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URBAN FORESTS: A GLOBAL PERSPECTIVE

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By
Simone BORELLI
Michela CONIGLIARO
Federica DI CAGNO

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CONTENTS

List of contributors

Authors: Simone Borelli, Michela Conigliaro and Federica Di Cagno
FAO reviewers: Thomas Hofer, Tiina Vahanen
Editor: Alex Chepstow-Lusty
Proof-reader: Barbara Hall
Designer: Marco Perri

External contributors

Latin America and the Caribbean: Germán Tovar Corzo, Gabriela López Damian, Luiz Octavio de Lima Pedreira, Elena B. Craig, Analía Scarselletta

North America:
Phillip Rodbell, Adrina Bardekjian, Michael Petryk, Ernesto Herrera Guerra, Peter Smith, Lauren Marshall, Paul Johnson, Richard Hauer

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Europe:
Clive Davies, Ian Whitehead, Rik De Vreese, Mariateresa Montisci

Near East and North Africa:
Federica Di Cagno, Simone Borelli, Michela Conigliaro

Sub-Saharan Africa:
Jessica Thorn, Nero Bertrand Festus, Brigitte Nyirambangutse, Patrick Likongwe, Charlie Shackleton

6

URBAN FORESTS: A PERSPECTIVE FROM SUB-SAHARAN AFRICA

"A collective effort towards sustainable urban ecosystems"

AUTHORS

Thorn, J.P.R., Department of Environmental Sciences, University of Namibia, Windhoek, Khomas, Namibia; School of Geography and Sustainable Development, University of St Andrews, St Andrews, Fife, UK - Nero, B.F., Department of Forest Resources Technology, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana - Likongwe, P.J., Department of Environmental Science, Rhodes University, Makhanda 6140, South Africa; Leadership for Environment and Development, Zomba, Malawi - Nyirambangutse, B., The Global Green Growth Institute (GGGI), GGGI Rwanda Program, Kigali, Rwanda - Shackleton, C.M., Department of Environmental Science, Rhodes University, Makhanda 6140, South Africa

URBAN FORESTS: A PERSPECTIVE FROM SUB-SAHARAN AFRICA

6.1 Introduction

In an increasingly urbanized world, the importance of Urban and peri-urban forestry (UPF) is gaining recognition in the context of global sustainability initiatives. FAO held the **1st African Forum on Urban Forestry** in July 2021, aiming to promote greener, healthier and happier cities and towns in sub-Saharan Africa (SSA). This forum aligns with various international, regional and national science-policy initiatives, such as the **UN Decade on Ecosystem Restoration**, the **Great Green Wall**, and the **Tree Cities of the World** programme, which seek to scale up urban forestry and ensure its sustainable management (Berglihn and Gómez-Baggethun, 2021).

Despite the increasing attention given to urban forestry in SSA, there is a lack of comprehensive studies on its state in the region. Therefore, in the run-up to the **2nd World Forum on Urban Forests** to be held in October 2023, this chapter seeks to appraise the extent and dynamics of urban forestry in SSA. It begins by providing an overview of the trends in the region, highlighting specific ecosystem services that are particularly significant, prominent or distinct in SSA. The chapter then explores innovative practices in urban forestry within SSA. Finally, it discusses future opportunities for resourcing and research in the field.

6.2 The context of urban forestry in SSA

To appraise the extent and dynamics of urban forestry in SSA, it is necessary to first appreciate the contexts in which it occurs. This is because, at a continental scale, SSA is characterized by a complex array of social, climatic, environmental and economic dynamics that influence or shape the planning, management and implementation of urban forestry, as well as citizens' needs and expectations of urban forests and trees in urban spaces. SSA encompasses 46 countries, spanning 47° of latitude (from approximately 13° North to 34° South), from deserts to

tropical forests and a GDP per capita range (in 2021) of USD 220 in Burundi to approximately USD 8 600 in Gabon (World Bank, 2021). This diversity leads to a wide range of urban forestry policies, initiatives, needs, financing, expertise, coverage and driving forces, making it challenging to generalize across the region.

One major dynamic shaping urban planning and services in SSA, including urban forestry, is the high rate of urban population growth (Figure 1). It is expected to increase from 609 million in 2021 to 772 million by 2026, and 1.26 billion (UNDESA, 2019) or an additional 950 million people by 2050 (OECD-European Commission, 2020). Current urban growth rates (2020–2025) in SSA are more than double those of Asia and three times that of Latin America and the Caribbean (UN-Habitat, 2022). there isn't enough space between the words in countries of the Global North (Shackleton *et al*., 2021). Urban growth is driven in part by large-scale rural to urban migration, internal population growth and urban expansion enveloping surrounding rural villages and landscapes. This growth puts significant pressures on undeveloped lands, demands for basic services and the ability to plan and implement effective strategies. Consequently, urban forests often experience declines, leading to the loss of tree canopy, with adverse effects on water reserves and biodiversity while exacerbating natural hazards such as landslides, flooding and coastal erosion (Pastore, 2022; Zabret and Šraj, 2015; Girma *et al*., 2019; Thorn *et al*., 2021a). For instance, Freetown in Sierra Leone lost 12 percent of its total canopy between 2011 and 2018 due to population expansion and rapid urbanization, and many other cities experienced similar declines.

The spatial extent of urban forests in SSA is largely unknown, but it is evident that the current space allocated for urban trees is limited. In general, urban spatial configurations are designed to accommodate dense human populations, movement and social interactions. As a consequence, this leaves limited room for retrofitting green strategies. For example, it is difficult to reduce stormwater runoff by 50 percent using green infrastructure in a city that is 90 percent impervious, particularly if only 1–2 percent of the land surface can be allocated to greening strategies (Pataki *et al*., 2021).

Informal settlements or slums, which account for 58–75 percent of residential areas in SSA, have grown rapidly over the last three decades (Visagie and Turok, 2020). They face pervasive poverty, inequality and a limited provision of basic services (UN-Habitat, 2022). In these contexts, urban green spaces play crucial roles in providing land for dwellings, food production and various provisioning services such as fuelwood, construction timber, fodder, wild foods and traditional medicines (Wijesinghe and Thorn, 2021; Mollee, Pouliot and McDonald, 2017; Shackleton *et al*., 2022). However, the extensive use of local provisioning services may lead to unsustainable practices, overextraction (fuelwood demand is often implicated), land degradation, dumping of household, sanitary or commercial waste, and informal housing (Adegun, 2018). Budget constraints and restricted capacities lead to limited or no maintenance of urban green spaces, with them being often under-prioritized in spatial planning processes and considered non-essential luxury goods when compared to other basic services and housing (UN-Habitat, 2016; Herslund *et al*., 2018). Due to the extensive use of provisioning services, local ecological knowledge of species is high, which is also a consequence of many residents being migrants from rural areas, or only first-generation urban dwellers.

Informality extends beyond housing and the economy to encompass the nature of many urban forests and green spaces. Thus, there are typically many green areas in SSA towns and cities that have neither been formally designated nor managed as such, and yet they provide various ecosystem services to urban residents. These spaces include, *inter alia*, undeveloped lots, riparian fringes, railway and road verges, interstitial spaces, peri-urban commonages. Indeed, informal areas may cover a larger area than formal green spaces, especially in poorer neighbourhoods (Radebe, 2018), and therefore are more accessible. In being undesignated and often unmanaged, the spaces may be used for activities that would be regulated or disallowed in the formal urban forests and parks, such as sports, cultural or traditional ceremonies, provisioning of goods, loud or anti-social behaviour, and urban agriculture. The vegetation is typically less maintained,

and thus may be more natural, which is important for certain spiritual services (Ngulani and Shackleton, 2019; Kepe, McGregor and Irvine, 2015). However, lack of maintenance and care may also encourage degrading activities (e.g. dumping), disturbance, grazing by livestock, and invasion by alien species. The unmaintained appearance might also elicit safety concerns (Manyani, Shackleton and Cocks, 2021). Nevertheless, for many urban dwellers, informal green spaces are the only green spaces within reasonable proximity to homes and places of work.

