



(RESEARCH ARTICLE)



Urban recreational green spaces dynamics and implications in the Bonaberi Neighbourhood of Douala IV Municipality, Cameroon

Egbenchong Ruth Eneke and Nformi Beatrice Maluh *

Department of Town Planning, National Advanced School of Public Works, PO Box 510 Yaounde, Cameroon.

World Journal of Advanced Research and Reviews, 2024, 23(02), 1008–1019

Publication history: Received on 23 June 2024; revised on 08 August 2024; accepted on 10 August 2024

Article DOI: <https://doi.org/10.30574/wjarr.2024.23.2.2342>

Abstract

Globally, urban recreational green spaces constitute a major environmental resource of urban landscapes. These greeneries are suffering from shrinkages and transformations due to pressures on more urban land needed for housing, commercial and industrial purposes and uncontrolled urbanization. This study was conducted to assess the spatiotemporal variations and extent of transformations within the urban green spaces and their associated implications in the Bonaberi neighbourhood of Douala IV Municipality. To achieve this, empirical data was collected through field visits, in-depth interviews with urban authorities and mapping of urban green spaces for 2003 and 2022. Two hundred inhabitants were purposively sampled while local council authorities and other stakeholders were interviewed in the Douala IV Municipality. This was complemented by secondary data obtained from the Douala Urban Council. The collected data were analyzed using descriptive and inferential statistical techniques and results revealed that the rapid transformation and decrease of urban green spaces in terms of spatiotemporal nature is a function of expansion and uncontrolled urban settlements. The shrinkage in urban green spaces in the Douala IV municipality has resulted in loss of biodiversity, increase in urban heat islands, atmospheric pollution, unattractiveness of the environment, crimes, mental and physical health issues. This was x-rayed by the poorly arranged green spaces, littered with wastes and having multiple paths used by motorists, pedestrians and vendor activities. This study concludes that greeneries remain a vital environmental resource, thus, recommending effective application of planning policies to restrict their encroachment. Additionally, greeneries should be treated among the top priorities of the development agenda of urban planning authorities as enshrined in the Sustainable Development Goal 11.

Keywords: Urban; Recreation; Green Spaces; Spatiotemporal dynamics; Douala IV

1. Introduction

Urban recreational green spaces are areas in the urban environments that are designated for leisure, recreation and aesthetic enjoyment. They consist predominantly of unsealed, permeable and 'soft' surfaces such as soils, grass and shrubs which are either privately or publicly accessible. These greens can either be amenity green space (recreational and domestic green spaces), functional (productive, institutional and burial ground green spaces), semi-natural (wet lands, woodlands green spaces) and linear green spaces (river and canal, and transportation corridors green spaces) (Swanwick *et al.* 2003) that can serve multiple functions in the context of urban living. The preservation and development of these urban commons only became widely recognized across different spheres of science and planning policies in most countries of the developed world in the 19th Century when cities were almost devoid of green spaces (Benedict & McMahon, 2002; 2006). The Millennium Ecosystem Assessment (2005) concluded that about 60% of the world urban green spaces have been degraded resulting from urbanisation pressure which is among the major drivers of global environmental change (World Bank, 2009; UN, 1995).

*Corresponding author: Nformi Beatrice Maluh

The rapid and uncontrolled urbanisation has become an iconic feature of the 21st century, changing the physical and social landscape of the cities archetypical of urban centres of the developing world (Antrop, 2004). Such leads to significant alteration of its ecosystems and the loss of urban greenery (James *et al.* 2009; Maas *et al.* 2006; Sandstrom, 2002) as well as habitat loss in the urban landscape (McKinney, 2002). This has triggered a myriad of environmental challenges ranging from a reduction in green spaces to ecosystem deterioration (Niemela *et al.* 2012). Urban green spaces are considered as ecosystem resources which are directly (such as active or passive recreation) or indirectly (for example, positive influence on the urban environment) available for users and are important for supporting specie populations and biodiversity (Forman,1996; Kimengsi and Fogwe, 2017).

Ideally, due to the benefits associated with urban green spaces, it is expected that much space should be preserved for posterity but this has not been the case. These urban commons are compounded with urban challenges emerging from rapid urbanisation amongst other urban challenges as manifested through the sprung of settlement extension, agricultural activities, excessive logging for timber, transportation, electric poles among other urban activities. In the USA, a study on land use change in 274 metropolitan areas revealed a loss of about 1.4 million hectares of green spaces to different land developments while in African countries for example; several towns in the Republic of South Africa have less than 10 percent of their total lands occupied by green spaces (Mensah, 2014). More than half of Cameroon's population resides in urban areas with an urban population of 58.7%, and an average urban growth rate of 6.1% (World Bank Annual Report, 2021). This rapid urbanisation process is manifested in Douala which is the main port and commercial center, and Yaounde the administrative and political capital of Cameroon with an urban growth rate of 4.9% and 6%, respectively.

In Douala, redevelopment through the clearance and rebuilding of outdated urban structures and reuse of new urban land for new projects has taken place and is still on-going, leaving especially the Bonaberi neighborhood in a work yard (Egbenchong, 2022). This redevelopment in Douala IV Municipality has resulted in the achievement of the Bus Station (Gare Routiere) space, the community gardens in Sodiko and Bonassama, and the reconstruction of the New Road (Nouvelle Route) and the Fly over road. These developmental aspects have all ensured the attractiveness of the neighbourhood and have equally decongested housing and commercial activities like restaurants, hawking, salons, from the road aisle and walk sides into the periphery of Bonaberi Municipality (Egbenchong, 2022).

