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Dear Dr. Olubode Oluwaseun,

ACCEPTANCE OF YOUR MANUSCRIPT IJAR-172-07 FOR PUBLICATION

I am pleased to inform you that your manuscript titled **'Peri-Urban agricultural expansion and forest loss in Lapite, Ibadan, its implication for floristic composition and species invasion**" has been accepted for publication in IJAR. The article is scheduled for publication as part of Volume 18 (Issue 1) 2023 of the journal.

We trust that your experience with the Journal has been favourable. We look forward to working with you again.

Accept my congratulations

'Biodun Claudius-Cole

Editor-in-Chief

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Peri-Urban agricultural expansion and forest loss in Lapite, Ibadan, its implication for floristic composition and species invasion

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Abstract

Peri-urban agriculture in developing countries is in increasing demand for food as a result of increasing population. It offers an alternative land-use for income generation to ameliorate urban poverty and contributing to global food security. Peri-urban agriculture however causes forest loss, degradation, and species invasion. This study investigated the extent of forest loss, species composition, and importance of invasive species in peri-urban agriculture at Moniya, Akinyele local government area, Ibadan, Oyo State in the wet season of 2019. The study site was located at Lapite, Moniya, Ibadan on N 07° 34.253, E 003° 54.633; 235 m above sea level. Ten farmlands (sizes: 1120 m^2 and 3750 m^2) were evaluated within 70.4 hectares. Systematic sampling for herbaceous and woody flora was conducted using plot sizes of 10 × 10 m and one square meter quadrats, respectively. Land-use cover change from 1998-2018 was assessed with Arc GIS 10 on USGS Landsat imageries. Enumerated floristic data were analyzed for species composition, relative important value (RIV), and invasive species were noted. One hundred and thirty-two (132) herbaceous species in 38 families were enumerated with RIV ranging from 0.02% - 13.9%. *Talinum fruticosum* had the highest RIV (13.58%). Twenty woody species in 13 families were enumerated with RIV of 1.33% to 23.2%. *Elias guineensis* had the highest RIV. Five invasive species were identified. *Leucaena leucocephala* had the highest occurrence among invasive woody species (RIV=13.38). *Alternanthera sessilis* was the most (RIV= 2.5%) occurring invasive species. GIS analysis indicated bare/deforested areas increased from 8.33% in 1998 to 46.23% in 2018. Loss of cover and species invasion was attributed to the expansion of agricultural areas and might increase the impact of climate change in the area. Peri-urban agricultural activities in Moniya should be regulated to prevent the further incursion of invasive species and forest loss with associated benefits.

Keywords: *Peri-urban agriculture, deforestation, species composition, ecosystem change, Relative importance Value.*

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Introduction

Nigeria is well endowed with forest resources, accounting for about 2.5 percent of the Gross Domestic Products (GDP). These resources employ over 2 million people and more than 80,000 people working in the log processing industries, especially in the forest zones of the south (FAO, 2015). The resources are situated in high forests, woodlands, bushlands, plantations, and trees on farmlands. These forests occupy about 10 million hectares representing almost 10 percent of the total land area of 92,376,700 hectares. This total is made up of about 445 reserves, distributed over the five main ecological zones of Freshwater/mangrove, the lowland rainforest, the derived savanna, and the Sahel/Sudan savanna (FAO, 2015). According to Aigbe *et al*. (2012), forests provide a wide range of non-wood products and environmental functions, these products include conservation of biodiversity, medicine, watershed protection, stabilization of the hydrological regimes, and carbon sequestration.

Despite the huge resources, increase in human population, its demands, and subsequent anthropogenic activities have continuously been mounting pressure on the ecosystem (FAO, 2017). The continuous alteration of the ecosystem by man and his quest for alternative use of the environment has resulted in a continuous and serious degradation of the ecosystem which thus poses a threat to nature and its inhabitants (Ogunwale, 2015). Anthropogenic activities mostly implicated in forest depletion globally are agriculture, pollution, urbanization, road construction, mineral exploitation, oil-spillage, and industrialization (Ibrahim *et al*., 2015). Nigeria is not left out of the tragedy befalling forests worldwide. From 2001 to 2018 alone, the country has lost 818,286 ha of its tree cover. This accounts for 6% of its total tree cover (Mongabay Deforestation Statistics, 2019). The loss of this large amount of forest and its resources can be traced to anthropogenic activities of man. The rate of losses of forest and associated resources in Nigeria is attributed to factors including uncoordinated land use policy and other forms of land use such as agriculture, grazing, industrialization, urbanization, and water management leading to the formation of deserts, bare surfaces, and general environmental degradation (Aigbe *et al*., 2012).

