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Arnold Mwanzu

Joseph Mwangi

Winnie Nguyu




Jacob Nato

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Promoting Sustainable Environments through Urban Green Spaces: Insights from Kenya

Arnold Mwanzu ^{1,*}, Winnie Nguyu ², Jacob Nato ² and Joseph Mwangi ¹

¹ Library Department, Aga Khan University, Nairobi 30270, Kenya; mwangijocef@gmail.com

² Kenya Institute for Public Policy Research and Analysis (KIPPRA), Nairobi 56445, Kenya; wnguyu@kippra.or.ke (W.N.); jnato@kippra.or.ke (J.N.)

* Correspondence: arnold.mwanzu@aku.edu

Abstract: Kenya has experienced rapid population growth and urbanization in recent years leading to major changes in its natural environment. Urban infrastructure has a significant influence on carbon emissions and environmental degradation. Urban green spaces are some of the interventions that demonstrate how the impact of increased urbanization can be managed. An exploration of the current state of urban green spaces in Kenya is essential to identify equitable and sustainable development strategies. Kenya has a few green spaces and community gardens for relaxation and recreational activities. These spaces' continued renovation and preservation strongly indicate Kenya's commitment to maintaining urban green spaces for a sustainable environment. A multi-method approach involving a literature review, situational analysis, and researchers' reflections was used to examine two urban green spaces (Nairobi City Park and John Michuki memorial park) and identify their benefits and opportunities to the environment and community whilst highlighting the challenges of maintaining the spaces. Green spaces provide socioeconomic benefits, increased biodiversity, reduced air and water pollution, and regulated temperatures. Population growth, lack of enough public open spaces, and overdevelopment are highlighted as contributors to environmental degradation. Urban green spaces in Kenya offer numerous economic and social development opportunities, promoting employment creation and attracting foreign investment. Today, community centers, such as green libraries, sustain the environment by availing modern reading areas with adequate natural lighting and disseminating knowledge that promotes green growth. It is unclear how renovated Kenyan urban spaces, such as parks, create a better environment and reduce the negative impacts of urbanization. This paper aims to fill this gap by providing an understanding of the role of urban green spaces in Kenya and how they promote environment sustainability.

Keywords: urban green spaces; Kenya; net zero transition; green libraries; environmental sustainability; urban parks; sustainability; urban greening



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1. Introduction

In recent years, Kenya has experienced rapid population growth and urbanization. For instance, Kenya is now home to four cities: Nairobi, Mombasa, Kisumu, and Nakuru. The country also adopted a devolved system of governance in 2013, which has seen the growth or development of urban areas in the country. The rapid population growth and urbanization have led to major changes in Kenya's environment. Notably, urban infrastructure significantly influences higher carbon emissions and environmental degradation. Urban green spaces are one potential approach to how the impact of environmental pollution can be reduced. Urban green spaces have many benefits, such as maintaining ecological balance, promoting human health, and reducing traffic congestion. They are also essential for providing recreational and leisure activities. It is necessary to explore the current state of urban green spaces in Kenya and identify equitable and sustainable development strategies.

Urban green spaces are important to the urban ecosystem [1]. They offer a variety of social, economic, and environmental benefits. According to [2,3], the social benefits of urban green spaces include aesthetic value, leisure and recreation, individual perception, and human and mental health. Most of the benefits of urban green spaces are environmental, including providing habitats for plants and animals, enhancing air quality, reducing noise pollution, and creating a micro-climatic condition [4]. Urban spaces also confer several economic or financial benefits, including tourism earnings from having a favorable image and the possibility of investment inflows [5]. Considerable work has explored the value of green urban spaces to green growth. Green growth is a key strategy for sustainable development through climate change mitigation, promoting human health and sustainable urbanization. In addition to the socioeconomic benefits, green spaces offer solutions for the effect of rapid and unsustainable urbanization on a nation's growth [6]. Green growth implies increased public and private investments and consumption, leading to sustainable resource use, lower greenhouse gas emissions, and reduced vulnerability to climate change. It also addresses social equity concerns by understanding the consequences of a transition (OECD, *undated*). Therefore, fostering growth through parks, green spaces, and waterways can stimulate innovation, social welfare, and promote business opportunities.