It is worth mentioning that the displaced population from their former sites has resorted to more proliferation of settlements extension, curbed waste disposal into river courses and vendors' encroachment on preserving easements like wetlands and swamp areas. This further accelerates the transformation and degradation of the available urban green areas, thus, leaving the entire urban areas with an unpleasant appearance. Many scholars have opined that urban green spaces and preservation, especially in the developing world, are facing management challenges. They have equally attributed these challenges to population explosion, limited implementation of urban planning laws, and dependence on outdated urban plans as well as urban aesthetics not featuring as a valuable urban land use (Mensah, 2014; Niemela *et al.* 2012).

1.1. The problem

Urban gardens, preservation easements and other urban green spaces are important parts of the complex urban ecosystem of Douala IV Municipality. They are important in city beautification, climate regulation, flood retention, increment of property values, job opportunities and generation of revenues. It is expected that much spaces in urban areas will be reserved for such purposes. Ironically, these greeneries had and are still suffering from shrinkages and transformation due to pressures for more open urban land for housing, commercial, industrial, and other urban land-uses. These greens still suffer from inconsistencies in the implementation of urban planning laws patterning to their management and other urban functions. The inconsistencies are attributable to lack of priority and political will of planners attached to the preservation of greens thereby explaining why the 'ELF Green Space' has been consumed by industrial land use in the case study area. In addition, the poor coordination between the officials and local population in the management of the greens as well as flash floods, poor channeling of run-off and sandy soils are other factors posing profound challenges to the urban green spaces in Douala IV Municipality. The ineffective implementation of sustainable management strategies into planning of urban green spaces had and still continues to present an unappreciated view of the city, promote deficient health and environmental implications, as well as demystify the concept of attaining the vision of Eco- or sustainable cities in the 21st Century. It is in this light that this study is conducted so as to edify the issues associated with the dynamic nature of urban greens in Douala 1V Municipality.

2. Research methodology

2.1. Study Area

Bonaberi has a population of over 500,000 inhabitants out of more than 3,000,000 inhabitants of Douala (Tamunang, 2013). Bonaberi is located in the Douala IV Sub-Division in Wouri Division of the Littoral Region (North of Douala) in which the council is cited in the Bonassama-community. It makes up part of the low-lying basin which runs from the foot of Mount Cameroon to the southern part of Kribi. Approximately 75% of this municipality is two meters above the sea level. This Municipality covers a surface area of about 203.9 Km² of the total area of Douala city. According to Tamunang (2013), Bonaberi Municipality is located between latitudes 4°03" and 4°07" north and longitude 9°04" and 10°02" east. It is bordered to the North by Youpwe, to the South by River Wouri, to the East by Deido, and to the West by Dibombari as illustrated on Figure 1.

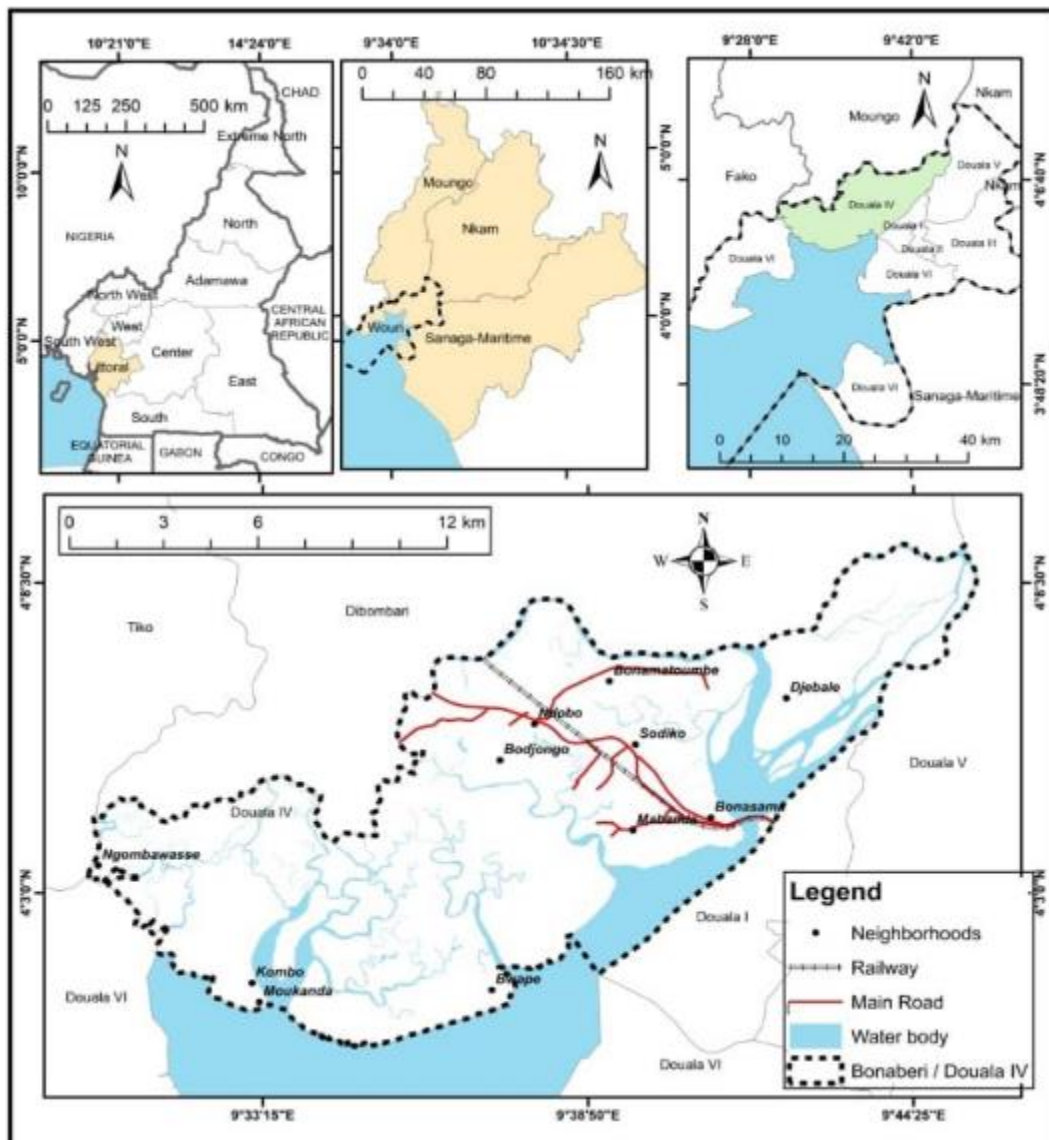


Figure 1 Location Map of Bonaberi, Douala IV Municipality

Source: Adopted from the Administrative Map of Cameroon NIC, 2020 and Google Earth Imagery

Douala IV Municipality is a commercial center with increasing number of factories such as plastic, breweries and cash-crop processing units benefiting from its relatively cheap land and cheap labour. It is elevated almost entirely on the aquatic terrain of the lagoon marginal depressions, thereby necessitating extensive land reclamation. As a result of the abundant activities carried out in this zone, it has pulled a massive population influx thereby causing traffic jams on

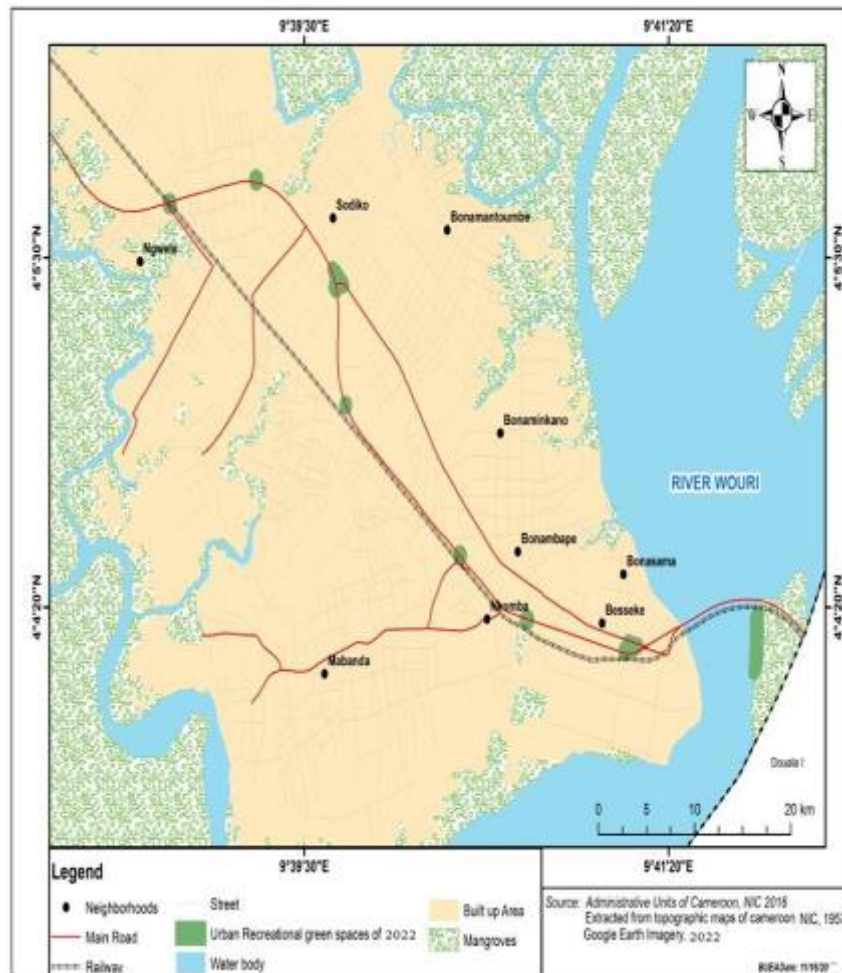
roads or side walk with informal activities and overcrowding by the newly established urban dwellers associated with poor health conditions. This rapid population growth and unprecedented activities in this zone have potentially altered the aesthetics of the area through the erection of make shift structures on both man-made and natural urban greens like wetlands and other green spaces, which are looked upon as a mirror for urban civilization and city identity.

2.2. Research Methods

The study was investigatory and descriptive in nature; adopting the qualitative and quantitative techniques, while deriving their enshrined advantages, their innate biases were easily eliminated by the researcher. The study made use of primary and secondary data. Primary data were obtained from questionnaires administered to 200 inhabitants who lived around the Bonaberi neighborhood of the Douala IV Municipality selected through a simple random sampling technique. Field observations and on-the-spot appraisals provided data on the urban recreational green spaces, implications and management of Douala IV Municipality and pictures taken to express the state at present. This was complemented by secondary data and interviews of the local council and the Douala City Council authorities. Information gotten from Douala City Council enabled the acquisition of data on the development and management and the use of Master Plans of the municipality and entire division. These collected data were treated using the Microsoft excel spreadsheet with tables and diagrams for analysis. The Cameroon town planning policies on land use and infrastructure permitted the explanation of norms. Such norms brought out the gaps that have led to inappropriate planning of recreational urban green spaces and management within the municipality.

