests mainly for provisioning services. Since the households and communities varied in their socio-economic statuses, levels of remoteness, availability of alternative sources of livelihood, they were found to vary at the landscape level in their degrees of dependence on the forests and consequently, their patterns of degradation.

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Ecosystem services; environmental income; livelihood; sustainability; tropical forests

Introduction

Tropical forest ecosystems are host to a rich assemblage of species and provide a wide range of ecosystem services such as food, medicines, building materials, shelter (Lawrence et al. 2005; Reid et al. 2005) and store houses for carbon (Houghton 2005; Pan et al. 2011; Lewis et al. 2013). These enormous resources provide a wide range of benefits to the African populace whose subsistence and livelihood are to a large extent dependent on the forests (CIFOR 2005; Norris et al. 2010; Bromhead 2012). As these forest resources continually sustain the rural poor communities by providing an important "safety net" of food (Bromhead 2012), they equally contribute to the economy by providing employment in the forest sector, and so provide a basis for diversification in forest-based enterprises at different scales. Although rural households generate quite a lot of "environmental income" (either as cash or subsistence) from the forests, its benefits are not only used to meet their immediate needs, but helps them not to slack into (deeper) poverty (during bad harvests or between agricultural harvests (by filling the seasonal gaps) and also to step out of poverty (Angelsen & Wunder 2003; McSweeney 2004; Wunder et al. 2014). Hence, these forest resources have not only supported households that are mostly engaged in farming activities (as seen in most rural African setting), but furthermore, provided platforms for continual coexistence and subsistence. Even though tropical forest ecosystems are known to achieve the afore-mentioned for many households, little is known about the existing relationships between freshwater swamp forest use and degradation across the Niger Delta region in Nigeria as well as in most other African settings.

Indeed the freshwater swamp forest ecosystems are not only poorly understood, estimated and studied, but are largely unexplored as regards its use, potentials and ecological processes. Although this fragile landscape supports the livelihood and economy of the forest dependent communities with its high value timber, forest products, fertile soils and vast potentials, it has largely remained unexplored and documented. With the tightly socioecological system and processes of forest ecosystems across the region (Norris et al. 2010), it has become imperative that how these relates to and affects the freshwater swamp forest ecosystem be explored and elucidated. As this ecosystem remains both a centre-piece and pivotal resource for sustenance of households across the Niger Delta region, exploring its use dynamics are both important in achieving sustainability of the ecosystem to the people and maximizing its potential in climatic regulation and ecosystem stability of the entire West African region. This study aims to explore the dynamics surrounding freshwater swamp forest use. Specific objectives includes, to understand the patterns, dynamics and determinants of forest use in the region, to show the extent to which the populace depends on the ecosystem, and to elucidate the constraints surrounding the use of the forest and the responses and perceptions surrounding the use and consequent degradation of the ecosystem.

Materials and methods

Study area

Environment and people of the Niger Delta

The Niger Delta is a generally flat, low-lying sedimentary basin located in southern Nigeria, drained by the Niger River and crisscrossed by a network of rivers, streams and creeks which drains into the Atlantic Ocean at the Bight of Biafra (Figure 1). Broadly made up of marine sediments of Lower and Upper Cretaceous age (Akintola 1982), it is a swampy region with mainly medium to coarse