Green growth is affordable and has several benefits [6]. Therefore, a city, country, or region stands to gain by promoting the development of urban spaces or their preservation. Given the critical importance of urban green spaces, the Organization for Economic Cooperation and Development (OECD) launched a program to assess how urban green growth and sustainability policies can improve metropolitan areas' economic performance and environmental quality. From case studies across various geographical, economic, and national contexts, there is demand for environmental quality and products and services that reduce pressure on the environment. This would enhance the contribution of urban areas to national growth, quality of life, and competitiveness (OECD, *undated*).

A recent trend in Kenya is the growth in the real estate industry. This growth is necessitated by the rising population and the movement of people from rural to urban areas searching for job opportunities and other interests. While real estate growth is vital for the economy, this should not come at the expense of a sustainable and healthy living environment. For better living, the ecosystem requires a good balancing act that ensures everyone can access clean air, clean water, and other environmental benefits. With proper planning for urban green spaces, the ecosystem can be favorable for human, animal, and plant life; this will promote good health and better economic outcomes in the long run.

According to [7], air quality and ozone pollution in the atmosphere are worsening in many cities globally. This results from rapid population growth and economic development, making ozone pollution a major atmospheric problem affecting air quality and human health, especially in megacities where human activities are high. Nairobi, one of the African cities with high human activity, contributes to ozone depletion.

Figure 1 below shows the annual total column of ozone at the Nairobi Regional Global Atmospheric Watch (GAW) station as reported by the Kenya Meteorological Department during the 11th meeting of the ozone research managers of the parties at the Vienna Convention in Geneva. The preliminary investigations indicated a decreasing trend in ozone from 1984 to 2019, providing an annual mean of 255.6 DU (ozone amount).

Urban green spaces increase air quality and reduce ozone depletion, thereby creating environment sustainability. Additionally, they control urban climate through the cooling effect while the tree vegetation in spaces such as parks act as windbreaks to control urban flooding. The study, therefore, offers a valuable proposition that urban green spaces need to be planned for and developed alongside other important urban amenities for tourism. Furthermore, they need good maintenance and adequate funding to ensure sustainability.

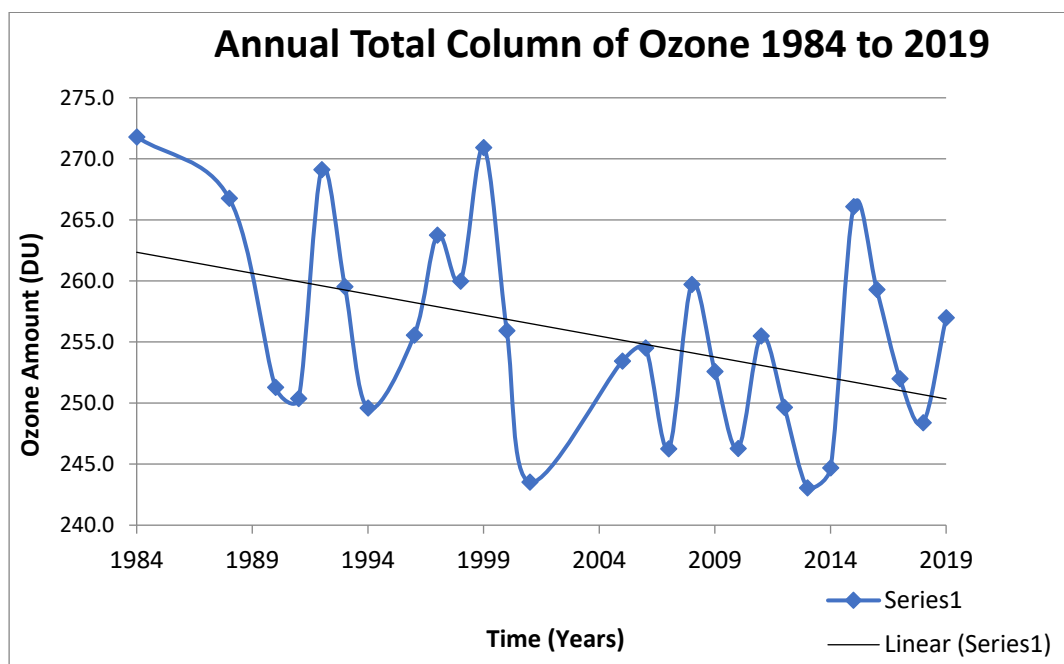


Figure 1. Annual total column of ozone in Nairobi, Kenya (Source: Kenya Meteorological Department National report).

