World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

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Urban green spaces in kara city (Togo): Typology and community expectations

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World Journal of Advanced Research and Reviews, 2025, 25(01), 1488-1496

Publication history: Received on 01 December 2024; revised on 16 January 2025; accepted on 19 January 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.25.1.0097

Abstract

Urban green spaces (UGS) are essential to ensure the quality of life and fulfillment of city dwellers. There is a growing interest in research investigating the association between green space and climate resilience in urban area. This study aims to inventory both formal and informal green spaces in Kara, the second-largest city in Togo, and to analyze the characteristics expected by the local population. The photo-interpretation method was used to find UGSs, using very high-resolution satellite images under Google Earth Pro software. For each UGS found, the surface areas were determined using GPS forms. The proportion of UGSs per habitant was established in comparison with the standard defined by the Word Health Organization (WHO). In additional, a survey from 373 informants was carried out the challenges of UGSs sustainability, including local community needs. The results show that Kara city has 39 green spaces, ranging in size from 0.1 hectares to 5.59 hectares. These are mainly building greens spaces (51.3%), natural and semi-natural areas (28.2%), trees lining the roads (17.9%), and parks and recreation (2.6%). Per capita green space calculated was 0.2 square meters, very low compared with the threshold of 10 square meters per inhabitant recommended by the WHO. Despite their small size, the green spaces in this town are still very important. Local community expected eight (08) challenges of UGS project, including accessibility, cleanliness and the availability of development infrastructures (safety, lighting, drinking fountains, walking routes, shaded areas and children's playgrounds). It is therefore important for municipal authorities to give much more attention to green spaces in future urban development plans.

Keywords: Urban green spaces; Community expectations; Climate resilience infrastructure; Togo

1. Introduction

Urban green space (UGS), such as parks, green corridors, and residential greenery, can provide multiple benefits for urban wellbeing (1–5). Multiple age groups visit UGSs. The well-being benefits gained and the ecosystem services of UGS include the provision of plant species that are useful as food or medicine, have been extensively documented (6–10). There is a growing interest in research investigating the association between green space and Climate resilience in urban area. In the African context, there is low prioritization of the conservation of UGS (11–14). In recent years, the loss of green spaces in urban area is a worrying problem that can have consequences for a number of ecosystem services.

Research founds that pressure from competing land uses is the primary force behind their loss in many cities globally. Bawa (2017) outline how individual housing policy of municipal governance can precipitate the losses in West Africa. Pressure against the conservation of UGS will be exacerbated by densification in cities, pollution and climate change (16–18). By 2050, an additional 950 million city-dwellers will be added to the 567 million people living in African urban

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agglomerations in 2015 (19). Thinking about more sustainable cities calls for the development of green areas, the management of which is often part of an urban forestry program. The sustainability of these UGSs depends on the needs of local populations being taken into account. Urban green spaces are becoming essential elements of modern urban planning.

Countering the loss of UGS requires effective policies and strong political will. In Togo, policy on green spaces is governed by two main pieces of legislation. These are the Constitution of the 4th Republic of 14 October 1992 and Law No. 2008-005 of 30 May 2008 on the environment (20). It is therefore part of sustainable development cities policies and strategies. But urban development in Togo is beyond the control of public authorities and planners, and green spaces are under-valued and subject to poor management. Planned green spaces are either not marked out on the ground due to high land pressure. Most of the research on green spaces in Togo focuses on Lome the national capital of Togo. Secondary towns, where densification is taking place, are overlooked. This study was to draw up an inventory of formal and informal green spaces and their characteristics expected by the local population in Kara where such studies remain scarce, the second largest city in Togo.

