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Impact of urbanization on the floristic diversity of home gardens in Abomey-Calavi: Towards a sustainable conservation strategy

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Abstract

Home gardens are vital systems for producing utilitarian plants, typically situated in or near residences. The diversity of these gardens is influenced by the urban layout and the sociocultural background of their locations. This research aims to examine the diversity and sustaining factors of home gardens along a rural-urban continuum to enhance their value in Abomey-Calavi municipality. The study employed a systematic inventory of plant species, complemented by a socio-economic survey conducted in 150 households possessing home gardens, distributed across three urbanization levels: urban, peri-urban, and rural. To characterize the home gardens, species richness, Shannon diversity index, and Pielou's equitability were calculated. Linear regression was used to assess the impact of urbanization levels on species richness, and binary logistic regression identified the determinants for conserving home gardens among the population. The findings reveal a total species richness of 112 species across 46 botanical families, with noticeable variations along the rural-urban gradient. The average number of plant species per garden is 14 ± 0.32 in rural settings, 7 ± 0.32 in peri-urban areas, and 3 ± 0.22 in urban areas. The dominant families include Euphorbiaceae, Moraceae, Caesalpiniaceae, and Combretaceae. The Shannon diversity index is higher in rural areas (2.94 bits) than in urban areas (2.5 bits). The study identified a declining species richness from city centers to peripheral zones (R^2 = 0.66; P <0.001). Respondents cited mostly occupation and income level as key factors for maintaining home gardens. These insights can guide local policy decisions to develop conservation strategies for preserving the floristic diversity across varying urbanization levels.

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Introduction

Home gardens are traditional land-use systems around settlements where various utilitarian plant species are maintained or cultivated by the inhabitants. These species are used daily for food, traditional medicine, and many other ecosystem services (Gbedomon *et al.*, 2017).

According to the FAO (2019), home gardens, also known as "domestic gardens" or "mixed gardens," are generally established near dwellings and represent the most intensively cultivated part of agricultural lands. Studies have shown that 60% of family food comes from home gardens, in which trees play a crucial role (Khanal *et al.*, 2019). They, thus serve as an alternative to biodiversity conservation, especially for plant genetic resources (Galhena *et al.*, 2013; Nomel *et al.*, 2019). From a socio-economic perspective, home gardens contribute significantly to food security (Kimbatsa *et al.*, 2018; Aké-Assi *et al.*, 2020), as they complement other agricultural production such as fruit production and subsistence or cash crops. They account for 59% of crop production and an increasingly important share of agricultural income (FAO, 2019). In the light of these challenges, it is necessary to consider strategies for their conservation in the context of remarkable urban and demographic growth.

Urban expansion and demographic growth are currently key factors influencing biodiversity in general, and particularly in urban and peri-urban areas (Blood *et al.*, 2016; Dieng *et al.*, 2019). These factors alter ecology, socio-economic conditions, and market dynamics, which in turn shape the plant diversity of home gardens (Sander and Vandebroek, 2016), making them dynamic over time. In developing countries, this problem is even more pronounced due to the lack of spatial planning (Moscarelli, 2016). It leads to a reduction in cultivable areas around dwellings, following the urbanization gradient. Consequently, the choice of species for home gardens depends on their structure (Mili *et al.*, 2019) and their ability to adapt to the ecological conditions of the environment (Vroh and Kouamé, 2022).

In Benin, where natural resources are under intense pressure from agriculture and urbanization, home gardens in large cities become increasingly scarce as one moves away from urban centers (Salako *et al.*, 2014; Idohou *et al.*, 2014). This is evident in the municipality of Abomey-Calavi, which has experienced significant demographic growth in recent decades due to rural exodus and economic access to land (Dossou, 2005; Mairie d'Abomey-Calavi, 2017). This has led to a prioritization and chaotic occupation of space by buildings, reducing the number of home gardens, their biodiversity, and the ecosystem services they provide to the population. It is therefore, necessary to assess the current state of plant diversity in these gardens (Sidibé *et al.*, 2020), which are becoming increasingly rare in Abomey-Calavi.