3. Results and discussion

3.1. The Spatial Outlay of Urban Green Spaces in the Bonaberi, Douala IV Municipality



Source: (Field work 2023)

Figure 2 Spatial Distributions of Urban Recreational Green Spaces in Douala IV Municipality

Bonaberi is considered as the ‘industrial hub’ of Douala, with haphazard urban expansion, little or no political power when it comes to executing its own developmental projects like recreational spaces amongst others. This has resulted to lack of encouragement for public participation in decision making, thus affecting the distribution of urban green spaces. From the recreational map of Douala IV Municipality (Figure 2), it is evident that the urban green spaces are unevenly distributed, with a greater proportion of the recreational sites situated within the North Western and South Eastern parts of Douala IV Municipality.

It was observed that open public green spaces in Bonambape, Bonassama and Sodiko were located at junctions of arterial ways. Field investigation was carried out to determine the location of the urban recreational sites, 80% of the sampled inhabitants acknowledged the existence of green spaces within their locality but pointed that the urban green spaces were poorly situated and located. This was further affirmed in an interview with an official of the Construction Department of the Urban Council who asserts that *“the urban green spaces are unevenly distributed and poorly located. These spaces are located at proximity to the road, which exposes the users to different forms of assaults, pollution and accidents”*. Urban recreational green spaces within the Douala IV Municipality are areas considered to enhance the quality of life of the urbanites, increase their life span, regulate the climatic condition of the area, as well as promote the environmental, social, and economic sustainability of the area. These potentials are only attainable through proper management and maintenance of the greeneries that goes a long way in cementing green space users’ attachment to the sites. Findings on the varying activities performed within the recreational green spaces include physical exercise, sports and personal outdoor training, relaxation and leisure activities such as reading, picnicking and sunbathing; play and exploration; admiration of the beautiful environment; social gathering such as birthday celebrations, dancing and photo-shoots; spiritual meditation; seeking for shade amongst others (Figure 3). This was further affirmed by some officials who reported that *“they used the urban spaces for amusement with friends and for sports”*. This is in line with the findings of Milton (2002) who opined that the development of urban green space ushers in a number of benefits ranging from air and water purification, pollution mitigation, carbon sequestration, microclimate regulation, habitat for urban wildlife, recreational, spiritual and therapeutic value as well as social integration.

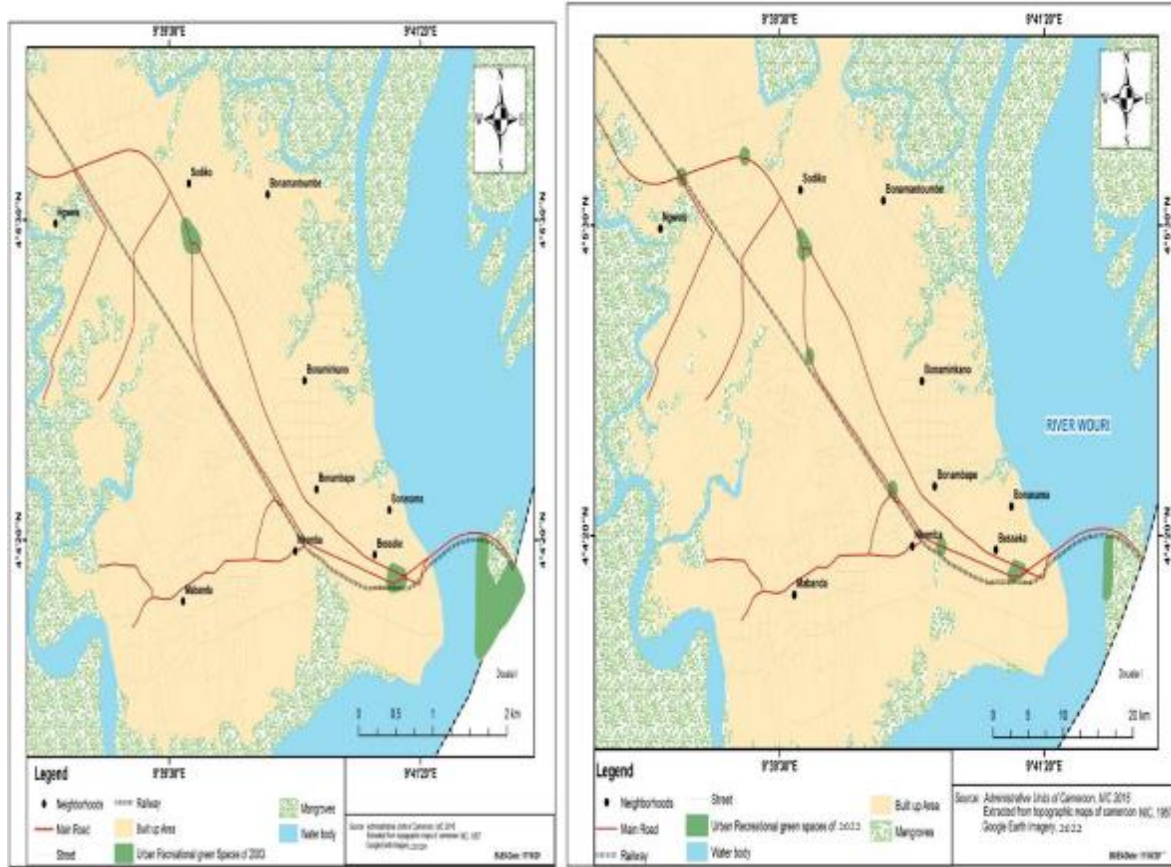


Figure 3 Relaxation Site and Sports Activities in Urban Green Space of Douala IV Municipality

Source: (Field work 2023)

3.2. The Spatiotemporal Nature and Extent of Transformations of Urban Green Spaces in Bonaberi

Douala IV Municipality is blessed with urban recreational green spaces ranging from community gardens, schools, cemeteries, city farms, urban parks, street trees, alley greens to urban natural resources like forests, wetlands, mangroves, tree plantations and water bodies. These urban resources have been undergoing destruction and shrinking especially from human forces. The spatiotemporal variations of the nature of the green spaces where examined as shown on Figure 4.



a) Urban Green Space in 2003

b) Urban Green Space in 2022

Figure 4 (a and b) The Evolution of Recreational Green Spaces in Douala IV Municipality between 2003 and 2022

Source: Field work, 2022

Figure 4a shows the recreational green spaces within the Douala IV Municipality in 2003, though few in number but the areal coverage in 2003 was more extensive than the situation in 2022. The large area covered by urban green spaces in the past is attributed to less settlement densification which is illustrated by the increase areal coverage of green spaces. In addition, priority was given to green spaces due to its contribution to the well-being of the city and cultural values. From Figure 4b, it is evident that the urban recreational sites in 2022 have increased in terms of numbers but ironically, the areal coverage has decreased compared to that in 2003 as shown in Table 1.

Table 1 Extent of Transformation in Urban Green Spaces in Douala IV Municipality

Land cover/Land use type	Base Area in Km ² (2003)	% of Total Land Area	Total Area in Km ² (2022)	% of Total Land Area	Extent Transformation	of	% of Change
Settlement	20.8	10.2	29.4	14.42	8.6		4.22
Recreational sites	0.16	0.08	0.02	0.01	-0.14		-0.07
Water Bodies	32.2	15.79	31.89	15.64	-0.31		-0.15
Total Area of Land	203.9	26.07	61.31	30.07	8.15		4

Source: Calculations based on the distribution map of urban recreational sites in Bonaberi between 2003 and 2022

In assessing the spatiotemporal changes in green spaces in Bonaberi Municipality, the urban greenery reduced from 0.16 Km² (0.08%) in 2003 to 0.02 Km² (0.1%) in 2022; a reduction of 0.14 Km² (-0.07%) over a period of 19 years. The

decrease is as a result of settlement extension resulting from population increase. Settlement occupied 20.8 Km² (10.2%) in 2003 and 29.4 Km² (14.42%) in 2022 accounting to an increase of 8.6 Km² (4.22%). Water bodies occupied 32.2 Km² (15.79%) in 2003 and 15.64% in 2022 indicating a reduction by -0.31 Km² (-0.15%). Field investigations revealed that the emerging urban land uses like industrial, commercial and transportation were noticed to have contributed to the reduction in the recreational sites. This was further affirmed by information obtained from officials of the urban council who indicated that *“population increase, installation of commercial stalls by vendors and different emerging urban land uses have encroached upon urban green spaces”*. For instance, *“ELF Green Space”* that once served as a cultural and relaxation/sporting site for urban dwellers and also as a source of revenue for the local government has been transformed to industrial land use (Dangote Cement Factory) as indicated by the Satellite images in Figure 5. This view is further shared by Puplampu and Boafo (2021) who examined the unprecedented urban expansion of Accra and the fragmentation of the natural ecosystem revealed that the urban built environment of Accra has expanded from 55.1% to 83.79% at the expense of the natural environment, including the green spaces which has declined from 41% to 15% over 27 years..

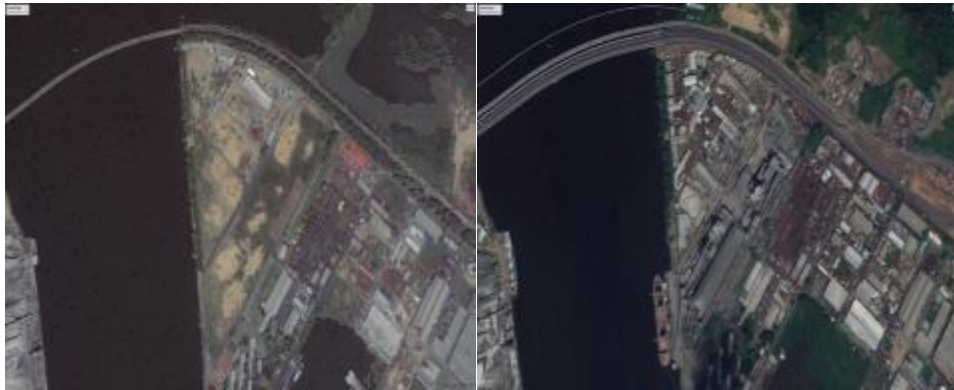


Figure 5 Satellite images of Dangote Cement Factory between 2003 and 2022

Source: Field work, Google Earth Imagery 2003 and 2022

Furthermore, urban renewal processes to meet the needs of road transportation triggered the alteration of its ecosystem and loss of urban greens in Bonaberi as shown on Figure 6.



Figure 6 The Newly Constructed Road and Fly Over in Sodiko

Source: Field work, 2023

The construction of Nouvelle Route (Figure 6A) and the fly-over way (Figure 6B) in Sodiko in Bonaberi greatly transformed and significantly reduced the urban greens of the Municipality. The findings revealed that the rapid population growth, proliferation of informal activities on urban green spaces and less attention paid to the management of the urban green spaces constitute other factors plaguing the destruction of the urban greens in Bonaberi. Further

investigation conducted with some officials in the Department of Hygiene and Sanitation and the Department of Construction in the Urban Council on the reduction in areal coverage disclose that “*urban green spaces are on a decrease due to lack of sensitization of the population, population increase, and limited skilled workers amidst others*”. They added that “*there is lack of follow-up of the Master Plan and low priority attach to urban greens by the town planners*”. This aligns to the findings of Mensah (2014) and Djibril *et al.* (2012) who attributed the poor maintenance of urban parks and other green spaces to institutional inefficiencies in Kumasi in Ghana, Abidjan in Cote d’Ivoire and Harare in Zimbabwe.

3.3. Implications of urban recreational green space dynamics and planning options

Urban recreational green spaces, including parks, playgrounds, and gardens are widely recognized for their valuable contributions to the well-being of city dwellers. However, the shrinkage of these green spaces has brought about negative implications on the environment and well-being of the inhabitant in Bonaberi. From field investigations, the shrinkage of urban recreational green spaces has resulted in an increase in urban heat islands (27%), loss of biodiversity (15%), atmospheric pollution (18%), violence and crimes (17%), unattractive environment (13%) and mental and physical health issues (10%).

3.3.1. Loss of Biodiversity

Despite the rich heritage of urban green spaces as sanctuaries for diverse native and non-native plant and wildlife playing a crucial role in biodiversity conservation, the continuous urban expansion in Bonaberi has resulted in the shrinkage of biodiversity. The shrinkage is due to clearance for infrastructural development, unsustainable exploitation of mangrove forest and urban greens, pollution, poor management and maintenance. The loss of biodiversity in Bonaberi has affected the ecosystem functioning and significant disruption of ecosystem which has resulted in extreme weather events such a flash floods which is recurrent in Bonaberi (Figure 7). This can be mitigated by increasing awareness on the impacts of biodiversity loss and increase support to government conservation policies and actions.



Figure 7 The Effect of flash flood occurrence in Mabanda in the Month of July

Source: Field Work, 2023.

3.3.2. Increase in Urban Heat Islands

The increase in concrete, asphalt and other impervious surfaces absorb and re-radiate heat resulting in temperatures rise creating localized hotspots in Bonaberi. Bonaberi being the industrial hub in Douala, coupled with increase housing, commercial activities, infrastructural development and vehicular emission, has contributed in creating pockets of high temperature in the surrounding environment. These activities release pollutants and greenhouse gases into the atmosphere which further modify the microclimate of the area and increase urban heat island. In addition, the growth of tall buildings and the compact layout in the city impede natural air circulation, trapping heat and intensifying temperature levels.

Urban Heat Islands contribute to higher temperatures which can directly impact thermal comfort and stress level. The relationship between temperature and thermal comfort highlight that inhabitants feel comfortable when temperatures range between 25°C and 27°C, while when temperatures rise above 32°C, a significant proportion of the population feel stress due to heat (Nikolopoulou & Steemers, 2003; Parsons, 2014; Awuh, 2021). From Table 2, the average temperature

range in Douala IV is between 24°C (75°F) and 32°C (90°F). The hottest months from January to May have temperature average hovering above 30°C (86°F), indicating that residents may experience discomfort and heat stress. The Urban heat Island effect exacerbates the situation by trapping heat within the city leading to elevated temperature compared to surrounding rural areas. The cooler months of June to December have average temperatures of 27°C (81°F) with little seasonal variation. Also, the high humidity levels makes the perceive temperature feels higher, in addition, the location of Douala near the Equator, means it does not experience drastic temperature swings and the climate remains relatively warm and humid year-round.

Table 2 Average temperature variations of Douala IV between 2003 to 2022

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature °C												
Average	28.5	28.4	28.8	28.2	27.7	26.8	26.2	25.6	26.0	26.9	27.5	28.8
High (extreme)	32.4	32.3	32.7	32.4	31.8	30.2	28.8	27.9	29.8	30.5	31.6	33.2
Low (extreme)	29.5	24.5	24.8	23.9	23.5	23.4	23.6	23.2	22.2	23.2	23.3	24.2

Source: The Douala Meteorological centre, 2022

Green spaces allow heat dissipate more efficiently, as plant through the process of photosynthesis absorb solar radiation and release oxygen which moderate temperatures. The reduction in the area coverage of urban green spaces in Bonaberi diminishes the cooling effects associated with natural vegetation, exacerbating urban heat island. From field investigations, 89% of respondents reported to have been affected by urban heat island related diseases such as dry mouth, fatigue, heavy sweating, headache and intense thirst. This corroborates with the findings of Enete (2014) who asserted that urban heat islands affects human health by contributing to general discomfort, respiratory difficulties, heat cramps and exhaustion, non-fatal heat stroke and heat related motility. To mitigate this, the city council should integrate green spaces in to city planning by introducing the use of cooling roof, designs that promote natural ventilation, encourage public transport and walkability, encourage the use of energy-efficient buildings, monitor and assess urban heat island.

3.3.3. Atmospheric pollution

The shrinkage in green spaces has significantly contributed to increase atmospheric pollution through reduction in air filtration, increase carbon emission, reduce wind dispersal of pollutants, and increase dependency on energy intensive cooling. Bonaberi is confronted with deterioration in air quality due to the intensification of urbanization and industrialization with over 70% of industries in Cameroon located in Douala with poor waste treatment methods that have exposed the population to air pollution. Exposure to air pollution increases both long term and short term respiratory and cardiovascular diseases and health issues like irritation of the eyes, nose and throat, dry cough, wheezing, shortness of breath and chest pains among others. Vigevaniet *al.* (2023) express that green spaces play a pivotal role in the absorption of pollutants, act as natural filters, trap dust, pollen and other airborne particles in the surface and release oxygen thereby reducing concentration of particulate pollutants in the air. But increase in atmospheric pollutants has adverse effects on human health, ecosystem and climate change. To mitigate this, the city council should incorporate proactive strategies like the expansion of urban green spaces, regulate industrial emission via installing pollution control devices, adopt cleaner production processes and regular monitoring of emissions.

3.3.4. Unattractive Environment

Urban green spaces provide a visually pleasing environment as they introduce colour, texture and vibrancy to the urban landscapes in contrast to the concrete surfaces that dominate the urban environment in Bonaberi. The shrinkage and poor management of these green spaces has resulted in a visually unappealing and monotonous environment characterized by makeshift structures, roads and other infrastructure. The reduction in green spaces in Bonaberi has resulted in the loss of biodiversity, leading to more uniform and less engaging environment, thereby negatively affecting the aesthetics and quality of life in the town. It was also observed that a majority of these green spaces have been encroached upon as women are seen trading in roast maize, plantains and call boxes in green spaces. This encroachment is due to negligence in the part of the city authorities. This was further affirmed by an official of the Department of Hygiene and Sanitation who expressed that '*negligence is expressed through installation of commercial stalls, trampling, and wastes disposal on the green spaces by pedestrians, motorists and patronizers in green sites which destroy the aesthetics of Bonaberi*' (Figure 8). The aesthetics in Bonaberi can be improved by increasing the number and size of

parks, enhance nighttime energy-efficient lighting designs that highlight and encourage community involvement in urban beautification projects such as cleanups and tree planting events to foster a sense of ownership.



Figure 8 Unattractive Environment due to Inappropriate Use of Green Spaces in Bonaberi

Source: Field Work, 2023

Figure 8a shows poorly disposed wastes on the green space in Bonassama, Figure 8b shows public green space in front of the urban council and 'Hotel de la Ville' where part of the green is used as a dumpsite for unused vehicles and containers, while Figure 8c shows green space under construction that has been encroached upon by informal commercial activities at Ancient Route. These incompatible activities by users have degraded the greeneries both in their quantity and attractiveness.

3.3.5. Mental and Physical health issues

Parks equipped with playgrounds, sports facilities, and open spaces are focal points for individuals and families seeking outlets for physical activity and play which encourage a healthy and active lifestyle among urban residents. These spaces offer serene settings for relaxation and tranquility. Their shrinkage in the Bonaberi Neighborhood has led to increase in air pollution, contributing to respiratory problems and other health issues such as stress, anxiety, increase rates of obesity and heart diseases.

3.3.6. Violence and Crimes

The hypothesis that well-maintained green spaces can enhance social cohesion, act as a platform for neighbourhood interaction and in turn foster collective vigilance and deter potential criminals is true. However, the inefficiently maintained and secluded green spaces in Bonaberi are fertile grounds for illicit activities, serving as locations for drug dealing and hidden criminal acts like rape. In addition, these green spaces which are very close to the road attract vulnerable populations such as homeless individuals who turn to involve themselves with petty theft and assault. This is similar to the findings of Syption (2023) who reported that poorly maintained green spaces attract criminal activities, potentially increasing vandalism, drug-related offenses and loitering. This can be solved through inclusive designs, natural surveillance, adequate lighting at night, integrate public performances to create a vibrant and welcoming environment.

4. Conclusion

This paper provides some reflections on the urban recreational green spaces dynamics in Bonaberi. The issue of urban greening is topical given the current rate of urban development which mounts pressure on the environment. In concrete terms, it is estimated that by 2050, 6.3 billion people will populate cities. This indicates a logical increase in the demand for urban green space to accommodate physical activity. Such space is likely to include a mixture of green streets, pocket parks, larger parks, among others. Factors like urbanisation, settlement expansion constitute a constant threat to the existence of urban greens as epitomized in the study area. Apart from settlement expansion, human and natural challenges constitute a constant threat to the existence of urban greens as epitomized in Bonaberi. Such a spiral cycle of human action on the environment affirms the concept of the Tragedy of the Commons that ends up with the unfortunate situation wherein mankind has become his own demise such as increase in urban heat islands, loss of biodiversity, atmospheric pollution, crimes and health issues. This calls for immediate and efficient attention on the

design, maintenance and accessibility of urban green spaces so as to achieve a sustainable or eco-city. The study recommends that urban green spaces be treated among the top priorities of the development agenda of urban planning authorities with key stakeholders managing green spaces, well-resourced for effective application of planning policies to restrict encroachment around greeneries. Urban dwellers should be sensitized on environment ethics and be encouraged to participate actively in the management of the urban green spaces. Establish systems to monitor and assess the quality, quantity and distribution of urban green spaces. This will help to identify areas in need of improvement and inform decision-making processes related to urban planning and development.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

- [1] Antrop, M. (2004): Landscape change and the urbanization process in Europe. *Landscape Urban Plan*, 67, 9–26.
- [2] Awuh, E.M. (2021). Monitoring Day and Night-Time Situation of Urban Heat Island and Possible Adaptation Measures in Douala, Cameroon. *Journal of Geoscience and Environmental Protection*, 9, 163-176.
- [3] Benedict, M. A. & McMahon, E. T. (2002): Green Infrastructure: Smart Conservation for the 21st Century. *Renewable Resources Journal*, 20, 12-17.
- [4] Benedict, M. A. & McMahon, E. T. (2006): Green Infrastructure Linking Landscapes and Communities, London, Island Press.
- [5] Djibril, C., Coulibaly, A., Wang, X., & Ousmane, D. (2012). Evaluating green space use and management in Abidjan City, Cote D'Ivoire. *International Journal of Economics and Management Engineering*, 2(3), 108-116.
- [6] Egbenchong, R.E. (2022). Urban Development Implications on mobility in Wouri Division, the Littoral Region of Cameroon. An Unpublished Ph.D Thesis, Department of Geography and Planning, University of Bamenda.
- [7] Enete, I.C. (2014). Impacts of climate change on Agricultural production in Enugu State, Nigeria. *Earth Science and Climate Change*, 5(9), 234.
- [8] Fogwe, Z. N. (2016). An Assessment of an Urban Development-Flood-Impact Relationship in a Near Millionaire City of Cameroon (Bamenda). *Journal of Geoscience and Environment Protection*, 4, 136-146. <https://doi.org/10.4236/gep.2016.44017>.
- [9] Forman, R.T.T. (1996). Land Mosaic: The Ecology of Land and Regions, Second ed. Cambridge University Press.
- [10] James, P., Tzoulas, K., Adams, M.D., Barber, A. et al. (2009). Towards an integrated understanding of green space in the European built environment, Urban Forestry & Urban Greening. *International Journal of Urban and Regional Research*, 65-75.
- [11] Maas, J., Verheij, R.A., Groenewegen, P., Vries, S., Spreeuwenberg, P. (2006).: Green Spaces, Urbanity, and Health: how strong is the relation? *Journal of Epidemiology Community Health*, 60(7), 587-593.
- [12] MEA-Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Synthesis Island Press, Washington DC.
- [13] McKinney, M. (2002). Urbanization, biodiversity, and conservation. *BioScience*, 53(10), 883-890. [https://doi.org/10.1641/00063568\(2002\)052\[0883:UBAC\]2.0.C;2](https://doi.org/10.1641/00063568(2002)052[0883:UBAC]2.0.C;2)
- [14] Mensah, C. A. (2014). Urban Green Spaces in Africa: Nature and Challenges. *International Journal of Ecosystem*, 4(1), 1-11.
- [15] Milton, K. (2002). Loving Nature: Towards an Ecology of Emotion. Routledge, New York. <https://doi.org/10.4324/9780203421413>
- [16] Niemela, R., Stefan E., Eriksson, K, & Maija L. (2012).: A Screening tool for Assessing Everyday Health Information Literacy. *The Journal Libri*, 62, 125-134
- [17] Nikolopolou, M., & Steemers, K. (2003). Thermal Comfort and Psychological Adaptation as a Guide for Designing Urban Spaces. *Energy and Buildings*, 35(1).

- [18] Persons, K.C. (2014). *Human Thermal Environments: The Effects of Hot, Moderate and Cold Environments on Human Health, Comfort and Performance* (3rd Ed). Boca Raton, FL: CRC Press.
- [19] Puplampu, A.D & Bofo, A.Y (2021). Exploring the impacts of urban expansion on green spaces availability and delivery of ecosystem services in the Accra Metropolis. *Environmental Challenges*, 5.
- [20] Sandstrom, G.U (2002): Green Infrastructure Planning in Urban Sweden. *Printing Practice & Research*, 19(4), 373-385
- [21] Swanwick, C., Dunnett, N. and Wolley, H. (2003). Nature, Role and Value of green spaces in towns and cities: *An overview, Built Environment*, 29, 94-106.
- [22] Sypion, N (2023): Exploring the impact of green areas on crime rates in Urban environments. *European Research Studies Journal*, 4, 456-461.
- [23] Tamunang, B. M. (2013). *Urban Renewal Process and Implications, The case of Bonaberi Municipality in Douala Littoral Region. An Unpublished M.Sc Thesis, Department of Geography, University of Buea.*
- [24] United Nations. (1995). *United Nations, Population Division, World Urbanisation Prospects, Urban and Rural Population Estimates and Projections*, New York, United Nations Publications Board.
- [25] Vigevani, I., Corsini, D., Comin, S., Fini, A. and Ferrini, F., (2023). Methods to quantify particle air pollution removal by urban vegetation: A review. *Atmospheric Environment: X*, p.100233.
- [26] World Bank., (2009). *Cameroon, Forest and Environment*, Available at www.worldbank.org/External/Project.
- [27] *World Bank Annual Report (2021). From Crisis to Green, Resilient and Inclusive Recovery*. Washington, D.C.: World Bank Groups, 3(1).