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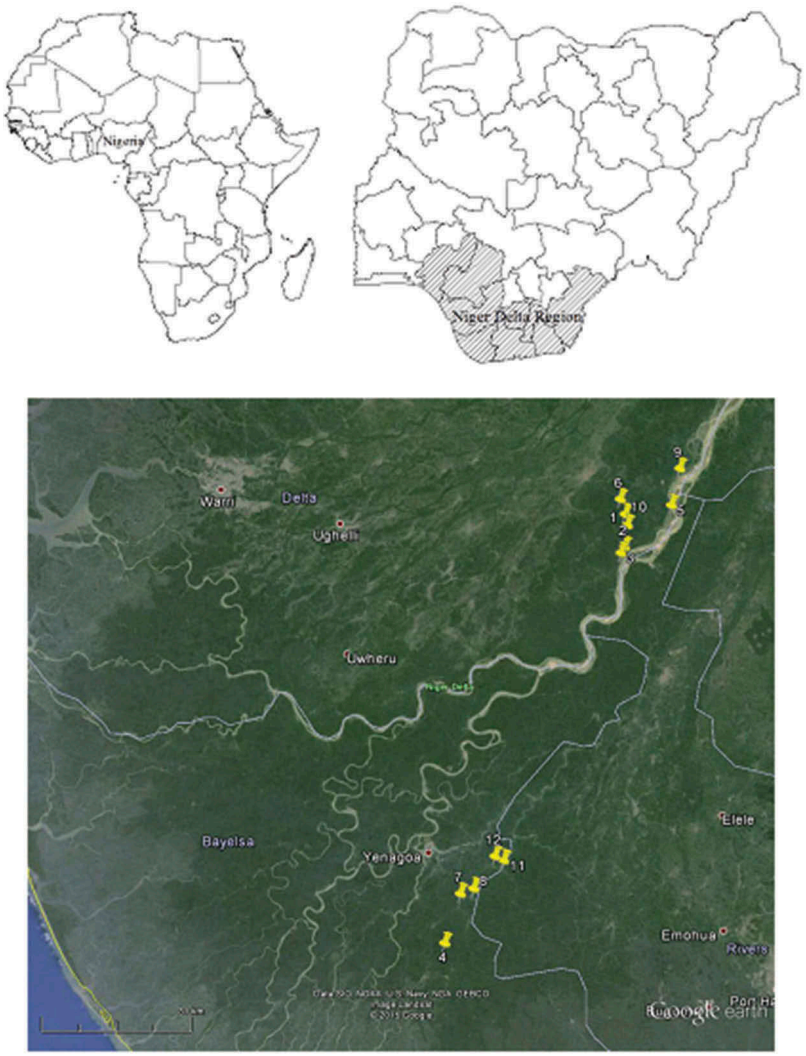

Figure 1. Map of the Niger Delta region showing the study locations and the map of Nigeria and Africa showing the Niger Delta and Nigeria inset, respectively.

unconsolidated sands, silt, clay, shale and peat. The region is characterized by a tropical climate with long rainy season mainly from March/April to October. The flood regime starts in August, peaks in October and tapers off in December. The wet season lasts nearly throughout the year; the wet season peaks in July and the dry months are mainly between Decembers to February (Hughes & Hughes 1992). Relative humidity rarely dips below 60% and fluctuates between 90% and 100% for most of the year, with average monthly maximum and minimum temperatures varying between 28–33°C and 21–23°C, respectively (NDES 1997; James 2008). Though the region is taken to cover the 9–11 oil producing states in Nigeria for political, administrative and development reasons (Ighodaro 2005), it is delimited to cover the present day Delta, Bayelsa and Rivers states based on its human geography, hydrology and of course ecology (World Bank 1995; Adekola & Mitchell 2011).

The region represents about 12% of Nigeria's total surface area and supports 31.2 million people who represent 25% of Nigeria's population (NPC 2006; UNDP 2006). It is made up of more than 40 ethnic groups that speak more than 250 dialects and has a rich cultural heritage (Jike 2004). These ethnic groups are broadly classified into five major linguistic categories: the Ijoid, Yoruboid, Edoid, Igboid and Delta Cross; with each of them embracing an enormous mix of ethno-linguistic communities (Watts 2004). The settlement of the region is made up of predominantly rural populations who live in dispersed settlements and have cultural attachments to the environment. With the availability of dry land determining the settlement pattern across the region, many of the larger settlements are found in the better drained and accessible interior parts, while the low relief and poorly drained locations supports the vast majority of small and scattered rural communities (UNDP 2006).

