



INTEGRATION OF BIODIVERSITY INTO THE KAMPALA CLIMATE CHANGE ACTION PLAN

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The Post-2020 Biodiversity Framework - EU Support project aims to support concrete transformative solutions for the effective implementation of the recently adopted Kunming-Montreal Global Biodiversity Framework (KM-GBF), leading to the vision of Living in Harmony with Nature by 2050.

More information on the project and its activities can be found on the project website at www.4post2020bd.net and on its social media channels:

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More information on the project and the Covenant of Mayors in Sub-Saharan Africa can be found on the project website at <https://comssa.org/en/>

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EXECUTIVE SUMMARY

This report was prepared under the Post-2020 Biodiversity Framework - EU Support project which aims to support concrete transformative solutions for the effective implementation of the recently adopted Kunming-Montreal Global Biodiversity Framework (KMGBF), leading to the vision of Living in Harmony with Nature by 2050. It seeks to outline opportunities for integrating biodiversity concerns into the revision of the Kampala Climate Change Action Plan (KCCAP) that was developed by the Kampala Capital City Authority (KCCA) in 2015 and is currently under review.

Through the revision of the Action Plan, KCCA and its partners (CoMSSA and Expertise France) saw the unique opportunity to find ways to address the inextricable links between the biodiversity and climate crises and to align the KCCAP with global and national biodiversity-related instruments and policies.

To that end, it was decided to support the KCCA review process with an emphasis on biodiversity integration.

As part of this effort, this report provides an assessment of the level of integration of biodiversity-related issues in the different elements of the KCCAP, as well as recommendations for further integration of biodiversity in the updated KCCA. The methodology underlining this report is based on desk review, site visits and 21 semi-structured interviews undertaken between September and December 2023.

The overall aim is to advance in strategically leveraging the climate-biodiversity-society nexus, which is fundamental to the delivery of the KMGBF. The table below summarizes the report's main recommendations for opportunities to foster transformative biodiversity governance.

Area of recommendation	Recommended action
<p>Alignment of the KCCAP with international biodiversity-related policies</p> <p>(see section III.2)</p>	<p>Ensure that the KCCAP explicitly refers to, and incorporates, the targets outlined in the Kunming-Montreal Global Biodiversity Framework (GBF), the Plan of Action on Subnational Governments, Cities and other Local Authorities for Biodiversity (2023–2030), as well as the Ugandan National Biodiversity Strategy and Action Plan (NBSAP).</p> <p>KCCA already directly contributes actively to various targets of such global and national biodiversity policies. This can be made explicit for international recognition. To that end, KCCA may consider:</p> <ul style="list-style-type: none"> • Making commitments and reporting on actions taken on the CitiesWithNature platform • Aligning efforts for biodiversity-inclusive planning to the Singapore Index on Cities' Biodiversity, for better monitoring and communicating progress nationally and internationally
<p>Integration of biodiversity issues in the KCCAP climate change profile</p> <p>(see section II.1)</p>	<p>Consider the role of biodiversity and its interlinkages with climate change more explicitly, to make inroads for awareness creation and concerted efforts towards transformative action.</p>
<p>Integration of biodiversity issues in the KCCAP Energy and GHG Emissions Profile</p> <p>(see section II.2)</p>	<p>Consider a more comprehensive and holistic GHG profile of the city by including data on the carbon sequestration potential of wetlands, trees and green spaces. This may require additional capacity as accurate monitoring of habitat-based carbon sequestration may be more challenging than for 'engineered' removals.</p>

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Area of recommendation	Recommended action
<p>Promotion of nature-based solutions (NBS) to benefit biodiversity and people as a contribution to KCCAP's strategic priority areas and areas of intervention (see section II.3 and II.4)</p>	<ul style="list-style-type: none"> • <u>Energy</u>: Green roofs and facades can contribute to cooling, whilst providing habitat for various animal and plant species. • <u>Mobility</u>: Improved collaboration between KCCA and the Uganda National Roads Authority on the greening of roadsides, building on the Roads Manual and including local and context-specific biodiversity parameters, should be given due consideration • <u>Waste</u>: Scaling up existing efforts of waste-to-wealth and waste-to-energy approaches could reduce the threat of pollution to biodiversity; NBS-based greywater treatment, for example, 'treatment wetlands' and 'waste stabilisation ponds' can deliver wastewater treatment functions but also co-benefits for people and nature, such as increasing biodiversity, improving urban microclimates, biomass production, and enabling water reuse. • <u>Land use and built environment</u>: The ambitious efforts towards a Green-Blue Master Plan should be continued and supported financially. <p>Furthermore, efforts should pay increased attention to:</p> <p>A) Strategic greening for pollinators and habitats for various species:</p> <ul style="list-style-type: none"> • Ensure appropriate habitat for various species by planting trees and vegetation strategically to increase the habitat (informed by data collection); • Emphasise ecological corridors; • maintain greenspaces through appropriate mowing techniques for supporting habitat for pollinators; • Enhance botanical gardens as havens for pollinators; • Include rewilding as a strategy for more biodiversity, whilst taking into account potential trade-offs and disbenefits (e.g. crime in bushy areas), as well as perceptual issues around aesthetics and residents' valuation of nature in urban regeneration efforts. <p>B) Strategic greening and sustainable urban drainage for stormwater runoff and soil erosion mitigation:</p> <ul style="list-style-type: none"> • Re-assess greening interventions in Kampala and make sure that efforts are made for targeted greening of areas at risk of soil erosion. • Promote sustainable urban drainage approaches that capture stormwater runoff and curb surface temperatures, whilst reversing the loss of biodiversity in soils. Target the household level and the level of public buildings, by utilizing permeable/semi-permeable paving materials for parking lots. <p>C) Strategic greening for climate change mitigation and climate resilience:</p> <ul style="list-style-type: none"> • Planting methods with a goal of quick carbon absorption are often at odds with those best for biodiversity, thus the main goal of restoration should be protecting biodiversity, with carbon absorption a side-effect • Choice of types of plants and trees: forward-looking planning is needed to make green spaces resilient to climate change. Native species should be given precedence. KCCA should work with NFA and urban ecologists and plan for which trees/vegetation are at risk in Kampala from climate change and how to address this. The National Urban Roads Manual gives some information but is not exhaustive. • <u>Eco practices</u>: <u>Wetlands and Eco-parks</u>: Monitor and scale up efforts of ecotourism parks; foster sustainable utilisation of wetlands as a pragmatic approach • <u>Urban Agriculture</u>: scale up existing efforts around urban agriculture; encourage small-scale organic urban farming and agroforestry; and ensure that residents of informal settlements, the urban poor and youth benefit from such initiatives (e.g., create urban gardens for youths: gazette dedicated spaces and set up community committees to manage urban gardens)

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Area of recommendation	Recommended action
<p>Improved urban governance for addressing the nexus of biodiversity, climate change and societal challenges</p> <p>(see section II.4 and III.1)</p>	<p>Increase the involvement of communities</p> <ul style="list-style-type: none"> • Improve involvement of communities in planning, designing and implementing greening activities, to avoid vandalism of trees and green spaces; • Encourage neighbourhoods to develop small community-managed parks; • Increase awareness of homeowners to target biodiversity through landscaping (rather than beautification only); • Involve more schools in environmental action and experiment with innovative solutions to use the potential for multiplication, with an emphasis on bottom-up and truly participatory approaches to ensure effectiveness and long-term sustainability. <p>Enhance collaboration with civil society, academia and the private sector</p> <ul style="list-style-type: none"> • Encourage dialogues with the private sector and NGOs, allowing them to take the front stage of activities to expand messages and actions; • Encourage more applied research and citizen science: connect researchers and local government in more areas of intervention, building on existing MoU with Makerere University, and explore working with environmental NGOs for wider reach; • tap into existing knowledge, expertise and data on biodiversity that NGOs hold, and rally faith-based and traditional entities, cultural institutions (e.g. Buganda Kingdom) and youth networks (e.g., Global Biodiversity Youth Network) to jointly explore avenues for biodiversity conservation. • accommodate local indigenous understandings of nature within urban planning to enhance the preservation of nature and stewardship (e.g., by considering greening initiatives with specific aims of providing wild plants for collection to cater for biodiversity but also for preserving traditional knowledge) • engage environmental and conservation NGOs in open debates and into activities of KCCA, when drafting plans, as well as in implementation and monitoring • Follow up with organisations who voiced specific interest in collaborative efforts (see section III.1) and invite others to join. <p>Improve horizontal and vertical institutional coordination and collaboration on policies, plans and implementation</p> <ul style="list-style-type: none"> • Transformative action for biodiversity requires synchronized coordination of planning, implementation, and regular monitoring and reporting across all levels of government. Explore improvement of national and local working relationships through dialogues. • Enhance interdepartmental collaboration: bridge departmental silos in KCCA and improve collaboration between environmental officers reporting to NEMA and the physical planning/landscape department <p>Build on, and enhance, existing capacity:</p> <ul style="list-style-type: none"> • Strengthen KCCA's operational capacity for biodiversity-related aspects in terms of staff, logistics, supplies, and equipment: include urban foresters in the key governance structure of KCCA and employ them permanently for maintenance and management of green spaces; scale up training to KCCA staff on green space maintenance and tree nurseries, and biodiversity issues; • leverage the capacity (as well as data) for biodiversity that exists in the various environmental NGOs, who voice a keen interest in being better included in planning, developing and implementing urban environmental action. <p>Raise awareness and access to finances for urban biodiversity</p> <ul style="list-style-type: none"> • Develop a participation strategy for all relevant actors and raise awareness about the ecological and social benefits of urban biodiversity; • Exchange on inspiring practices with other urban authorities and the international community; • Enhance visibility at the global level on urban biodiversity conservation and protection efforts • Consult external partners for guidance to city planners and decision-makers on international and national funding options for environmental and biodiversity-related financing.