Continuous opening of lands for agricultural expansion has established itself as one of the major threats to biodiversity loss, in most developing countries which are characterized by an enormous population, high poverty rate, and expensive price of acquiring fertilizers. Therefore, farmers explore uncultivated farmlands which are still fertile as a means of improvising cheap sources of fertilizers and expanding their farm size and output. Onuche (2010). This, in turn leads to biodiversity and habitat loss, loss of forest and its resources. This rate of forest expansion drew the attention of the FAO (2001) who warned that if the rate of forest loss increases at the present progression, by 2050 the world's arable land will increase by some 70 million hectares, and much of the new farmland will be on areas that are currently forested.

In recent years, peri-urban agriculture has gained more popularity in many developing countries with increased demand for food and other agricultural produce for its ever-increasing population, and its potential as an alternative source of income and alleviation of poverty and food insecurity. (Germer *et al*., 2011). Therefore, peri-urban agriculture is an important food security functional mechanism used by the FAO in response to food scarcity and insecurity in most developing countries (FAO,2001). Benefits of peri-urban agriculture as described by Duchemin *et al*. (2008) include food security, food accessibility, good food quality, economic integration, fight against poverty, prevention of biodiversity loss, multiple inter-individual interactions, social participation, and social integration among others.

However, agricultural activities have been established as major drivers of climatic change, with the emission of greenhouse gases from agricultural activities contributing to 30% of anthropogenic greenhouse emissions (Smith *et al.*, 2013). Global demand for agricultural products such as food feeds, and fuel is increasing the demand for croplands and pasture expansion across much of the developing world (Gibbs *et al.*,2010). In recent times, many forested areas have been lost to arable farming leading to land cover change occasioned by vegetation loss or species invasion.

Land cover change has been described as the third most important anthropogenic cause of carbon emissions globally and the second most important in developing countries (World Bank, 2010). Tree species that serve as a device for sequestrating carbon are cut down and large expanses of land are opened up for agricultural expansions. Gibbs *et al.* (2010) described the agricultural expansion as the major driver of tropical deforestation and reported that between 1980 and 2000, both intact forest and disturbed forest have given way for the creation of new agricultural lands with intact forest accounting for 55% loss and disturbed forest accounting for 28% loss. The impact of this population increase and the increased pressure subsequent pressure on rural lands and attendant cover changes are disproportionately reported for Nigeria and other developing countries.

This study aimed at fulfilling the following objectives:

1. Assess floristic composition of peri-urban land use in Lapite, Moniya, Oyo State, Nigeria
2. Evaluate rate of forest loss due to agricultural expansion in Lapite, Moniya, Oyo State, Nigeria
3. Identify invasive species in Lapite, Moniya, Oyo State, Nigeria

Materials and methods

Location and description of the study site

The study was located at Lapite village, a peri-urban settlement located close to Moniya (also a peri-urban town) at Akinyele local government area, Ibadan, Oyo State, Nigeria between latitude 07º 34.253 and longitude E 003º 54.633 and elevation of 235 m above sea level. The study area consisted of ten farmlands ranging from 3750 m^2 to 1200 m^2 in the area and summing up to over 70.4 hectares. They comprised either mixed cropping or mono-cropping of maize, cassava, okra, leaf vegetables, potatoes, cocoyam, and banana. The study area featured a large dumpsite that covered about ten hectares of the land surface.

Data collection

Flora sampling procedure

A systematic sampling design was employed for the assessment of the flora composition of the study area, using a plot size of 10 ×10 m^2, with the number of plots determined by the farm size, and a randomized sampling technique was used for the enumeration of the tree samples. Enumeration of herbaceous flora contents was done using quadrats of 1m ×1m size which were laid systematically at the corners and center of each plot. Data were collected on the heights and stem girths of tree species encountered.

Species identification and enumeration

Herbaceous flora identification followed identification using the flora of Johnson (1997) and Akobundu *et al.* (2016). Tree species were identified using Nigeria Trees by Keay *et al.* (1964) and West African Flora of Hutchinson and Dalziel (1979). Species were identified for their invasiveness from the IUCN invasive species database. (IUCN, 2019).

Global positioning system (GPS); Garmin™ertrex12 H model was used for geo-referencing (determination of the coordinates: longitude and latitude and elevation of the study site and aerial mapping). A meter rule of 100 meters long was used for measurement of demarcated plot size at intervals and the stem girth of each tree species was taken at breast height. A one square meter quadrat was used for quantitative enumeration of the flora samples present at the study site. Wooden pegs were used to demarcate the transects from one another.

Data analytical tool

Analysis for geographical data

Google earth 2018 was used to determine the coordinates of the study site. The historical changes in the vegetation and the landscape of the study site were assessed using a Geographic information system (GIS). Information on the land-use land cover changes of the study site from 1998-2018 was obtained with Arc GIS 10 from USGS Landsat imageries.

