Impact of religious tourism on Loburo Forest (Redemption Camp), Ogun State, Nigeria

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Abstract
Vegetation plays essential roles in life support systems and its mapping presents valuable information of the understanding of natural and man-made environments. The impact of religious tourism on Loburo Forest in Ogun State, Southwestern Nigeria which currently host Redemption Camp, a foremost religious sites. Five land-use patterns *Raphia* dominated forest, Plantation area, Secondary forest, Fallow land and developmental area were described and mapped within three 25m x 25m plots for tree enumeration. The result shows very low species composition of plants in each of the forest type. The floristic forms appear monodominant: with *raphia* formation of 28 stands out of 51 plant stands sampled from three plots; plantation had 15 stands of *Cola accuminata* in 41 stands sampled; *Raphia hookeri* and *R. vinivera* were dominant in secondary forest; *Cola hispida*, *Ficus exasparata* and *Albizia* spp were dominant in fallow forest while *Tremia orientalis* was dominant in the developmental area. Apart from *Raphia* and *Cola* sp, all the plant species were early successional types while *Alchornea cordifolia*, a shrubby and scrambling tree dominated the undergrowth in all the land-use/vegetation types. The Shannon Wenner index of diversity shows that the secondary forest was most diverse (2.50) followed by plantation (2.15). The index of dominance was highest for fallow land. Nevertheless the site can still be salvaged if sizeable portion can be set aside for regeneration and conservation of the remnant species in order to promote healthy environment for inspiration of the religious adherents, support learning and research of the educational institutions springing up in the area.

Key words: vegetation, land-use type, monodominant, healthy environment.

Introduction

The assessment and monitoring the state of earth surface are key requirements for global change research. Vegetation classification and mapping are important tasks for managing natural resources on which tourism is based. The vegetation provides bases for all living being and it plays essential roles in life support systems (Adesalu *et al*., 2010). Vegetation mapping also presents valuable information on the understanding of natural and man-made environments (Xiao *et al.* 2004) and it is usually the first in biodiversity conservation and the bases for conservation of natural resources (Ogunjemite, 2007; Isichie, 2010; Badejo, 2013).

Loburo Forest was one of the largest tracks of community forests in Ogun State before the construction of Lagos-Ibadan Express way in 1978. The construction of the road opened up the region to physical development,

particularly, religious activities pioneered by the Redemption Camp of the Redeemed Christian Church of God in 1983. These activities has since grown in leaps and bounds, leading to establishment of large communities within the area with severe consequences and high level of alteration on the ecology and sociol economic activities of the area.

Religion had contributed significantly to sustained biological diversity all over the world through injuctions to the adherents, establishment of sacred groves, shrines and so on (Nabofa, 1988). Religion had also played crucial roles in tourism development through pilgrimages and visits of adherents to designated religious sites (Alabi, 2013). Nevertheless, this had not received wide acknowledgement in Nigeria probably due to its volatile nature caused by mutualsuspision among the different religious groups. This study, therefore offers a chance to examine the impact of religious tourism from the perspectives of conservation and tourism on Loburo Forest in Ogun State which is currently hosting the Redemption Camp. It examined the effects of activities in the Redemption Camp in Loburo Forest, on the immediate community and the environment

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Methods

The study area

Loburo Forest, is situated between kilometer 36 – 48 along Lagos – Ibadan Express way and forms part of Owode and Sagamu Local Government Areas of Ogun State. The community forest occupied about 75 km^2 of virgin and graded level of secondary forest (National Atlas, 1987) before Redemption Camp started in the year 1983. The study area has since witnessed major religious revivals and outreaches and establishment of camp grounds by several christian religious outfits.