This study was initiated to address this concern, with the aim of assessing the impact of urbanization on the floristic diversity of home gardens, in order to ensure the sustainable management of utilitarian biodiversity in Abomey-Calavi. The results of this study provide a technical basis for promoting home gardens and conserving urban biodiversity in Benin.

Materials and methods

Study area

The municipality of Abomey-Calavi is located in the Atlantic Department of the Republic of Benin. It lies between 6°22' and 6°30' North latitude and between 2°15' and 2°22' East longitude (Fig. 1). It is bounded to the north by the municipality of Zè, to the south by the Atlantic Ocean, to the east by the municipalitys of Cotonou and So-Ava, and to the west by the municipalitys of Ouidah and Tori-Bossito. The municipality covers an area of 539 km².

According to the latest population census in Benin, the population is estimated at 656,358 inhabitants, of which 332,784 are women (INSAE, 2016). The municipality is divided into nine (9) districts: Abomey-Calavi, Akassato, Godomey, Golo-Djigbé, Hèvié, Kpanroun, Ouèdo, Togba, and Zinvié. The climate of the municipality is subequatorial, characterized by four seasons: a long rainy season

(April to July), a short rainy season (September to November), a long dry season (December to March), and a short dry season (August to September). The terrain is relatively flat, consisting of sandy plains and lateritic plateaus interspersed with depressions and marshes. The dominant social groups in the municipality are : Aïzo and Fon. However, other groups such as the Goun, Nago, Toffin, Yoruba, and others are also present. The main economic activities include agriculture, fishing, agricultural product processing, livestock farming, industry, trade, crafts, and tourism (Mairie d'Abomey-Calavi, 2017).