Freshwater swamp forest ecosystem in the Niger Delta

Covering about 17,000 km^2 or about half of the delta region (UNDP 2006), the freshwater swamp ecosystem of the Niger Delta are unique and represent an important biodiversity area (Happold 1987; Hilton-Taylor 2000; UNDP 2006). The freshwater swamp ecosystem is located between the lowland rain forest to the north and the mangrove swamp forest to the south; providing a transition zone between the two ecosystems and a corridor for the migration of flora and fauna. It is the region's main source of timber and forest products, and habitat for endangered and rare wildlife (UNDP 2006). The freshwater swamp ecosystem is an important fishery base for the region; a seasonal nursery for fishes especially during the floods and a major habitat for crayfish, prawn, crabs and crocodile. The annual

flood enriches the soils in the ecosystem and greatly promotes its agricultural potentials.

Conceptual framework

The rates at which tropical forest ecosystems (including the freshwater swamp forests) are continually degraded are increasing in proportion due to weak policies and poor management guidelines across most terrains. Forest degradation is defined as a long-term reduction in the total output, quality and potential of services, resources and functions that forest ecosystems provide. Such reductions are seen to affect its capacity to provide provisioning services (such as wood/timber), regulatory services (such as carbon storage), supporting (such as nursery habitats for fishery) and amenity functions (like recreation and spiritual sites). Its effects are seen to occur in chains and occurrences; with one event or impact leading to others. An example could be seen in instances where selective logging of some highly priced and durable economic trees reduces both the available wood and trees in its location, its carbon storage capacity, its conservation potentials and also displaces the fauna that depend on it for existence. Across the Niger Delta region, a host of underlying causes (Geist & Lambin 2002) are both responsible and key to the direct causes of forest degradation across the landscape. Such underlying causes include population pressure and distribution, weak governance, uncoordinated policy and guidelines on forest abstraction, economic factors (lack of other alternative sources of income), unregulated resource exploitation (crude oil spills and gas flares). While the forest ecosystems may still be in existence (depending on time, scope and extent of such occurrences), the services and goods they provide have been reduced (or degraded).

Study design and data collection

Freshwater swamp forest ecosystem has its largest extent across West Africa in the Niger Delta (notably, Delta, Bayelsa and Rivers states); where it is found in its largest proportion along the Niger basin (Figure 1). A further shift from the basin where the forest communities are located, are the zones for the lowland rain forest and mangrove ecosystems. This study, however, is neither focused on the rain forest nor the mangrove ecosystem (which have mainly been the focus of forest ecosystem study in the Niger Delta studied). It is focused instead on the freshwater swamp forest ecosystem, which does not have sufficient baselines. Hence, in order to capture the use dynamics of the ecosystem, communities (along the basin) under different forest transitions and resource bases were selected for the study. Since the chosen communities across Delta and Bayelsa states gave a good representation (out of the three states) for the study, they were used for the study. The settlements in this forest region are comprised of small villages and hamlets and made up of individuals or households whose sources of livelihood are mainly seasonal (such as farming and fishing). Their populace are quite small and ranged between 15 and 50 (and above) households in each of the settlements. As a result, even though 75–90% of each settlement was used for the survey (being a representative population), the total number seemed small, though representative (Table 1).

Besides being in the freshwater swamp forest zone, each of the settlements used for the survey were scrutinized for relative peace and stability; and such that their leaders also consented to or approved the survey. Primarily, the different communities used for the study were selected to capture the variations in resource availability (crude oil presence/absence), remoteness, accessibility and alternative sources of livelihood (besides forest-based activities) (Table 1).

A semi-structured questionnaire was used to gather information from households (defined as a person or group of people who live together, and depend on each other to meet their daily needs) across 12 randomly selected forest communities in (Delta and Bayelsa states) the region (Figure 1). The questionnaire was designed following a review of forest ecosystem use, management and degradation across the region (World Bank 1995; NDES 1997; UNDP 2006; James 2008; Adekola & Mitchell 2011; Irikana 2011; Onojeghuo & Blackburn 2011). Pilot study was initially conducted across the communities and discussions held with key informants (community leaders, professionals and old residents) on the contents of the survey. This helped to ensure that the issues raised were both applicable to the people and understood as well. A random sampling was then conducted across the forest communities (Figure 1) using households in each of the selected

Table 1. Community characteristics/features and respondent's population.