Figure 1. Number of people living in urban areas in Africa, 2000--2026 (in 1 000s) (UNDESA, 2019)

UNDESA (United Nations, Department of Economic and Social Affaairs), Population Division. 2019. World Urbanization Prospects: The 2018 Revision (ST/ ESA/SER.A/420). New York. https://population.un.org/wup/publications/Files/ WUP2018-Report.pdf

In contrast to informal settlements, former colonial residential neighbourhoods in many SSA cities and towns exhibit relative affluence, reasonable services and large gardens, resulting in a 'leafy' or green visage. Wealthier residents in these areas often invest time and funds in greening for aesthetic reasons, privacy, and even food production. Indeed, recent studies show a correlation between wealth and vegetation cover and diversity (Giombini and Thorn, 2022; Venter *et al*., 2020), although this relationship is far from universal. The urban authorities also maintain street trees and local parks, a legacy of the former colonial period in design and species, such as *Eucalyptus*, *Quercus* and *Pinus*, which are poorly adapted to the climatic conditions and compete for resources with indigenous species (Shackleton and Gwedla, 2021). However, there is a nascent move in some countries towards favouring native tree species in public urban spaces, together with the recognition for 'unmanaged green spaces' critical for pollination,

maintaining healthy predator–prey relationships, grasses and wildlife connectivity. Nevertheless, the contrast in abundance of and access to urban green spaces and trees between informal and low-income neighbourhoods and more affluent ones remain an environmental justice concern (e.g. Giombini and Thorn, 2022; Venter *et al*., 2020).

Colonial legacies can also often be observed in urban master plans and regulations (Baruah, Henderson and Peng, 2021). This situation relates to a range of different aspects, including density of buildings, abundance and proximity of green spaces, and spatial zoning of neighbourhoods for different socioeconomic classes or racial groups. There are many present-day cities that simply adopted and updated old colonial plans in their entirety or modelled revisions on the original, colonial plans (Likongwe *et al*., 2021). Similarly, access to green spaces and the activities permitted in them are shaped by regulations legislated during the colonial period, which may not resonate with indigenous culture or the needs of present-day communities (Cocks *et al*., 2020).

Livestock, such as cattle, goats, sheep and camels, are commonly found in towns and cities throughout SSA (Graefe, Schlecht and Buerkert, 2008). Free-ranging grazing livestock are commonly found along roadsides and in formal and informal green spaces, while penned animals are fed fodder by their owners harvested from similar places, or via purchased feed. As a consequence, the demand for fodder affects species composition, growth rates and survival of urban trees (Shackleton *et al*., 2017). Hence, urban authorities and citizens require awareness of such pressures when selecting tree species. In addition, livestock excreta can serve as a source of manure for urban agriculture or domestic gardens (Thorn *et al*., 2021b).

A final consideration is that urban forestry is generally given a low priority by many urban authorities in SSA, particularly in contexts of high poverty and informal settlements. Municipal budgets and resources are often directed towards infrastructure development and the delivery of basic services (Gwedla and Shackleton, 2015). In such settings, authorities often do not prioritize investing in: local enforcement (e.g. to prevent dumping, open defecation); municipal budgets for waste management (e.g. fuelling waste trucks, clearing drains, preventing the overflow of stormwater drainage systems, regularly extracting sewage); security (e.g. crime, vandalism); and lighting. In addition, limited access to grid-connected or renewable energy continues the dependence on fuelwood and charcoal for cooking and heating, thereby contributing to deforestation. Regular land occupation encroaches on public green spaces, riparian areas and floodplains, steep slopes, easements and sensitive habitats.

However, the low prioritization of urban forestry by authorities typically contrast with the high appreciation of trees and green spaces by most urban citizens, resulting in citizen-led initiatives to plant or maintain trees in private and public spaces for a range of different reasons and services (Wijesinghe and Thorn, 2021; see Table 1 for a list of 60 tree planting projects in cities and towns in SSA, compiled by Ekamby and Mudu [2022]). Moreover, concerns about the possible effects of climate change are changing mindsets (and budgets) regarding the value of trees and urban green infrastructure in many regions.

6.3 Nature and magnitude of benefits from urban forests in SSA

The ecosystem goods and services from urban forestry in SSA are diverse (Hosek, 2016). Benefits extend well beyond the regulating and recreational services commonly associated with urban forestry in the Global North. For example, SSA urban contexts heavily rely on provisioning and spiritual services, which are accessed from a wide array of formal and informal green spaces under both private and public ownership.

The magnitude and importance of specific services vary depending on local socioeconomic and cultural factors, the condition of the urban forest, and the physical accessibility of these spaces. However, it is important to note that urban forests in SSA may also cause more ecosystem disservices than in other regions. This situation is primarily due to the region's vulnerability, resulting from factors such as: poverty; people living in precarious or marginal areas; increased reliance on urban forests for provisioning services; challenges in waste management and sanitation.

Provisioning services

Fuelwood sourced from the woody biomass of trees and shrubs is a crucial provisioning service. For instance, certain tree species in Nairobi are used for heating and cooking (Furukawa *et al*., 2011). In low-income urban areas of South Africa, such as Bulawayo (Zimbabwe), about 70 percent of residents depend on fuelwood for energy (Dube, Musara and Chitamba, 2014; Shackleton *et al*., 2022). Some poorer households consume up to 3 670 kg of fuelwood annually (Shackleton *et al*., 2022), but the exact proportion sourced from urban and peri-urban forests is unknown.

Urban forests in SSA also provide food and medicines, directly from the trees themselves, as well as indirectly through mushrooms or wildlife found in these forests. Urban residents in places like Ibadan, Nigeria gather fruits from citrus species, *Mangifera indica* (mango) and *Cocos nucifera* (coconut), and utilize bark for medicinal purposes to treat malaria or arthritis (Borokini, 2012). In South Africa, low-cost and informal neighbourhoods harvest annually about 340 kg of fruit per household from their own homesteads, as well as trees in public spaces (Kaoma and Shackleton, 2015). Wild foods are also collected for subsistence and income generation (Hosek, 2016). The likelihood of urban farms for providing food depends on climatic conditions, cost and availability of water, land tenure, and security, among other factors. For instance, in Windhoek, Namibia, private landowners are more likely to grow fruit trees in their gardens than government bodies in public spaces due to the high costs of irrigation, as well as fencing to secure against theft or livestock grazing damage of tree saplings (Wijesinghe and Thorn, 2021).

In addition, urban trees serve as a valuable source of timber for construction, fencing, crafts and tools. Fibrous materials, such as palm leaves, are used for roofing, screens and crafts (e.g. Kaoma and Shackleton, 2014). Urban trees also play a role in providing fodder for animals, particularly in peri-urban areas of SSA (Thorn *et al*., 2021a).

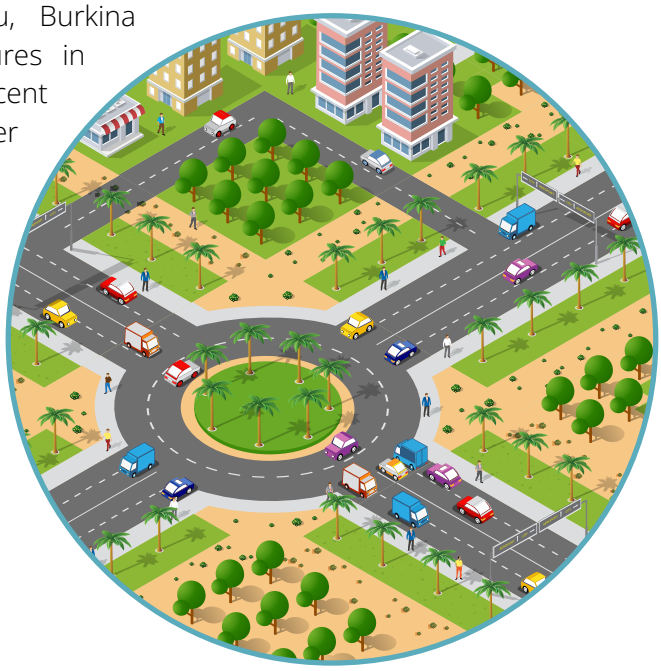
Regulating services

Urban trees play a crucial role in climate regulation, particularly in providing shade and cooling (Lawal, Lennard and Hewitson, 2019), and trapping and filtering dust, releasing oxygen, sequestrating carbon, and ameliorating air and noise pollution (UNFCCC, 2023; Hwang, Wiseman and Thomas, 2015; Tan, Lau and Ng, 2016). With climate change projections indicating greater warming and expanding aridification in SSA (due to projected declines in semi-desert, dry savanna and

Mediterranean biomes), urban trees will become more important. Furthermore, climate change will lead to changes in above-ground net primary production, soil carbon and surface runoff. In addition, climate change will likely enable invasive species expansion, which impacts biodiversity loss, and changes in the frequency and intensity of wildfire seasonality, and in turn affect seed germination, growth of young plants and water regulatory services (IPCC, 2022).