I. INTRODUCTION

As pointed out in the IPBES (2018) Assessment Report on Biodiversity and Ecosystem Services for Africa, Africa's population - likely to double by 2050 - coupled with rapid urbanization, will place tremendous pressure on the continent's biodiversity and nature's contributions to people. The report warns of unregulated land cover change, including unregulated conversion of forests, rangelands and other natural areas, such as wetlands, for food production and urban development that is happening at a fast pace, leading to habitat loss and fragmentation, degradation of water catchments, and soil erosion, leading to loss of biodiversity and livelihoods.

As hotspots for land-use change due to urban expansion, cities are widely recognised as drivers of biodiversity loss. Yet, they can also serve as a refuge for species when they offer the required combination of nesting, resting and foraging habitats (Ofori et al., 2018; Villasenor et al., 2020). In wider discussions on cities and biodiversity governance, Bulkeley et al. (2022) suggest **that there is indeed significant evidence that cities can no longer be viewed simply as a threat to biodiversity, but are transforming their role to one of significant opportunity. The fast pace of urbanization in Africa therefore may offer opportunities for transformative biodiversity governance.**

It is in such spirit that this report seeks to outline opportunities for integrating biodiversity concerns into the revision of the Kampala Climate Change Action Plan (KCCAP) that was developed by the Kampala Capital City Authority (KCCA) in 2015.

An external evaluation of the KCCAP is carried out for the period 2016/17 to 2021/2022 and makes recommendations for its update through 2025, aligned with the current KCCA Strategic Plan. It will ultimately provide considerations for the development of the upcoming 2025/2029 City Strategic Plan. The evaluation of KCAAP is undertaken by Breek Consult Limited, a consultancy firm contracted by the Covenant of Mayors in Sub-Saharan Africa (COMSSA). Through the revision of the Action Plan, KCCA and its partners (CoMSSA and Expertise France) saw the unique opportunity to find ways to address the inextricable links between the biodiversity and climate crises and to align the KCCAP with global and national biodiversity-related instruments and policies.

To that end, it was decided to support the KCCA review process with an emphasis on biodiversity integration. As part of this effort, **this report provides an assessment of the level of integration of biodiversity-related issues in the different elements of the KCCAP, as well as recommendations for further integration of biodiversity in the updated KCCA.** In comparison to developing a standalone Local Biodiversity Strategy and Action Plan, such an endeavour may go at the expense of detail and quantity in terms of biodiversity targets and indicators and pose challenges to align with predefined priority areas. Yet, the approach opens avenues for the creation of synergies, mainstreaming and upscaling and creates opportunities to advance in strategically leveraging the climate-biodiversity-society nexus, which is fundamental to the delivery of the post-2020 Global Biodiversity Framework.

I. INTRODUCTION

For this report, urban biodiversity is considered to be the assemblage of species, habitats and their distinct properties ranging from the urban core to the periphery that provides ecosystem services for city dwellers (see also Ahmed & Puppim de Oliveira, 2017).

The methodology underlining this report is based on desk review, site visits and interviews undertaken between September and December 2023 by the individual expert contracted by Expertise France to support the biodiversity integration into the KCCAP.

Documents were reviewed and analyzed to elicit existing data and information on the following aspects: the impacts of biodiversity loss and degraded ecosystems in terms of climate change vulnerability in the City of Kampala; the impact of these elements on greenhouse gas emissions in the City of Kampala; entry points for the integration of biodiversity in the four priority areas, as well as for potential contribution of biodiversity issues to the achievement of the Action Plan and its five main strategic areas of intervention.

This was accompanied by 21 semi-structured interviews (see list of interviewees in the Annex), to derive recommendations that are informed by, and tailored to the social, economic, political and cultural aspects of the local context. From there, it quickly emerged that various existing initiatives in the City of Kampala already exist to address biodiversity-related issues directly or indirectly. The interviews therefore also focused on the status of the implementation of those, even if they are not officially linked to the plan, and how these activities could be potentially leveraged in the update of the plan.



II. THE STATUS OF BIODIVERSITY INTEGRATION IN THE KCCAP

This part of the report presents the outcome of an assessment of the level of integration of biodiversity-related issues to the KCCAP and its ability to deliver climate adaptation and mitigation measures for the city and its citizens.

Results are presented in line with the structure of the KCAAP, and thus the chapter first attends to the climate and energy profiles, before turning to the four priority areas of the plan and its five strategic areas of intervention. The chapter concludes with an assessment of the capacity of KCCA to deal with biodiversity issues.

II.1 Integration of biodiversity issues in the KCCAP climate change profile

The plan describes the climate change profile in terms of climate vulnerabilities of flooding and heat stress and warns of increased frequency and magnitude of heavy rainfall and floods as well as droughts if no action is taken. It then lists the drivers of vulnerability and identifies causes and impacts. The description of drivers of vulnerability includes some biodiversity-relevant issues in listing human activities that are detrimental to natural ecosystems: housing in hilltops (leading to clearing of natural vegetation that reduces infiltration of rainfall and increases runoff – see Kampala Energy and Climate Change Profile 2015, p. 25), settlements in wetlands (reducing capacity to capture, store and dissipate surface water runoff – see Kampala Energy and Climate Change Profile 2015, p. 25), and poor solid waste management practices leading to flooding; as well as poor building practices including limited green cover, inadequate green spaces and impervious surfaces that magnify the urban heat island effect. Also, the introduction refers to important biodiversity-relevant issues:

“Pollution and waste water control have added pressure on the local natural ecosystems causing environmental degradation and a reduction in air quality.

Water drainage during heavy rains through the natural swamp filtering system has been affected by construction practices in wetlands and bad waste disposal habits. (...)

Kampala is blessed with abundant natural resources but the ever increasing urban population places a burden on their protection, conservation and usage” (KCCAP, p.8).

Yet, even though biodiversity-related issues are included among core drivers of climate vulnerabilities and the detrimental effects of human activities on natural resources are widely acknowledged in the plan, the interlinkage between the biodiversity and climate crisis in Kampala is not explicitly recognized in the KCCAP. **Better emphasizing the interconnectedness, and including biodiversity concerns at the centre are key opportunities for a clearer and more targeted integration of biodiversity issues into the updated climate change profile.**

To that end, based on desk review and interviews with stakeholders in Kampala, the next paragraphs seek to provide an overview of the climate change impacts of biodiversity loss and ecosystem degradation in the City of Kampala (NB: this takes place at a more generic level where accurate data is lacking), to provide recommendations for updating the city's climate change profile.

Climate change impacts of ecosystem degradation and biodiversity loss in the City of Kampala are multi-faceted and have significant consequences for the city's environment, economy, and society. **Biodiversity loss and degraded ecosystems reduce the city's ability to withstand and recover from extreme weather events like floods and heat waves.** The separate document outlining the Kampala Energy and Climate Change Profile 2015 (p. 35) makes a case in point:

II. THE STATUS OF BIODIVERSITY INTEGRATION IN THE KCCAP

“Ecosystem degradation undermines the ecosystem protection function against (...) climate change related hazards and disasters. Moreover, climate change exacerbates ecosystem degradation which in turn triggers more humanitarian and environmental disasters and reduces nature and societies’ security and resilience”.

Since 2015, the situation has aggravated. Natural habitats, such as wetlands and green spaces, act as buffers, absorbing excess water and provide cooling. Yet, “trends show that the urban ecosystem and natural assets are fragmented and continue to be disrupted” (ICLEI and KCCA, 2018). Green spaces are becoming less and more fragmented, and there is a widely acknowledged deplorable state of wetlands in Kampala:

“The condition of Kampala’s wetlands is varied, with many in poor condition and, in some cases, possibly beyond the capacity to recover naturally. (...). More than half the area of Nakivubo wetland has been altered by encroachment from industries and human settlements and by the construction of channels that disrupt its natural flow system and its capacity to act as a natural water prefiltering system”(World Bank DRR strategy, 2019, p-54).

With these ecosystems degraded Kampala becomes more susceptible to the destructive impacts of extreme weather events, leading to property damage, infrastructure disruptions, and potential loss of life. This also becomes evident from the interviewees’ responses:

“Urban development puts pressure on ecosystems such as wetlands and forested areas, with grave effects for climate vulnerability and increased natural hazards” (KCCA interviewee)

“If we do not incorporate biodiversity, we can't contribute to climate change. Loss of biodiversity arises from a failure to implement open space policy and an unregulated construction sector.” (NGO interviewee)

“The pollution of waterways with waste is detrimental to biodiversity but also clogs drainage and leads to flooding. Wetlands degradation through siltation and waste means that the natural purification function of wetlands is lost; the resulting water purification costs of Lake Victoria are high” (NGO interviewee)

“Wetlands ecosystems are being depleted, leading to recurrent flooding” (Academia interviewee)

“KCCA is not doing enough to protect wetlands, with detrimental effects for flooding effects. The issue is that economics work against wetlands protection.” (Academia interviewee)

Whilst most of the interviewees refer to flooding issues, **degraded ecosystems and limited green spaces also contribute to the urban heat island effect**, making Kampala warmer than surrounding rural areas.