Context of Urban Green Spaces in Kenya

The role of green spaces in the physical and psychological well-being of cities has been widely documented. The importance of natural green environments has been recognized in Kenya since the 1950s; however, urban green spaces have largely been neglected in recent urbanization. Only 3.2% of Nairobi city is green compared to 25% in Kigali and 24% in Johannesburg. Additionally, declining air quality, water scarcity, and over-dependence on non-renewable energy sources have raised serious concerns about the environmental impact of urbanization in Kenya.

Several cities and urban areas in Kenya have tried to set aside urban green spaces. This initiative is commendable, but the gap lies in their proper maintenance and adequate planning. Usually, local and county governments lack budget provisions for caring for urban spaces. Thus, they largely remain unattractive to many residents, and they, in turn, offer only limited environmental products or services.

The few green urban spaces in Kenya, as highlighted in this study, have not grown at par with the rate of urbanization. This should pose a serious concern for the city, urban planners, and residents. If we begin with a simple hypothesis that every person requires a square meter of green urban space, at the minimum, for a better life, then the urgency and rationale can be visualized and well understood. Therefore, the need for more urban green spaces cannot be over-emphasized, and urban planners can prioritize urban green spaces in their planning and budgeting for the environment with the support of other relevant stakeholders. Few studies have explored the relationship between rapid urbanization and the preservation of green spaces in Kenya and regionally. This paper sought to address this gap by providing insights into Kenyan urban green spaces that promote a sustainable environment. The paper presents a case of two green spaces in Kenya, i.e., Nairobi City Park and John Michuki Memorial Park. Furthermore, the paper discusses the benefits of urban green spaces in Kenya, opportunities for implementing urban green spaces in Kenya, challenges encountered in maintaining Kenyan green parks, libraries as agents of public green spaces, policy issues for green growth and green spaces, theories of urban green spaces, and indicators for measuring green growth.

2. Theories of Urban Green Spaces

A few theories have been developed in the literature concerning urban green spaces. These include the garden city model and the principle of intelligent urbanism [8]. The garden city model was proposed by Ebenezer Howard in 1898. The garden city model was proposed to break centralization in towns and rescue the natural environment [9]. It sought to combine the benefits of rural and town setups while avoiding their negative impacts [10]. The garden city model advocates a city with the economic and cultural advantages of city life and the ecological benefits of a rural setup. This was to undo the damages of modern cities that ruined themselves with their spatial demographic growth [11]. The garden city model explains the development of urban green spaces to promote a sustainable environment. The green spaces are borrowed from the rural environment featured with green vegetation. These are integrated with city spaces to break the general construction that populates the city.

Another theory is the principle of intelligent urbanism. This theory is used in city planning and urban design. It comprises 10 principles (<https://eud.leneurbanity.com/10-principles-of-intelligent-urbanism-in-city-planning-and-urban-design/>, accessed on 20 May 2023): balance with nature, a balance with tradition, appropriate technology, friendliness, efficiency, human scale, opportunity matrix, regional integration, balanced movement, and institutional integrity. The intelligent urbanism theory focuses on developing a harmonic and comfortable social environment for residents. It conceives urbanization as a balance with nature rather than a misbalance [12]. Accordingly, the utilization rate of natural resources in society should not exceed the number of resources that nature can replenish yearly [13]. This explains this study's idea of a sustainable environment attained through green spaces.

A few empirical studies undertaken in Kenya have focused on various aspects of green spaces and parks in Kenya. Ref. [1] assessed the challenges facing urban green spaces, focusing on Nairobi City Park. The study observed that the park has troops of Sykes monkeys, silvery-cheeked hornbills, beautiful butterflies, and a wide variety of plant life. It also provides tree seedlings as well as being a reforestation center. Based on the study findings, 86 per cent of the respondents acknowledged that the park faces several challenges: pollution, encroachment, unintended use, and social and management challenges. The largest of these are pollution at 54 per cent, encroachment at 24 per cent, unintended use at 8 per cent, and invasion and monkeys each at 7 per cent.