2. Material and methods

2.1. Study area

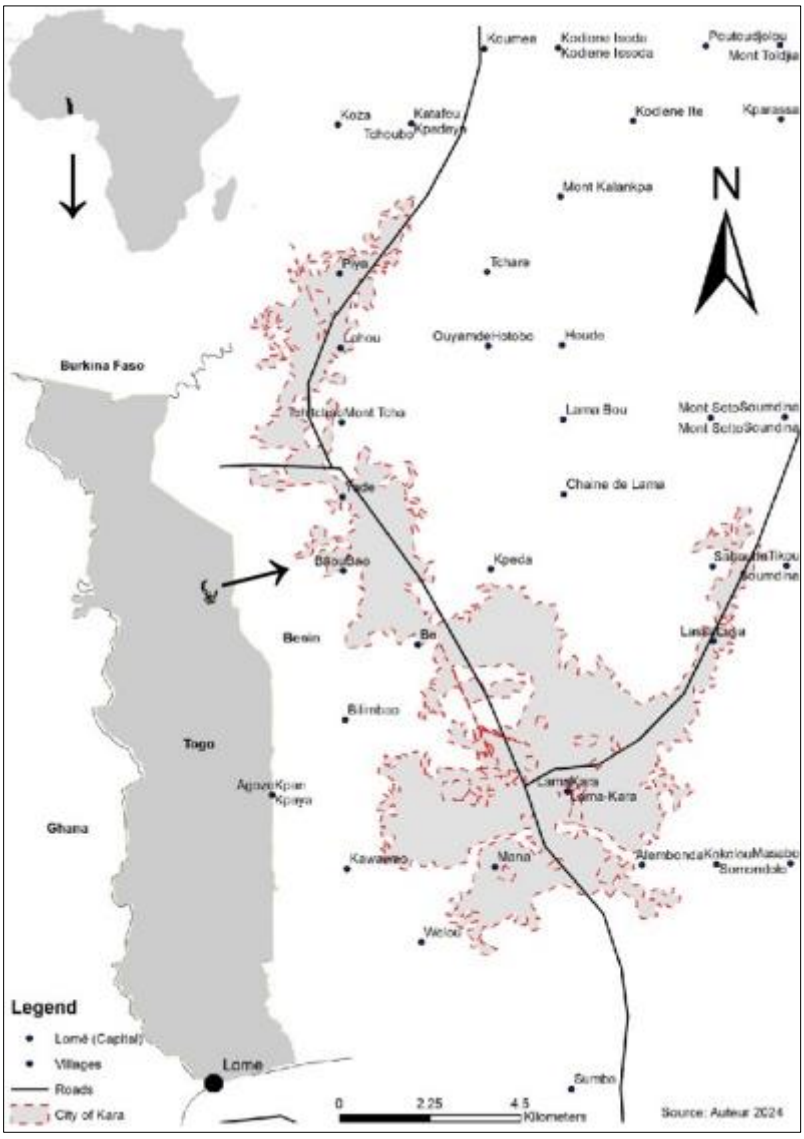

Figure 1 Study area

Kara is 411km north of Lome (Fig. 1). It has a total population of 193, 625 making it the most second populated city in Togo (21). It is located in the moist tropical semi-deciduous vegetation zone, which has favorable soil conditions that support farming and green vegetation. Rainfall averages 709.8mm. The population is mainly made up of indigenous people, notably the kabies and tems. There are also mobas, lossos, lambas, lougbas, ewes, tchambas, nagos and fulanis. Farming and livestock rearing are the main activities of these populations. These communities have initiate most of the green spaces of Kara but now they are losing the green spaces due to several human-induced activities. This made the communities suitable places for the study to know the diversity and. the challenges of UGSs.

2.2. Data collection and analysis

The first step of this study was to find UGSs. It was determined by photo-interpretation employed statistic morphological approach, and using very high-resolution satellite images under Google earth Pro software. It is a reliable method for extracting urban agglomerations and UGSs (22–24). We used images taken at the end of the dry season and the beginning of the rainy season, when cultivated areas are clearly distinguishable from natural vegetation and built-up areas. Mapping was carried out at an altitude of 1000 meters above ground level. The classification of UGSs was based on the typology of green spaces, described by Rall et al. (2015); and Bougé (2009). For each UGS found, the surface area was determined using GPS forms. Per capita green space (R_{UGS}) was calculated according to the population data provided by the Statistical Center of Togo. It was established in comparison with the standard defined by the Word Health Organization (WHO). The R_{UGS} was calculated as follows R_{UGS} = (Surface of green space found) / (Total population of the Town).