Community	Number of respondents	Percentage (%) of total population	Crude oil well availability	Main occupation of community	Remoteness/accessibility
1	15	70	Present	Farming	Fairly remote/fairly accessible
2	20	70	Absent	Civil service/farming	Peri-urban/well accessible
3	18	80	Absent	Farming	Very remote/poorly accessible
4	15	90	Absent	Farming	Very remote/poorly accessible
5	12	70	Present	Farming	Fairly remote/poorly accessible
6	30	80	Absent	Farming	Peri-urban/well accessible
7	18	70	Absent	Civil service/farming	Peri-urban/well accessible
8	30	75	Present	Farming/civil service	Peri-urban/fairly accessible
9	18	75	Present	Farming/fishing	Fairly remote/poorly accessible
10	17	72	Absent	Farming	Fairly remote/poorly accessible
11	20	70	Present	Farming/peti-trading	Fairly remote/fairly accessible
12	30	70	Present	Peti-trading and civil service	Peri-urban/fairly accessible

locations. Each of the communities was divided into four clusters to enable better coverage of the localities. For each of the clusters, the first household was visited and every fourth household used subsequently. This helped to eliminate bias of choice, and also enabled variation of views based on the socioecological and economic variations inherent in each of the communities, to be captured. Since the sizes of the communities (population and household units) surveyed were not even, the number of respondents from each of the communities varied across space. The study was conducted between October 2013 and April 2014 and covered 243 households across the region.

Data analysis

The data gathered from the survey were analysed using quantitative methods that involved rankings, variance and regression techniques. To understand the dynamics surrounding forest use across the region and for each of the communities, Kruskal–Wallis rank sum test were conducted and the results visualized with box plots. Wilcoxon rankings were used to understand the differences that existed in the indices surrounding access to forest resources and services reduction. In order to understand the existing relationship between forest use (frequency of forest visit) and distance to household distance, a linear regression was conducted; while how the use varied across the different distances, was elicited with the analysis of variance output. Forest distances were categorized into: forests within the neighbourhoods (0–1 km); forests beyond the neighbourhoods but within the villages (>1–5 km) and forests far from the villages (>5 km).

To model the level of dependence of the people or the extent to which each of the provisioning services of the forest ecosystem supported the people's livelihood, a multiple regression was conducted. This furthermore, provided insights on the extent to which the socioeconomic status of the people determined forest use and dependence. The provisioning services (food [forest fruits, nuts and vegetables], fuel wood, wood [timber], grazing land, medicine/herbs, bushmeat/game, fishery, snails, and composting) were categorized using Likert scale according to their levels of importance (from its least value of 1 to its highest importance value of 5) to the people and the socioeconomic status used were the people's full time occupation (which included both forest and non-forest related jobs) and level of education (from no formal education to a highest level of masters' degree). All the analyses were conducted with R statistical software version 3.1.0 (http://cran.r-project.org).

Results

Forest use dynamics

The forests were generally very useful across the entire region, as the different communities were seen to depend on it (high levels of importance) to meet their needs on more regular occasions (Kruskal–Wallis $\chi^2 = 104.10$, $p < 0.05$; Figure 2).

Since the communities differed in their remoteness, they equally varied in their needs for the forests (Kruskal–Wallis $\chi^2 = 43.08$, $p < 0.05$). However, since they generally depend on the forests to meet most of their needs, they visited the forests more frequently (Figure 2) mostly due to reasons associated with their daily sustenance (farming [22.6%]; forest products [11.9%]; fire wood gathering [11.5%]; fishing [7.8%] as well as for multiple or combined reasons (farming and fire wood collection [34.6%]; Figure 3). This quest to satisfy their needs for sustenance, which generally influences their current use of the forests are somehow not different from the fundamental use of the forests in their past (Kruskal–Wallis $\chi^2 = 11.18$, $p = 0.43$; Figure 4).

Forest products/services loss and responses

Due to the nature and myriad of activities ongoing across the forest communities, the forest products were found to be reducing drastically across the forest communities (Wilcoxon $W = 2820$, $p < 0.05$). This reduction in resources were varied across the forest communities (Kruskal–Wallis $\chi^2 = 33.72$, $p = 0.0004$) due to direct and underlying causes (Figure 5) in different proportions and furthermore, due to lack of individual commitments to the preservation of the forest resources ($W = 4920$, $p < 0.05$) across the region.