The lack of tree cover and vegetation in the city intensifies heat retention which can have adverse effects on public health, increase energy demand for cooling, and decrease overall urban comfort. The climate profile takes this into account. At the same time, the National Forestry Authority emphasizes the loss of tree cover but deplored that exact data on this is lacking, as the National Forestry Authority maps the city as built-up versus open space and there is currently no mapping of individual trees from satellite imagery or other sources being done, making exact data generation and monitoring impossible.

Kampala heavily relies on nearby ecosystems, such as wetlands and rivers, for its water supply. However, **biodiversity loss and ecosystem degradation can disrupt local water cycles and lead to reduced water availability and deteriorating water quality**. Wetlands, for example, act as natural filters, purifying water before it reaches rivers and streams.

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Their degradation can result in polluted water sources, leading to health issues for residents and exacerbating water scarcity, especially during dry periods. There is a lack of data publicly available on the exact state of wetlands in Kampala which have been continuously degraded:

“Wetlands have traditionally been seen as vast, cheap and unencumbered land available for development. The allocation of wetlands for industrial development, for instance through the Kampala Development Plan 1972, set the stage for wetlands encroachment. Industries put pressure on wetlands through heavy pollution loads and drainage for infrastructure development”. (Uganda Wetland Atlas, Volume II, 2016, p.5)

Biodiversity loss also poses a threat to agricultural productivity and food security. Biodiversity loss can disrupt the delicate balance of ecosystems, affecting pollinators, natural pest control, and nutrient cycling. Reduced biodiversity can lead to the decline of important pollinators like bees, which are crucial for crop production. Additionally, degraded ecosystems can result in soil erosion and loss of soil fertility, negatively impacting agricultural productivity and threatening food security for the city's growing population.

Recommendations

The decline in biodiversity and ecosystem health equates to the loss of valuable ecosystem services that benefit Kampala's residents. These services include climate regulation, air quality regulation, water purification, and cultural and recreational opportunities. Without access to these services, the city's resilience and quality of life in the face of climate change are compromised. **Biodiversity loss can be qualified as one of the underlying drivers of climate change-related impacts in Kampala. At the same time, urban development and climate**

change pose threats to biodiversity, and the twin challenge is inherently interlinked. It could be useful for the revised KCCAP to consider the role of biodiversity and its interlinkages with climate change more explicitly, to make inroads for awareness creation and concerted transformative action.

II.2 Integration of biodiversity issues in the KCCAP Energy and GHG Emissions Profile

This section reviews the impact of urban biodiversity loss and ecosystem degradation on greenhouse gas (GHG) emissions in Kampala. It analyses how this is currently being considered in the KCAAP section `Energy and GHG emissions profile` and proposes biodiversity-related solutions for mitigation and diversification for updating the city's energy profile.

In general, **urban biodiversity loss and ecosystem degradation have significant impacts on GHG emissions.** Healthy ecosystems, such as urban forests and wetlands, act as carbon sinks, absorbing and storing carbon dioxide from the atmosphere. When these ecosystems are degraded or lost, their capacity to sequester carbon diminishes, leading to a net increase in greenhouse gas emissions. Biodiversity loss results from activities like deforestation, urban expansion, and agricultural conversion, whilst these land-use changes contribute to greenhouse gas emissions, through the release of carbon stored in trees, vegetation and soils. In Kampala, the GHG inventory has taken this duly into account when considering the Afforestation, Forestry and other land use (AFOLU) sectors. It found that the emissions of the sector are relatively low compared to others (see KCCAP, p. 21). However, close monitoring of future developments is required as Kapala is heavily urbanizing and ecosystems are continuously at threat of being degraded.

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It would be recommendable to assess if the GHG inventory includes all aspects and linkages between biodiversity, ecosystems, energy use and GHG in a comprehensive manner.

For example, as a KCCA interviewee pointed out in the interview for this evaluation, the impacts of biodiversity loss and ecosystem degradation on GHG emissions are not fully known, and the GHG inventory does not take into account tree cover yet; however, data from tree audits is there which can be applied and factored into calculations in future.

Furthermore, the energy and GHG emissions profile concentrates on sources and uses of energy and GHG emissions. In terms of biodiversity-related issues, it identifies current sources of GHG emissions from land use, including “few green spaces and environmental degradation” (KCAAP, p. 23). This was a recurrent theme also in the interviews that took place for this evaluation, as the following quote exemplifies:

“Green public spaces have disappeared, leading to air quality issues and lost GHG capture”
(Academia interviewee)

A strong emphasis on the role of green spaces and trees is also evident from the separate Kampala Energy and Climate Change Profile 2015 (p. 96-98) which elaborates upon the role of forests for capture and storage of CO₂, whilst being “an important source of local biodiversity and for the development of a structured wood energy industry that maintains environmental integrity”, then going on to present Kampala’s aim to plant 500,000 trees. It is interesting to note that **the role of wetlands for carbon sequestration is not included in the KCCAP Energy and GHG profile, even though wetlands make up a substantial part of the landscape.**

Furthermore, **biodiversity loss and ecosystem degradation can affect the dynamics of methane emissions.**

Wetlands, for instance, are known sources of methane, but they can also act as methane sinks under certain conditions. Altering or losing these ecosystems can disrupt the balance of methane emissions, leading to potential increases in atmospheric methane levels. In Kampala, the deplorable state of wetlands is well documented. To the knowledge of the author, no dedicated research has been published on methane emissions of wetlands in Kampala. It would be of added value to gather more data on wetlands from this perspective, and integrate such a component into the GHG emission profile of Kampala and when monitoring the state of wetlands.

Last but not least, **biodiversity loss and ecosystem degradation can set off feedback loops that exacerbate greenhouse gas emissions.** For example, as temperatures rise due to climate change, it may become more challenging for certain species to survive, leading to further biodiversity loss. Additionally, stressed ecosystems may release stored greenhouse gases more readily, contributing to a vicious cycle of emissions and climate change impacts. Whilst data on these aspects is difficult to obtain, awareness of the connection between biodiversity and climate change in this regard could be raised in an updated KCCAP.

Recommendations

Overall, the impact of biodiversity loss and ecosystem degradation on greenhouse gas emissions in Kampala can lead to a reduction in the city's carbon sequestration capacity and an increase in its overall carbon footprint. Addressing these issues requires concerted efforts to conserve and restore ecosystems, adopt sustainable land-use practices, and promote biodiversity conservation to mitigate climate change impacts and reduce greenhouse gas emissions.

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The energy and GHG emissions profile concentrates on sources and uses of energy and GHG emissions. In calculations, data on the carbon sequestration potential of wetlands, trees, green spaces and other nature-based solutions in Kampala is currently not comprehensively considered in the GHG inventory of the city. It would be recommendable to examine this more closely for a more holistic GHG profile. However, this may require additional capacity and sensitisation as accurate monitoring of habitat-based carbon sequestration may be more challenging than for 'engineered' removals. Yet, it can still provide powerful climate change mitigation. Furthermore, the wider ecosystem recovery provided will be essential for biodiversity conservation and climate change adaptation.

II.3 Integration of biodiversity in the four priority areas of the KCCAP


SECTOR	VISION	TARGET	IMPACT
ENERGY  INCREASE RENEWABLE ENERGY USE		<ul style="list-style-type: none"> • Number of EE Audits conducted per year • Improved cook stoves distributed to and purchased by institutions & households • Amount saved as a result of energy audits conducted • 50 Megawatts of renewable energy produced on the territory (solar, waste to energy) • 50% of charcoal (2015 baseline) replaced with alternative cook fuel (briquettes, biogas) • 15 % of the energy mix from renewables 	<ul style="list-style-type: none"> • Household and institutional savings • Increase in green jobs • Reduction in street lighting costs • Improved air quality • Energy efficiency buildings

Image 1: Targets and expected impact under the energy sector of the KCAAP

For the energy sector, the KCCAP envisages to increase renewable energy use. **There is no apparent integration of biodiversity-related issues, yet possible entry points exist for linking goals for the creation of habitat for biodiversity and energy savings in the form of green roofs and walls that serve for cooling.**

As the energy profile of the KCCAP outlines, there is generally a low use of air conditioning by KCCA which has a positive impact on the GHG balance. This is due to the preference by KCCA to use alternative ways such as natural ventilation, renovation and construction of buildings following standards that avoid systematizing AC.

Yet, with predicted rising temperatures and heatwaves, in the future, green roofs and facades could contribute to cooling effects and be part of the solution to keep on the path of low use of air conditioning. Already today, as stated in the National Building Codes, buildings should have green roofs where possible (see paragraph 150 (7)-(b, e, g)).

According to a survey by the Green Growth Institute (2023), undertaken to establish the state of play on green building principles in the existing buildings in the Greater Kampala Metropolitan Area (GKMA), out of 100 public buildings, 85.4 per cent have permeable paving while only three buildings have green roofs.

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For future revisions of the KCAAP, the potential for cooling through green roofs and facades could be considered more strongly, with co-benefits for biodiversity in terms of the creation of habitat for pollinators, for example.