Urban forests also provide flood regulation benefits by mitigating stormwater runoff and erosion, and improving water quality through intercepting pollution. These environmental services are essential because increased urban expansion and land use and land cover change results in the infill, sedimentation, changing profile or reclamation of water sources while enlarging impermeable surface areas, thereby increasing stormwater runoff with consequent sewer overflows. For instance, in Zomba City, Malawi, the restored Sadzi Hill is key for aiding climate regulating services, such as reducing runoff and flooding accompanied with mud and rockslides (Likongwe *et al*., 2021). Similarly, in Freetown, Sierra Leone, rehabilitated forests in hilly environments are important for preventing mudslides and sediment-laden floods during the rainy season (Ciu *et al*., 2019).

Urban forestry also helps in reducing the urban heat island (UHI) effect, where cities are warmer than their surrounding areas due to grey infrastructure and human activities. Vegetated areas in cities have been shown to have lower temperatures than less vegetated areas. For example, in Ouagadougou, Burkina Faso, nocturnal temperatures in areas with more than 40 percent vegetation cover were lower than areas with less than 10 percent vegetation (Linden, 2011). Similarly, in Bulawayo, Zimbabwe, parks had a cooler midday temperature by 3.6 °C than surrounding built-up areas, which were 6.1 °C warmer (Ngulani and Shackleton, 2020).



Cultural services

urban forests in sub-Saharan Africa (SSA) provide important cultural services to local communities, including spiritual and religious values, recreation, and a sense of place. Values related to sacred natural places, where one might feel reverence for nature, are often crucial in connecting residents and places, especially in modern multicultural and multifaith societies (Rall *et al*., 2017). However, these services are often overlooked in urban forestry design, planning and management (Konijnendijk *et al*., 2018).

Although only a handful of studies have documented the spiritual and cultural attachments to urban nature in SSA (De Lacy and Shackleton, 2017; Murtala and Manaf, 2019; Ngulani and Shackleton, 2019; Seburanga *et al*., 2014), it has been found that the spirituality linked to nature holds high importance in certain cities such as Cape Town (South Africa), Bulawayo (Zimbabwe) and Kumasi (Ghana) (Rall *et al*., 2017). This situation contrasts with findings in the Global North, where spiritual values have been ranked lowest in importance compared to other cultural services such as recreation.

Some tree species serve as a connecting medium between people and their ancestors (Shackleton *et al*., 2015; Likongwe *et al*., 2021). For instance, certain tree species, such as the strangler fig (*Ficus thonningii*) and the coral tree (*Erythrina abyssinica*) in Rwanda, are regarded as spiritual mediators, while others such as the northern large-leaved dragon-tree (*Dracaena steudneri*) are believed to repel ghosts. These species are associated with residential designs throughout the country (Seburanga *et al*., 2014). Trees can also be associated with shrines or worship, where the choice of tree species planted considers their social, cultural and spiritual values (Fuwape and Onyekwelu, 2011), in addition to their nutritional and aesthetic benefits (Oyebade, Popo-ola and Itam, 2013; Babalola *et al*., 2013). Indeed, de Lacy and Shackleton (2017) have demonstrated a correlation between tree species richness and a sense of spirituality in urban sacred sites.

Urban forests in SSA also provide spaces for quiet reflection, which is crucial in high-stress urban environments. For instance, in Kigali, Rwanda, the Nyandungu urban-rehabilitated wetland incorporates the Pope's Garden and a medicinal garden with 17 000 trees comprising 55 indigenous tree species (Photo 2). Urban forests are gathering places for various events, including weddings, ceremonies, meetings and political rallies, and as such they promote social inclusion, community building, education and knowledge sharing. Additionally, they offer opportunities for exercise, sports and children's play.

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Photo 2. A beautiful setting in Kigali: Nyandungu wetland is a newly opened green space featuring intentionally planted native tree species, the garden of Pope John Paul II, and a medicinal garden.

6.4 Trends and innovations emerging in urban forests across SSA

Urban forests and people's relationships with them are dynamic and constantly changing through time and in place. Hence, this needs to be considered by urban planners, authorities and forestry and parks departments. We briefly consider some of the trends and innovations evident in one or more SSA regions.

Planning partnerships between local governments and the public

Efforts to expand urban canopy cover are gaining momentum at the city level as authorities become increasingly aware of the links between climate change, nature-based solutions, critical infrastructure and essential public services. For instance, in Kampala, Uganda, a 20-year urban forestry plan (2019–2039) has been produced to expand urban tree density, increase the canopy cover from 15 percent to 30 percent, boost native tree species diversity, raise community

understanding of city urban forest management, and create an online spatially explicit tree directory for the public to find information on the 328 species in private and public spaces (**www.kcca.go.ug/tree-directory**). Despite these efforts, finance, staffing, equipment, population expansion, land competition and rapid construction of roads and other grey infrastructure remain major bottlenecks.

In 2017, following a devastating landslide in Freetown (Sierra Leone) that left more than 1 000 people dead or missing, the "**Transform Freetown"** initiative was launched. As part of this initiative, the "Freetown the **TreeTown Campaign**" aimed to grow one million trees and increase the city's vegetation cover by 50 percent by the end of 2022. The campaign encouraged community ownership, in particular, getting residents in low-income areas along slopes and rivers to take part in tree planting and maintenance. Freetown implemented an innovative financing model, leveraging blended sources of finance and digital technology. Accordingly, the TreeTracker app was introduced to monitor the survival of planted seedlings (targeting 80 percent), with participants receiving mobile money as an incentive. Each tree was assigned a unique geotagged and photographed ID, which could be turned into 'impact tokens' that businesses and individuals could buy, sell and trade to fund further tree planting.

These examples demonstrate the importance of planning partnerships between local governments and the public in promoting urban forestry, and highlight the potential for innovative financing and digital solutions to support tree planting and maintenance initiatives.

Participatory urban planning and development

Participatory planning advocates for a bottom-up approach in developing strategies for urban green infrastructure that reflect contemporary realities and the direct involvement of municipal departments (FAO, 2016). Although SSA has been slow to successfully implement these principles, nevertheless, several cities are making progress. For example, the master plan of Kampala, Uganda was recently revised by the Kampala Capital City Authority using participatory urban natural asset mapping in order to identify the location, condition and vulnerability of urban natural assets, as well as target spaces for urban forestry (Figure 2) in the Greater Kampala Metropolitan Area.

In Cape Town, South Africa, tree removals in public spaces or road reserves only occur where there is an unmanageable threat to human life or interference with overhead or underground services (City of Cape Town, 2021).