Determinants/patterns of forest use

Distances between the dwelling units and the forests were found to influence their use of forests across the region ($F(3, 239) = 8.76$, $p = < 0.05$) accordingly: forests within the

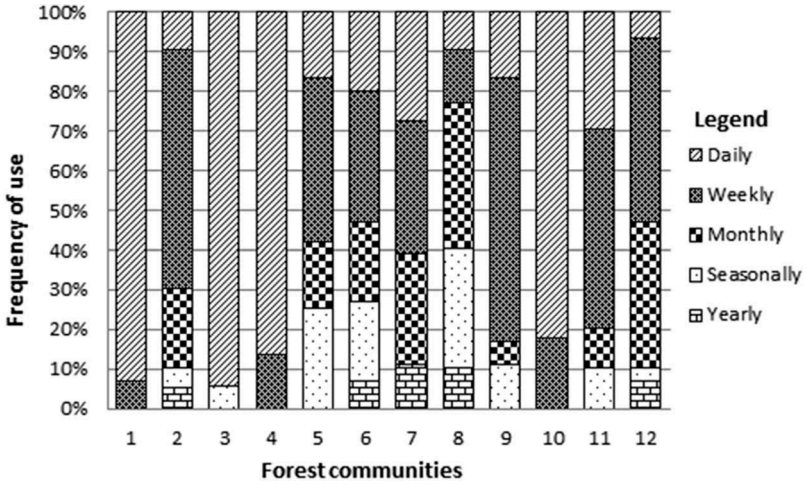

Figure 2. Frequency of forest use/visit.

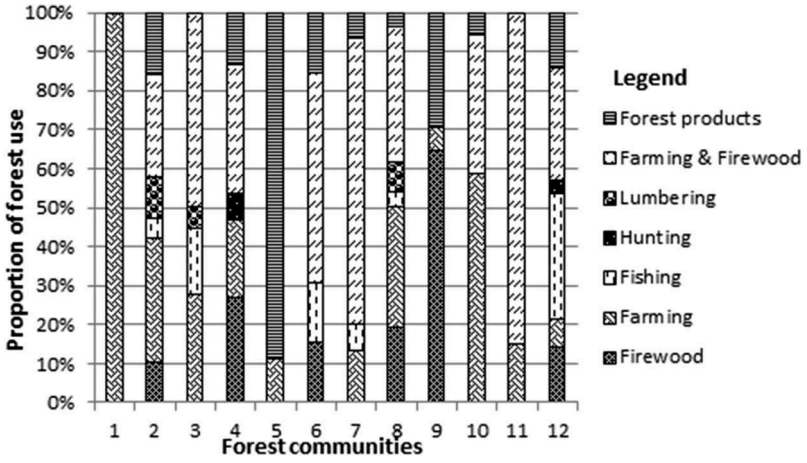

Figure 3. Varying forest usages across the forest communities.

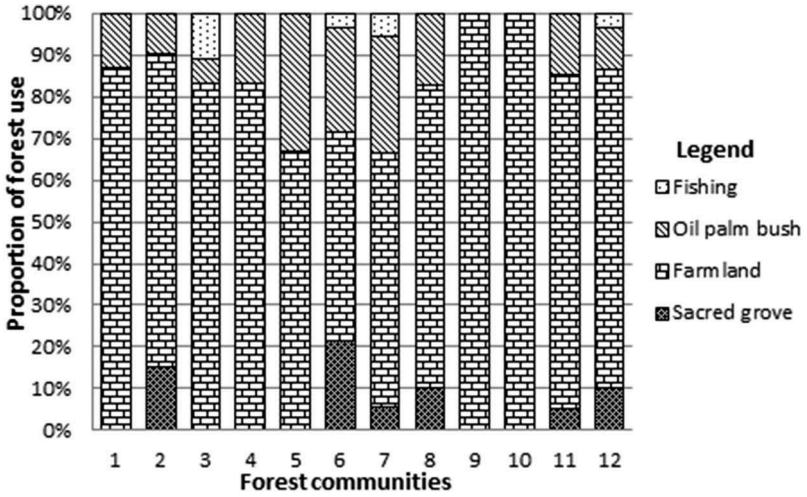

Figure 4. Patterns of forest use in the past across the forest communities.