This of course has to be seen in a wider perspective, and contextual challenges have to be kept in mind. The GGGI report lists several barriers to green building activities in Uganda, such as lack of public awareness, high initial costs, lack of financing schemes and limited knowledge of design and construction (GGGI, 2023). This resonates with research from other African contexts which has shown that the application of green roofs faces obstacles, such as a lack of related expertise and comparatively high construction costs (Labuschagne and Zulch, 2016). However, given that in other geographical contexts this is an effective solution providing water retention areas as well as cooling, with co-benefits for biodiversity it seems worthwhile to investigate existing examples of green roofs and facades in Kampala and their potential for scaling up.


SECTOR	VISION	TARGET	IMPACT
MOBILITY	 <p> REDUCE CONGESTION & TRAVEL TIMES INCREASE SUSTAINABLE TRANSPORT SYSTEMS </p>	<ul style="list-style-type: none"> • 50% of motorists using mass public transport (Buses & Train) • 20% reduction in average hours of travel • 50% of city roads tarmacked • 25 km of NMT (cycle/Pedestrian) lane length constructed • 15% of new vehicle registrations (Institutional & public transport fleet) using alternative fuel (compressed natural gas, biofuels, all electric) • Alternative fuel dispensing/charging stations established • At least 200,000 motorists using car sharing system annually • 40% of current 14-seater taxis replaced by buses 	<ul style="list-style-type: none"> • Household savings • Increase in green jobs • Reduced GhG emissions • Improved air quality • Traffic de-congestion

Image 2: Targets and expected impact under the mobility sector of the KCAAP

For the mobility sector, the KCAAP envisages reducing congestion and travel times and increasing sustainable transport systems. There is no apparent integration of biodiversity-related issues. **Potential entry points exist for the inclusion of targeted greening principles in the construction of roads.** In Uganda, the department responsible for road trees is the Environment Unit within the Ministry of Works and Transport, which recently published the Urban Roads Design Manual 2023. Therein, a landscape approach is applied, and it acknowledges that trees in urban landscapes provide a range of ecosystem services,

including habitat, refuge, food, and corridors for other fauna and flora. The loss of trees is occurring at an alarming rate in Uganda, especially on hilltops and lowland areas in this tropical landscape known for dense vegetation and tree canopy.

The manual makes detailed recommendations on the types of trees to be planted, according to tree and canopy size. It lists generally appropriate tree species for urban roads throughout Uganda according to the climate but leaves the choice to the implementer according to the specific location of the road within

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Uganda that determines the final tree species choice based on the local climate, geology and landscape type (see Urban Roads Design Manual 2023, p. 50).

Whilst the manual states invasive species that should be avoided, there are no apparent biodiversity-related parameters underlying the design guidance. For example, as outlined by ICLEI a guide for pollinator-friendly cities (Wilk et al., 2019), road, railway and waterway verges can assume the function of ecologically important network elements and indeed pollinator refuges in densely populated urban areas. They emphasize that cities should consider complementing green belts and green corridors when planning traffic verges, roadside and railway verges, roundabouts, waterways and river banks to create and manage pollinator habitats. **This calls for collaboration between KCCA and UNRA in the final choice of plants and trees, where local and context-specific biodiversity parameters should be given due consideration** - a recommendation that was also made by the National Forestry Authority during the interview for this evaluation.


SECTOR	VISION	TARGET	IMPACT
WASTE + WASTE WATER	 INCREASE 3RS	<ul style="list-style-type: none"> • 30% of waste recycled • 60% of newly approved buildings with water harvesting units/systems installed • 5 megawatts of electricity generated/supplied from methane capture • Biogas systems installed 	<ul style="list-style-type: none"> • Green economy job growth • Behaviour change • Improved drainage flows • Waste reduction in households & institutions • Improved health and wellbeing

Image 3: Targets and expected impact under the waste and waste-water sector of the KCAAP

There is no apparent integration of biodiversity-related issues in the waste and wastewater sector that seeks to increase the `3Rs` (reduce, reuse, and recycle). At the same time, the importance of the sector cannot be overemphasized:

“Better waste management and disposal is key, as pollution is bad for biodiversity”

(NGO interviewee)

Whilst waste and pollution are harmful to biodiversity, waste is also an opportunity for wealth creation through existing efforts of waste-to-wealth (organic manure) and waste-to-energy approaches (biogas). Interviewees commented that in terms of visions and targets, KCCA seems to be on the right track, but that more could be done. Recommendations from interviewees are to scale up existing efforts. In terms of waste-to-energy, a new project with

Act Together is targeting informal settlements and could provide valuable results for lesson sharing. KCCA interviewees also recommended setting up bottom-up waste transfer stations. Here, incentives are required for sorting at the source.

The obvious remaining entry points for working with nature in the waste sector are NBS-based grey-water treatment approaches. It is recommended to analyse and learn from an existing pilot by the National Water and Sewerage Corporation on NBS-based greywater treatment. Unfortunately, to the knowledge of the author, there is no published

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information available, and it was not possible to interview knowledgeable representatives of the NWSC to gain a better understanding of the mentioned pilot.

Globally, NBS such as treatment wetlands, ponds and lagoons, and soil infiltration processes have been actively used as reliable and economically efficient wastewater treatment technology for decades. There is a well-established evidence base in science and practice, that demonstrates the effectiveness and efficiency of, for example,

‘Treatment Wetlands’ and ‘Waste Stabilisation Ponds’ (International Water Association and Nature Conservancy, 2021).

As the cited report further emphasizes, when considering if such systems are locally feasible and desirable, it **is important to consider not only the ability to deliver wastewater treatment functions but also co-benefits for people and nature, such as increasing biodiversity; improving urban microclimates; biomass production; and enabling water reuse.**

SECTOR	VISION	TARGET	IMPACT
LAND USE + BUILT ENVIRONMENT	 <p>IMPROVED CONSTRUCTION PRACTICES</p>	<ul style="list-style-type: none"> • Integrated green (circular economy) neighborhoods planned/ developed • 300,000 people supported to reduce exposure to climate hazards • 80% of new public investments classified as climate smart • New buildings certified as green buildings • Water harvesting units installed • 500,000 new trees grown (street, park and household) • 30km of drainage channels constructed/improved • Acres of wetlands protected and or restored 	<ul style="list-style-type: none"> • More eco friendly buildings • Increased green economy • Carbon sequestration • Climate resilient infrastructure • Reduce disaster exposure & lower costs for risk/disaster management • Improved community practices • Increased green spaces and trees in households for improved health & income

Image 4: Targets and expected impact under the land use and built environment sector of the KCAAP

Amongst the four priority areas of the KCCAP, biodiversity-related issues are most obviously integrated in the priority area of land use and built environment, where it relates to targets of green buildings; 500,000 new trees grown; and acres of wetland protected and restored. In terms of green buildings, as already outlined above in relation to potential energy savings, green roofs and facades have the potential to also address biodiversity targets. As stated in the National Building Codes, buildings should have green roofs where possible (see paragraph 150 (7)-(b, e, g)). It also recommends a reduction of stormwater generation through green roofs and permeable paving (paragraphs 200 (5) & 211 (2)).

Furthermore, the sector of land use and built environment offers **opportunities for reversing the trend of loss of biodiversity in soils by promoting sustainable urban drainage approaches which also offer advantages in terms of capturing stormwater runoff and curbing surface temperatures.** This can be done at the household level and the level of public buildings, for example by utilizing permeable or semi-permeable paving materials for parking lots, such as permeable interlocking concrete pavements, grass pavement, permeable clay brick pavements (see for examples within Kampala: GGGI, 2023).

Further promotion of these, in line with these standards, would be recommendable.

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II.4 Potential contribution of biodiversity issues to the achievement of the Action Plan

The Action Plan and its five main areas of intervention currently integrate biodiversity-related issues only in the area of land use and built environment, as well as cross-cutting issues. As recommendations for integration into the remaining areas (energy, waste, mobility) have been made in the preceding section, this section focuses on the specific actions under land use and built environment, as well as cross-cutting issues.

On land use and built environment, the following specific actions are particularly relevant: **Landscape policy; Wetlands protection, conservation and restoration; Creation of eco-parks; Conducting tree audit. Within the cross-cutting eco-practices and the Green Economy, specific actions are particularly relevant related to the adoption of environmental clubs / officers / ambassadors / champions for best practice promotion; and Go Green including tree planting and creation of green/waste ambassadors; as well as urban agriculture** (Reinforce the Urban Agriculture policy of KCCA, upscaling the existing pilot projects and initiating new ones). To streamline the assessment of the potential contribution of biodiversity-related issues to contribute to the achievement of the Action Plan, for this report, they are clustered into the following groups of issues: **greening: policies and initiatives; wetlands and eco-parks; urban agriculture; and other aspects.** Under each, the state of biodiversity-related actions is discussed, taking into account the current efforts in the city to protect/enhance urban nature or biodiversity. Further orientations for updating are provided, based on the recommendations of the interviewed stakeholders.

Urban Greening: Policies and Initiatives

Plenty of activities and initiatives in the city are related to greening in terms of policy and practice that have the potential to protect and enhance biodiversity and contribute to the achievement of the plan.

The landscape policy is developed at the ministerial level, and a Green infrastructure ordinance was drafted by KCCA, which is currently awaiting legal approval. The tree audit was carried out as planned and contributed to a better understanding of the city's tree species. It brought about the evidence of a high percentage of exotic tree species in the city that is detrimental to biodiversity.