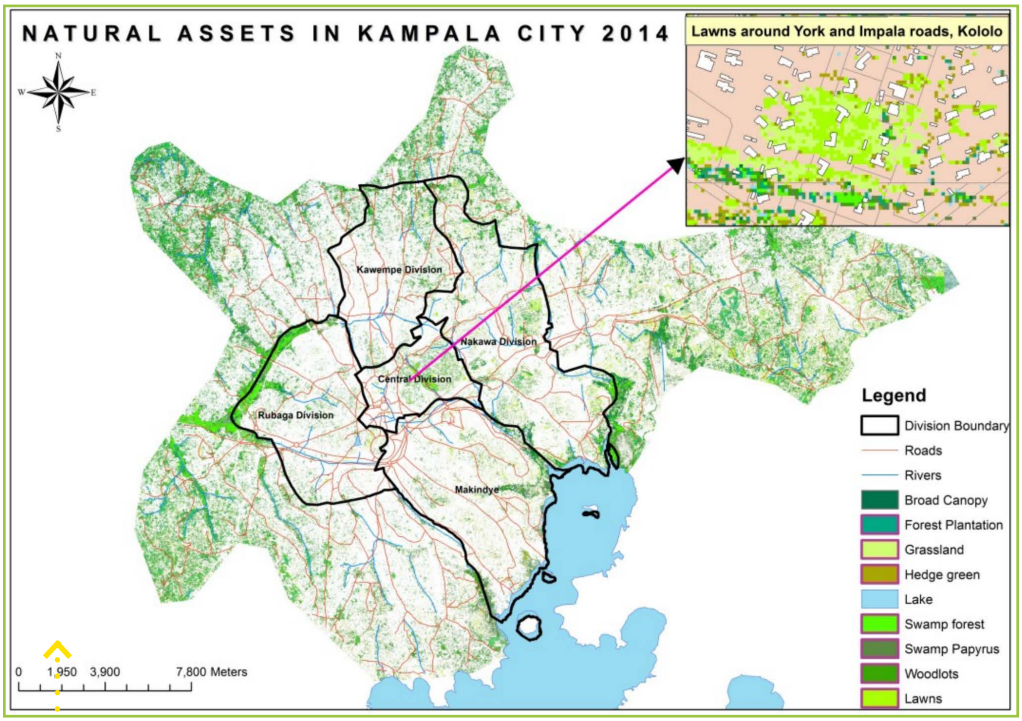

Figure 2. Urban natural asset mapping using participatory methods in Kampala, Uganda (ICLEI Africa, 2019) Source: ICLEI Africa. 2019. Urban Natural Assets for Africa: Rivers for Life. https://cbc.iclei.org/project/una-rivers-life

In Sekondi-Takoradi, Ghana, various organizations (e.g. Goshen Global Vision, Forestry Commission of Ghana, Department of Parks and Gardens, United States Department of Agriculture) launched the Greening Sekondi-Takoradi project. Students, churches, community members and other stakeholders planted 20 000 trees in degraded spaces in Sekondi-Takoradi to ensure even distribution and fair access to green infrastructure (Goshen Global Vision/USDA-Forest Service, 2019). Despite these examples, most initiatives that plant urban forests focus on distributive justice,[1] namely the socially just allocation of resources, goods and opportunities in a society rather than recognizing and addressing aspects of urban forestry such as recognitive[2] and substantive justice[3] (Wijesinghe and Thorn, 2021).

[1] Distributive justice concerns the socially just allocation of resources, goods and opportunities in a society. It is concerned with how to allocate resources fairly among members of a society, taking into account factors such as wealth, income and social status.

[2] Recognition justice is a theory of social justice that emphasizes the recognition of human dignity and of the difference between lower status groups and the dominant society.

[3] Substantive justice is the justice administered according to the rule of law.

These examples demonstrate the importance of involving municipal departments responsible for urban green infrastructure in decision-making and incorporating participatory approaches for successful implementation. The need for recognizing and addressing justice considerations in urban forestry projects is also highlighted.

Urban agriculture including horticulture and agroforestry

The participation of households in urban agriculture in SSA varies across countries, ranging from as low as 4 percent in Windhoek, Namibia (Thorn *et al*., 2021a), to 33 percent in Zambia and Kenya, and as high as 72 percent in Lubumbashi, Democratic Republic of the Congo (Balasha, Murhula and Munahua, 2019). Barriers such as settlement formality, property rights, and distance from food retailers (Davies *et al*., 2021) and the cost of irrigation in arid regions (Wijesinghe and Thorn, 2021) contribute to the differences in participation rates. Urban agriculture offers numerous benefits, including increased food security for the urban poor, protection of urban ecosystems, community cohesion, education, and closing energy and mass loops in a circular economy[4] (Kanosvamhira and Tevera, 2022; Balasha, Murhula and Munahua, 2019; Ferreira *et al*., 2018).

In East and Southern Africa, urban agriculture activities are predominantly conducted by women, while in West Africa, both women and men are involved (Drechsel, Hope and Cofie, 2013). Fruit trees, particularly mango (*Mangifera indica*), are commonly found in urban households in countries such as United Republic of Tanzania, Zanzibar (FAO, 2014), Democratic Republic of the Congo (Sikuzani *et al*., 2019), Nigeria (Dangulla *et al*., 2020) and Zimbabwe, and throughout Southern Africa (Shackleton and Mograbi, 2020). Horticultural production is mainly practised in backyard spaces, unlike designated urban areas as seen in Europe and the United States of America.

Alongside urban agriculture, multistorey, mixed agroforestry systems have a long history in Africa for generations, supporting the cultivation of fruit, coffee, spices, and other crops. Agroforestry systems diversify the income of investors and growers and minimize risks against commodity price fluctuations while generating intermediate revenues from understorey crops to help service the loans required for investing in tree planting and the wait for longer-term investments from trees (Mengesha *et al.*, 2020).

[4] A circular economy seeks to close the loop on resources by reusing and recycling energy and raw materials.

State-led river and landscape restoration using urban forestry

Several projects across SSA utilize urban forestry to protect watersheds, which has various benefits such as flood prevention, maintaining healthy reservoirs, reducing the UHI effect, limiting evapotranspiration, intercepting pollutants, and ensuring food security for urban and downstream households that rely on fish as a nutrient source.

In West Africa, numerous initiatives focus on restoring riparian areas and slopes. Many cities in Nigeria, for example, are planting trees in erosion-prone areas to enhance water percolation and reduce runoff. Similar efforts are taking place in Ghana, Côte d'Ivoire, Benin and Togo, where trees are planted along steep slopes to mitigate gully erosion (Conigliaro, Borelli and Salbitano, 2014).

In East Africa, the **Nairobi Rivers Basin Rehabilitation and Restoration Program** aims to enhance the quality of drinking water and the city's water supply, improve

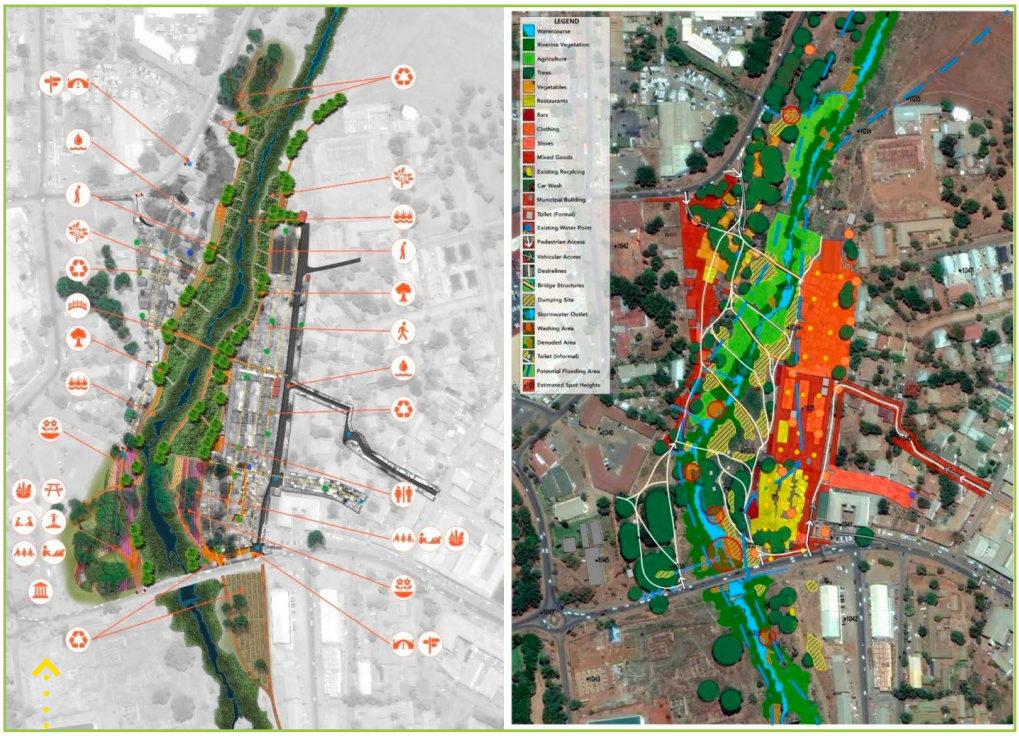

Figure 3. Landscape master plan in Lilongwe, including tree planting along the river. Source: ICLEI Africa. 2021. Lilongwe River Revitalisation project. https://cbc.iclei.org/river-revitalisation-lilongwe-malawi/site-analysis

wastewater treatment processes and reduce runoff. Rehabilitation programmes are underway in three peri-urban settlement river catchments in Kiambu County, which bounds the northern border of Nairobi. Likewise, in Dar es Salaam, United Republic of Tanzania, Zanzibar, the **Msimbazi Basin Development Project** focuses on rehabilitating a flood-prone basin, encroached by settlements. These projects involve investment in urban forestry, terracing, sediment and erosion control, solid waste management, transport and urban planning. Furthermore, urban forestry is important for filtering industrial and household waste, mitigating waterborne diseases such as cholera and typhoid, and redressing issues such as the impacts of sand mining.