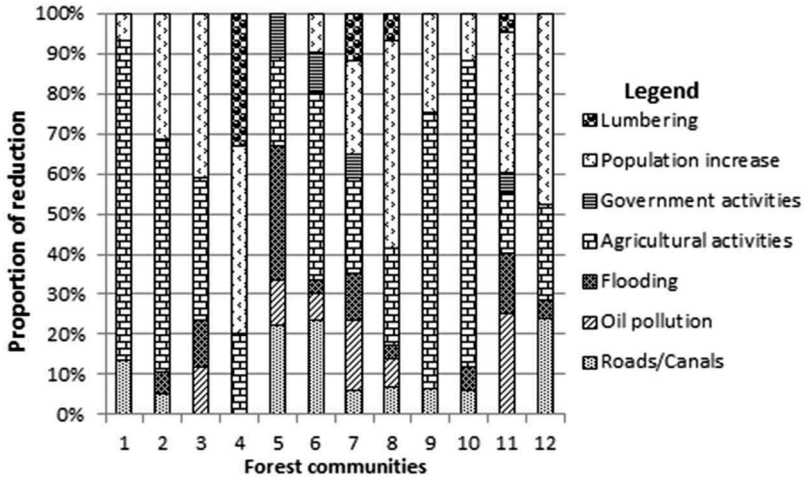

Figure 5. Reasons for forest products' reduction across the forest communities.

neighbourhoods, within the villages and far from the villages (F = 13.29, p = 0.000328; F = 9.15, p = 0.002762; F = 3.83, p = 0.051376, respectively). Though the levels of importance differed with distance across space, the forest units were generally useful to the people from one location to the other.

Generally, the different forest resources were important to the people, irrespective of their full time occupation (F(9, 233) = 1.29, p = 0.25, multiple R^2 = 0.05, adjusted R^2 = 0.01) and their highest levels of education (F(9, 233) = 1.86, p = 0.06, multiple R^2 = 0.07, adjusted R^2 = 0.03). However, the degree of dependence or importance for each of the services/products changes as the socioeconomic status improves (especially, with reference to fuel wood consumption; at 0.05 significance level).

Discussion

Forest utilization

The Niger Delta ecosystem provided forest products (such as food, fuel wood, protein sources – crabs, crayfish, fishes, prawn, periwinkles, snails and other raw materials; Figures 6(a–g)) as seen in most other forest-community landscapes (Lawrence et al. 2005; Lewis 2006; Shackleton et al. 2007; World Bank 2008); and the people depended on it for sustenance and their livelihood, and so, utilized it frequently (Figure 2). However, with varied communal–individual preferences and needs, the uses of the forests for different purposes varied across the communities. While some of the people across the forest communities utilized the forest resources by harvesting what they needed, others were constrained to buy them from the markets due to the scarcity of the forest products or time to harness them. Similar to the forest-dependent people found across the communities, the products were seen not only to provide sustenance to households, but furthermore provided opportunities as sources of livelihood for those that depended on the sale of such products to be able to generate sources of income in order to meet other needs (basic necessities and essential needs).

This quest for sustenance has remained the central focus of forest use across the region over the years; and may likely remain the same as the way of life and norm of the indigenous people have barely changed. Hence, logging of forests to facilitate agricultural activities, oil palm production and fishing (Figure 4) were seen to dominate the forest use. This use of the forests for subsistence and income generation have remained the dominant focus of forest use across the region and may likely continue to be so except there are improvements to the economic well-being of the populace. With the variation in perception and dependence on the forest in absolute terms for the provision of vital services, the ecosystem's forest and rural landscapes are expected to experience degradation at different spatial scales.