The second step was to carry out the challenges of UGSs found sustainability, including local community needs. This study uses a combination of quantitative and qualitative methodologies (27,28). Due to the lack of official data on the use of green spaces in the town of Kara, a large number of local residents were surveyed in order to ensure that the population of Kara was representative. The survey was conducted between 26 August 2024 and 25 November 2024, using semi-structured questionnaires. Informants were contacted at their place of work or on the outskirts of the green spaces. Their consent to take part in the survey was sought after explaining the purpose of the study (29,30). Information on the sociodemographic characteristics of informants, and the characteristics of the green spaces expected by informants was collected. The data analysis focuses on the frequency of citations (Fr). The Fr was calculated as follows: Fr = (Number of times a particular characteristic of UGS was mentioned)/(total number of characteristic mentioned)×100.

3. Results and discussion

3.1. Diversity and typology of UGSs in Kara city

In total, thirty-nine (39) UGSs, ranging in size from 0.1 hectares to 5.59 hectares, were identified and mapped (Fig. 2). The calculated green space per capita is 0.2 square meters, which is very low compared with the threshold of 10 square meters per capita recommended by the WHO. This ratio is also lower than that of the city of Lome, the capital of Togo (0.75 square meters) (20). It is similar to the value calculated for the cities of Ouida (0.27 square meters) and Porto-Novo (0.18 square meters). The supply of urban green space in Kara is better than in Cotonou (0.12 square meters), Abomey-Calavi (0.06 square meters) and Sèmè (0.06 square meters) in Benin (31). Financial constraints, land ownership, political interference and ineffective park management have been identified as reasons for the scarcity of green spaces in southern countries (32). It is therefore important that urban authorities pay greater attention to green spaces, taking into account the needs and expectations of local populations.

With respect to Rall and al. (2015); and Bougé's typology (2009), these inventoried UGSs are grouped into four categories (Table 1). These are mainly: **A** - building greens spaces (51.3%), **B** – Natural and semi-natural areas (28.2%), **C** -Trees lining the roads (17.9%), and **D** - Parks and recreation (2.6%). The inventory includes green and partially green spaces. Agricultural land, Blue spaces (water, wetlands) and grey spaces (rocks) were not taken into account in the study. In total, 04 categories of green space are identified in this study. This categorization is not a typology in the strict sense and other ways of grouping green spaces are possible and legitimate. Other structuring possibilities could include spatial complexity, social function, quantity and quality of ecosystem services (12,33,34). The diversity of green spaces is a rich and varied field of study, which crystallises the multiple and complex issues underlying the relationship between man and nature in urban areas.