In Lilongwe, Malawi, river revitalization is being implemented through urban forestry in collaboration with the **Lilongwe City Council, ICLEI Africa** and the Tsoka and Lizulu informal markets in Lilongwe (ICLEI Africa, 2021). Risk hotspots along river buffer zones have been identified, urban agriculture is being implemented, waste dumping is being reduced, and a landscape master plan has been developed (ICLEI Africa, 2019) (Figure 3).

Municipal-led programmes to plant indigenous species

The species composition of urban forests varies in African cities, with some cities dominated by exotic species and others having a higher abundance of native species. This situation in turn impacts the kind and extent of benefits accrued (Aronson *et al*., 2014). In cities such as Kigali in Rwanda, Lomé in Togo, Kumasi and Accra in Ghana, Maradi and Niamey in Niger, and many South African towns, exotic or alien species predominate (Nero, 2019; Gwedla and Shackleton, 2017; Moussa *et al*., 2020; Seburanga *et al*., 2020). For instance, in ten South African towns, 71 percent of the street tree species are exotic (Gwedla and Shackleton, 2017). Similarly, in Kigali, Lomé and Niamey, exotic species constitute about 75 percent, 69 percent and 52 percent of the woody species composition, respectively (Moussa *et al*., 2020; Seburanga *et al*., 2020).

Many exotic species were introduced into African cities during the colonial era and were mostly planted along streets, in parks and homesteads for shade, beautification and economic development (Hosek, 2022; Shackleton and Gwedla, 2021; Seburanga *et al*., 2020). Some of the introduced species have become invasive in many countries, spreading from urban settings into the surrounding rural farmlands and conserved areas, threatening biodiversity and ecosystem functioning. Some common exotic species in African cities include jacaranda (*Jacaranda mimosifolia*), Madagascar almond (*Terminalia mantaly*), casuarina (*Casuarina equisetifolia*), royal palm (*Roystonea regia*), avocado (*Persea americana*),

common guava (*Psidium guajava*), mango (*Mangifera indica*), neem (*Azadirachta indica*), false ashoka (*Polyalthia longifolia*) and cassia (*Senna siamea*).

In other cities, native species richness exceeds that of exotic species (Chimaimba *et al*., 2020; Dangulla *et al*., 2020). In the Nigerian cities of Sokoto and Zaria, urban farmlands have a higher abundance of native species (Dangulla *et al*., 2020). In Zomba, Malawi, 64 percent of tree species are indigenous, with higher proportions in remnant patches of vegetation than in gardens or planted areas (Chimaimba *et al*., 2020).

Native species have the potential to be cultivated as amenity and avenue trees in urban areas just as successfully or even better than exotics, since they are better adapted to the local environments. Indigenous species are already well-known to urban dwellers and may be ecologically and economically preferred, as well as supporting more native fauna and flora (Shackleton, 2016). Furthermore, indigenous species reduce the susceptibility of urban forests to unsuspecting environmental disasters (i.e. pests and diseases). In addition, native species serve as a haven for threatened and vulnerable species, for example, baobab (*Adansonia digitata*), African mahogany (*Afzelia africana*), mahogany (*Entandrophragma* spp.), *Hymenostegia aubrevillei,* African mesquite (*Prosopis africana*) and black afara (*Terminalia ivorensis*) (Nero *et al*., 2018; Chimaimba *et al*., 2020). Moreover, planting native species can help preserve the cultural and sacred values attached to some species (Atindehou *et al*., 2022).

However, native species have been under-represented in many African cities due to a lack of knowledge about their ecology and maintenance, and preferences for exotics. Nevertheless, there is a growing emphasis on planting native species, with the growing recognition of the above-mentioned benefits. For example, new parking lots at shopping centres in South Africa are now dominated by the planting of native species (O'Donoghue and Shackleton, 2013), while plant nursery owners report increasing demand for indigenous species by consumers (Arnoldi and Shackleton, 2021).

Community hillside rehabilitation to reduce erosion

Beyond city-wide urban planning and programming across SSA, local actors (e.g. community groups, organizations, businesses) play an integral role in the planting and management of urban trees, particularly where municipal interventions may be limited. Hillside rehabilitation and improved management by communities are important not only in reducing erosion, but reducing hazards such as mud and rockslides, and increasing native fauna and flora. For instance, Zomba, Malawi

is endowed with six hills, most of which are deforested. Residents living around Sadzi Hill, which was one of the heavily degraded hills following encroachment from over 350 crop gardens and settlements, experienced erosion and mud and rockslides in the rainy season (Chimaimba *et al*., 2020). Since 2013, local individuals have championed regeneration and replanting of the Hill. As a result, vegetation cover has increased from 26 percent to 61 percent, with an almost threefold tree density compared to the nearby hill with no co-management, and with a concomitant decrease in the incidence of mudslides (Likongwe *et al*., 2021).

Roadside nurseries providing planting stock

A common use of roadside urban forests in major SSA cities is the shelter they provide to small-scale, entrepreneurial nurseries that supply trees to residents, businesses and local authorities. The roadside location also makes the nurseries and plants for sale visible and accessible to motorists and pedestrians. Together with significant employment, the income earned is generally above the national poverty lines. For example, in Ethiopia, Molla, Abtew and Tebkew (2020) calculated net annual incomes as USD 14 628 per nursery, while they were reported as being somewhat lower in Kenya, at USD 9 474 (Rutto and Odhiambo, 2017). Equally importantly is the role that nurseries play in providing planting material to residents. While most species on sale are ornamental plants, there is usually a supply of fruit trees and favoured native species. Furthermore, nursery workers or owners undertake basic management of the urban forest in terms of clearing debris, removal of understory growth and disposal of waste.

Nevertheless, at a planning level, urban forests along roads are among those which have been shown to be the first deforested or degraded with the construction of new linear transport developments. The key will be ensuring that existing stocks remain intact when considering the rapid pace of development across SSA in the coming years. Hence, conducive enabling environments that safeguard against impacts are critical, and the role of effective stakeholder engagement in environmental impact assessments cannot be understated.

In-situ informal settlement upgrading and informal spaces

A key innovation in African cities that is becoming more widely adopted is *in-situ* upgrading of low-income, informal settlements. This approach requires communities and city authorities to co-design context-specific, needs-driven and appropriate plans for providing basic services, flexible land tenure, and green spaces in places where land is in high demand and there are competing interests. It responds to a call by UN-Habitat (2022) to "re-imagine" current urban systems to incorporate innovation, mitigating problems including pandemics, and maximizing benefits by becoming more equitable, healthy and environmentally friendly.

For instance, in Namibia, a cooperation between the municipality of Gobabis, the Shack Dwellers Federation of Namibia, the Namibia Housing Action Group, the **Namibia University of Science and Technology** and other international parties initiated a project aimed at creating inclusive cities. As such, some of the important activities were learning exchanges, planning studies, water delivery, **re-blocking** for security of tenure, land registration and allocation. The project resulted in an expedited process of land delivery and the growth of street trees while settlements were upgraded rather than being relocated or residents resettled in a new place (Harris, 2016).

Urban foraging

in SSA, provisioning ecosystem services are highly rated by urban communities. As a result, urban foraging, which involves collecting various products such as fuelwood, traditional medicines, wild foods, construction materials, and fish from local water bodies, is more widespread than in the Global North. For instance, in Lagos, Nigeria, 61 percent of residents frequently forage one or more products from private and public spaces (Adeyemi and Shackleton, 2023), compared to 47 percent in Kampala, Uganda, and 68 percent in two medium-sized towns in South Africa (Garekae and Shackleton, 2020). Furthermore, urban forests provide crucial land for fodder for livestock, such as in Oshakati and Gobabis in Namibia.