Patterns and determinants of forest use

The freshwater swamp forests were important for the existence of the forest communities and the mainstay of their sustenance and livelihood. This may be partly because there are no wide gaps between the wealth of the people; as those that had higher degrees and were engaged in non-forestry related jobs such as civil service, still depended on the forests to meet some of their needs. Such individuals maximize the use of the forests for the provision of nutrition (fruits, vegetables and nuts), fuel and forest land for subsistence agriculture. This enables them to channel their income to meeting other needs like clothing and family maintenance and in effect augment or make up for their low earnings. Since most of the people are indigenes of the communities, they had access to family lands and either lived in their own houses or family houses, which are designed to accommodate the convenience of processing harvested forest products as well as the use of fuel wood in cooking. Though there are no restrictions on forest use across most of the communities and so even migrants that lived far away from family lands could harvest products, this access and freedom becomes more common when such people live in the environment for quite some time and become integrated and known by the society. This few migrant populations which are mostly in the communities as civil servants or teachers (either posted or transferred by the government), traders and short term contract workers (which are mostly better socioeconomically than the indigenous people) constitute the bulk of the people whose household income could afford them the use of more convenient sources of fuel (such as kerosene and gas cookers) and options of buying forest products from markets or from household that have them. Higher levels of education are supposed to generally reduce forest dependency (Mamo et al. 2007) (by opening up other opportunities) as well as the use of fuel wood (as the time spent collecting them are both unprofitable and higher in opportunity costs) (Adhikari et al. 2004; Coulibaly-Lingani et al. 2009); however, as most of the people do not have the (better) employment which their educational status are supposed to offer them due to the high unemployment rates in the region (UNDP 2006), the reverse becomes the case. The full time occupations of the people were indicators of their household incomes and to a great degree reflected their use and dependence on the forests for certain products. However, the individual family needs and household size impacted

Figure 6. Ecosystem services examples. (a) Crabs. (b) Crayfish. (c) Fuel wood logs. (d) Fishes. (e) Periwinkles. (f) Prawns. (g) Snails.

indirectly their use and dependence on the forests to either supplement what their main jobs catered for or influenced the time or degree of commitment they made to forest use. As it is common to find families with so many children to feed or extended families (living with them) to take care of across the region, people that had jobs that could take care of their needs (such as civil servants and teachers) still relied on the forests (beyond what they would have) to provide for their households. These additional burdens affect both the indigenous and migrant households, and have contributed to the degradation of the resources.

Forests found within their neighbourhoods were considered to be more important and useful compared to those more distant to their neighbourhoods. While this (distance to forests) may be considered a common phenomenon of forest use (Mamo et al. 2007; Brown et al. 2011), its application to the swamp forests are both contextual and specific. This is because, the very rainy and marshy/swampy nature of the communities are constraints in themselves to forest resource use; with the result that most of the very vital forest products in the forests are left to rot and decay for greater part of the year (due to longer rains and floods). As a result, only forests that is either accessed by wooden platforms or foot holdings (found closer to the communities) or those that are accessed by navigating on the creeks and streams, are utilized for a greater part of the year. This model of forest use is not adhered to strictly by some of the people that depend on certain forest products to generate income and livelihood beyond the general sustenance of their families. As most of these resources are scarce in nearby forests, these fewer group of people for whom forest distance is not an issue, utilize short breaks in rain to access the distant forests and act as agents of degradation in the distant (more undisturbed) forests long before the general populace.

Forest ecosystem services reduction and responses

The causes of loss and reduction of ecosystem services are varied at different spatial scales across the communities (Figure 5), mainly due to underlying factors such as agricultural activities and population increase. As the population of the region grows, efforts to harness forest resources are intensified (in order to meet the growing needs of such populace) and as a result, most of the forest products are overexploited at non-resilient scales. While this pressure and consequent depletion of forest resources are mainly as a result of varied and increased demands from a growing population (Dubey et al. 2009; Misra et al. 2014), it is equally as a result of the shallow understanding and perception of forest use and service across the region as in most African communities. As the communities know so much about what they could get from the forest ecosystem in terms of provisioning services and little or nothing about the capacities of the forests to provide regulatory and supportive services, it affects both the way they relate with and use the swamp forests. Hence, the capacity of the swamp forests to continually sequester carbon and regulate the climate of the region is continually impeded by the people who have been focused on short term and immediate benefits from the ecosystem. On the other hand, as agricultural activities are continually seen as a better (income yielding) replacement option to the forests, it has remained the major threat to harnessing the full potential of the fragile freshwater swamp ecosystem. Such agricultural activities (which has mainly been in the form of plantain and oil plantations) have no doubt sustained the different households, but has (equally) steadily reduced the biodiversity, led to large-scale environmental degradation, resulted in a net loss of carbon emissions and reduced the carbon storage in the ecosystem (Koh & Wilcove 2008; van der Werf et al. 2009; Koh et al. 2011; Morel et al. 2011).