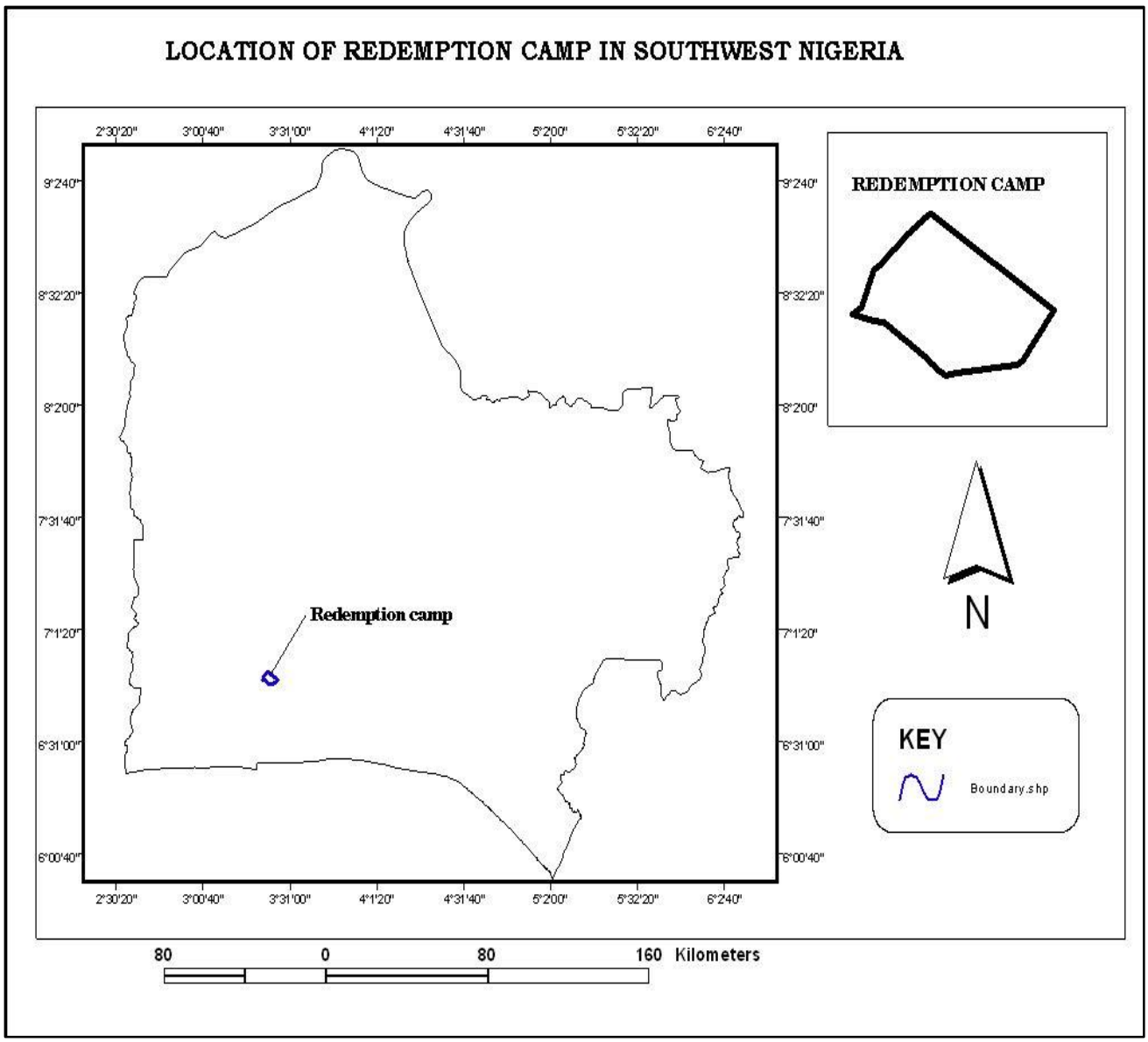
Vegetation

The climax vegetation is lowland Tropical Rainforest of the moist evergreen type (Salami, 2008). The area comprises a series of ecosystems: the Guinea-Congolian forests found in most parts of southern Nigeria. (National Atlas, 1987; and Oates *et al* 2008)