A project that is contributing to impressive action on the ground is the "Sustainable Livelihoods and Inclusive Cities - Kampala Strasbourg (SLICKS)" project. It builds on the efforts of the Urban Natural Assets mapping undertaken by KCCA and ICLEI, which looked at the green cover of the city and areas and identified conservation priority areas for birds and bees.

SLICKS has three components: green spaces, urban agriculture (UA), and education. It aims to develop a Green-Blue infrastructure plan to interlink with the infrastructure plan and facilitate integrated planning. It will also pilot wetlands restoration in collaboration with NEMA to support eco-tourism. For the development of the Green-Blue Infrastructure Master Plan, data on biodiversity is being collected, with birds as biodiversity indicators, to inform stepping stones for biodiversity and connectivity. The plan will for example focus on water reservoirs and connectivity for bird species. An academic expert interviewed named bird species of special concern which are endangered in the IUCN red list:

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several vultures, the crescent crane, and several types of egrets and **recommends working with experts to identify measures for appropriate habitat (choice of tree species) and protect existing habitats of these species, notably wetlands.** Findings from the biodiversity audit of birds are in line with academic literature. During a long-term study of urban birds in Kampala over 32 years, Chamberlain et al. (2018, p. 275) found an “overall decline in species richness that was largely driven by declines in insectivores and granivores. General declines were evident also when the trends in the most common individual species in these two groups were considered. The occurrence of the commonest predator and scavenger species tended to increase over the period considered. Insectivorous species are likely to be especially affected by increasing urbanisation due to air pollution. Predators and scavengers are likely to have benefitted from the inability of municipal waste management to keep pace with growth in the human population, hence providing more potential food resources. Both insectivores and predators/scavengers are therefore good candidates for the development of urban indicators.”

Recommendations:

Several stakeholders consulted recommended **carrying on with the ambitious initiatives towards a Green-Blue Infrastructure Master Plan** and highly commended the efforts of a biodiversity audit of birds. **As part of greening efforts, they recommend to pay attention to:**

a) Strategic greening for pollinators and habitats for various species

It is recommended to direct specific conservation efforts on green infrastructure that supports pollinator habitat quality and connectivity.

Research provides robust evidence of how, for example, small greening action can quickly increase the availability and complexity of plant communities in urban greenspaces and lead to positive changes in the richness, demographic dynamics and network structure of a depauperate insect community (Mata et al., 2021). KCCA should ensure appropriate habitat for various species by planting trees and vegetation strategically to increase the habitat (informed by data collection); emphasise ecological corridors; and maintain greenspaces through appropriate mowing techniques for supporting habitat for pollinators.

Some interviewees also call for enhancing botanical gardens as havens for pollinators. Extensive guidelines on pollinator-friendly cities from the European context exist (Wilk et al., 2019; Tremblay and Underwood, 2023) which could be consulted to assess the contextual viability for the local context in Kampala.

Furthermore, it should be considered to include rewilding as a strategy for more biodiversity. However, awareness raising is needed for this, and potential trade-offs and disbenefits (e.g. crime in bushy areas) need to be taken into account, as well as perceptual issues around aesthetics and the valuation of nature in urban regeneration efforts. Interviewees emphasized that for effective and long-term natural assets protection, there is a need to understand the value attached to nature by residents and prioritize awareness creation of biodiversity and its benefits.

b) strategic greening for stormwater runoff and soil erosion mitigation

Researchers have extensively written about Kampala’s changing landscape where hilltops and upper slopes are losing the tree cover important for infiltration and the slowing of surface runoff. The lower slopes and valleys are losing vegetation to urbanization, exposing many buildings, infrastructure, livelihoods, and people to flash floods.

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Lwasa (2016) cautioned that KCCA's greening is selective and, perhaps, not strategic enough to reduce flood risk or air pollution.

"By focusing on beautification and planting of trees along streets, there is a missed opportunity to utilize nature in reducing flood risk: strategically greening hilltops for multiple purposes, including runoff management. We are losing trees at an alarming rate, especially on hilltops and in lowland areas." (Lwasa, 2016). Against this background, it would be prudent to re-assess greening interventions in Kampala and make sure that efforts are made for targeted greening of areas at risk of soil erosion. Here, it may also be worthy to align the plans and strategies of KCCA. For example, areas most commonly affected by soil erosion have been identified under KCCA's DRR strategy 2019 (section 5). It may prove strategic to update and align this information.

c) **strategic greening for carbon sequestration potential**

Several interviewees recommended that expertise should be sought to identify trees appropriate for GHG capture. For example, NFA could advise KCCA on such issues. Yet, researchers also caution that the main goal of restoration should be protecting biodiversity, with any carbon absorption a side-effect, as planting methods with a goal of quick carbon absorption are often at odds with those best for biodiversity (Heal, 2023). Other aspects relate to the choice of types of plants and trees, where forward-looking planning is needed to **make green spaces resilient to climate change**. Urban ecosystems change and some tree species will become extinct in future. It is important to plan green spaces with future climate change in mind, e.g., diversity of species of plants and more resilience against pests. The conventional wisdom is that **native species** need to be given precedence. KCCA should work with urban ecologists and plan for which trees/vegetation are at risk in Kampala from climate change and how to address this.

The Urban Roads Manual gives some information but it does not seem to be exhaustive.

d) **leveraging traditional knowledge systems in greening initiatives**

It would be worthy to also consider wild plants in greening initiatives to cater for biodiversity but also for preserving traditional knowledge systems. Research has shown that many people in Kampala collect wild plants. A study by Mollee et al. (2017, p. 2) showed that *"almost half of the respondents reported collecting wild plants in the urban and peri-urban environment of Kampala. This indicates that wild plants form a potentially important role in the livelihoods and traditions of Kampala's residents. Moreover, almost twice as many plants are collected for medicinal purposes than for food purposes. The findings in this study further indicate that residents with lower income, younger age (<51 years old), and predominantly living in peri-urban areas are more likely to be collectors of urban wild plants. This description of the current situation can help urban land planners and urban ecologists identify locations and species to incorporate in urban design. For example, green zones can be incorporated into planning maps, with specific aims of providing wild plants for collection."*



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Other relevant recommendations to improve the nexus of biodiversity, climate change and societal challenges for updating the KCCAP, with a specific emphasis on urban greening interventions relate to governance issues:

Improve the involvement of academia, civil society and the private sector:

- Encourage neighbourhoods to develop small community-managed parks and stewardship.
- Work with individual homesteads: there, tree planting is not done to target biodiversity (rather beautification, aesthetics, shade). Awareness should be increased of the importance of biodiversity and what can be done at the individual household level.
- Encourage more dialogues with the private sector and NGOs, allowing them to take the front stage of activities. Interviewees mentioned that KCCA is not always well received at the community level, and recommended using those actors to expand messages and actions.
- Encourage applied research and citizen science: connect researchers and local government in more areas of intervention. There is already a Memorandum of Understanding in place with Makerere University that makes this possible and which should be used at a wider scale. It is also recommended to explore working with environmental NGOs for a wider reach of citizen science.
- Improve involvement of communities in planning, designing and implementing greening activities, to avoid vandalism of trees and green spaces.
- Involve schools as laboratories, e.g. for tree planting and experiments on innovative solutions such as small-scale biogas approaches. Interviewees recommended working with all of the 79 public schools that exist within KCCA, as the potential is huge for multiplication. In this context, the challenge is that top-down approaches have proven not to be effective and long-term sustainable.

For example, the maintenance of trees is an issue if initiatives are perceived as an external intervention by KCCA.

Bottom-up and participatory approaches are therefore recommended.

Enhance interdepartmental collaboration:

- There is a need for coordinated and concerted efforts of all divisions regarding the management of biodiversity, and an integrated infrastructure development / comprehensive design.
- Bridge departmental silos in KCCA (e.g., between the Landscape Department and Gender and Health Department).
- Improve collaboration between environmental officers and the landscape department data on biodiversity is scattered amongst many organizations: need to work with other stakeholders on all taxa (e.g., Nature Uganda has data on birds in Kampala, too)

Build on, and enhance, existing capacity:

Due to the governance structure of KCCA, where urban foresters are not included in the key structure, they are only temporarily employed. Several interviewees highlighted that this ought to be changed if proper maintenance and management of green space is to be taken seriously.

There is a need to scale up training to KCCA staff on green space maintenance and tree nurseries and to train gardeners in KCCA on biodiversity issues. This is already taking place through, e.g., the SLICKS project, but longer-term solutions, beyond project life cycles, need to be found.

Capacity for biodiversity exists in the various environmental NGOs, who voice a keen interest in being better included in planning, developing and implementing environmental conservation and restoration efforts. This capacity could be leveraged for spill-over effects and to complement KCCA's capacity.

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Wetlands and Eco-parks

The major activity related to wetlands under the plan is the above-mentioned SLICKS project. As part of it, pilot wetland restoration is underway in collaboration with NEMA to boost eco-tourism, with the potential to protect and enhance biodiversity and contribute to the achievement of the KCCAP. At the time of undertaking interviews, designs were developed and the site for the park was still to be determined. It will be important to monitor to what extent the park will be able to contribute to addressing the interlinked climate and biodiversity crisis to derive lessons learnt for possible scale-up. In general, stakeholders commented positively on such interventions, whilst mentioning the potential of mutual learning exchanges with cities in the region, such as Kigali, where similar interventions have been realised with success.