As the forest ecosystem continually becomes degraded, the associated consequences are not only seen in the loss of ecological services (such as the biodiversity and watershed protection), but also on the forest-dwelling people who continually lose their means of existence (Lamb et al. 2005). Since these reductions are likely to impact the livelihoods of the rural poor mostly, alternative sources of livelihood and proactive steps towards sustaining the ecosystem are advocated.

Sustainable forest resource management

Establishing guidelines and policies for sustainable forest use are necessities for continual existence and maximum derivation of benefits from forest ecosystems. Achieving this across forest ecosystems (especially, the freshwater swamp forests) in the Niger Delta region has been a big challenge due to the enormous (and conflicting) interests of a lot of stakeholders. Most activities that go on in the region (such as crude oil exploration and industrialization) have mostly focused on the end product without much attention on the need to reduce the consequent forest degradation that follows. Suitable environmental impact assessments are to be conducted before any project that are linked to the forest landscape are done. This is to be enforced by the government at all levels across the region, irrespective of who is involved.

Effective law enforcements are equally needed at the community levels across the ecosystem/region in order to regulate the use of the forests. This will become effective if there are established laws that will guide forest resource harvests (whether communally or individually owned), than when there are discrepancies across the region as to what constitutes an offence.

Ensuring that juvenile trees are not harvested as log or firewood is to be enhanced across the forest ecosystem. This will help to ensure that tree species found in the ecosystem will have sufficient (bank) replacements when the older ones are gone and in effect, help to reduce species extinction in the ecosystem. While it is easier or more convenient to cut down shrubs or small trees (especially around the neighbourhoods) for fuel wood, the people should be encouraged to use snags (dead wood) in the forest or those left over after lumbering activities. Combining this with awareness (environmental education) and government subsidized sources of fuel will go a long way in achieving sustainability across the ecosystem. Teaching the public the art of afforestation and immediate replacement (by planting) of every tree harvested, especially at household levels, will go a long way to ensure that this forest region and ecosystem will not be lost.

Conversely, strict monitoring of forest resource harvest across the ecosystem whether for timber or non-timber forest products especially among migrants and contractors

should be taken seriously. While this is not an avenue for being hostile and unfriendly to non-indigenes of the forest communities, it should be noted that most times, such people care less about the harm that over-exploitation and unregulated extraction (especially beyond the threshold levels) poses to such fragile ecosystems.

Conclusion

Swamp forest ecosystems are important for meeting the needs of people who depend on it to sustain their needs and household livelihoods. As a result of the intensity and trend of anthropogenic activities ongoing in the Niger Delta, the freshwater swamp forests, as well as other tropical forest ecosystems, are threatened with extinctions, potential collapse and associated livelihood challenges; hence, the need to establish workable good forest management guidelines. With the ever-evolving perception of forest resource utilization and management (Wang 2004) inherent at landscape scales, establishing these guidelines especially at the community levels seem elusive. This is furthermore compounded with the quest for higher financial returns driving forest land use changes as well as the expansion of profitable agricultural activities across the region (Wunder 2005; García-Fernández et al. 2008). Nonetheless, since the forests not only provide the livelihoods of people, but also security for cultural and spiritual existence, its continuous existence is as important to the people as it is for biodiversity conservation. An all-inclusive forest conservation strategy that considers the people's social interests should be promoted at community levels; while alternate livelihood streams that will reduce dependence on the forest resource, should be facilitated by the local, regional and national government.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Disclosure statement

No potential conflict of interest was reported by the authors.

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