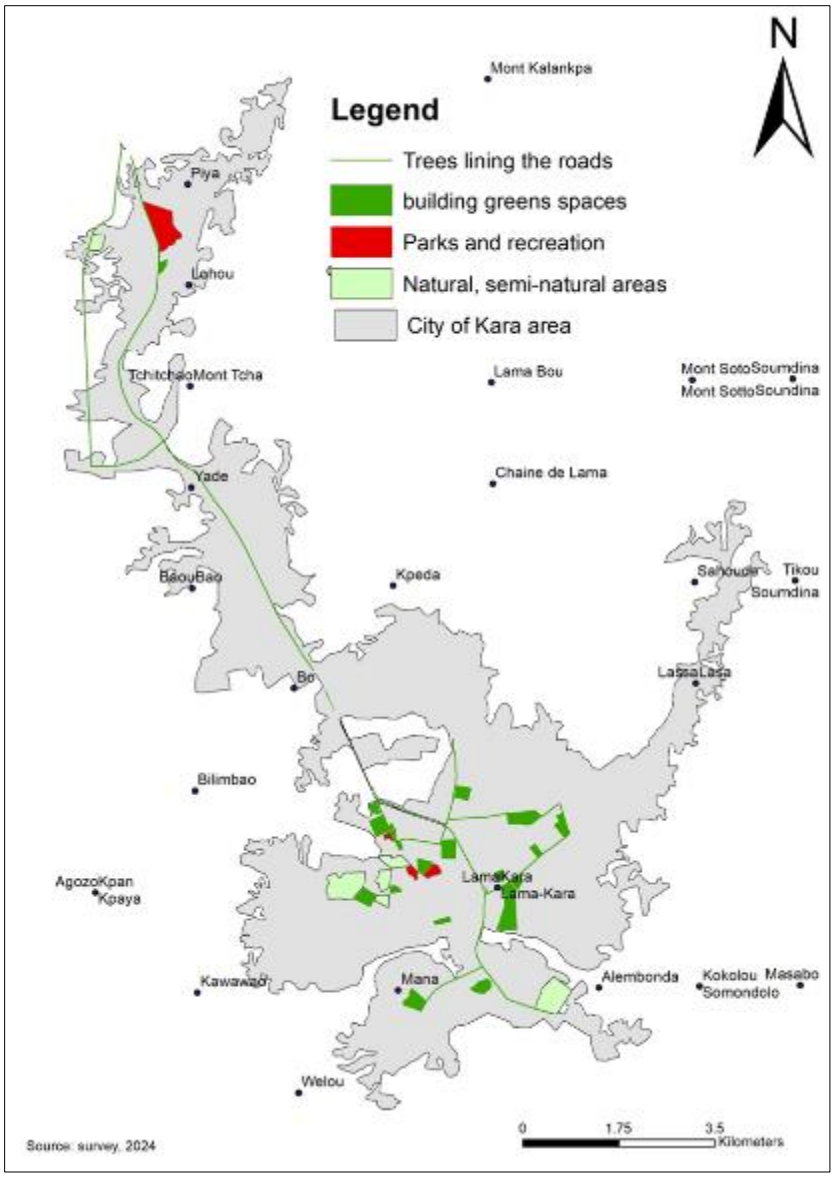

Figure 2 Distribution of green spaces in the city of Kara (Togo)

Table 1 The categories of the UGS inventory with a description and photos of examples

Categorties	Description	Photos of exemples
building greens spaces	Green spaces accompanying buildings including green balconies, ground-level plant walls, facade plant walls, hedge, house garden, green playground, school ground	

Natural, semi-natural areas	Riverbank green, forest (remnant wood-land, managed forests, mixed forms), shrubland, abandoned spaces	
Trees lining the roads	Street green and green verge, Roadside verges, roundabouts, tree rings, informal trails	
Parks and recreation	Large urban park, historical park/garden, pocket park, institutional green space, green sport facility	

3.2. Challenges of UGSs sustainability

The challenges in this study is to provide information for the proper planning, design and development of urban green spaces that meet users' needs.

3.2.1. Sociodemographic characteristics of informants

A total of 373 informants were surveyed (Table 2). The sex ratio was 0.52. Most were men (65.7%). Women were under-represented (34.3%). The majority were young under 30 years of age (78%) and adults (12.6%). Older people aged over 61 (9.4%) were also included. Most of them are indigenous (68.1%) and married (59.9%) or single (38.2%). There are a large proportion of informants who have not attended school (34.8%) and others who have reached secondary school (16.9%) and university (30.4%). They are mostly employees (64.3%) and students (63%), who visit green spaces daily (10.1%), or 2 to 5 times a week (53.1%), or 1 time per week (21.7%) to recreate, walk, etc. These characteristics show a sample where all users are represented regardless of gender, age, marital status, level of education, professional status, ethnic groups or frequency of visits. This may not influence the results in terms of preferences and expectations (35,36).