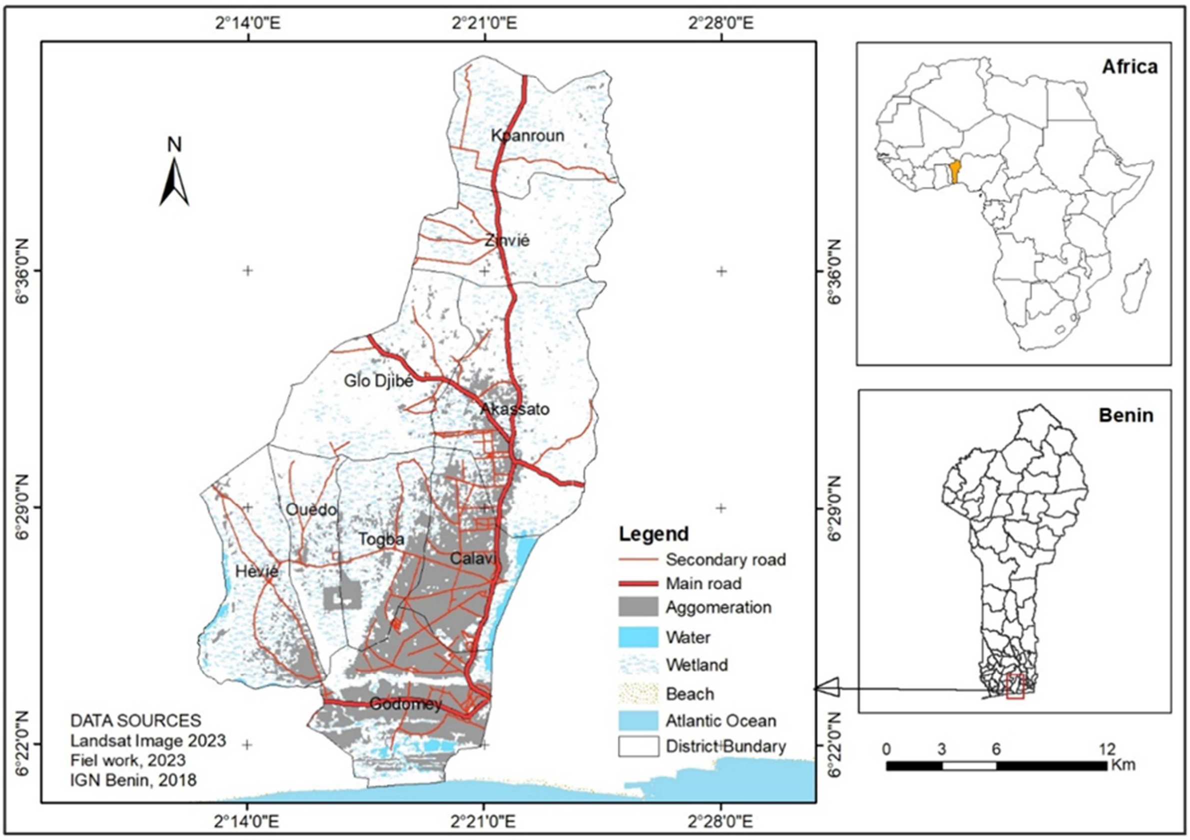

Fig. 1. Map of the study area

Sampling methods and data collection

Data collection was based on a systematic inventory of the plant species cultivated by households in municipalitythe Abomey-Calavi municipality. Species were recorded using an inventory sheet that included the species name and its botanical family. A total of 150 households were surveyed in 18 localities spread across the urban areas of the municipality.

The sampling of these 150 households was done by interviewing 30 randomly selected individuals within the study area. This survey determined the proportion of individuals who either owned home gardens or had knowledge of them. The actual sample size was then calculated from the survey results using the Dagnelie's formula (1998).

$$n = \frac{U^2{}_{1\_}\alpha/_2 \times P(1-p)}{d^2}$$

In this study, n represents the total number of individuals surveyed, which is the sample size. $U_{1-\alpha/2}$ is the value of the standard normal variable for a given probability; for α=0.05, α = 0.05, $U^2_{1-\alpha/2} = 4$; p is the proportion of individuals who have knowledge of home gardens (our survey results showed p=0.46p, d is the margin of error allowed, which for this study was set at 8%.

Based on these parameters, the calculated sample size was approximately 155 households. However, for equitable distribution, 150 households were selected and distributed across different localities within the three urbanization zones (Table 1).

Table 1. List of surveyed localities

Type of environment	District	Village/Urban neighborhood
Urban	Abomey-Calavi	Alédjo
		Agori
		Aitchédji
	Godomey	Logbozounkpa
		Cocotomey
		Atrokpo-Codji
Peri-urban	Akassato	Misséssinto
		Agassa-Godomey
		Gbétagbo
	Togba	Tokan
		Togba
		Ouéga-Tokpa
Rural	Golo-Djigbé	Agonkèssa
		Zèkanmey
		Yékon-Aga
	Kpanroun	Kplassouhoué
		Hadjanaho
		Kpanroun

Table 2. Demographic criteria for choosing the urbanization gradient

Demographic rate	Degree of urbanization	Type of environment
More than 75% of the district's population lives in an urban environment	100%	Urban
25 to 74% of the district's population lives in an urban environment	50%	Peri-urbain
Less than 25% of the district's population lives in an urban environment	25%	Rural

To identify the 150 households in these localities, the snowball sampling method was used, based on the network structure of the target population. In this approach, households with home gardens are first identified and then, the head of the household is asked to recommend other households with similar gardens. This process continues until a saturation point is reached. In this context, the saturation point is defined as the number of households selected for each village or urban neighborhood based on the level of urbanization. To assess the level of urbanization in the municipality of Abomey-Calavi, the demographic criteria proposed by the United Nations Habitat Programme in 2016 (http://www.unhabitat.org) were used and are presented in Table 2.

The analysis of factors influencing the conservation of home gardens is based on sociodemographic data collected from the households surveyed. The variables collected include (i) the reasons for establishing a home garden, (ii) the utility of a home garden, and (iii) the measures taken to preserve these gardens.

Data analysis

Characterization of home gardens in Abomey-Calavi along the rural-urban gradient

Species identification was performed either directly in the field or at the National Herbarium of Benin. Botanical nomenclature for Angiosperms (http://www.tela.botanica.org) and The Plant List from Kew and Missouri Botanical Garden (http://www.theplantlist.org/) were also exploited.

Diversity parameters calculated include species richness, the Shannon-Weaver diversity index, and Pielou's eveness.

Species Richness (S) represents the total number of species present in a given home garden.