Nairobi City Park's pollution occurs through air, water, and land [1]. Air pollution is mainly from vehicles, water pollution is mainly from the discharge of raw sewage into the nearby Kabarage stream, while land pollution is through the disposal of plastic bags and textiles. Another challenge is encroachment, which has led to the destruction of habitats as people build houses. In addition, there has been the challenge of unintended use, such as grazing and extraction of traditional herbs. Other cited challenges are social such as rape and murder, monkeys that eat eggs or snakes, and management challenges relating to low staffing and limited expertise to manage natural resources.

According to [14], environmental protection is an increasingly pressing issue worldwide. Ozone depletion, the greenhouse effect, global climate changes, global warming, and biodiversity loss are among the rising environmental concerns. Petersen and Canoz [15] corresponded to this view and indicated that rapid economic growth and overconsumption led to the exploitation of natural resources contributing to environmental degradation. The consequences of these trends include global warming, environmental degradation, and health hazards that threaten human survival. As such, ref. [14] noted that during a recent climate change conference, COP 26 in Glasgow, UK, in November 2021, the Glasgow climate pact was unveiled to drive action across the globe on mitigation (by reducing emissions) and adaptation. The pact's goals were to financially help those already affected by climate change, enabling countries to deliver on their climate goals, and to collaborate, working together to deliver even more significant action. Ref. [16] suggest the 15-min city concept as a viable solution to the poorly regulated urbanization process. The need for

synergy of climate change and air pollution mitigation around cities triggers the concept. The concept can be applied in Nairobi and other urban areas in Kenya to promote the adaptive transformation process of urban structures and the conservation of green spaces. The implementation of the concept would consider the local natural, historical, socioeconomic, and environmental factors of urban green spaces.

3. Methods

A multi-method approach was used to triangulate the literature review and exploratory study data related to the sustainable environment and urban green spaces concept. Books, scientific journal articles, and agency reports were reviewed, providing insights on preserving urban green spaces to promote a sustainable environment in Kenya. The analysis, integrated with researchers' reflections, identified the benefits, opportunities, and challenges of 2 green spaces in Kenya, i.e., Nairobi City Park and John Michuki Memorial Park, and demonstrated how they promoted sustainable urban development. The policy component was intended to identify practices by county and national governments that promote urban green spaces in Kenya.

4. Parks and Urban Green Spaces in Kenya

Kenya has secured a few places as parks and green spaces. In Nairobi County, some of the available green spaces include Nairobi City Park, Uhuru Park, Nairobi National Park, Arboretum, Jeevanjee Gardens, Karura Forest, the Michuki Memorial Park (which the Government has recently restored), the August Seventh Memorial Park, Lang'ata Botanical Garden, Ololua Forest, and Ngong Road Forest Sanctuary. Outside Nairobi County there are also other green spaces sparsely distributed throughout the country. Among them are the Machakos People's Park, Evergreen Park in Kiambu County, Mwea National Reserve, Karue Hill Picnic in Embu County, Haller and Bamburi Parks in Mombasa, Amboseli National Park in Kajiado, Wangari Garden in Thika, and others. Some research has been conducted on some of these areas, including [1] on Nairobi City Park, Wildlife Direct, ref. [17] for the case of Kisumu City, ref. [18] for Nairobi City, ref. [19] for central Nairobi, ref. [20] for Thika sub-county, and ref. [21] for the case of Karura and Ngong forests, to highlight just a few.

In Nairobi, City Park and Uhuru Park are the main green spaces used as recreational grounds. The City Park is in the parklands area of Nairobi, while Uhuru Park is located within the central business district (CBD) along Uhuru Highway. Both parks do not charge entry fees. The Nairobi city county Government manages the City Park [1]. The park has botanical gardens and rich biodiversity and covers about 60 hectares.