Multivariate analysis for floristic data

Detrended Correspondence Analysis (DECORANA) Software

Detrended correspondence analysis DCA was used to indicate the relatedness of a quadrant to others (Hill, 2012). The most explanatory combination of axes was used to display variations and relationships. Paleontological statistics (PAST2.14) version software (Hammer *et al.*, 2001) was used for multivariate analysis, phytosociological classification and computation of diversity indices.

RESULTS

Results of Species Composition of Lapite Moniya

A total of one hundred and thirty-two 132 species of herbaceous flora belonging to 38 different families were enumerated on the field with relative importance values (RIV) ranging from 0.012% to 13.9% as presented in Table 1. *Talinum fruticosum* had the highest RIV (13.9%), followed by *Euphorbia heterophylla* (8.1%), and *Tithonia diversifolia* (6.3%), with *Mallotus oppositifolius, Vernonia cinerea, Daniella oliveri, Physalis micrantha, Manniophyton fulvum, Aconthospermum hisipidum,* having the least RIV (0.012%).

Twenty woody species in 13 families were enumerated with RIV ranging from 1.3% to 23.2%. *Elias guineensis,* had the highest RIV (23.2%) followed by *Newbouldia laevis* (13.9%) and *Leuceanea leucocephala* (10.3%), while *Ficus polita, Bridella feruginea,* and *Anthoceilesta djalolensis* had the lowest each with RIV of 1.3% (Table 2).

Table 1: Composition and relative importance value of herbaceous flora at Lapite, Moniya, Ibadan

Species	Family	RIV
Talinum fruticosum (L.) Juss.	Portulacaceae	13.588

Euphorbia heterophylla L.	Euphorbiaceae	8.056
Tridax procumbens L.	Asteraceae	6.341
Tithonia diversifolia (Helmsl.) A. Gray	Asteraceae	6.329
Laportea aaestuans (Linn.) Chew	Uticaceae	4.212
Marriscus alternifolius Vahl.	Cyperaceae	3.897
Spermacoce ocymoides Burm f.	Rubiaceae	3.850
Celosia leptostachya Benth.	Amaranthaceae	3.258
Spigelia anthelmia Linn.	Loganiaceae	3.142
Oldenlandia corymbosa Linn.	Rubiaceae	3.131
Phyllanthus amarus Schum. & Thonn.	Euphorbiaceae	2.522
Merremia aegyptia (Linn.) Urban	Convolvuaceae	2.494
Desmodium scorpiurus (Sw.) Desv.	Fabaceae	2.008
Senna hirsuta (Linn.) Irwin & Barneby	Fabaceae	1.707
Synedrella nofiflora Gaertn.	Asteraceae	1.698
Ageratum conyzoides Linn.	Asteraceae	1.619
Sida garckeana Polak	Malvaceae	1.553
Peperomia pellucida (L.) H.B. & K.	Piperaceae	1.536
Commelina benghalensis L.	Commelinaceae	1.372
Paullinia pinnata L.	Sapindaceae	1.310
Calopogonium mmucunoides Desv.	Fabaceae	1.304
Centrosema pubescens Benth.	Fabaceae	1.251
Commelina erecta L.	Commelinaceae	1.056
Brachiaria deflexa (Schumach) C.E. Hubbard	Poaceae	1.013
Euphorbia hyssopifolia Linn.	Euphorbiaceae	1.012
Euphorbia hirta Linn.	Euphorbiaceae	0.991

Cromolaena odorata (L.) R. M. King & Robinson	Asteraceae	0.879
Asystasia gangetica (Linn.) T. Anders	Acanthaceae	0.879
Desmodium tortuosum (Sw.) DC.	Fabaceae	0.840
Shrankia leptocarpa DC	Fabaceae	0.829
Boerhavia errecta Linn.	Nyctaginaceae	0.798
Acroceras zinaniodes Dandy	Poaceae	0.663
Solanum nigrum L.	Solanaceae	0.625
Alchornea cordifolia (Schum & Thonn.) Mull. Arg.	Euphorbiaceae	0.617
Alternanthera ficodea (L.) Sm.	Amaranthaceae	0.584
Mucuna pruriens (L.) Dc.	Fabaceae	0.539
Pouzolzia guineensis Benth.	Urticaceae	0.511
Commelina africana L.	Commelinaceae	0.510
Sida acuta Burm. F.	Malvaceae	0.461
Passiflora foetida L.	Passifloraceae	0.452
Ficus exasperata Vahl.	Moraceae	0.427
Senna obtusifolia (L.) Irwin & Barneby	Fabaceae	0.410
Ipomea involucrata P. Beauv.	Convulvulaceae	0.393
Alchornea laxiflora (Benth.) Pax & K. Hofm	Euphorbiaceae	0.375
Melanthera scandens (Schum & Thonn.) Roberty	Compositae	0.373
Albizia zygia (Dc.) J.F. Macbr. (Seeedling)	Fabaceae	0.357
Platostoma africanum P. Beauv.	Lamiaceae	0.330
Commelina diffusa Burm. f.	Commelinaceae	0.329
Triumfetta rhomboidea Jacq.	Malvaceae	0.312
Physalis angulate Linn.	Solanaceae	0.311
Cleome viscosa L.	Cleomaceae	0.282