Despite the prevalence of urban foraging, many city authorities either prohibit or disapprove of such extractive practices. Consequently, urban foraging is not incorporated into city plans or greening projects, despite its significance as a poverty alleviation strategy. This highlights the need for policy and regulatory reforms to accommodate and support urban foraging in urban planning and development. Regulatory reforms are needed to establish appropriate zoning in order to accommodate pastoral practices in urban centres. This includes: carrying out management practices to improve fodder quality; ensuring equitable access rights throughout wet and dry seasons; setting up mechanisms to minimize conflicts among different land uses; establishing land tenure agreements for commons:[5] implementing monitoring systems; and promoting the inclusion of diverse knowledge worldviews in decision-making.

Financing models for urban forestry

Urban forestry projects exist in all countries in SSA (Ekemby and Mudu, 2022), although, in most regions, information about the levels of financing of urban forestry is limited. Nevertheless, Ekemby and Mudu (2022) recently reviewed urban forestry projects in Africa and found that most projects in SSA cities are funded by national governments. However, local or city governments are also often involved. For example, in South Africa, the City of Tshwane Metropolitan Municipality is funding USD 3 million to plant indigenous trees. Other common funders include multilateral donors, civil society organizations and private companies (Ekemby and Mudu, 2022). However, a key challenge remaining is often that national budgets designated to urban forestry do not always represent 'essential' status (de Satgé and Watson, 2018; Irlich *et al*., 2017), and thus many urban forest managers have to work below their financial needs (Pelling, O'Brien and Matyas, 2015, Ampaire *et al*., 2016; Sarabi *et al*., 2019).

Nevertheless, new funding mechanisms are helping expand the scope of public responsibilities for urban forests. For instance, some municipalities allocate a portion of stormwater fees, transportation, education and fire protection towards tree programmes. Considering that many people harvest ecosystem services because they lack financial resources to purchase substitutes, investment in urban forestry can be seen as an investment in poverty alleviation budgets (Shackleton, 2021; Contesse, Van Vliet and Lenhart, 2018). The **Sister Cities Partnership** among the municipalities of Cape Coast, Ghana and Bonn, Germany, which started in 2007, contributes to the securing of funds, building capacity and resourcing staff. Climate Insurance Linked Resilient Infrastructure Financing (CILRIF) allows

[5] Land or resources belonging to or affecting the whole of a community.

municipalities access to insurance coverage through the United Nations Capital Development Fund, with pilot projects in Durban, South Africa, as well as Makati, Philippines. Tax increment financing[6] has recently started to be used in SSA. Here, a municipality or redevelopment agency acquires land or invests in infrastructure to support urban forestry, without relying on other, more costly sources of funding such as tax increases or capital reserves (World Bank, 2023). Blended financing models through public–private partnerships cover a diversity of contractual agreements characterized by different risk-sharing financing schemes and organizational forms, involving a range of actors. Table 1 summarizes some illustrative, but not exhaustive private sources for urban forestry in SSA.

International financing is also an important and growing source of funding. For instance, the African Forest Restoration Landscape Initiative (AFR100) aims to restore 100 million ha of deforested and degraded land by 2030. To date, 33 African countries have pledged USD 210 million, with an additional USD 200 billion investment required. The Great Green Wall Initiative, which started in 2007, is another major international effort to reforest drylands across 22 African countries and 8 000 km of the Sahel, with projects in Ghana, Burkina Faso, Senegal, Mali, Niger and Ethiopia, and 167 000 ha of degraded land, including some urban centres. The initiative is in collaboration with the United Nations Convention to Combat Desertification. The **Green Climate Fund** is another important source of finance, although most investment has been in rural areas.

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[6] Tax increment financing (TIF) is a public financing method that is used as a subsidy for redevelopment, infrastructure and other community-improvement projects in many countries, including the United States of America. The original intent of a TIF programme is to stimulate private investment in a blighted area that has been designated as in need of economic revitalization.

Table 1. A selection of private sources for urban forestry in SSA

FUNDING SOURCES	BENEFITS
User charges for public spaces or botanic gardens	Identifiable recipients pay charges for enjoying benefits derived from urban forests. In cities in SSA, access fees to botanic gardens are often used for maintaining urban forests.
Certification of green buildings	This incentivizes companies to reduce carbon emissions and energy costs, thereby enhancing the performance of buildings built and sold for commercial/residential purposes.
School or community greening projects	These projects donate trees to grow in public spaces with benefits for education, reputational gains, microclimates and carbon offsetting.
Private procurement of trees by homeowners	Beautification – but often exotic, expensive ornamentals rather than invasive species.
Green bonds[7]	Usually, fixed-income[8] securities are issued to raise the necessary capital from an institutional investor.
Payments for ecosystem services (PES) and REDD+	PES schemes are generally applied to protected areas in Africa, or in rural environments.
Impact investing	An example of impact investing in SSA, is the African Forestry Impact Platform (AFIP), which aims to invest USD 500 million in sustainable forestry in SSA. AFIP was launched by British International Investment, the Norwegian Investment Fund for developing countries (NORFUND), Finnish investor Finnfund and New Forests. So far USD 200 million has been raised and AFIP is acquiring operational assets, including the largest forest company in East Africa, Green Resources (Takouleu, 2022).

The Clean Development Mechanism (CDM)	CDM urban forestry afforestation and reforestation holds potential, although significant barriers to local communities remain in SSA, with needs for more proactive regulatory, institutional and capacity-building policy strategies to improve forest data management, for example, in Cameroon (Minang *et al*., 2008).

[7] OECD and Bloomberg Philanthropies. 2015 Green bonds: mobilising the debt capital markets for a low-carbon transition. https://www.oecd.org/environment/cc/Green%20bonds%20PP%20%5Bf3%5D%20%5Blr%5D.pdf

[8] A fixed-income security is an investment that provides a steady interest income stream for a certain period.

Note: Impact investing refers to investments "made into companies, organizations, and funds with the intention to generate a measurable, beneficial social or environmental impact alongside a financial return"

6.5. Future trends and opportunities to scale urban forestry in SSA

Which type of trees will we use in SSA cities in the future?

City authorities and local communities should prioritize large, healthy, high-quality indigenous trees that are more tolerant of shocks such as pests and diseases. Moreover, high species diversity generally supports greater resilience to climate change (Sjöman, Hirons and Bassuk, 2018). Native species should therefore be prioritized over exotic species to avoid invasive threats (Stevenson *et al*., 2020). This will require some change in urban residents' preferences and behaviour, especially private households, which often default to planting the available exotic, ornamental species.

Similarly, selection should be suitable for site-specific conditions, attuned to current and future local growing conditions, and meet the needs of residents. Tree collections (e.g. arboreta) and botanical gardens will play a central role in identifying suitable species for planting, with an emphasis on tree quality and diversity rather than numbers. The successful establishment of trees should consider the below-ground (e.g. mycorrhizas) and above-ground (e.g. pollinators) interactions to promote longevity, conservation, and continued provision of the full range of ecosystem services provided by trees (Stevenson *et al*., 2020).

City urban forest policy reforms

In many SSA cities, there are specific urban forestry policies and laws, although they are often implicit in broader urban policies and legislation (Wijesinghe and Thorn, 2021). Nevertheless, city authorities in SSA are increasingly developing formal policies and programmes to develop and support urban agriculture in public and private spaces. Examples of policies include the City of **Johannesburg's Food Resilience policy**, **the City of Cape Town's Urban Agricultural Policy, Nairobi's Urban and Peri-urban Agriculture, Livestock and Fisheries Policy** and the **Addis Ababa Master Plan** (Lindley *et al*., 2015). Similarly, the municipalities of Ouagadougou, Burkina Faso and Lilongwe, Malawi are actively developing green belts that incorporate urban agriculture. While these are positive trends, many more municipalities lack urban forestry policies, as well as urban agricultural policies and plans. Urban forestry policy reforms and practices should seek to directly integrate more indigenous species into urban forestry that reflect African realities. In this regard, horticultural and ornamental plant markets should shift attention to producing wild ornamental plants and indigenous species for Africa's future urban greening programmes.