“Actions must meet the needs of people and boost the economy. We see eco-parks in wetlands as an appropriate way forward”
(NGO Interviewee)

The importance of a better integration of wetlands into city planning is emphasised by various stakeholders. It was also elevated to a priority action within the DRR strategy of 2019 (see below). It was not possible to gain any exact feedback from NEMA and KCCA on the implementation of these actions under the DRR Strategy of 2019, which are closely related to the KCCAP’s concerns about wetlands. Also, the State of Wetlands which NEMA is developing was not published at the time of writing this report. For an update of the KCAAP, the current knowledge of wetlands should be closely reviewed to make evidence-based decisions for priority actions moving forward.

Priority action					
3.5 Integrate wetlands into city planning, making them a priority to ensure the best long-term sustainable use.					
Acquire a better understanding about the current state of Kampala’s wetlands to develop intervention strategies for recovery, recover the wetlands, and generate positive effects for flood risk reduction and climate and environmental resilience.					
3.5.1	Carry out and publish habitat and physical condition survey of all remaining wetlands, including detailed geospatial, ecological, and physical information.	Physical Planning	Public Health and Environment	MWE NEMA	Short term (1 year) ⁽⁵⁾
3.5.2	Review the current designated wetlands and develop management plan, which identifies high-priority areas where greater protection or improvement intervention should be targeted.	Public Health and Environment	Physical Planning Engineering and Technical Services	MWE NEMA Development Partners	Medium term (2-3 years) ⁽⁵⁾

Image 5: Wetlands as a priority under the KCCA DRR Strategy 2019

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Meanwhile, relevant recommendations to improve the nexus of biodiversity, climate change and societal challenges for updating the KCCAP concerning wetlands emerged from the interviews. Various interviewees pointed out that rather than the restoration of wetlands, sustainable utilization as a pragmatic approach should be fostered. Furthermore, the need to raise awareness was highlighted, including creating more examples of ecosystems that realise ecosystem services, e.g., demonstrating the value of wetlands as key assets.

“There is a need for more examples of well-designed and protected ecosystem service places. The monetary value of ecosystem services of wetlands needs to be specified, and figures of wetlands as assets should come from NEMA. Wetlands are currently no priority as they are not on anyone’s financial books. It’s not an asset to anybody, no one allocates funding to wetlands. This is not an issue of manpower but priority”

(KCAA interviewee)

Urban agriculture

Urban agriculture (UA) plays an important role towards the achievement of the priority areas of the KCCAP. Uganda’s policies are very favourable towards UA, which is not very common in Africa. Food security is absent from urban development planning and policy in many countries and UA is even prohibited in many cities (Battersby and Watson, 2018; Titz and Chiotha, 2019). Elevating UA to a strategic priority, as done in Kampala, can contribute to food security for the urban poor and has potential positive environmental benefits including reduced emissions from transportation, reduced “urban heat island” effect, as well as reduced food waste through composting.

Although UA is also often cited as promoting biodiversity. in urban areas, the extent of empirical evidence for such claims remains understudied in the scientific literature (Clucas et al., 2018)

Yet, a recent study on the biodiversity found in urban agricultural areas shows that under favourable conditions of management and surrounding land use, UA would also be able to harbour noticeable biodiversity and contribute to nature conservation in cities. The authors conclude that “Further research is needed to better understand the ecological implication of UA. Nevertheless, we recommend considering UA for its benefits provided to humans but also to non-human beings as a habitat (Royer et al., 2023). Obviously, favourable conditions must include the abolishment of chemical pesticides.

Current efforts in the city to promote UA take place through pilot projects at the Kyanja Agricultural Resource Centre and Demonstration Farm. It was established in 2013 and showcases innovative solutions which do not require a lot of space, such as vertical solutions for vegetable production, but also the production of mushrooms, poultry and biogas. It was very positively assessed by all stakeholders interviewed, and a visit in September 2023 under the assignment leading to this report also allowed to experience the excellent initiative on site. Stakeholders see Kyanja Resource Centre as an excellent initiative that showcases innovative UA solutions for scarce space and provides training for free. However, the resource centre is far from the city and awareness of the centre is low. The initiative should be replicated elsewhere and must reach informal settlements to gain a wider impact.

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Suggestions by interviewees to that end include scaling up the training of trainers (ToTs) with youth groups or environmental NGOs on UA practices. The aim must be to achieve a more critical mass of urban farmers.

Besides positive comments on the Kyanja Resource Centre, other **relevant recommendations to improve the nexus of biodiversity, climate change and societal challenges for updating the KCCAP, with a specific emphasis on urban agriculture** were made:

- Foster climate-smart and resilient urban and peri-urban agriculture and agroforestry
- Encourage moving away from pesticides and other agrochemicals; undertake pest control with organic means
- Plant more fruit trees along drainage channels and train communities on fruit production
- Learn from bottom-up initiatives: e.g. Ento youth group at Makerere University Agricultural Institute is piloting composting with black soldier larvae (turn waste into feed for animals)
- Create urban gardens for youths: gazette smaller spaces and dedicate to poor people and the youth in the periphery of the city. set up community committees to manage urban gardens
- Valorise wetlands for urban farming: use space around wetlands for UA and protect wetland

II.5 Capacity of KCCA to deal with biodiversity issues, natural protection, enforcement of laws and regulations pertaining to the environment

The capacity is defined by the distinct but interconnected legal mandates related to environmental governance by KCCA,

the Ministry of Water and Environment, the National Environment Management Authority (NEMA), and the National Forestry Authority. KCCA is primarily responsible for the administration and management of Kampala. Its legal mandate includes urban planning, infrastructure development, and overall city management. In the context of the environment, KCCA is involved in issues such as waste management, green space development, and ensuring sustainable urban development within Kampala.

NEMA is the national environmental regulator in Uganda. Its mandate extends to the entire country, focusing on the formulation of environmental policies, guidelines, and regulations. NEMA is responsible for coordinating and supervising all activities in the country that have, or are likely to have, significant impacts on the environment. This includes issues like biodiversity conservation, pollution control, and environmental impact assessments. NEMA also directly supervises the Environmental Officers within KCCA.

Meanwhile, wetlands are managed by the Wetlands Management Department (WMD) within the Ministry of Water and Environment. The WMD management approach brings together conservation goals and sustainable use to ensure that the population continues to benefit from the services provided by wetlands (Uganda Wetlands Atlas Volume II).

Another stakeholder of importance is the National Forestry Authority (NFA), which is conserving natural forests primarily as water catchment areas. NFA and KCCA collaborate on managing and preserving urban forests within Kampala. KCCA works with NFA to incorporate environmental considerations, including forest conservation, into urban planning and development projects, and NFA provides guidance and support to KCCA to ensure that development projects within Kampala comply with national forestry regulations and standards,

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especially those related to tree-cutting and forest conservation. Both entities also collaborate on public awareness campaigns and educational programs to highlight the importance of urban forests, biodiversity, and the role of residents in conservation efforts.

In summary, while KCCA's mandate is specific to the administration of Kampala, NEMA, WMD and NFA operate at the national level, overseeing environmental issues throughout Uganda. They work collaboratively to ensure that environmental considerations are integrated into urban planning and development activities in the capital city.

Yet, KCCA seems to suffer from common capacity-related challenges to the integration of biodiversity in urban planning instruments, including the unclear definition of mandates among institutions, lack of human resources, vague local policies, lack of interdepartmental coordination and lack of finance (Ahmed and Puppim de Oliveira, 2017). Meanwhile, the overall impression by interviewed stakeholders is that KCCA is well equipped to protect natural assets in terms of legal mandates, but that implementation and enforcement remain the main challenges. Capacity is inherently linked to staffing and KCCA staff criticise that, for instance, urban foresters are only employed temporarily. Several interviewees also mentioned the need for improved capacity of KCCA to generate models to demonstrate the value of ecosystems (for flood risk reduction etc). But also the knowledge on biodiversity-related international policies is reportedly low.

“It would be useful to appoint a focal person for climate change and biodiversity in KCCA to do justice to its crosscutting nature”

(Academia interviewee)



Image: Kampala market © Unsplash

III. RECOMMENDATIONS FOR A FURTHER INTEGRATION OF BIODIVERSITY IN THE UPDATED KCCAP

This section seeks to synthesize recommendations that are highlighted in more detail in the preceding sections of part II. In addition, it makes suggestions for better alignment with international biodiversity-related policies and goals.

Overall, to address climate change impacts, the assessment concludes that the City of Kampala must prioritize efforts to conserve and restore ecosystems, protect biodiversity, and adopt more sustainable land use practices. Integrating nature-based solutions into urban planning and infrastructure development can enhance the city's resilience and reduce vulnerability to climate change, whilst providing biodiversity co-benefits. Collaborative efforts among government authorities, local communities, and non-governmental organizations are crucial for implementing effective strategies to mitigate the consequences of biodiversity loss and ecosystem degradation in Kampala.

Meanwhile, specific and detailed recommendations have to be seen within the wider perspective of the manifold urban development challenges that Kampala is facing: The **low socioeconomic conditions** of many of its residents and those of the surrounding districts hampers economic growth nationally and even regionally since Kampala is the country's commercial and economic hub and a key centre and driver in the Great Lakes Region. The bulk of the area (**around 60%**) is **semi-urbanised and comprises 62 informal settlements**, housing an estimated 560,000 families (Ernstson and Mukwaya, 2021). The poor socioeconomic conditions have placed significant pressure on the city's services and revenue streams, which has contributed to a **deterioration of infrastructure** such as roads, schools and hospitals. The response to urban growth and the infrastructure backlog has been the formation of a dynamic and growing **urban informal sector**.