Acalypha fimbriata Schum & Thonn.	Euphorbiaceae	0.266
Trema orientalis	Cannabaceae	0.251
Combretrum hispidum Laws.	Combretaceae	0.250
Corchoru stridens L.	Malvaceae	0.240
Oplismenus burmannii (Retz.) P. Beauv.	Poaceae	0.212
Solenostemon monostachyus (P. Beauv.) Brig.	Lamiaceae	0.208
Newbouldia laevis (P. Beauv.) Seemann *ex* Bureau	Bignoniaceae	0.203
Mimosa pudica Linn.	Fabaceae	0.203
Panicum maximum Jacq.	Poaceae	0.196
Cynodon dactylon (Linn.) Pers.	Poaceae	0.186
Brachiaria lata (Schumach) C.E.Hubbard	Poaceae	0.186
Portulaca quadrifida Linn.	Portulacaceae	0.178
Sclerocarpus africanus Jacq. ex Murr	Asteraceae	0.176
Axonopus compressus (Sw) P. Beauv.	Poaceae	0.176
Digitaria horizontalis Willd	Poaceae	0.174
Combretum racemosum P. Beauv.	Combretaceae	0.160
Triumfetta cordifolia A. Rich.	Malvaceae	0.157
Azadirachta indica A. Juss. (Seedling)	Meliaceae	0.151
Wahlenbergi aperrottetii	Campanulaceae	0.139
Amaranthus spinosus Linn.	Amaranthaceae	0.120
Cyperus rotundus Linn.	Cyperaceae	0.120
Pueraria phaseoloides (Roxb.) Benth	Fabaceae	0.116
Ipomoea triloba Linn.	Convulvulaceae	0.110
Pennisetum polystachion (Linn.) Schult.	Poaceae	0.105
Digitaria nuda (Schumach)	Poaceae	0.104

Marriscus fllabeliformis Kunth var.	Cyperaceae	0.103
Luffa cylindrica (Linn.) M.J. Roem.	Cucurbitaceae	0.098
Reissantia indica (Willd.) N. Hallé	Celastraceae	0.089
Pupalia lappacea (Linn.) Juss.	Amaranthaceae	0.084
Parquetina nigrescens Afzel.	Apocynaceae	0.079
Solanium torvum Swartz	Solanaceae	0.074
Lepistemon owariense (P. Beauv.) Hall.	Convolvulaceae	0.072
Emilia praetermissa Milne-Redhead	Asteraceae	0.071
Rottboellia cochinchinensis (Lour.) Clayton	Poaceae	0.069
Leptochloa caerulescens Steud.	Poaceae	0.069
Combretum zenkeri Engl. Diels	combretacea	0.068
Gomphrena celosioides Mart.	Amaranthaceae	0.067
Boerhavia coccinea Mill.	Nyctaginaceae	0.060
Spilanthes costata Benth.	Asteraceae	0.058
Cnestis ferruginea DC	Connaraceae	0.053
Celosia isertii C.C. Townsend	Amaranthaceae	0.052
Ipomea eriocarpa R. Br.	Convolvulaceae	0.049
Eleusine indica Gaertn.	Poaceae	0.048
Typha orientalis C. Presl	Typaceae	0.044
Paspalum conjugatum Berg.	Poaceae	0.044
Anthonotha macrophylla P. Beauv.	Fabaceae	0.042
Leptochloa filiformis (Lam.) P. Beauv.	Poaceae	0.042
Diodia samentosa Sw.	Rubiaceae	0.041
Ageratum conyzoides Linn.	Asteraceae	0.040
Cleome rutidosperma DC.	Cleomaceae	0.039

Piliostigma thoninngii Milne-Redhead	Fabaceae	0.037
Croton lobatus L.	Euphorbiaceae	0.034
Cochorius olitorius L.	Malvaceae	0.034
Abutilon indicum (Jacq.) Medic.	Malvaceae	0.032
Triathema portulacastrum Linn.	Aizoaceae	0.031
Setaria megaphylla (Steud.) Dur & Schinz	Poaceae	0.031
Scoparia dulcis Linn.	Plantaginaceae	0.028
Anielema beniniense (P. Beauv.) Hunth	Convolvulaceae	0.028
Dactylotenum aegyptium (Linn.) P. Beauv.	Poaceae	0.027
Senna occidentalis (L.) Link	Fabaceae	0.026
Vernonia amygdalina Delile	Asteraceae	0.026
Cyperus esculentus Linn.	Cyperaceae	0.026
Eragrostis tenella (Linn.) P. Beauv. ex Roem &Schult	Poaceae	0.026
Portulaca oleracea Linn.	Portulacaceae	0.025
Manniophyton fulvum Mull. Arg.	Euphorbiaceae	0.025
*Alchornia cor*difolia Mull. Arg.	Euphorbiaceae	0.025
Oldelandia corymbosa Linn.	Rubiaceae	0.018
Cleome viscosa L.	Cleomaceae	0.016
Diditaria gayana (Kunth) Stapf. ex A. Chev.	Poaceae	0.014
Icacina trichanta Oliv.	Icacinaceae	0.014
Cenchrus biflorus Roxb.	Poaceae	0.014
Paspalum scrobiculatum Linn.	Poaceae	0.014
Mariscus longibracteatus Cherm.	Cyperaceae	0.014
Ipomoea mauritiana Jacq.	Convolvulaceae	0.012
Vernonia cinerea (Linn.) Less.	Asteraceae	0.012

Daniellia oliveri (Rolfe) Hutch & Dalz.	Fabaceae	0.012
Mallotus oppositifolius (Geisel) Mull. Arg.	Euphorbiaceae	0.012
Physalis micrantha Linn.	Solanaceae	0.012
Acanthospermum hisipidum DC	Asteraceae	0.012

Table 2: Woody Floral Composition and Relative Importance Values of the peri-urban area of Moniya, Ibadan in 2019

S/N	SPECIES	FAMILY	RIV
1.	*Elaeis guineensis* Jacq.	Arecaceae	23.157
2.	*Newbouldia laevis* (P. Beauv.) Seemann *ex* Bureau.	Bignoniaceae	13.945
3.	*Leuceanea leucocephala* (Lam.) de Wit.	Fabaceae	10.382
4.	*Ficus exasperate* Vahl.	Moraceae	9.310
5.	*Milletia thonningii* (Schumach.) Baker	Fabaceae	5.546
6.	*Magnifera indica* L.	Anacardiaceae	5.095
7.	*Morinda lucida* Benth.	Rubiaceae	5.095
8.	*Gliricidia sepium* (Jacq.) Steud.	Fabaceae	3.544
9.	*Gmeliana arborea* Roxb.	Lamiaceae	3.534
10.	*Tectona grandis* L.f.	Lamiaceae	2.433
11.	*Cocos nucifera* L.	Arecaceae	1.992
12.	*Havea brasiliensis* Mull. Arg.	Euphorbiaceae	1.992
13.	*Anacardium occidentale* L.	Anacardiaceae	1.772
14.	*Anthocleista djalolensis* A. Chev.	Longaniaceae	1.331
15.	*Citrus sinensis* (L.) Osbeck	Rutaceae	1.552
16.	*Spondias mombin* L.	Anacardiaceae	1.331
17.	*Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) Baill.	Irvingiaceae	2.663
18.	*Bridella feruginea* Benth.	Euphorbiaceae	1.331
19.	*Albizia lebbeck* (L.) Benth.	Fabaceae	2.663
20.	*Ficus polita* Vahl.	Moraceae	1.331

Diversity indices of herbaceous flora in Moniya, Ibadan

The diversity indices accounted for 132 species (Taxa) with a total abundance of 26757 individual plants (Table 3). The dominance index of 0.06911 for herbatious plants indicated that there was no prevalence of any species in the study site. Simpson index showed a value of 0.9309 which indicated that there was high species richness and moderately even distribution with Evenness index of 0.2182. Diversity of species in the study area was very high with the Shannon Weiner value at 3.361. The high diversity was accounted for by many of the enumerated herbaceous plant (Figure 3).

The woody flora had a lower diversity indices than herbaceous flora of Lapite, Ibadan, Twenty species (Taxa) with a total abundance of 227 individuals were enumerated in the study site. The low dominance index (0.202) indicated that no particular species was dominating the study area. Simpson index of 0.797 indicated that there was fairly high species richness and near moderate even distribution (0.423) across the landscape. Equitability index (0.7128) indicated that each plot used for the enumeration had a fairly high even distribution of various species encountered. Diversity of woody plants was high (though not as high as that of herbaceous flora) with a Shannon-weiner value of 2.135 (Table 3). The diversity was accounted for by few of the enumerated woody plants, except *Ficus polita*, *Ficus exasperata* and *Elaeis gunieensis* (Figure 4)

Table 3: Species Diversity of Herbaceous and woody flora at Lapite, Moniya, Ibadan

Diversity index	Herbaceous plants	Woody plants
Taxa_S	132	20
Individuals	26757	227
Dominance_D	0.06911	0.2029
Simpson_1-D	0.9309	0.7971
Shannon_H	3.361	2.135
Evenness_e^H/S	0.2182	0.423
Equitability_J	0.6882	0.7128

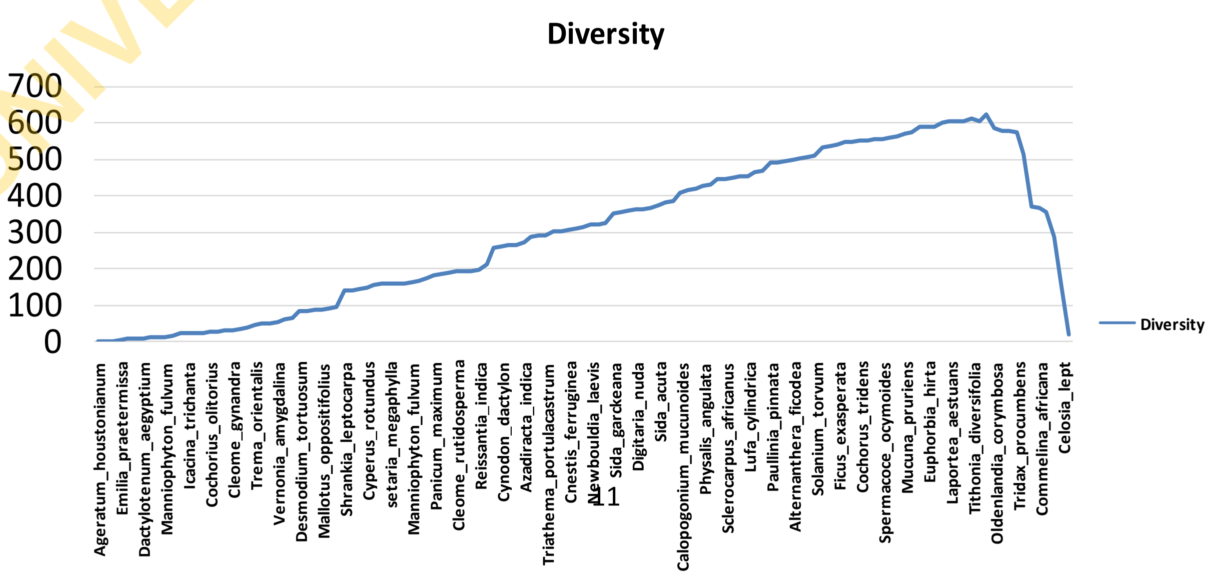

Figure 3: Diversity curve of herbaceous species at Lapite, Moniya, Ibadan

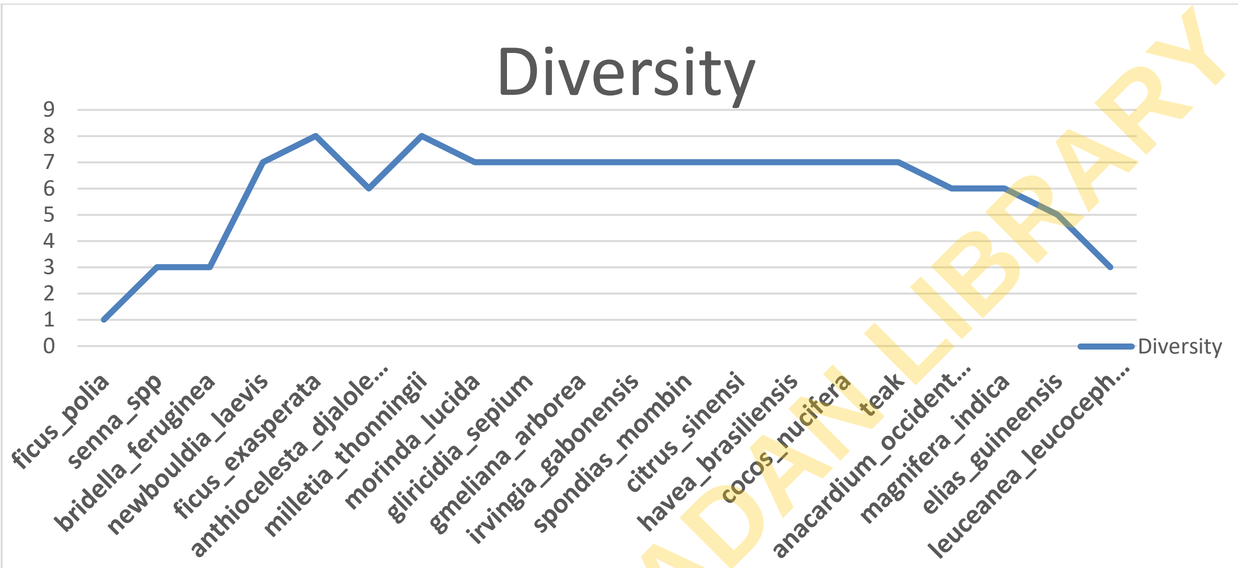

Figure 4: Diversity curve of woody species of Lapite, Moniya, Ibadan

Species invasion among herbaceous and woody flora at Lapite, Moniya, Ibadan

Five prominent invasive species were identified at the study site comprising *Leuceanea leucocephala* being the only woody invasive species identified with an RIV of 13.3% among the woody plants. *Alternathera sessilis, Chromolaena odorata, Mimosa pudica, and Cyperus rotundus* were the identified invasive herbaceous plant with *Alternanthera sessilis* being the most occurring invasive species with RIV of 2.5% (Table 5).

Vegetation change in the study site as a result of peri-urban agricultural activities

Land-use cover change from 1998-2018 assessed with Arc GIS 10 on USGS Landsat imageries showed that the vegetation cover of the study site substantially changed over time. In 2018, the vegetation cover reduced to 68.75% from 1998. The non-vegetated area covered 31.24%, further, slighhly more vegetation was however recorded in 2018 where non-vegetated areas, corresponding to built-up areas in 1998 had increased from 31.24% to 32.65% in 2018. The increase can therefore be largely attributable to increase in the build-up areas.

Table 5: List of invasive species encountered among the flora of Moniya and Environs in June-August, 2019

Species	Family	Relative Importance Values
*Leuceanea leucocephala**	*Fabaceae*	13.38

Mimosa pudica	*Fabaceae*	0.06
Chromolaenaodorata	*Asteracea*	0.89
Cyperusrotundus	*Cyperaceae*	0.12
Alternatherasessilis	*Amaranthaceae*	2.47

* = woody plant

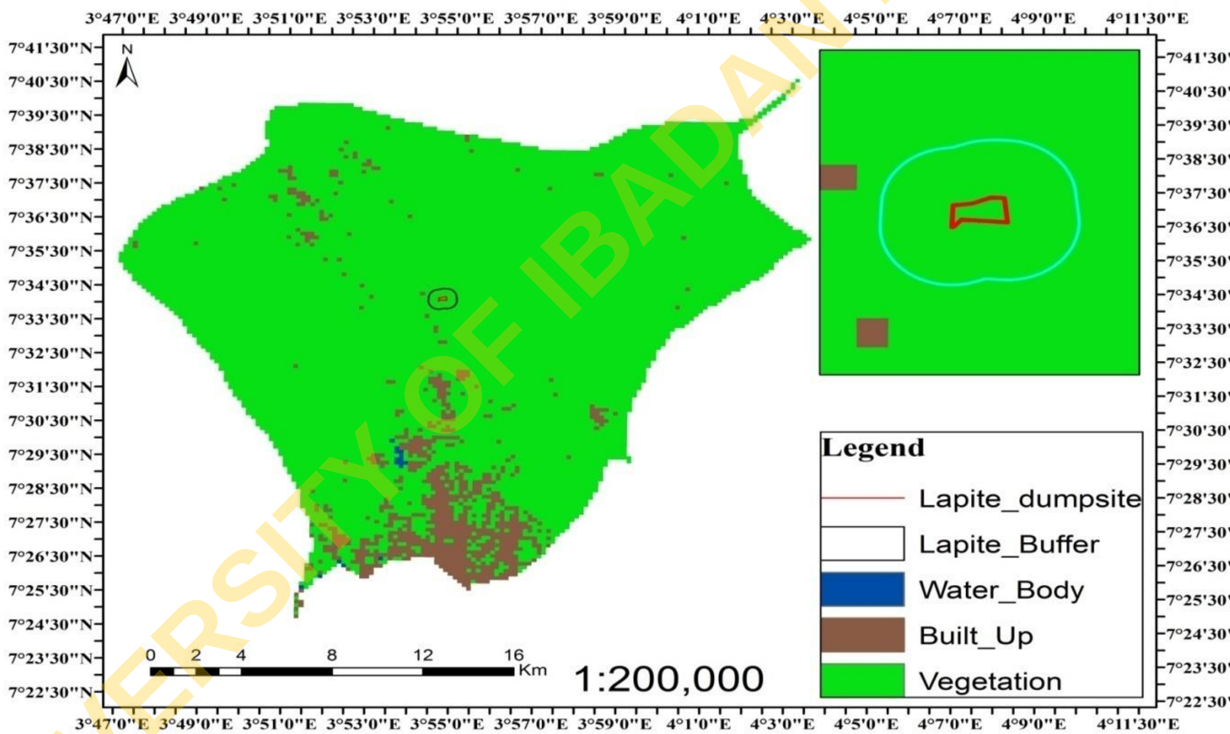

Figure 7: Land-use type and land-use cover of Lapite and Moniya in 1998

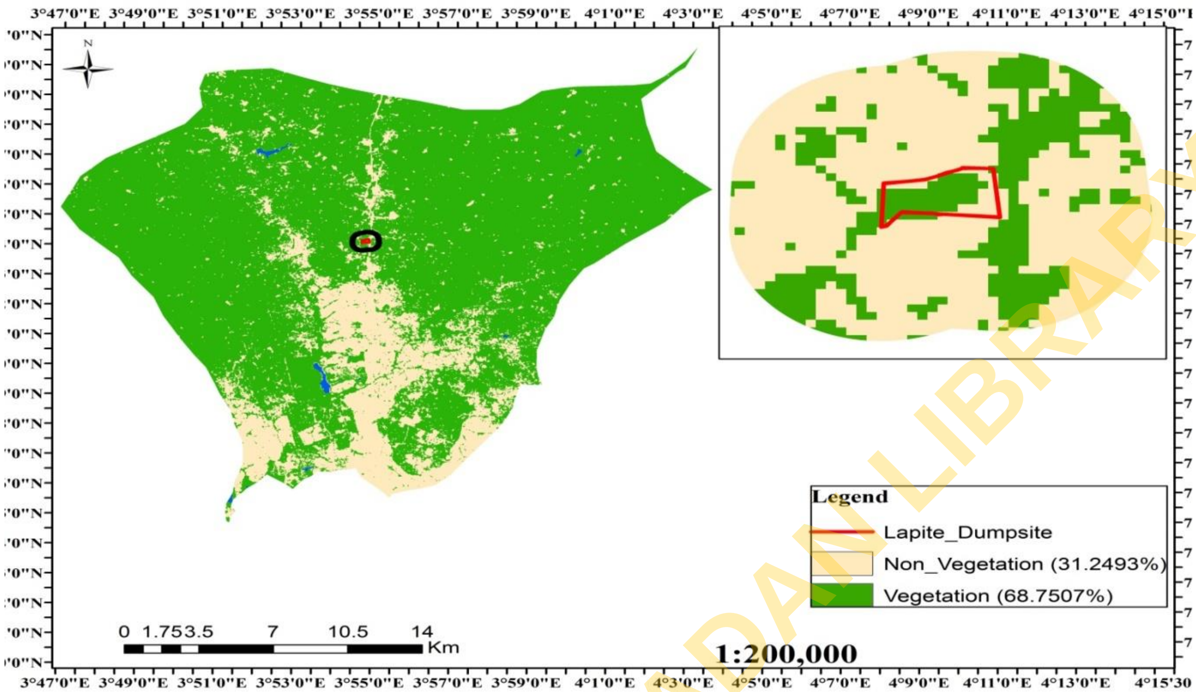

Figure 8: Land-use type and land-use cover of Lapite and Moniya 2018.

Discussion and conclusion

The study revealed that vegetation cover of Lapite in Moniya reduced over the years as a result of construction-related activities. A loss of 32.72% of agricultural and forest lands was recorded from 1998 to 2018. The presence of many herbaceous species (ruderals and agrestals) known to associate with disturbed habitats supports FAO (2016) that arable farming contributes to reduction of forest lands in the tropics; and Ibrahim *et al*. (2015) that agricultural activities, anthropogenic activities such as urbanization, pollution, road construction, mineral exploitation, oil-spillage, and industrialization as the major causes of forest depletion globally.

Agricultural practices, as the main source of livelihood of many peri-urban dwellers, reflect in the nature of vegetation of peri-urban communities, as they interface with urban areas. The agrarian nature of Lapite community in Moniya contributed mainly to state of its vegetation. The loss of its vegetation/forest cover was suspectedly enhanced by its proximity to Ibadan city, an urban settlement. Demand for cropland, fuelwood and pasture are among main drivers of ecosystem change. In agreement with the reports of Gibbs *et al*, (2010) and Adu *et al* (2012), the low populations of tree species in study area could have been occasioned by felling to make room for agriculture expansion, while the gaps created were being compensated for by the high populations and diversity of agresters. It also could have contributed to the presence of invasive species in the site. This was so as Duke (2002) highlighted that the ecosystem is a structural system, such that alteration or perturbation of one of the structures creates a vacuum for the incursion of invasion into the ecosystem.

The slight gain in vegetation cover over a 10-year period was an indication that the ecosystem is prone to slow recovery, and efforts should be made to encourage tree conservation practices, especially because of other benefits such as climate change mitigation, watershed protection and soil conservation. Peri-urban agricultural farmers should practice integrated farming methods as they help to conserve natural resources. Furthermore, integrated land-use planning that provides an essential strategic framework for balancing land uses should be encouraged.

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