4.1. Nairobi City Park

City Park in Nairobi is one of the green spaces remaining in the city, with a long history. Originally, the park was part of the Karura Forest. Following the rapid development of homesteads and Karura farms (currently Muthaiga), the isolation of the forest began. Originally known as the Nairobi Forest Reserve, 221 acres were declared off-limits in 1903. The forest was later renamed the Municipal Forest and served as a source of bushmeat during the world wars [22]. It was established as a zoological garden in 1921, named the City Park in 1923, and declared a public park in 1925 ([Utalibora.word.press.com/2019/11/26/the-Nairobi-city-park/](https://utaliibora.word.press.com/2019/11/26/the-Nairobi-city-park/), accessed on 20 May 2023). The park is between Limuru Road, Forest Road, and the Parklands suburbs. The Kabagare stream flows in the lower part of the park. It is regarded as the heart and lungs of Nairobi's central business district.

The park offers a scenic environment for the city's residents for passive recreation from the hustle and bustle of Nairobi. It also offers picnic sites for family and group outings. Within the park are unique features such as bird watching, a nature walk, and the *Mtego wa Panya* maze, offering fun and physical fitness. Catering services are also available at the Bowling Green Restaurant. The park is far from the CBD, and transport is readily available. It is also adjacent to the famous city market.

Apart from its environmental essence, the park also has a cultural heritage. It is the resting place of key people in Kenya's political life, including Kenya's second vice president, Hon. Joseph Murumbi, his wife, and human rights activist Pio Gama Pinto. In addition, the World War I memorial cemetery and the Goan and Jewish cemeteries are within the park. By 1990, the park had the Boscowen collection of rare plants next to a football pitch [23]. The park was also used for live performances by dancing troupes from India and brass bands. A bandstand which involved live performances by the King's African Rifles and various touring dance groups from India was suggested by the then Nairobi Municipal Committee chairman, Mr H.R. Tate [22]. Parklands residents rejected a plan to introduce a zoo in the park in 1923 for fear of lions roaming within their estates [24].

Notable visitors to the park have been city residents and tourists from various parts of the world. Locally, people who stay adjacent to the park, such as those who stay in the Pangani estate and students from Aga Khan High School and Aga Khan University Hospital in Parklands, have been frequent visitors [23].

Despite the greatness exhibited by the City Park, it has been engulfed in some challenges. Although part of the fauna, the monkeys in the park have been blamed for causing damage, including destroying trees [23], eating eggs and snakes, and sometimes harassing visitors [1]. Another major problem relates to land grabbing. The park has shrunk to 60 acres from the original 90 acres owing to questionable land allocations of part of the park to private developers and companies (will Nairobi maintain its status as the 'Green City in the Sun?'). The 60 acres were declared a protected area in September 2009 through a legal notice in the Kenya Gazette supplement No. 59 of 2009.

To ensure the park's management, some lobby groups have come together to maintain the City Park. An example here is the Friends of City Park. This lobby group completed a biodiversity survey which identified about 988 species of flora and fauna ([Utaliibora.wordpress.com/2019/11/26/the-Nairobi-city-park/](https://utaliibora.wordpress.com/2019/11/26/the-Nairobi-city-park/), accessed on 20 May 2023). The park also consists of a mixture of native forest trees, cultivated gardens, and open spaces for recreation (from the information pamphlet produced by friends of City Park IN nglenya.com/places/city-park.html, accessed on 20 May 2023). Another lobby group is the Friends of Nairobi Arboretum for the case of the Arboretum. Recently, the former Cabinet Secretary in Charge of Environment, Hon. Keriako Tobiko, announced an enhancement to the park's management and delegated it to the Forestry Forest Services in collaboration with the Nairobi Metropolitan Services (NMS) ([Kilimoneews.co.ke/general-news/city-park-to-be-managed-as-a-public-forest-tobiko/](https://kilimoneews.co.ke/general-news/city-park-to-be-managed-as-a-public-forest-tobiko/), accessed on 20 May 2023). However, the Friends of City Park continue to play a pivotal role in the park's management (Nairobi inspires citizens to recover green spaces during the pandemic).

4.2. John Michuki Memorial Park

The reopening of the renovated John Michuki memorial park by the President of Kenya in 2020 strongly indicated Kenya's commitment to maintaining urban green spaces for environmental preservation. The rehabilitation of Michuki Park involved the establishment of tree nurseries, solid waste management by Nairobi Metropolitan Services, general relaxation spaces, and restoration of waterways for the Nairobi River. The green renaissance saw a revamp from a dumping site to a green recreational space.