The challenge lies in identifying urban planning modes and reform coalitions that can find ways to integrate the informal economy while also providing more stable incomes and safe jobs, and revenue streams for the city (Lwasa and Owens, 2018).

Therefore, recommendations have not only to be sought with a focus on biodiversity – which is why interviews with various local stakeholders took place to elicit **relevant recommendations to improve the nexus of biodiversity, climate change and societal challenges for updating the KCCAP**.

III.1 Synthesis of key biodiversity-related recommendations derived from desk review, interviews and field observations:

Promote nature-based solutions (NBS) to benefit biodiversity and people as a contribution to KCCAP's strategic priority areas:

- **Energy:** Green roofs and facades can contribute to cooling, whilst providing habitat for various animal and plant species.
- **Mobility:** Improved collaboration between KCCA and the Uganda National Roads Authority on the greening of roadsides, building on the Roads Manual and including local and context-specific biodiversity parameters, should be given due consideration
- **Waste:** Scaling up existing efforts of waste-to-wealth and waste-to-energy approaches could reduce the threat of pollution to biodiversity; NBS-based greywater treatment, for example, 'treatment wetlands' and 'waste stabilisation ponds' can deliver wastewater treatment functions but also co-benefits for people and nature,

III. RECOMMENDATIONS FOR A FURTHER INTEGRATION OF BIODIVERSITY IN THE UPDATED KCCAP

such as increasing biodiversity, improving urban microclimates, biomass production, and enabling water reuse.

- **Land use and built environment:** The ambitious efforts towards a Green-Blue master plan should be continued and supported financially. Besides, efforts for strategic greening should pay attention to: greening for pollinators and habitats for various species; stormwater runoff and soil erosion mitigation; and carbon sequestration potential.
- **Eco practices:** Existing efforts around urban agriculture should be scaled up, and small-scale organic urban farming and agroforestry should be encouraged, whilst ensuring that residents of informal settlements, the urban poor and youth benefit from such initiatives.

For all of the above, measures must be action-oriented as part of a comprehensive implementation plan with clear targets, timelines, and responsibilities. This may also lead to improved finance for biodiversity in terms of access to external (donor) funding. Research has shown that a lack of measurable actions in urban biodiversity plans means that cities are unable to showcase success. Thus, a lack of measures can result in a lost opportunity to highlight biodiversity successes (Pierce et al., 2020).

Improve collaborative efforts to benefit biodiversity and people as a contribution to achieving the Action Plan:

- **Improve horizontal and vertical institutional coordination and collaboration on policies, plans and implementation**

Transformative action for biodiversity requires synchronized coordination of planning, implementation, and regular monitoring and reporting across all levels of government (UN-Habitat, 2022).

In this regard, it could be worthy to explore leveraging the reported improvement of national and local working relationships through dialogues in Uganda under the ICLEI UNA rivers project:

“When the UNA Rivers team engaged with local officials in Kampala and Entebbe and with key national government departments in Uganda, it became clear that there was a need to better align the sustainability efforts of the country’s different tiers of governance. It was decided that a major aim of the project would be to strengthen multi-level governance in order to improve the integrated management of urban natural assets.

To achieve this objective, the team decided to facilitate dialogues between national and local government actors. Several meetings were held in 2018 and local government representatives worked with the Wetlands Management Department (WMD) and the National Environment Management Authority (NEMA) to co-develop an action plan for the dialogues and identify key themes, opportunities and challenges that needed to be addressed. The dialogues began in 2019 and, so far, have served as invaluable platforms for collaboration and coordination” (ICLEI, 2019).

- **Improve collaboration with the civil society**

Environmental and conservation NGOs commented that there is not enough effort by KCCA to include a wide range of stakeholders in developing and implementing climate change and biodiversity/environmental efforts. Various actors are promoting green ambitions but they report working in isolation of KCCA, despite being willing to cooperate. Those stakeholders should be engaged in open debates when drafting plans – but also in updating the KCCAP. This could be done by working with environmental / conservation umbrella

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organizations on implementation and monitoring by integrating conservation stakeholders into the activities of KCCA. There are manifold opportunities to coordinate the implementation of KCCAP with civil society organisations for wider outreach and upscaling but also to ensure that donor funding is complementary to bottom-up efforts for biodiversity conservation and environmental protection. Interviewees also recommended tapping into existing knowledge, expertise and data on biodiversity that NGOs hold, but also to work with churches, cultural institutions (e.g. Buganda Kingdom) and schools to scale up efforts. In particular, it was recommended to rally faith-based and traditional entities (e.g., Buganda Kingdom) and youth networks (e.g., GBYN).

The power of faith-based organisations for policy impact has been recognised at the global level in relation to the UN Decade on Ecosystem Restoration (2021-2030): “Religious and spiritual leaders, whether high level or youth leaders, have the ear of the people, essential in identifying drivers of deforestation or poor ecosystem management, as well as the voice to influence behavioural attitudes with a strong presence. The grassroots connection is critical in identifying drivers of deforestation and driving national conservation and restoration efforts by spearheading policy discussions that are sensitive to social conditions.” (United Nations Environment Programme, 2021).

The role of traditional entities, such as the Buganda Kingdom, can potentially be harnessed for biodiversity conservation. On the one hand, interviewees emphasize that the Kingdom owns large tracts of land in Kampala and collaboration could be harnessed for sustainable land use planning. On the other hand, the clans’ totem animals and traditional conservation of wildlife could potentially be built upon.

Indeed, the power of integrating biocultural values into urban environmental planning has been emphasized by African scholars. As people interpret and define nature based on their cultural and historical contexts, accommodating local indigenous understandings of nature within urban planning can be highly beneficial to the preservation of nature and stewardship (Cocks et al., 2020).

Notably, **various stakeholders voice interest to be engaged in environmental protection and biodiversity efforts by KCCA.**

These include the Uganda Biodiversity Fund which previously tried to engage with KCCA to partner in raising resources for biodiversity protection; Biodiversity Hub International which has an MoU in place with KCCA and would like to offer to train KCCA staff on the Kunming-Montreal Global Biodiversity Framework (GBF) and help build capacity for biodiversity at KCCA; FAO who would be interested to work with KCCA on clean energy work by training communities; and ICLEI CBC voiced keen interest to be invited to give input towards better integration of biodiversity into urban policies and plans. Follow-up by KCCA with these organisations for collaborative efforts is highly encouraged.

- **Increase awareness of the importance of urban biodiversity**

Consider developing a participation strategy for all relevant actors, accompanied by a communication or narrative guideline to raise awareness about the ecological and social benefits of urban biodiversity. This could also extend to the international level, in the form of an exchange of inspiring practices with other urban authorities and the international community.

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Visibility at the global level on urban biodiversity conservation and protection efforts could also lead to increased financing for biodiversity efforts and projects around sustainable urban land use. Awareness should also be raised within the different departments at KCCA. In this regard, interviewees recommended developing and strengthening KCCA's operational capacity for biodiversity-related aspects in terms of staff, logistics, supplies, and equipment.

External partners should consider providing information and guidance to city planners and decision-makers on existing international and national funding options and sector programmes to be tapped for environmental and biodiversity-related financing.

III.2 Recommendations for better aligning the KCCAP with international biodiversity-relevant policies

Thus far, the KCCAP does not make any explicit linkages to international biodiversity-related policies and goals. The KCCAP revision therefore offers an opportunity to enhance its contribution to international goals, but also to highlight how existing activities already, and directly, contribute to such. To that end, **it is recommended to ensure that KCCAP explicitly refers to, and incorporates targets outlined in the Kunming-Montreal Global Biodiversity Framework (GBF), the Plan of Action on Subnational Governments, Cities and other Local Authorities for Biodiversity (2023–2030), as well as the Ugandan National Biodiversity Strategy and Acton Plan (NBSAP).** In the subsequent sections, opportunities for enhanced alignment are made for each of these in more detail.

The Kunming-Montreal Global Biodiversity Framework (GBF)

Uganda, as a Party to the Convention on Biological Diversity (CBD), adopted the Kunming-Montreal Global Biodiversity Framework (GBF) at the 15th Conference of the Parties to the CBD (COP 15) in Montreal in December 2022.



THE BIODIVERSITY PLAN
For Life on Earth

Image 6: The GBF is accompanied by an awareness-raising campaign on “The Biodiversity Plan: For Life on Earth” (<https://www.cbd.int/gbf/>)

Among the Framework's key elements are 4 goals for 2050 (Protect and Restore natural ecosystems; Prosper with Nature; Share Benefits Fairly; and Invest and Collaborate) and 23 targets for 2030. The latter are organised around 3 themes (Reducing threats to biodiversity loss; Meeting people's needs through sustainable use and benefit-sharing; Tools and solutions for implementation and mainstreaming).

The revision of KCCAP, with a focus on integrating biodiversity concerns, directly relates to Target 12 of the GBF which aims to ensure biodiversity-inclusive urban planning, inter alia to increase the green and blue spaces within cities and other densely populated areas, to contribute to human well-being and the conservation of biodiversity in urban areas.