Table 2 Socio-demographic characteristics of informants

Sociodemographic characteristics	Number (%)
Gender	
Male	245 (65.7)
Female	128 (34.3)
Age	
Young (≤ 35 years old)	291 (78)
Adults (>35 and < 60)	47 (12.6)
Old (≥ 60)	35 (9.4)
Marital status	
Single	142 (38.2)
Married	223 (59.9)
Divorced / separated	7 (1.9)
Educational level	
Uneducated	130 (34.8)
Primary school	67 (17.9)
High school	63 (16.9)
University	113 (30.4)
Jobs status	
Employed	240 (64.3)
Unemployed	43 (11.6)
Student	63 (16.9)
Retired	27 (7.2)
Ethnic groups	
Indigenous	254 (68.1)
Non indigenous	119 (31.9)
Visit frequency (per week)	
never (0)	56 (15.0)
Rarely (1)	81 (21.7)
Frequent (2 to 5)	198 (53.1)
Daily (7)	38 (10.1)

3.3. Local population's expectations of urban green spaces

The results show that expectations mainly relate to the comfort, safety and functionality of the spaces. Eight (08) expectations were expressed by the respondents (Table 3). In order of importance, they included cleanliness (70.2%), lighting (59.9%), the availability of a water source (57.3%), a shaded rest area (57.3%), a walking path (55.1%), and children's play areas (48.1%). Respondents also mentioned the need for security guards (48.7%) and easier accessibility (38.4%). Several studies corroborate our findings on expectations in terms of urban green spaces. In Brazil and China, urban populations favour green spaces for cleanliness, accessibility, and rest areas (37,38). In Burkina Faso, research on green spaces highlights the importance of facilities such as water points and security, particularly in Ouagadougou (39,40). These studies, although conducted in a variety of contexts, highlight universal needs for a better quality of life

in urban areas (41,42). Differences emerge, particularly in studies of highly urbanized contexts, such as the United States and Europe. The results show that aesthetics, identity and cultural activities dominate the expectations of people in these regions, unlike the city of Kara, where cleanliness and lighting are priorities (43–45). These disparities can be explained by cultural, economic and environmental differences specific to each region.

Table 3 Frequency of people's expectation of UGs

Characteristics of green spaces	Frequency, N (%)
Cleanliness	262 (70,2)
Lighting	223 (59,9)
drinking fountains	214 (57,3)
Shaded rest area	214 (57,3)
Walking routes	206 (55,1)
Safety	182 (48,7)
children's playgrounds	180 (48,1)
Accessibility	143 (38,4)

This study differs from others in that it focuses on Kara, a secondary city in sub-Saharan Africa, where studies on green spaces are still rare. It thus offers a unique perspective on a little-documented region that is facing multiple problems such as climate change, population densification and food security. It is helping to provide concrete data on the specific expectations of the inhabitants of the city of Kara, encouraging the creation of suitable green spaces. The results can guide decision-makers towards inclusive and sustainable projects.

4. Conclusion

This study inventoried 39 urban green spaces (UGS) in the town of Kara (Togo), categorizing them into four distinct types. The most prevalent category comprises green spaces associated with buildings, such as green balconies, ground-level plant walls, facade plant walls, hedges, house gardens, and green playgrounds. Moreover, the findings reveal that local populations place significant importance on eight key attributes of UGS: cleanliness, lighting, drinking fountains, and shaded rest areas, walking routes, safety, and children's playgrounds. These insights highlight the critical need for municipal authorities to integrate UGS as a priority in urban development plans. By addressing the identified challenges and aligning UGS designs with community expectations, decision-makers can create a more resilient and livable urban environment. Furthermore, the results offer valuable guidance for ensuring the long-term sustainability of green space projects by focusing on user-centric designs. Future research should investigate the broader impacts of UGS on community health and well-being, particularly in the context of climate change. Additionally, exploring innovative strategies for enhancing the ecological and social sustainability of UGS will be essential for fostering urban resilience in the years to come.

Compliance with ethical standards

Acknowledgments

This study was carried out with the technical support of National Sanitation and Public Health Agency of Togo (ANASAP TOGO)

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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