According to [25], attempts have been made to restore and reclaim green spaces in Nairobi following cases of privatization and grabbing of green spaces and urban forests. They cite an example where half of the Karura forest was reportedly privatized by private developers [26]. A similar case is cited by [27], who noted the neighboring communities' encroachment of the Karura and Ngong forests. In recent years, attempts to reclaim grabbed land meant for environmental conservation have proved challenging, with only a few isolated successes. A notable example that bore success and worldwide acclaim was the robust campaign by the Green Belt Movement led by the late Professor Wangari Mathai, who was at the forefront of saving the Karura Forest. The Karura forest has since become one of the popular urban green spaces in Kenya, attracting both local and

international environmentalists in research activities, leisure and fitness activities, charity runs to advocate for the conservation of the environment, and educational activities on environmentalism. Another notable reclamation of urban green spaces in Kenya is the reclamation of 2000 acres of Nairobi National Park, City Park Nairobi, and an ongoing campaign to reclaim grabbed parts of Ngong forest. Figures 2 and 3 show before and after photos of John Michuki Park.



Figure 2. Photos of the space as a dumpsite before renovation and transformation to John Michuki Park (source: Kenya Forestry Service).



Figure 3. Photos of John Michuki Memorial Park after renovation and restoration (source: Kenya Forestry Service).

5. Discussion

5.1. Benefits of Urban Green Spaces in Kenya

Urban green spaces provide numerous benefits, such as improved quality of life, increased well-being, and increased physical activity. They also have a significant influence on the natural balance of the environment. For instance, they increase biodiversity, reduce air and water pollution, regulate temperatures, and improve thermal insulation. Moreover, they provide psychological benefits, such as improved mental health, stress relief, encourage community participation, use, and acceptance of urban green spaces, and reduced aggression.

In Kenya, green spaces are also essential for reducing traffic congestion. At the macro-scale, features of urban expansion related to green spaces can influence the structure of cities and predict traffic models [28]. This can reduce emission levels and hence the air pollution associated with urbanization. Parks and green spaces can act as catalysts for wider transport-related development. Such development includes strategic urban planning, traffic calming, and improved active transport infrastructure.

5.2. Challenges and Opportunities for Implementing Urban Green Spaces in Kenya

One of the key challenges in implementing urban green spaces in Kenya is the speed and concentration of population growth. The rapid urbanization of overpopulated and underdeveloped cities has put immense pressure on infrastructure and resources. This has led to a lack of proper planning for urban green spaces and the overdevelopment of built areas. The lack of open spaces has also had a negative impact on air quality, leading to an increase in air pollution. As a result, implementing urban green spaces has become essential to reduce this pressure and air pollution.

The main opportunities for implementing urban green spaces in Kenya are related to the potential for economic and social development. By improving urban infrastructure, creating green spaces can improve the quality of life and attract investments from foreign companies. Furthermore, green spaces can be a source of employment opportunities. Projects such as tree planting and landscape design can create employment, particularly for the local population. The Government of Kenya has repackaged the 'Kazi mtaani' program to provide day jobs for youths to plant trees, with a target to plant 15 billion trees by 2032. This employment opportunity doubles as a national initiative to reduce greenhouse emissions, stop and reverse deforestation, and restore 5.1 million hectares of deforested and degraded landscapes through the African Landscape Restoration Initiative.

There is an increased pace of urbanization and population growth throughout the world. Every year, many citizens, especially the youth, keep moving from rural to urban cities in search of jobs or better living standards [29]. This is especially prevalent in developing countries [30], including Kenya. However, with rapid urbanization, green spaces become encroached upon in search of space to accommodate the increasing numbers [2].

Another key challenge facing green spaces is the land-grabbing problem. Green spaces appear most vulnerable, especially to private developers who yearn to grab land and construct properties for profit.