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The guidance notes prepared by the Secretariat for Target 12 outline that this could be accomplished by, for example, creating new green and blue spaces, better managing existing areas for biodiversity and health outcomes, and ensuring that such areas are accessible to people. The target calls for the mainstreaming of biodiversity in the context of green and blue spaces and biodiversity-inclusive urban planning.

Through the various activities that KCCA is undertaking in terms of greening, notably the efforts towards a Green-Blue Infrastructure Plan (which itself is not yet referred to in the KCAAP) based on biodiversity audits, KCCA already directly contributes actively to Target 12 of the GBF.

This can be made explicit and can potentially become a strong selling point for advocacy and communication around the KCCAP, including access to funding for its implementation. Furthermore, the monitoring framework for the GBF identifies the following indicator for this target: 12.1 Average share of the built-up area of cities that is green/blue space for public use for all. The inclusion of this indicator, linked to set targets by KCCA, should become part of the updated KCCAP for a better alignment with the GBF.

The revision of KCAAP also offers opportunities for increased uptake of nature-based solutions, as outlined in section III.1 above. By doing so, the KCAAP would make great strides towards contributing to Target 8 of the GBF which aims to minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solution and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity. This can be made explicit in the text of the KCCAP, too.

Plan of Action on Subnational Governments, Cities and other Local Authorities for Biodiversity (2023–2030)

The implementation of the GBF is guided and supported through a comprehensive package of decisions also adopted at COP 15. Amongst these, CBD COP15 Decision 15/12 and its associated **Plan of Action on Subnational Governments, Cities and other Local Authorities For Biodiversity (2023–2030)** call for greater commitment at subnational and local levels to the implementation of the GBF. The KCCAP revision offers an opportunity to contribute to the Plan of Action by considering making direct linkage with its seven action areas, of which the most pertinent Action areas are outlined below.



Image: Kampala, Uganda © Unsplash

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Action area	Recommendation for alignment (based on semi-structured interviews and desk review)
<p>Action area 1: (b) Encourage subnational governments, cities and other local authorities to develop biodiversity strategies and action plans in harmony with national biodiversity strategies and action plans.</p>	<p>KCCA should ensure that the KCCAP update in terms of priorities, targets and activities is in harmony with Uganda's National Biodiversity Strategy and Action Plan. [see dedicated section (III.iii) below]</p>
<p>Action area 2: Collaboration between levels of government, and mainstreaming. (a) Collaborate with subnational governments, cities and other local authorities to improve harmonization of strategic planning, coordination and implementation between levels of government.</p>	<p>Relevant recommendations have been made in the previous, section on improved horizontal and vertical institutional coordination and collaboration on policies, plans and implementation. Taking these into consideration would also serve to better align with the CBD's Plan of Action.</p>
<p>Action area 3 Resource mobilization: (b) Collaborate with subnational governments, cities and other local authorities, to create enabling conditions for significantly increased private sector investment, and reforms that can introduce new revenue streams for biodiversity conservation and ecosystem restoration at the subnational and local levels.</p>	<p>Recommendations by interviewees included considering to scale up the involvement of the private sector in the development and implementation of green spaces and eco-tourism parks. Such approaches may contribute to new revenue streams for biodiversity conservation and ecosystem restoration at the subnational and local levels.</p>
<p>Action area 4 Capacity development: (a) Support subnational governments, cities and other local authorities in implementing capacity development and technology transfer initiatives that contribute to the implementation of biodiversity strategies and action plans and the Kunming-Montreal Global Biodiversity Framework.</p>	<p>Various capacity-related concerns were raised by interviewees who recommended developing and strengthening KCCA's operational capacity for biodiversity-related aspects in terms of staff, logistics, supplies, and equipment. External partners should consider providing information and guidance to city planners and decision-makers on existing international and national funding options and sector programmes to be tapped for environmental and biodiversity-related financing.</p>
<p>Action area 5 Communication, education and public awareness: (a) Support subnational governments, cities and other local authorities in developing inclusive and action-oriented communication, education and public awareness, public access to information and participation initiatives at the subnational and local levels, reconnecting nature and people in and around cities and regions</p>	<p>One of the recommendations arising from the assessment was to consider developing a participation strategy for all relevant actors, accompanied by a communication- /narrative guideline to raise awareness about the ecological and social benefits of urban biodiversity. KCCA should consider setting aside funding in its budget to undertake such activities and seek additional funding from national and international partners to that end.</p>

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Action area	Recommendation for alignment (based on semi-structured interviews and desk review)
<p>Action area 6 Assessment and improved information for decision-making:</p> <p>(a) Invite the use of the Singapore Index on Cities' Biodiversity as a self-assessment tool for city and local governments to benchmark and monitor the progress of their biodiversity conservation efforts against their own individual baselines;</p> <p>(b) Support subnational governments, cities and other local authorities in co-producing data, and in gaining and offering better access to data and scientific evidence and expertise to improve decision-making, enabled by improved capturing, analysis and reporting of local and landscape-based biodiversity data.</p>	<p>The widely applied 23-indicator index helps cities track their progress in biodiversity planning. Whilst efforts are ongoing for biodiversity-inclusive planning by KCCA, it could be considered to align these, where possible, to the Singapore Index on Cities' Biodiversity, for better monitoring and communicating progress nationally and internationally.</p>
<p>Action area 7 Monitoring and reporting:</p> <p>(a) Encourage subnational governments, cities and other local authorities to use online commitment and reporting platforms, such as RegionsWithNature and CitiesWithNature, where subnational governments can report on, and track progress against, their commitments to contributing to the implementation of the Kunming-Montreal Global Biodiversity</p>	<p>KCCA is already listed as one of the cities under the CitiesWithNature platform. However, on the publicly available website (see: https://citieswithnature.org/city-profiles/Kampala%20Capital%20City%20Authority) there is no evidence of commitments or action taken. It would be recommended to do so, as for example the ambitious efforts be KCCA (e.g. around the Green-Blue Infrastructure Plan) could be showcased for international recognition of KCCA's commendable efforts towards biodiversity-inclusive planning.</p>

National Biodiversity Strategy and Action Plan (NBSAP II)

Various actions under the KCAAP already contribute and link to NBSAP II targets. In the NBSAP II, a national target under strategic objective 3 lists as proposed activity “Promote protected areas as core drivers for nature-based tourism development in the local economy”. The team responsible for updating the KCAAP could consider whether, for example, the ecotourism efforts could be linked to this goal. Besides, NBSAP II has an urban target for pollution, to which the targets of the KCCAP can be explicitly linked. NBSAP II also makes a strong connection between urban pollution and biodiversity (see Chapter 3.8 of the NBSAP). This linkage could also be made much more visible in the KCCAP update. Last but not least, District Local Governments are responsible for submitting and preparing annual reports on the progress and implementation of NBSAP II to NEMA. It would be prudent to use the information from those reports, if any were prepared at KCCA, for a better alignment as well as a knowledge base for the KCCAP update.

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ANNEX 1:

ANALYSED STRATEGY & POLICY DOCUMENTS

- Kampala Climate Change Action Strategy;
- Kampala Energy and Climate Profile (2015);
- Kampala Disaster Risk and Climate Change Resilience Strategy;
- National Biodiversity Strategy And Action Plan II (2015-2025);
- Uganda Biodiversity Outlook 2017;
- Uganda Wetland Atlas, Volume II, 2016;
- Kampala Urban Environmental Profile (World Bank, 2015);
- Kampala Hazard Profile (GFDRR, 2020);
- Uganda Wetlands Atlas Volume I: Kampala City, Mukono and Wakiso districts (UNEP, 2015).
- ICLEI (2018) Natural assets mapping for Kampala



Image: Kampala, Uganda © Alan David

ANNEX 2:

STAKEHOLDERS INTERVIEWED

<p>KCCA</p>	<ul style="list-style-type: none"> • Isaac Mugumbule, Head of Landscaping Unit, Physical Planning Directorate • Michael Kirya, Manager of Urban Agriculture Programmes, Gender, Community Services and Production Directorate • Eleth Nakazzi, Officer, Department of Strategy Management and Business Development • Edison Masereka, Manager Business Development and PPPs • Maximus Kwesiga, Environment Officer, KCCA Department of Public Health and Environment • Kato Geoffrey, Farm manager Kyanya Agricultural Resource Centre (KCCA Demonstration Farm)
<p>National Government entities</p>	<ul style="list-style-type: none"> • National Forestry Authority: Paul Buyerah Musamali, Director Policy and Planning (as well as a team of six staff members) • Ann Nakafeero, Senior District Support Officer, NEMA
<p>Non-governmental organisations</p>	<ul style="list-style-type: none"> • Paul Twebaze, Research Fellow, Advocates Coalition for Development and Environment (ACODE) • Jimmy Muheebwa, Director Conservation and Partnerships, Nature Uganda • Rogers Miwamanya, Landscapes Manager, Flora and fauna International • Ivan Amanigaruhanga, Founder, Uganda Biodiversity Fund • Irene Kananura, Founder, Biodiversity International
<p>Academia</p>	<ul style="list-style-type: none"> • Prof. John Tabuti, Ethnobotanist, Makerere University • Dr. Paul Mukwaya, Senior Lecturer and Judith Mbabazi, Graduate Student researcher, Makerere University, Department of Geography, Geo-informatics and Climatic Sciences (Urban Action Lab) • Dr. Daniel Waiswa, Senior Lecturer, Makerere University, