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Research Article
Biodiversity Decline and Socio-Economic Impact on Rural Dwellers: Panacea for Poverty Alleviation

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Abstract

Background and Objective: Forest biodiversity provides an enormous range of forest products that play an integral part in livelihood and well-being supports and assist to drive sustainable growth in rural communities but the disparities in value-use and social or economic activities have a side effect on biodiversity. As a result, in the research region, there has been a progressive reduction in biodiversity. This study investigates the biodiversity decline and socio-economic impact on rural dwellers. **Materials and Methods:** Data were obtained from information provided based on the respondent's knowledge as harvesters, marketers and consumers of the biodiversity resources using a structured questionnaire. A random sampling technique was used to select twelve communities in proximity to the study area. The data were analyzed using descriptive statistics and correlation analysis. **Results:** Results showed a total of sixty-two biodiversity resources (plants and animals) were identified as contributing to the socio-economic welfare of households as a source of income generation, 47.5% of house-derived food intake, 42.5% obtained medicinal herbs, 10.0% generate other incomes. It was observed that all the respondents generate incomes from the forest resources, 33.3% pay their wards school fees, 20.3% pay house rent and 26.7% pay for transportation and other social responsibilities. The result revealed that about 70% of respondents confessed the validity of contributions of biodiversity resources to the socio-economic welfare of the rural community while 30% says no. The result showed that 35% of the respondents were affected by biodiversity decline, 57.5% felt the intensity of the declining impact on the income generation while 7.5% of respondents were unchanged. The result shows that 16.7% of resources user restock or were willing to restock after harvesting while 83.3% refused. **Conclusion:** Biodiversity contributes and plays a significant role in the socio-economic welfare of the rural community, hence, a need to intensify campaigns on conservation and reforestation in Nigeria, which promotes entrepreneurial skill acquisition as an alternative source of livelihood.

Key words: Biodiversity, decline, household, rural community, resources, socio-economic

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Biodiversity is the degree of life forms in a species, ecosystem, biome or an entire planet. It is also a metric of ecosystems health and is often used to describe three areas under which variety occurs: Genetic, primarily refers to the variation of genes in a species, subspecies or population, species, where refers to the difference between the living organisms with their component population at different geographical scales (local, regional or global), and community/ecosystem, relates to the variation within ecological complexes of which species are apart[1].

Socio-economic welfare refers to the level of prosperity and living standard of either an individual or a group of persons. The field of economics specifically refers to utility gained through the achievement of material goods and services[2]. Most Nigerians rely on biodiversity for their livelihoods and survival[3]. It provides a variety of ecosystem (supply, support, regulatory and cultural) functions, such as climate regulation, food and medication provision, raw materials and aesthetic qualities, among others[4]. Right from creation, man has depended on biodiversity/forest for his livelihood and supply of major needs and even their food. Furthermore, a substantial link exists between human population expansion and biodiversity loss, which has been thoroughly documented[5,6]. As the human population grows, plant and animal species, abundance, richness and density typically decrease, with vulnerable species eventually becoming extinct if no action is taken[7]. The more the population of man grows the more his interaction with nature and the disturbance in the equilibrium of ecosystem[8]. Urban development, deforestation, degradation, land degradation, wars and many forms of pollution, all are indications of the rapid human growing population[9,10]. However, since man's livelihood/socio-economic welfare depends on the diversity of nature, the unavailability of these life forms both in flora and fauna could directly or indirectly affect man's household economy. Chukwu[11] argued that poverty, biodiversity loss and environmental deterioration in Nigeria were all linked in some way. However, the socioeconomic impact of poverty, like insecurity, was cited as one of the reasons impeding biodiversity protection in Nigeria. Mother Nature's resources are frequently depleted without regard to future generations' sustainability or the effects of its loss on the current generation. Biodiversity is under severe threat worldwide, owing to the loss of natural areas, reduced species distributions and populations, among other factors[12].

Over 90% of Nigerian rural people rely on forest biodiversity for survival, with more than 70% relying on fuel wood for energy[10]. Also, the knowledge of the people usage of natures resources seems to be a very important factor to be considered in any conservation campaign because this affects their disposition towards conservation of biodiversity[13]. Biodiversity loss is an ecological problem as it disturbs the equilibrium as well as directly or indirectly affects household socio-economic welfare, particularly in the rural areas[14]. The household economy-environment relationship has been conceptualized in a variety of ways since first coming to attention during the 1970s[15].

Subsequently, studies have documented the importance of nature resources for the livelihoods and incomes of poor people, suggesting that the impact of natural resource degradation or loss was particularly felt by the poorest communities[16]. These studies demonstrated empirically that the poorest groups tend to derive a greater proportion of their household income and livelihood needs from the natural resource base, hence, were disproportionately dependent on these resources[17]. More recently, attention has turned to understanding the relationship between biological diversity, poverty and household economy, specifically in response to the growing convergence of these agendas within the international policy context[18]. In the endeavour to minimize the rate of global biodiversity loss, contribute to poverty alleviation and provide benefits to all living creatures, it was noticed that little progress was made[16]. This study is very important by the fact that there is a growing interest and research by researchers and relevant agencies on issues of biodiversity and socio-economic welfare link and the success of such project is a collective responsibility[19]. This study investigates the decline of biodiversity on the socio-economic welfare of rural dwellers in the study area.

MATERIALS AND METHODS

Study area: Egbeda is a local Government Area in Oyo State Nigeria. Its headquarters is in Egbeda town. It is one of the 33 LGAs of the state. Egbeda is located on latitude 70°21'80"N and longitude 4002-4028'E with a total land area of approximately 191 km^2. The Egbeda LGA was carved out of the old Lagelu LGA in 1989, the development of which has led to the rapid expansion of the town from the agrarian community to urban town and a population of 281,573 at the 2006 census and 353,655 (projected to 2014). It is subdivided into 11 wards. Its geographical coordinates are latitude 7.36667 and longitude 4.05. It has a tropical wet

and dry climate (Koppen climate classification) with a lengthy wet season and a relatively constant temperature throughout the year. The vegetation pattern of Egbeda is that of rain forest in the South and guinea savannah in the North[20].

Data collection: Primary data for the study were collected through the administration of a questionnaire at ten randomly selected communities from the six selected wards in the local government. The communities are Arinkikun, Isebo, Erunmu, Alapade, Bale, Egbeda, Alaja, Alagba, Korobo and Olufon. Thus, hundred questionnaires were randomly administered to examine the respondent's view about biodiversity status and socio-economic welfare in the study area, secondary data were collected from maps, relevant literature and the Oyo State town planning office, Ibadan.

Sampling procedure and data analysis: Out of 11 wards, 6 wards were randomly selected. From each of the 6 wards, communities were randomly chosen to make ten surveyed communities. A total of 40 consumers, 30 marketers and 30 harvesters of biodiversity resources were assessed. Descriptive statistics and correlation analysis were used in the study. The tables include frequency distribution tables and percentages.

RESULTS

Species, local name, uses and availability status in the rural community: The total number of available species from the study was 62 species of different plants and animals which were observed and presently being collected and utilized by the rural dwellers, the result also reveals the percentage increase and decrease rate of available forest products in the study area. Hence, as presented Table 1, it shows the species, their local name, uses and availability status.

Contributions of biodiversity to rural community socio-economic welfare: Table 2 presented the results showed the biodiversity resources (plants and animals) contributed to the socio-economic welfare of households as a source of income generation, food security, medicine and environmental services. Meanwhile, 47.5% of house-derived food intake, 42.5% obtained medicinal herbs while 10.0% generate other incomes.

Contribution of proceeds from biodiversity resources revenues: It was observed that all the respondents (100%) generate incomes from the forest resources, 33.3% pay their wards school fees, 20.3% pay house rent and 26.7% pay for transportation and other social responsibilities as presented in Table 2.

Additional contributions to the socio-economic welfare of rural community engage in biodiversity resource uses/marketing: The result revealed that about 70% of respondents confessed the validity of contributions of biodiversity resources to the socio-economic welfare of the rural community while 30% says no as presented in Table 2.

Availability status of biodiversity resources in the last five years as viewed by the respondents: The result showed that in the last five years, biodiversity decline affects rural communities at various intensities. Thirty-five percent of the respondents were affected in socio-economic welfare, while 57.5% felt the intensity of the declining impact on the income generation while 7.5% of respondents could not notice any changes as presented in Table 2.

Percentage of harvesters that restock after harvesting: From Table 2, the result shows that 16.7% of resources user restock or were willing to restock after harvesting while 83.3% refused.

A significant relationship between harvester's willingness to restock/replant: The result of the significant relationship between harvester's willingness to restock or replant as presented in Table 3 between the harvester's willingness among the respondents was evaluated. The correlation coefficient of determination (R^2) shows a negative significant correlation in a relationship existed between harvester's willingness to restock or replant and the benefit derivable from biodiversity resource use. The value for the harvester's willingness to restock had a mean (6.98) while conservation willingness had a mean of (10.03).

DISCUSSION

This study allowed us to examine the declining impact of biodiversity that has contributed to the socio-economic welfare of the rural community in the study area. This study reveals that biodiversity contributes to the key areas of socio-economic welfare which are income generation, food, employment, medicine and environmental services. Sixty-two plant and animal species were identified and used in the study area. This contributes to about 47.5% of households as a food supplement, 42.5% as medicinal materials and 10% income

Table 1: Species, local name, uses and availability status in the rural community

Botanical names	Local names	Uses	Responses on availability status (%)		
			Increase	Decrease	Unchanged
Synsepalum dulcificum	Agbayun	Majorly food	20.0	60.0	20.0
Achatina achatina	Igbin	Food and medicine	53.3	46.7	-
Datura mete	Gegemu	Medicine	33.3	63.3	3.3
Ficus exasperate	Ewe Ipin	Medicine and others	16.7	80.0	3.3
Kigelia africana	Pandoro	Medicine	16.7	80.0	13.3
Terminalia catappa	Almond	Food	20.0	46.7	33.3
Varanus indicus	Monitor lizard	Food, medicine and others	26.7	43.3	30.0
Gryllus bimaculatus	Iree	Food	46.7	53.3	-
Carica papaya	Ibepe	Food	20.0	40.0	40.0
Poelagus marjorita	Rabbit	Food	35.0	45.0	20.0
Xerus inauris	Squirrel	Food	42.0	57.1	0.9
Talinum fruticosum	Water leaf	Food	35.0	55.0	10.0
Dovyalis caffra	Apple	Food and others	50.0	50.0	-
Ocimum gratissimum	Efinrin	Food and medicine	42.2	55.8	2.0
Vernonia amygdalina	Ewuro	Food and medicine	20.0	60.0	20.0
Hibiscus sabdariffa	Isapa	Medicine	40.0	41.0	19.0
Cola nitida	Kola nut	Medicine and food	23.8	47.2	20.0
Chrysophyllum albidum	Agbalumo	Food	35.4	55.6	-
Citrullus colocynthis	Tagiri	Medicine and others	30.0	50.0	20.0
Piper nigrum	Pepper	Food	40.0	45.0	15.0
Calotropis procera	Bomubomu	Medicine			
Cymbopogon citratus	Lemon grass	Medicine and others	23.3	56.7	20.0
Euphorbia lateriflora	Enuopiri	Medicine	21.0	59.0	20.0
Abrus precatorius	Omisinmisin	Medicine	30.0	41.0	29.0
Anacardium occidentale	Cashew	Food, medicine and others	40.0	50.0	10.0
Newbouldia laevis	Akoko	Medicine and others	49.0	50.0	10.0
Psidium guajava	Guava	Food and medicine	44.2	53.7	2.1
Ananas comosus	Pineapple	Food	30.0	35.0	25.0
Momordica foetida	Ejinrin	Medicine	32.1	44.7	14.2
Agaricus bisporus	Mushroom	Food and medicine	29.0	50.0	19.0
Musa acuminate	Banana	Food	10.0	90.0	-
Ocypode africana	Crab	Food	40.0	50.0	10.0
Cocos nucifera	Coconut	Food and others	32.4	47.5	20.1
Mangifera indica	Mango	Food and others	50.0	26.7	23.3
Tridax procumbens	Tridax	Medicine	22.2	60.8	18.0
Dialium indum	Awin	Food	50.0	50.0	-
Elaeis guineensis	Oil palm	Food and others	22.5	60.0	17.5
Citrullus lanatus	Melon	Food	34.0	60.0	6.0
Capsicum annuum	Ata rodo	Medicine	49.0	50.0	1.0
Struchium sparganophora	Ewuro odo	Medicine	15.0	70.0	15.0
Citrus tangerine	Tangerine	Food	25.0	75.0	-
Geochelone sulcata	Tortoise	Medicine and others	40.0	40.0	-
Gnetum africanum	EfoEru	Food	10.0	80.0	10.0
Azadirachta indica	Dongoyaro	Medicine and others	40.0	50.0	10.0
Launaea taraxacifolia	Efo Yanrin odo	Food	19.1	60.8	20.1
Macrotermes bellicosus	Termites	Food	25.0	60.0	17.5
Corchorus Olitorius	Ewedu	Food	25.0	57.0	17.0
Abelmoschus esculentus	Okra	Food	35.0	45.0	20.0
Pandinus imperator	Scorpion	Medicine and others	------	------	------
Irvingia gabonensis	Bush mango	Food and medicine	30.0	60.0	10.0
Dacryodes edulis	Pear	Food	45.0	53.2	2.8
Mus minutoides	Mouse	Food	35.8	45.1	20.1
Chamaeleo africanus	Oga	Medicine and others	25.0	55.0	20.0
Gliricidia sepium	Agunmaniye	Medicine and others	40.0	45.0	15.0
Crassocephalum crepidioides	Ebolo	Food	15.0	65.0	20.0
Zonocerus spp	Grasshopper	Others	25.0	35.0	40.0
Sida acuta	Wire weed	Medicine and others	27.0	54.5	19.5
Apis mellifera	Bees	Food, medicine and others	45.0	55.0	-

Table 1: Continuous

Botanical names	Local names	Uses	Responses on availability status (%)		
			Increase	Decrease	Unchanged
Citrus aurantium	Jagoin	Food and medicine	50.0	26.7	23.3
Garcinia kola	Orogbo	Food, medicine and others	16.7	80.0	3.3
Colocasia esculenta	Cocoyam	Food	20.0	43.1	6.9
Theobroma cacao	Cocoa	Food and others	20.0	40.0	40.0

Source: field survey, 2020

Table 2: Contributions of biodiversity to rural community socio-economic welfare

Biodiversity uses	Frequency	Percent	Valid percent	Cumulative percent
Food	19	47.5	47.5	47.5
Medicine	17	42.5	42.5	82.5
Others	4	10	10	100
Total	40	100	100	
Contribution of proceeds from biodiversity resources revenue responsibilities				
School fees	10	33.3	33.3	33.3
Rent payment	6	20.0	20	53.3
Transport	8	26.7	26.7	80
Other social	6	20.0	20	100
Total	30	100.0	100	
Additional contributions to the socio-economic welfare of rural communities engage in biodiversity resource uses/marketing				
Valid				
Yes	21	70	70	70
No	9	30	30	100
Total	30	100	100	
Availability status of biodiversity resources in the last five years as viewed by the respondents				
Increasing	14	35	35	35
Decreasing	23	57.5	57.5	92.5
Unchanged	3	7.5	7.5	100
Total	40	100	100	
Percentage of harvesters that restock after harvesting				
Yes, I replant/restock	5	16.7	16.7	16.7
No planting/no restocking	25	83.3	83.3	100
Total	30	100	100	

generation and other uses as presented in Table 1. Hence, It was observed that 47.5% of respondent uses biodiversity resource as a primary food source, this corroborates the report by the Federal Ministry of Environment[9,10,21] and this suggests a continuous use and dependence on biodiversity by the rural community.

This is similar to the findings interestingly, as these resources are being used regularly, it is expected and observed that their abundance reduces (loss) when not restocked. The result further shows that this decline in biodiversity (loss) has negatively influenced the rural dweller economy in the study area at varying intensities (percentage) as documented in Table 2 above. The contribution of proceeds from biodiversity resources revenues cannot be exhausted, it was observed that all the respondents (100%) generate incomes from the forest resources, 33.3% pay their ward's school fees, 20.3% pay house rent and 26.7% pay for transportation and other social responsibilities as presented in Table 2. This report is similar to other studies[9,18,21] documented that globally, food intensity and poverty are found where biodiversity loss is especially pronounced. These figures suggest the many other contributions of biodiversity to socio-economic welfare apart from food security and income generation. Furthermore, the additional contributions to the socio-economic welfare of the rural community involved in biodiversity resource use/marketing, result shows that about 70% of respondents observed the validity of biodiversity resources contributions while 30% says no as presented in Table 2.

The availability status of biodiversity resources in the last five years was examined from the respondents, results showed that in the last five years, biodiversity decline affects rural communities at various intensities. Thirty-five percent of the respondents were affected in socio-economic welfare, while

Table 3: Significant relationship between harvester's willingness to restock/replant

Source	Mean	Standard deviation	Willingness to replant or restock	Conservation
Willingness to replant pearson correlation or restock	6.98	1.67	1	-530 (**)
Significance (2-tailed)				0.000
N			40	40
Conservation Pearson			-530 (**)	1
Correlation	10.03	1.81	0.000	
Significance (2-tailed) N			40	40

Correlation is significant at the 0.01 level (2-detailed)

57.5% felt the intensity of the declining impact on the income generation while 7.5% of respondents could not notice any changes as presented in Table 2. This observation was similar to the findings reported previously[9,18].

Percentage of harvesters that restock after harvesting, from Table 2, despite the enormous benefits derivable from biodiversity uses, only 16.7% of the respondent of resources user restock or were willing to restock after harvesting while 83.3% respondents were indifferent and in line with the findings of the Federal Ministry of Environment[9,10] with the suggestive implication that more natures (biodiversity) will be lost at the expense of meeting socio-economic needs of rural dwellers. And this is also corroborated by the result findings reported[12,13].

Table 3, reveals that a significant negative correlation existed between willingness to replant/restock and the benefits derived from biodiversity resource use at ($r = -53^{**}$). The implication of the result showed that most harvesters get benefits from the use of biodiversity resources. Furthermore, the results from the correlation analysis showed a negative opposite relationship between willingness to conserve/restock and the derivable from biodiversity resource uses, hence, a serious need for concern on conservation campaign and orientation in the study area which is in line with the previous report[22].

Owing to the invaluable importance and contributions of biodiversity to the socio-economic welfare of households, the following recommendations are made to ensure sustained use of biodiversity resources and better socio-economic welfare. Since it has been known that people depend on biodiversity, measures should be taken by the government and stakeholders to maintain optimum population density around the forest periphery to reduce pressure on biodiversity and hence reduce the need for opening up of lands for building houses and road construction. Awareness of the need to conserve and restock after harvesting to secure biodiversity resources for future generations. Harvesting of biodiversity resources should be done at the season when its availability is highest in order not to reduce the genetic pool and chances of recommendation of the species in use.

CONCLUSION

The findings from this study have provided useful information as regards the contributions and biodiversity decline of forest resources is having on the socio-economic livelihood of the rural community which will assist in policy formulation and implementation in the study area.

SIGNIFICANCE STATEMENT

This study discovered the immense contributions of biodiversity resources to the socio-economic welfare of the households that can be beneficial for measuring the impact of biodiversity resource loss on the rural dwellers on their well-being. This study would help the researcher, government and stakeholders to uncover the critical measures and policies to be taken that many researchers were not able to explore. Thus, the new theory indicates that harvesting of resources should be carried out at the season when it's in abundance in order not to reduce the genetic pool of the species in production may be arrived at.

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