Data Collection

Plant (Flora) Diversity

Five land-use patterns (Raphia dominated forest, Plantation area, Secondary forest, Fallow land and Developmental area) were identified under socio-economic survey of the Redemption Camp. Each class of identified vegetated land–use was mapped within three (25 m x 25 m) plots for tree enumeration as described by Ogunjemite (2007). The incidences of every species (% occurrence) inside the plots were estimated. All trees were identified and counted. Density, basal area and frequency were estimated. Basal area and volume of all measured trees in the sample plots were calculated. The basal area and volume of trees were compared among land use types using the Analysis of Variance (ANOVA). For the analysis of natural regeneration, tree saplings in 5 m x 5 m subplots were sampled within each of the 25 m x 25 m plots. All plants located within these plots with Dbh < 5 cm were identified and counted. Plant heights were measured using Haga Altimeter and average height in each land-use computed. The phyto-sociological nomenclature of trees follows Keay (1989).



Results

The result of the floristic assessment of Loburo Forest (Redemption Camp) is presented on the basis of the major land-use forms: raphia dominated, plantation area, secondary forest, fallow forest and developmental area. Species composition of plants were very few in each of the forest types which implies monodominant nature of the floristic forms. Table 1 shows that in the raphia dominated forest, 28 stands were raphia out of 51 plant stands. In the plantation area (Table 2) there were 15 stands of *Cola accuminata* out of 41 stands sampled; The secondary forest (Table 3) had *Raphia hookeri* and *R. vinivera* as dominant species. *Cola hispida*, *Ficus exasparata* and *Albizia* spp were dominant in fallow forest (Table 4) while *Tremia orientalis* was dominant in the developmental area (Table 5). Apart from *Raphia* and *Cola* sp, all the plants were early successional species. *Alchornea cordifolia*, a scrambling tree dominated the undergrowth in all the land-use/vegetation types. Saplings of the dominant tree species were in the majority

while sedges were common in the wet portion of Raphia dominated, secondary forest and developmental area

Table 1: Species composition of Raphia dominated forest formation in Loburo Forest

Species Composition	Height (M)	DBH Cm)	Frequencies
Bridellia sp	11.00 ± 0.00	53.00 ± 0.00	1
Cleistopholis patens	15.00 ± 0.00	60.00 ± 0.00	1
Diospyros mespiliformis	5.00 ± 0.00	29.00 ± 0.00	1
Elaeis guineensis	12.29 ± 0.52	108.86 ± 5.15	7
Ficus goliath	7.00 ± 0.00	27.00 ± 0.00	1
Myrianthus arboreus	13.67 ± 0.49	68.67 ± 19.67	6
Raphia hookeri	10.11 ± 0.71	116.82 ± 1.79	28
Lovoa trichilioides	12.00 ± 0.00	55.00 ± 0.00	1
Sterospermum acuminatissimum	8.00 ± 0.00	45.00 ± 0.00	1
Berlinia grandiflora	7.75 ± 0.48	37.75 ± 3.94	4
Total			51
Herbaceous plants			
Alchornea laxiflora			
Perquentina nigrescens			
Nephrolepsis bisserata			
Cyperus rotundus			

At 95 % Confidence limit

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TABLE 2: Tree species and herbaceous plants observed within the plantation area of Loburo Forest

Species Composition	Height(M)	DBH(Cm)	Frequency
Albizia ferruginea	19.50 ± 1.50	104.00 ± 8.00	2
Anacardium occidentale	11.00 ± 0.00	136.00 ± 0.00	1
Antiaris africana	16.00 ± 0.00	98.00 ± 0.00	1
Chrysophyllum albidum	9.00 ± 0.00	65.00 ± 0.00	1
Cola acuminate	12.53 ± 0.43	122.73 ± 6.70	15
Cola hispida	14.00 ± 0.00	134.00 ± 0.00	1
Diospyros mespiliformis	11.00 ± 0.00	87.00 ± 0.00	1
Elaeis guineensis	35.00 ± 0.00	120.00 ± 0.00	1
Ficus exasparata	12.00 ± 0.00	76.00 ± 0.00	1
Ficus goliath	7.00 ± 0.00	27.00 ± 0.00	1
Pycnanthus angolensis	17.00 ± 0.00	56.00 ± 0.00	1
Rauvolfia vomitora	8.33 ± 0.42	65.16 ± 3.27	6
Spondias mombin	8.00 ± 0.84	63.00 ± 4.83	5
Sterculia tragacantha	8.67 ± 2.40	39.67 ± 10.00	3
Theobroma cacao	7.00 ± 0.00	85.00 ± 0.00	1
Total			41
Other plants			
Alchornea laxiflora			1
Carica papaya			1
Musa sapietum			4

At 95 % Confidence limit

Table 3: Tree Species and Herbaceous Plants Observed Within the Secondary Forest of Loburo

Species Composition	Height(M)	DBH(Cm)	Frequency
Albizia ferruginea	20.00 ± 0.00	110.00 ± 0.00	1
Alstonia boonei	15.00 ± 3.00	67.50 ± 42.50	2
Alstonia congoensis	17.33 ± 2.19	101.67 ± 6.01	3
Bridelia sp	20.50 ± 0.50	19.00 ± 1.00	2
Cleistopholis patens	23.75 ± 1.25	123.75 ± 8.00	4
Coffea spp	7.00 ± 0.00	89.00 ± 0.00	1
Elaeis guineensis	5.00 ± 3.00	115.00 ± 10.41	3
Funtumia elastic	6.33 ± 0.33	21.00 ± 2.08	3
Musanga cecropioides	15.67 ± 0.33	148.33 ± 4.41	3
Myrianthus arboreus	13.00 ± 1.00	84.00 ± 28.45	3
Pterocarpus osun	8.00 ± 0.00	27.00 ± 0.00	1
Raphia hookeri	9.56 ± 0.38	112.22 ± 3.55	9
Raphia vinifera	6.83 ± 0.40	139.17 ± 3.00	6
Sterospermum acuminatissimum	5.00 ± 0.00	34.00 ± 5.86	3
Terminalia ivorensis	27.00 ± 0.00	120.00 ± 0.00	1
Total			45
Herbaceous plant			
Albizia ferruginea			Seedlings
Alchornea cordifolia			Seedlings
Cola hispida			Seedlings
Celosia trigyna			
Elaeis guineensis			Seedlings
Perquentina nigrescens			
Tamacoccus sp			
Melicia excels			Seedlings
Nephrolepsis bisserata			
Pterygota macrocarpa			
Cyperus rotundus			

At 95 % Confidence limit

The average height of the vegetation/land-use forms were 5.9, 9.5, 8.0, 1.64 and 0.4 m respectively for Raphia dominated, Plantation, Secondary, Fallow and Developmental area floristic compositions. Analysis of variance (ANOVA) (Table 6) shows significant differences in the height among land-use/vegetation types, although plantation and secondary forests were closely related. The ANOVA for the DBH (Table 7) follows the same pattern as vegetation height with plantation and secondary forests closely related to one another. The Shannon Wenner index of diversity (Table 8) showed that the secondary forest was the most diverse (2.50) followed by plantation (2.15).

TABLE 4: Tree species and terrestrial herbaceous plants observed within the fallow forest of Loburo

Species Composition	Height(M)	DBH(Cm)	Frequency
Albizia ferruginea	8.00 ± 0.00	12.00 ± 0.00	1
Albizia zygia	5.00 ± 0.00	26.00 ± 0.00	4
Cola hispida	11.33 ± 0.61	141.50 ± 8.18	6
Ficus exasperate	1.83 ± 0.48	17.67 ± 2.46	6
Ficus goliath	4.00 ± 0.00	32.00 ± 0.00	1
Lecaniodiscus cupanioides	7.00 ± 1.00	48.00 ± 3.00	2
Mangifera indica	14.00 ± 0.00	130.00 ± 0.00	1
Rauvolfia vomitora	5.00 ± 0.00	30.00 ± 0.00	1
Crescentia cujete	6.00 ± 0.00	37.00 ± 0.00	1
Total			23
Herbaceous plant			
Alchornea cordifolia			Seedlings (Dominant)
Elaeis guineensis			Seedlings
Myrianthus arboreus			

At 95 % Confidence limit

TABLE 5: Tree species and terrestrial herbaceous plants observed within the developmental area of Loburo Forest

Species Composition	Height(M)	DBH (Cm)	Frequency
Crotalaria retusa	2.00 ± 0.00	10.00 ± 0.00	1
Harungana madagascariensis	3.00 ± 0.00	16.00 ± 0.00	1
Myrianthus arboreus	3.00 ± 0.00	14.00 ± 0.00	1
Spondias mombin	3.50 ± 1.50	16.50 ± 5.50	2
Tremas orientalis	3.88 ± 0.45	24.69 ± 2.88	13
Total			18
Herbaceous plant			
Alchornea cordifolia			30%
Carica papaya			7%
Chromolaena odorata			45%
Elaeis guineensis			Seedlings
Nephrolepsis bisserata			
Cyperus rotundus			25%

At 95 % Confidence limit

TABLE 6: Analysis of Variance of height of the tree species between the different vegetation types

Source	DF	SS	MS	F	P
Vegetation types	4	702.0	175.5	5.46	0.000
Error	185	5947.0	32.1		
Total	189	6649.0			

Significant at $P < 0.05$

TABLE 7: Analysis of Variance of diameter at breast height of the tree species between the different vegetation types

Source	DF	SS	MS	F	P
Vegetation types	4	30010	7502	5.50	0.000
Error	185	252204	1363		
Total	189	282214			

Significant at P < 0.05

TABLE 8: The diversity, evenness and dominance indices of the tree species observed in the different vegetation types

Indices	Raphia dominated	Plantation	Secondary forest	Fallow forest	Developmental area
Shannon-Wenner	1.52	2.15	2.50	1.90	0.96
Dominance	0.34	0.18	0.10	0.82	0.54

Discussion

The present vegetation of Loburo Forest represents a complete and radical departure from the original vegetation composition of the region as reported by White (1983). It is made up of very few early successional species devoid of the plants in the family Meliaceae and Moraceae that are typical characteristic of the lowland rain forest (Oke and Isichie, 1997; Oduwaiye, 2002; Oates *et al*., 2008). This attests to the level of disturbances and degradation that this once steady forested area had been subjected to. The vegetation height and DBH are very low showing that the forest had lost productivity and many of its attendant biodiversity. The only formation that appeared to be at steady state is the Raphia dominated land use/vegetation type and this is basically a result of its water logged condition which is of little value to physical development and agricultural activities. The secondary forest is limited in distribution with few patches regenerating hence the very low value for this land-use type.

In order to restore the biological diversity of Loburo Forest, there is the need to halt the level of degradation currently witnessed in the area and set aside some portions for regeneration. Religion can be used to bring about this as long as there is the awareness and willingness on the part of the religious organizations operating in the area. The organization of physical development taking place in the Redemption Camp attests to the fact that such changes are possible and more can be achieved through the commitment of the authority supervising the Redemption Camp to set up conservation committee comprising members of the community and staff of Biological Science Department of Redeemed University (RUN).

The role of green environment in healthy environmental services is now well known and it is therefore necessary that the authority of Redemption Camp be prevailed upon to set

aside a minimum of 20% of the land acquired from this forest for the purpose of conservation. This is in line with various forested area that had been taken up as concession for development such as Ologbo Concession Edo State (Bourgeon, 2005), the Lekki Conservation Centre, Lagos (Decker, 2007).

Conclusion

Loburo Forest, Ogun State Nigeria is one of the large tracks of ancient community forests in South-west Nigeria that has almost disappeared first through the construction of the Lagos – Ibadan Express way and the emergence of religious camping grounds. The Redeemed Christian Church of God operates the Redemption Camp, around which a community has grown with serious effects on the forest environs. The remnant biodiversity of the site could still be saved taking a cue from the experiences worldwide where such sites are repository of biological diversity. The commitment of supervising authority of the Redemption Camp in setting aside a minimum, 20% of the total area acquired right step. The site will not only be for the inspiration of the adherent, but as well as for the advancement of education and knowledge more so that there are various institutions of learning springing up in the community.

Refereces

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