The preceding discussion, therefore, posits that urban green spaces face several challenges, but they also hold opportunities that can be tapped to enhance better living standards for people. Challenges can be mitigated through proper planning and enforcement of laws and regulations that relate to green spaces and environmental sustainability, such as avoiding littering and being environmentally conscious. The plastic bags ban instituted in Kenya is a positive move but needs better enforcement and closer monitoring. With proper planning, urban green spaces will not be infringed by other competing infrastructures but will provide a safe, healthy, and sustainable living environment. The opportunities also need to be tapped so that the value of urban green spaces can be seen or felt, and this could be the solution to enhancing their long lifespan. With these in place, a good valuation system for urban green spaces can be developed, and assessments for willingness to pay for such services can be undertaken where possible.

5.3. Libraries as Agents of Public Green Spaces

Libraries play a valuable role in generating and preserving knowledge. However, the library can play a much better role in promoting the development and sustenance of urban green spaces. By doing this, libraries stand to gain by enhancing urban green spaces, as discussed in the following section.

Libraries are important in society since they offer opportunities to explore research, acquire new ideas, overcome misinformation, and offer a conducive environment for reading, learning, and recreation. Through their unique role, libraries can be integral in promoting green growth and generally sustainable development. Green libraries promote focus, concentration, and satisfaction [31]. By integrating green growth in a library, the users and staff can enjoy using the library without feeling the fatigue associated with reading and learning. Consequently, library users and staff's productivity, performance, health, and happiness are greatly enhanced [32]. In enhancing green growth, libraries and information centers can enhance the building, interior structure or design, natural lighting, library location, stock resources on green growth, training through sustainability workshops, and other events and projects that promote green growth.

A library building that allows enough natural light, embraces indoor plants, colorful décor, large windows inside the library, and lining the outer walls and indoor green spaces can enhance the library experience. This includes having a green building with a green roof for the library. Libraries should therefore develop or expand their green spaces. This also means the location of the library plays an invaluable role. To enhance this, libraries can establish collaborations with adjacent parks or gardens to establish library branches within the parks. Visitors to the parks can then be motivated to enter the library and do their work from there.

In motivating libraries to promote green growth, the International Federation of Library Associations and Institutions (IFLA), in collaboration with Environmental Sustainability and Libraries (ENSULIB), established a green library award in 2015. Libraries are thus encouraged to pursue strategies towards green growth. An example of a library promoting green growth in Kenya and Africa is the United States International University Africa (USIU Africa). It shows that African libraries embrace the green movement [33]. The library has a green building and engages in sustainability practices. It has a staircase that goes into a garden with plants and trees. It also has an open setup with benches that allow users to hold discussions, relax, and unwind [33]. According to [34], the architects and planning team of the USIU Africa library building design acknowledged the importance of going green and preserving the environment. He notes that the team went on to plan for a garden within the library which, to date, gets watered daily and provides a great ambience to users while also providing the feel of nature and the fresh smell of a garden.

Ref. [14] studied green initiatives in libraries in Kenya and noted that libraries had adopted greening initiatives such as architectural building designs with atriums and green roofing, ensuring maintenance-friendly and eco-friendly construction. Other initiatives include zoning of lighting, redesigning as per Leadership in Energy and Environmental Design (LEED) standards, offering bicycle parking spaces, recycling and reuse of resources, etc. The study's findings confirmed that efforts to go green in the library majorly affect the surrounding environment by providing a more conducive climate through cleaner air for reading and a smaller carbon footprint.

Libraries in Kenya have embraced greening initiatives to support the United Nations Sustainable Development Goals. According to [14], libraries in Kenya recognize participation in greening initiatives as a good strategy for supporting the United Nations Sustainable Development Goals on preserving natural resources for a sustainable future. The study, however, notes that not many libraries actively participated in such endeavors because of a lack of awareness. The small percentage that participates in greening initiatives do so through umbrella organizations such as the Parent Universities, which have a school of environmental science or climate control. Many libraries had embraced the green concept to be at par with the world order. With this adoption, they ensured redesigns and upgrades

to conform to LEED standards of green buildings. Kenya's Vision 2030 was acknowledged as a policy factor influencing libraries to embrace the green concept. The libraries have been embracing and implementing green initiatives in line with the policies of Vision 2030.

Libraries can therefore promote green growth by setting an example. They must have a green mission [35]. In addition to green buildings, green roofs, stock resources, green interior décor, appropriate library location, and other practices, they can also offer leadership on the importance of green growth. They also need to collaborate with like-minded people who yearn for green growth initiatives, have waste-disposal bins strategically placed in the building and outside, and reach out to the community to enhance green growth [35]. They then need to implement actions continuously for sustainable growth so that it is an ongoing process.

5.4. Policy Issues for Green Growth and Green Spaces

Based on an OECD study (undated), the key policy areas for the enhancement of green growth include:

- Business support services for green technology firms.
- Lowering barriers to consumption of green technology.
- Enhancing linkages for research and development between universities and local green farms.
- Multi-level governance issues.
- Public–private partnerships for green growth projects.

The underpinning idea is that green growth is a good growth policy [6]. Globally, some countries have set the pace in enhancing green growth. New York and Chicago are leading the way in the green city paradigm. Stockholm and London lead in congestion tax and public goods pricing, while Bogota and Sao Paulo lead in transportation. Transit-oriented development in Curitiba is also a best practice [6]. Generally, cities can play a critical role in enhancing urban green spaces by planning and budgeting for green growth initiatives.

The development or promotion of green growth is both public and private. Although the government takes the lead in adopting green growth policies, private organizations can do the same where the government is shy to implement them [6]. An example of this case has been demonstrated by the growth of city associations, such as C40 cities, which lead the way towards a healthier and more sustainable future (<https://www.C40.org>, accessed on 23 May 2023).

5.5. Indicators for Measuring Green Growth

In line with an OECD study, the indicators identified to measure green growth include:

- Quality of and access to transportation, including travel time.
- Open space and public spaces.
- Land use.
- Urban emissions, quality of air and water, and water use.
- Waste generation and wastewater services.
- Urban sprawl and its effects on green growth.
- Residential, industrial, and transport energy consumption.
- Extent and attractiveness of the urban and built environment.

6. Conclusions

Urban green spaces are essential for reducing the negative environmental and health impacts of rapid urbanization in Kenya. They can reduce emissions, improve air quality, provide recreational and leisure activities, and provide economic, social, and psychological benefits. However, there are numerous challenges to implementing urban green spaces in the country, such as population growth, inadequate open spaces, and overdevelopment. Nevertheless, numerous economic and social development opportunities and green spaces can create employment and attract foreign investment. By understanding the role of green

spaces in Kenya, it will be possible to create a better sustainable environment and reduce the negative impacts of urbanization.

The challenges faced by cities can be dealt with through proper planning and budgeting and ensuring enforcement of laws and regulations that help to maintain them. With the challenges contained, the opportunities they present can be tapped for the better, including systems put in place for the valuation of environmental goods and services and an assessment of people's willingness to pay for them. City and urban planners, environmentalists, and financiers must work together to promote urban green spaces to improve overall quality of life for citizens.

The rate of progress and development of green urban spaces should be one of the important metrics to focus on. The focus should not only be on poverty rates, economic growth rates, urbanization rates, and other important metrics while remaining silent on metrics relating to the environment, such as growth and quality of urban green spaces. In that case, we shall leave out an important variable from the equation, meaning that the outcomes might have shortcomings.

The traditional knowledge generation and preservation role is valuable for libraries, but with a focus on the environment, the role of libraries will have a further value addition. The library can be critical in promoting environmental sustenance and encouraging urban green spaces. Libraries can play this role by first ensuring their design is eco-friendly, ensuring the knowledge they contain has environmental conservation collections, and playing an advisory and advocacy role in encouraging urban green spaces.

While Kenya has several urban green spaces, much more can be achieved. This includes proper maintenance and funding of existing green spaces and increasing the number of green spaces by more than double the current numbers. With adequate green spaces well distributed throughout the country, the benefits will be felt, ranging from better health outcomes, revenue generation, and a healthy environment, to mention a few.

Finally, environmental conservation should not be regarded as a function of only one or two stakeholders, but a multi-sectoral and multi-stakeholder approach needs to be embraced. Conventional wisdom by many people is that the government is in charge. However, with all stakeholders playing a role, including the private sector, non-government organizations, citizens, government agencies, estate developers, and development partners, among others, the true potential of green urban spaces will be understood and utilized for the betterment of all.

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