Appropriate stakeholder engagement schemes such as training and consultation programmes must be strengthened for any policy to succeed in meeting its targets. There is a need to move from simply tree planting initiatives across the continent, to a complex and interrelated mosaic land management target, together with operational objectives that unite governance structures, address the equitable distribution of resources, promote training and knowledge, improve financial and technical support, hone implementation and streamline monitoring (AUC and Panafrican Agency, 2021).

Reversing inequities

The literature from Malawi (e.g. Likongwe *et al*., 2021), Namibia (e.g. Wijesinghe and Thorn, 2021; Giombini and Thorn, 2022; Thorn *et al*., 2021a) and South Africa (e.g. Gwedla and Shackleton, 2017; Venter *et al*., 2020; Cocks *et al*., 2020) has shown that poorer communities have less space and higher demand for products in green spaces. It is crucial in the future that green spaces should not be considered a luxury good for the more affluent, but an opportunity for all. Urgent efforts should be made to reverse inequities in urban forestry, promoting equitable distribution of spaces, resources and access. Additionally, there is a need to improve governance structures, provide training and knowledge, and offer financial and technical support. Furthermore, land availability and tenure should be strengthened to address environmental justice concerns.

Scaling resourcing and financing

Flexible models of public–private partnerships are needed to finance the establishment, development and maintenance of urban forests, especially where there is high climate vulnerability, risk of green gentrification or encroachment (Anguelovski *et al*., 2016). Cross-subsidization using rates and taxes from more affluent communities has shown to be successful in all areas of public service delivery and must be more widely applied in the urban forestry context. The economic case for urban forestry should be emphasized, highlighting job creation and the alleviation of multiple dimensions of poverty (e.g. see King and Shackleton, 2020), among other benefits (Shackleton, 2021; Pauleit *et al*., 2021). Governments should promote partnerships with national and international investors, showcasing successful companies and investment incentives (Mengesha *et al*., 2020). Working with planners, authorities, real estate enterprises and companies should be harnessed to develop parks in disadvantaged areas, green roofs and façades, or other urban forestry initiatives in SSA (Contesse, van Vliet and Lenhart, 2018; Vásquez *et al*., 2019).

Communicating and understanding the multiple benefits of trees

The multiple benefits of trees (and not just certain ecosystem services, such as carbon sequestration) should be widely acknowledged, more clearly defined, communicated and understood across SSA cities. Efforts should be made to inspire urban populations to engage in conservation actions, incorporating these into lifestyles while promoting mental and physical health and spirituality. There is a need to avoid oversimplified messaging that could lead to unintended consequences, such as the spread of invasive species or diseases, for example, with planting exotic tree species (Stevenson *et al*., 2020). Special tree planting days, for example, International Day of Forests (21 March), Arbor Day (28 April) or national tree days (e.g. in Angola, Benin, South Africa) can be used as opportunities to raise awareness.

Research directions

Overall, there is an urgency to build the knowledge base of urban forestry in SSA so that it is locally relevant to the SSA context and responsive to needs. Among other areas to be investigated, research should focus on: indigenous

knowledge of tree species; composition in urban and peri-urban households and communities; adaptability to climate change; extension education programmes: and the types of urban forestry that are gaining support across the continent. It is important to conduct comprehensive cost–benefit analyses that consider the potential negative environmental and social impacts. Further research is also required on ecosystem services and disservices in informal areas, as well as on trends in land-use changes.

Monitoring and evaluation can better inform the demand and plans for green spaces, species required, and the necessary associated regulations. Urban authorities should establish, maintain and regularly update inventories or databases of woody species in cities (i.e. which species are available, where they are located and the condition they are in). Local authorities typically give urban forestry a low priority. As a result, except for larger and wealthier cities like Ekiti State, Nigeria (Kayode, 2010) and Lomé, Togo (Raoufou, Kouami and Koffi, 2011), most cities do not have databases or records of tree stocks (number and species), locations or maintenance practices (Chishaleshale *et al*., 2015; see Table 1). Opportunities lie in embracing innovative technologies to monitor and manage urban forests, i.e. utilizing remote sensing, data analytics and smart systems for optimizing tree health, water management and resource allocation. Indeed, advanced global forest ecosystem monitoring techniques with sufficient resolution can help to directly recognize specific species (Tucker *et al*., 2023). Furthermore, citizen science and information technology through decentralized communication have an important role to play in tracking changes and maintaining urban forests (Escobedo, 2021; Maciejewski, Currie and O'Farrell, 2021).

6.6 Conclusions

Urban forestry in SSA is alive and well and dynamic; it comes in different shapes and forms, with a variety of unique characteristics. Yet, a key challenge remains in that much is unknown. While we have a good knowledge base for a few countries, with regard to the continent as a whole, there are clear research gaps that require deeper understanding across highly heterogeneous contexts. Similarly, while some SSA cities have specific urban forestry policies, many more municipalities lack policies that directly incorporate indigenous species that reflect African realities. Hence, building a locally relevant knowledge base for urban forestry in SSA is crucial.

We envisage that by 2030, African cities will boast thriving urban forests that integrate nature seamlessly into the urban landscapes. The continent will

witness a remarkable transformation as green corridors of tree-lined streets and rooftops and vertical walls become the norm, ensuring better air quality, reduced UHI effects, resilience to floods, droughts, erosion and landslides while enhancing overall quality of life and biodiversity. Urban forests will thus serve as ecological and recreational havens and create job opportunities, with residents having lifestyles underpinned by green stewardship. Future urban greening initiatives will not only plant trees, but will also include complex and interrelated mosaic land management targets, operational objectives that unite governance structures, provide financial and technical support, and address inequitable distribution and access to green spaces. Through cross-sector collaboration, local partnerships, participatory planning and community consultation, Africa's urban forestry will witness the mobilization of diverse stakeholders, including governments, non-governmental organizations, businesses and citizens. A collective effort towards sustainable urban ecosystems will inspire a new generation of tree advocates and conservationists. Africa will become a global example for comprehensive urban forestry strategies that prioritize the expansion of urban canopy cover, density and quality.

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Appendix

Table 1. Overview of tree planting projects in African cities (alphabetically by country)

No.	Country (City)	Number of trees to be planted or already planted	Duration of planting
1	**Algiers (Algeria)**	Twenty-five million trees were planted at the National Arbor Day announcement, and 17 million were expected to be planted by March 2020, in line with the national tree programme of 43 million trees. The number of trees was not mentioned in the master plan, which aims at transforming the city into a sustainable city with a garden city inside. There is also a project aimed at transforming the Oued Smar landfill (30 ha) into an urban ecological park (the number of trees is not mentioned). This project is part of the major green plan of Algiers for 2035.	Algiers 1 Tree project: 2019–2021; Algiers 2 Tree project: 2013–2030; Algiers 3 Tree project: 2009–2018
2	**Baraki (Algeria)**	More than 2 000 trees were planted after the announcement and 1 million trees are expected to be planted in one year.	2020
3	**Luanda (Angola)**	1 500 trees were planted in the city. In Rangel (urban district of Luanda), a tree planting project is planned following an announcement during the national tree day (the number of trees is not mentioned).	Luanda 1 Tree project: 2018; Luanda 2 Tree project: 2019
4	**Andulo (Angola)**	300 trees were planted.	2020
5	**Huambo (Angola)**	1 000 trees were planted, and 2 000 trees are expected to be planted.	2020
6	**Allada (Benin)**	2 500 trees were planted at the announcement.	2019–2020
7	**Parakou (Benin)**	2 100 trees were planted at the announcement by the Government of Benin and municipal authority.	2019–2020
8	**Savé (Benin)**	1 250 trees were planted at the announcement.	2019–2020
9	**Gaborone (Botswana)**	300 trees were planted.	2013

10	**Bobo-Dioulasso (Burkina Faso)**	The number of trees is not mentioned, but 6.9 ha of green spaces were planted.	2012–2014
11	**Ouagadougou (Burkina Faso)**	1 000 trees were planted, and 80 000 trees are expected to be planted.	2019–ongoing
12	**Pissa (Central African Republic)**	12 000 trees were planted, and 300 000 trees were to be planted afterwards.	2019–2020
13	**Brazzaville (the Republic of the Congo)**	160 000 trees planted.	2011–2021
14	**Abidjan (Côte d'Ivoire)**	500 trees were planted in 2019 along the road of the airport Port-Bouët 3-km long, 400 000 trees planted in Abidjan and 2.1 million planted nationwide.	2019–2030
15	**Cairo (Egypt)**	12 000 trees were planted, and 1 million trees to be planted by 2019 as part of a national project called Egypt's "100 Million Trees". 350 trees were planted, and 14 000 shrubs were also added for a vertical forest. Trees are a fundamental part of the capital park under construction in Egypt's New Administrative Capital close to Cairo (number of trees not available).	Cairo 1 Tree project: 2019; Cairo 2 Tree project: 2020–2022; Cairo 3 Tree project: 2016–2030
16	**Ismailia (Egypt)**	240 hectares of land have been reclaimed for tree planting. 500 000 ha of desert land could be reclaimed for afforestation.	2012–ongoing
17	**Massawa (Eritrea)**	The number of trees not mentioned. Tree planting activities are being conducted in the port city of Massawa in connection with the 30th anniversary of the commemoration of Operation Fenkil.	2020
18	**Addis Ababa (Ethiopia)**	More than 350 million trees were planted nationwide in a day starting from the capital as part of the Green Legacy Initiative. The number of trees was not mentioned, but there is also the "Beautifying Sheger" project to create 56 km of green spaces along the river. The city is expected to plant 5 million trees within the 20 billion trees nation plan.	Addis Ababa 1 Tree project: May-October 2019; Addis Ababa 2 Tree project: 2019-ongoing; Addis Ababa 3 Tree project: 2019–2024.

19	**Accra (Ghana)**	100 000 trees were planted in Accra, which is part of 10 million trees of the national tree programme.	2019
20	**Nairobi (Kenya)**	1.8 billion trees are expected to be planted in Nairobi and nationwide. About 10 000 trees are expected to be planted in a second project. 1 500 trees were to be planted in the Ngong Forest (25 km from Nairobi) after the announcement.	Nairobi 1 Tree project: 2018–2022; Nairobi 2 Tree project: 2020–2023; Nairobi 3 Tree project: 2021
21	**Daadab (Kenya)**	52 000 indigenous tree seedlings were planted in the refugee camp 'IFO2' in Daadab.	2018
22	**Maseru (Lesotho)**	Around 200–300 trees were expected to be planted in the capital and nationwide.	2020
23	**Monrovia (Liberia)**	10 000 trees were planted.	2017–2019
24	**Antananarivo (Madagascar)**	1 million trees were planted in the span of a few hours. 60 million trees are expected to be planted.	2020
25	**Lilongwe (Malawi)**	62 million trees are already planted, and more than 60 million trees are expected to be planted. 1 million trees were planted at the Dzalanyama Forest Tree Project.	Lilongwe 1 Tree project: 2020–2021; Lilongwe 2 Tree project: 2017–2018
26	**Bamako (Mali)**	18 000 trees are to be planted in the city. This is included in the national tree programme of 22 million expected to be planted by 2023 under the initiative "Un Malien, un arbre". 150 trees were planted in the Garden of Eden in Bamako.	Bamako 1 Tree project: 2019–2023; Bamako 2 Tree project: 2019
27	**Nouakchott (Mauritania)**	As part of the Great Green Wall Initiative, 2 million trees are expected to be planted, and 200 000 trees were already planted in 2010.	2010–2014
28	**Port Louis (Mauritius)**	1 million trees are to be planted, i.e. 50 000 trees per year.	2018–2030
29	**Marrakesh (Morocco)**	3 million trees were planted. 800 000 trees were expected to be planted before the end of the year.	2017
30	**Jbilat (Morocco)**	1 million trees to be planted.	2016

31	**Ouarzazate (Morocco)**	About 635 hectares of trees were planted to act as a protective buffer between the city and the desert.	2012–2017
32	**Katembe & Madjuva (Mozambique)**	55 0000 trees have already been planted and 750 000 trees are to be planted.	2018–2020
33	**Windhoek (Namibia)**	500 trees were planted.	2019
34	**Niamey (Niger)**	20 000 trees were planted in support of the Great Green Wall Initiative. 3 million trees were planted to address heat waves and pollution.	Niamey 1 Tree project: 2018–2020; Niamey 2 Tree project: 2019–2020
35	**Abuja (Nigeria)**	30 million trees to be planted as a part of the Presidential programme starting from the capital and nationwide.	2020
36	**Sokoto (Nigeria)**	1 million trees were planted in 2016.	2016
37	**Lagos (Nigeria)**	The number of trees planted is not mentioned, but there is a 5-year tree planting green project, and specific projects also to transform the Olusosun dumpsite (100 ha) into a green space.	2014–2024
38	**Kigali (Rwanda)**	The number of trees is not mentioned, but 43 589 hectares of trees were expected to be planted starting from Kigali to other parts of the country.	2018–2019
39	**Dakar (Senegal)**	1 300 trees will be planted in the public park, located near the Mosque of the Divinity in Ouakam, Dakar (2020–2035). An urban forest park covering 10 ha was planted on the site of the former Dakar airport (2020–2035).	Dakar 1 and 2 Tree project: 2020–2035
40	**Victoria (Seychelles)**	4 000 trees were expected to be planted in this city and other parts of the country.	2018
41	**Freetown (Sierra Leone)**	Over 12 000 trees are expected to be planted.	2019–2023
42	**Mogadishu (Somalia)**	4 000 trees were planted in the capital city during Arbor Day in 2013.	2013
43	**Johannesburg (South Africa)**	90 000 trees were planted, and 200 000 trees are expected to be planted (in Soweto) in support of the 2010 World Cup green programme.	2009–2010

44	**Riverside View (South Africa)**	2 000 trees were expected to be planted.	2019
45	**Riverlea (South Africa)**	200 trees were planted and 5 000 trees to be planted.	2020
46	**Cape Town (South Africa)**	210 mature trees were planted within 2 months before the World Cup started (2010). 15 523 trees were planted in 358 beneficiary sites (2010–2017).	Cape Town 1 Tree project: 2010. Cape Town 2 Tree project: 2010–2017
47	**Tshwane (South Africa)**	115 200 trees were planted.	2002–2032
48	**Durban (South Africa)**	10 000 trees were planted for the Buffelsdraai Tree Planting project.	2019
49	**uMhlathuze city (South Africa)**	10 million trees are expected to be planted in the next five years in South Africa. This tree planting project was launched during the recent tree day in September 2021.	2021–2026
50	**Al Jabalain (Sudan)**	1 million trees were planted in a refugee camp by UNHCR.	2017–2020
51	**White Nile State (Sudan)**	1 million trees were planted.	2017–2021
52	**Khartoum (Sudan)**	The number of trees was not mentioned for one of the few remaining urban forest reserves in Sudan.	2018
53	**Dar es Salaam, Dodoma, Arusha, and others (United Republic of Tanzania, Zanzibar)**	4 000 trees were planted and 50 million trees expected to be planted.	2016–2020
54	**Dodoma (United Republic of Tanzania, Zanzibar)**	The number of trees is not mentioned (but the type of trees planted specified) for a project aimed at transforming the semi-arid Dodoma into a green city. 4 000 trees are expected to be planted to support government efforts in making Dodoma city green.	Dodoma 1 Tree project: 2020. Dodoma 2 Tree project: 2021
55	**Lomé (Togo)**	50 000 trees planted during the National Arbor Day.	2020

56	**El Agba (Tunisia)**	The number of trees is not mentioned, but 3 ha of trees planted.	2018–2019
57	**Kasserine and Jendouba (Tunisia)**	2 million trees will be planted in the areas most affected by fires in the summer of 2021. This is a national reforestation programme that focuses mainly on these two cities.	2021–2022
58	**Chinsali (Zambia)**	1 billion trees were expected to be planted in 2019. 2 billion trees are planned to be planted by the Government in three-year time frame.	2019–2021
59	**Harare (Zimbabwe)**	The number of trees is not mentioned, but the project is greening the "Sunshine City". 15 million trees are expected to be planted on 1 December (national tree day).	Harare 1 Tree project: 2017 Harare 2 Tree project: 2018
60	**Addis Ababa-Djibouti (Ethiopia and Djibouti)**	The number of trees is not mentioned, but there is a tree-planting campaign themed "Green Addis Ababa-Djibouti, Green Ethiopia" in response to the national tree-planting campaign along the railway of these countries.	2020–ongoing

Source: Ekemby and Mudu, 2022