Shannon Diversity Index (H) represents the number of species in a home garden based on the relative proportion of individuals among various species.

$$H = -\sum_{i=1}^{n} Pi.Log_2 Pi$$

The index generally ranges between 0 and 5 bits (Hmax), and sometimes beyond. The value pi (ranging between 0 and 1) represents the relative proportion of individuals of species iii within the total population of all species; pi = ni /∑ ni, where ni is the number of individuals of species i and ∑ni is the total number of individuals across all species

Pielou's eveness (R): Often used alongside the Shannon diversity index to assess the evenness of species distribution. It measures the degree of diversity in a plantation and corresponds to the ratio between the actual diversity (H) and the maximum theoretical diversity (H max).

$$R = H/(\log_2 S)$$

The index value varies between 0 and 1. It tends towards 0 when almost all individuals belong to a single species, and towards 1 when each species is represented by the same number of individuals.

Jaccard Similarity Index: it measures the affinity between different habitat types, two by two. Its expression is:

$J = a/(a + b - c)$

Where: a = the number of species present in both habitats x and y ; b = the number of species present in habitat y ; c = the number of species present in habitat y but not in habitat x.Two habitats are considered similar when the similarity index is 50% or higher.

Gross spectrum (Sb): Given by the formula:

$Sbi = (ni \times 100)/N$

Where: ni = the total number of a given biological or phytogeographic type i ; N = the total number of species in the grouping. Sbi is the gross spectrum expressed as a percentage for a given biological or phytogeographic type.

In order to assess the species diversity of home gardens based on the urbanization gradient, the calculated diversity parameters were compared among rural, peri-urban, and urban environments where data were collected. The coefficient of determination (R^2) was calculated to depict the correlation between species richness and urbanization rate.

Socio-economic factors related to the conservation of home gardens in Abomey-Calavi

To assess the factors influencing the conservation of home gardens, respondents were classified into four sociodemographic categories: gender, age, ethnicity, and socio-professional status. Binary logistic regression was used to assess the relationship between the dependent variable and the independent variables. In this case, the dependent variables are the presence or absence of a home garden and their characteristics. The responses obtained for these variables were coded and analyzed using R software, version 4.2.3 (R Core Team, 2023). The theoretical model for "k" independent variables (x1, x2, x3,..., xkx_1, x_2, x_3, \ldots, x_kx1, x2, x3,..., xk) is:

$LogitP(x) = \alpha + \sum_{i=1}^{k} \beta_i X_i$

Where: Logit P(x) represents the dependent variable; Xi represents the independent variable; βi is the regression coefficient; α is the constant term.

Results

Characterization of home gardens along the rural-urban continuum in the municipality of Abomey-Calavi

Floristic composition of home gardens

The overall floristic richness of home gardens in the municipality of Abomey-Calavi consists of 112 species distributed across 46 botanical families. This floristic richness varies between urban and rural areas. Rural areas have the highest species richness with 76 plants distributed in 38 families, while urban areas have the lowest richness with 41 species across 20 families. Peri-urban zones have an estimated floristic richness of 68 species in 35 families. The list of inventoried species is presented in Table 3.

Table 3. List of inventoried species in home garde

Species	Families
Abrus precatorius	Fabaceae
Acacia auriculiformis	Mimosaceae
Acalypha hispida	Euphorbiaceae
Acalypha siamensis	Euphorbiaceae
Ageratum conyzoides	Asteraceae
Allamanda cathartica	Apocynaceae
Aloe buettneri	Aloeaceae
Aloe vera	Xanthorrhoeaceae
Amaranthus graecizans	Amaranthaceae
Amaranthus hybridus	Amaranthaceae
Ananas comosus	Bromeliaceae
Annona muricata	Annonaceae
Arachis hypogea	Fabaceae
Araucaria laubenfelsii	Araucariaceae
Artocarpus altilis	Moraceae
Azadirachta indica	Meliaceae
Borassus aethiopum	Arecaceae
Bougainvillea spectabilis	Nyctaginaceae
Bryophyllum pinnatum	Crassulaceae
Caesalpinia bonduc	Caesalpiniaceae
Cajanus cajan	Fabaceae
Caladium bicolor	Araceae
Callisia repens	Commelinaceae
Calotropis procera	Apocynaceae
Cananga odorata	Annonaceae
Capsicum frutescens	Solanaceae
Carica papaya	Caricaceae
Casuarina equisetifolia	Casuarinaceae
Catharanthus roseus	Apocynaceae
Chlorophytum comosum	Asparagaceae
Chrysophyllum albidum	Sapotaceae
Citrus limon	Rutaceae
Citrus sinensis	Rutaceae
Cocos nucifera	Arecaceae

Codiaeum variegatum	Euphorbiaceae
Colocasia esculenta	Araceae
Commiphora africana	Burseraceae
Corchorus oliturius	Tiliaceae
Costus afer	Zingiberaceae
Crateva adansonii	Capparaceae
Croton gratissimus	Euphorbiaceae
Cymbopogon citratus	Poaceae
Cyperus alternifolius	Cyperaceae
Delonix regia	Caesalpiniaceae
Dolonix regia	Caesalpiniaceae
Dracaena arborea	Asparagaceae
Dracaena sanderiana	Asparagaceae
Dracaena surculosa	Asparagaceae
Elaeis guineensis	Arecaceae
Erythrina variegata	Fabaceae
Eucalyptus camadulensis	Myrtaceae
Euphorbia lactea	Euphorbiaceae
Ficus benjamina	Moraceae
Ficus sp	Moraceae
Ficus thonningii	Moraceae
Ficus vogelii	Moraceae
Gmelina arborea	Verbenaceae
Hibiscus rosasinensis	Malvaceae
Ipomoea batatas	Convolvulaceae
Irvingia gabonensis	Simaroubaceae
Ixora coccinea	Rubiaceae
Jatropha curcas	Euphorbiaceae
Jatropha gossypiifolia	Euphorbiaceae
Jatropha multifida	Euphorbiaceae
Kalanchoe crenata	Crassulaceae
Kalanchoe thyrsiflora	Crassulaceae
Khaya senegalensis	Meliaceae
Lantana camara	Verbenaceae
Laurus nobilis	Lauraceae
Mangifera indica	Anacardiaceae
Manihot esculenta	Euphorbiaceae
Mirabilis jalapa	Nyctaginaceae
Momordica charantia	Cucurbitaceae
Morinda lucida	Rubiaceae
Moringa oleifera	Moringaceae
Musa spp	Musaceae
Newbouldia laevis	Bignoniaceae
Nicotina tabacum	Solanaceae
Ocimum basilicum	Lamiaceae
Ocimum canum	Lamiaceae
Ocimum gratissimum	Lamiaceae
Ocimum kilimandscharicum	Lamiaceae
Persea americana	Lauraceae
Philodendron hederaceum	Araceae
Phyllanthus amarus	Euphorbiaceae
Polyalthia longifolia	Annonaceae
Portulaca quadrifida	Portulacaceae
Psidium guajava	Myrtaceae
Ricinus communis	Euphorbiaceae
Rosmarinus officinalis	Lamiaceae
Saccharum officinarum	Poaceae
Sarcocephalus latifolius	Rubiaceae
Scoparia dulcis	Scrophulariaceae
Senna alata	Caesalpiniaceae
Senna siamea	Caesalpiniaceae
Solanum aethiopicum	Solanaceae
Solanum lycopersicum	Solanaceae
Spondias mombin	Anacardiaceae
Talinum portulacifolium	Portulacaceae
Talinum triangulare	Portulacaceae
Tectona grandis	Verbenaceae
Terminalia catappa	Combretaceae
Terminalia mantaly	Combretaceae
Terminalia superba	Combretaceae
Thevetia neriifolia	Apocynaceae
Tylophora cameroonica	Asclepiadaceae
Verbena officinalis	Verbenaceae
Vernonia amygdalina	Asteraceae
Yucca aloifolia	Asparagaceae
Zanthoxylum zanthoxyloides	Rutaceae
Zea mays	Poaceae
Zingiber officinale	Zingiberaceae

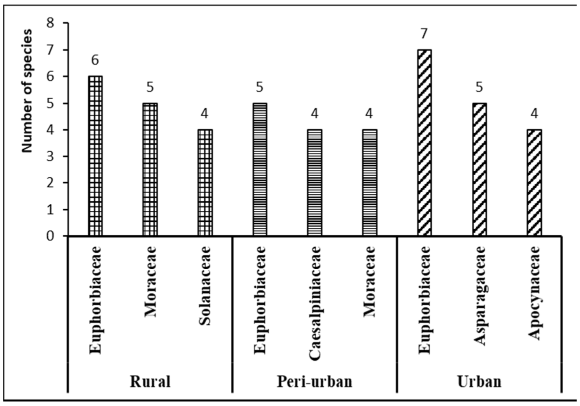

Fig. 2. Most representative families in the home gardens

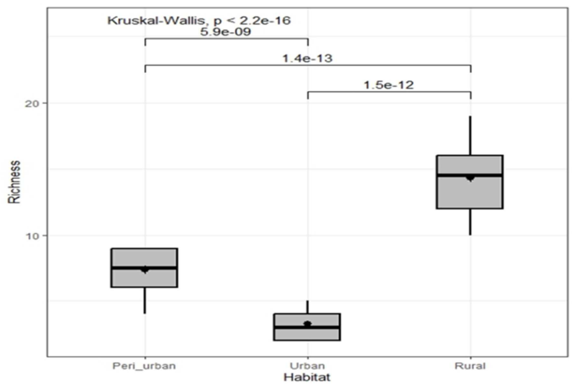

Fig. 3. Variation in the average number of plant species per household along a rural-urban gradient

The most represented botanical families in the different environments are Euphorbiaceae, Moraceae, Caesalpiniaceae, and Combretaceae (Fig. 2). A chi-square test performed on the data indicates that the distribution of these families does not depend on the type of environment (chi-Sq = 54.192; p-value = 0.999).

Home gardens have an average of 14 ± 0.32 plant species in rural areas, compared to 3 ± 0.22 species in urbanized areas. Households in peri-urban areas (the transition zone between rural and urban environments) have an average of 7 ± 0.32 plant species (Fig. 3). The Kruskal-Wallis test shows a significant difference in the average number of species per household along the rural-urban gradient (H = 87.96, DF = 2, P = 0.0001).

Table 4. Mean alpha diversity in each ecosystem type

Areas	Shannon index (bits)	Pielou's equitability
Urban	1.79	0.64
Peri-urban	2.53	0.40
Rural	2.94	0.42

Specific diversity and similarity of home gardens along the rural-urban gradient

Adecline is observed in plant species diversity from rural to urban areas (Table 4) as indicated by the Shannon diversity index, which is highest in rural areas (2.94 bits), moderate in peri-urban areas (2.53 bits), and lowest in urban areas (1.79 bits). This gradient reflects the impact of urbanization on biodiversity, with rural home gardens benefiting from more space, less environmental disturbance, and a greater reliance on diverse plant species for subsistence, leading to higher diversity. In contrast, urban gardens, constrained by space and influenced by urban preferences for ornamental or low-maintenance plants, show significantly lower diversity. Eveness values, with urban areas displaying the highest value (0.64), indicate a more even distribution of fewer species, suggesting dominance by a few species adapted to urban conditions. Meanwhile, peri-urban areas have an intermediate Shannon index and equitability, reflecting their transitional nature between rural and urban environments. This pattern highlights the need for targeted conservation strategies to maintain plant diversity, particularly in more urbanized settings where biodiversity is most at risk.

The similarity of home gardens in different environments is detailed in Table 5, which shows a low Jaccard similarity index of 11% between rural and urban home gardens, indicating significant differences in species composition. In contrast, there is a high similarity of 75.51% between peri-urban and rural gardens, suggesting a significant overlap in species. In addition, peri-urban gardens have a moderate similarity with urban gardens at 47%. This pattern reflects the transitional nature of peri-urban areas, which often combine characteristics of both rural and urban environments, and therefore contain a mixture of species found in both. The presence of many common species between peri-urban and other areas highlights the gradual shift from rural to urban biodiversity patterns as urbanization progresses.

Table 5. Jaccard similarity Iindex between home gardens in rural, urban, and peri-urban areas

Type of environment	Urban	Peri-urban	Rural
Urban	-		
Peri-urban	0,47	-	
Rural	0,11	0,7551	-

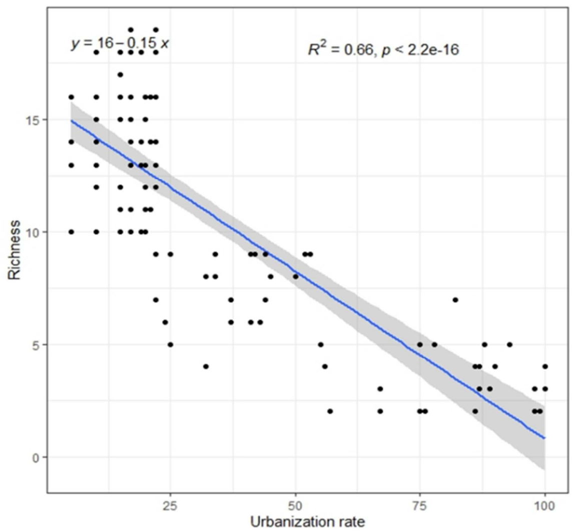

Fig. 4. Evolution of the species richness in relation to urbanization rate

This finding is further supported by the linear regression analysis shown in Fig. 4, which illustrates the correlation between home gardens species richness and the urbanization gradient. The coefficient of determination (R^2) of the linear function depicted in this figure is 0.66, with a very low probability (P = 0.00003).

Social factors favoring the conservation of home gardens in the municipality of Abomey-Calavi

According to the residents of Abomey-Calavi, several factors influence the maintenance of home gardens, including household size, level of education, ethnicity, main occupation of the household head, and average income.

Table 6. Sociodemographic characteristics of surveyed households

Sociodemographic characteristics	Proportion (%)
Male	86.67
Female	13.33
Total	100
Youth (18-30)	6.67
Adults (31-60)	70
Elderly (61+)	23.33
Total	100
Fon	39.33
Aïzo	17.33
Adja	8.67
Yoruba	10
Others	24.67
Total	100
Farmers	47.33
Civil Servants	40.67
Others	12
Total	100

Table 6 provides a sociodemographic profile of the households surveyed that highlights these influences. The majority of household heads interviewed are male (86.67%), with a small proportion of female household heads (13.33%). Adults make up the largest age group (70%), followed by the elderly (23.33%) and the young (6.67%). The most represented ethnic group is Fon (39.33%), followed by Aizo (17.33%), Yoruba (10%), and Adja (8.67%). The main socio-professional groups are farmers (47.33%) and civil servants (40.67%). This sociodemographic diversity suggests that cultural background and economic activity have a significant impact the decisions surrounding the maintenance and preservation of home gardens. For example, the predominance of farmers and the lower level of education among certain ethnic groups may explain a greater emphasis on home gardens for subsistence and cultural practices. Conversely, households with higher incomes or those working in non-agricultural occupations may prioritize different uses for their available land, potentially affecting the diversity and conservation strategies of home gardens.

Regarding the determinants of home garden maintenance within households, logistic regression and the Hosmer-Lemeshow goodness-of-fit test indicated that the model provided a good fit to the data, with significant omnibus tests of the coefficients and an overall predictive accuracy of 57.6%. The Wald test showed that the probability was less than 0.05 for the explanatory variables "main occupation" and "income level" (Table 7). This suggests that the main occupation and income level of the household head are key factors influencing the maintenance of home gardens in households.

Table 7. Factors determining ownership of home gardens among respondents

Variables	Regression coefficient (A)	Standard error (S.E.)	Wald	ddl	P-value	Odds ratio exp (B)
Gender	0.172	0.318	0.293	1	0.588	1.188
Household size	0.011	0.132	0.007	1	0.934	1.011
Ethnicity	0.011	0.056	0.038	1	0.846	1.011
Education level	0.219	0.131	2.776	1	0.096	1.245
Main activity	0.040	0.056	0.525	1	0.009	1.041
Average income	0.257	0.128	4.033	1	0.045	1.293
Constant	-4.720	0.896	27.742	1	0.000	0.009

Discussion

This study, which compares the taxonomic diversity of home gardens along a rural-urban gradient in the municipality of Abomey-Calavi, provides insights into the local distribution of plant resources used by local communities. It was carried out in the context of rapid demographic growth (Dossou, 2005), combined with the rapid urbanisation of an area that has evolved from a secondary town to a municipality of special status (Osséni *et al.*, 2023).

This transformation municipalityhas led to a degradation of plant resources, particularly those used domestically in home gardens (Kimbatsa *et al.*, 2018). The results indicate a decline in floristic diversity in home gardens from urban to rural areas, passing through peri-urban zones. This indicates a progressive decline in plant species richness in home gardens along the rural-urban gradient. Similar trends are observed in megacities of developing countries, where species richness decreases with urbanization (Ortega-Alvarez *et al.*, 2011; Useni *et al.*, 2021). Modern housing is often built with a preference for grey infrastructure over green spaces and landscape plantings (Mili *et al.*, 2029), limiting the promotion of home gardens (Salomon *et al.*, 2020) and their ecosystem services (Beichler, 2015). Furthermore, periurbanization processes have led to a reduction in agricultural spaces and natural vegetation in favor of the built environment (Forkuor and Cofie, 2011).

The comparison of species richness between urban and rural areas shows a stark contrast in floristic composition. Urban areas are dominated by ornamental species, while rural and peri-urban areas are dominated by food and medicinal plants. This difference in floristic trends is influenced by human preferences, space constraints (Clergeau, 2012; Marco *et al.*, 2010), dietary changes, and the introduction of exotic ornamental plants (Osseni *et al.*, 2023). Similar observations have been made in studies of large West African cities, which impliesthat urbanization disrupts biodiversity and reduces species richness in inhabited areas (Sylla, 2021). Urban policies must integrate conservation strategies to maintaindiversity in home gardens, which are vital for the local population.

In terms of factors that promote home gardens, the study revealed that "primary occupation" and "income level" significantly influence their conservation in Abomey-Calavi. Home gardens are crucial for the provision of non-timber forest products which provide food and sociocultural ecosystem services from perennial plants (Galluzzi *et al.*, 2010; Assogbadjo *et al.*, 2021). Their promotion is closely linked to the living standard ; households with moderate to low income rely on these gardens to supplement their diets based on their financial capacity (Gongault, 2020). This reliance serves as an alternative to ensure basic food security for low or middle-income households, thereby reducing their food expenses (Barbhuiya *et al.*, 2016). While main occupation and income level were identified as influencing factors, other socioeconomic variables such as education, access to resources like water, or local land management policies were not thoroughly examined. Furthermore, the study focused primarily on species diversity without delving into the critical ecosystem services that contribute to the sustainability of urban systems.

The main limitation of this study is its geographical scope, limited to the municipality of Abomey-Calavi. Therefore, the findings may not be entirely generalizable to other urban or rural contexts. Additionally, seasonal variations were not considered, which could affect the representation of home garden biodiversity throughout different times of the year.

Conclusion

This study, focused on the impact of the urbanization gradient on the species diversity of home gardens in the municipality of Abomey-Calavi, has confirmed that urbanization exerts a significant negative pressure on the species richness and diversity of these gardens. While some species remain common across rural and urban environments, the general trend shows a specific biodiversity loss as one moves from rural to urban areas. This decline is particularly evident in highly urbanized zones, where traditional home gardens are often replaced by more homogeneous and less diverse landscaped areas. The study also identified key social determinants for the conservation of home gardens in urbanized areas. Overall, it was found that household living standards heavily influence the decision to maintain these planted spaces. Households whose primary occupation involves agricultural practices or those with higher income levels are more likely to conserve home gardens, recognizing their value not only ecologically but also for food security, aesthetics, and financial benefits.

In light of these findings, it is crucial to support conservation initiatives for these gardens across all households in the municipality. Efforts should focus on raising awareness of the ecological, economic, and cultural importance of home gardens and implementing policies that encourage their preservation and integration into urban planning. Future studies could explore additional socioeconomic factors, seasonal variations, and the role of ecosystem services to develop comprehensive strategies for maintaining urban biodiversity and promoting sustainable urban development.

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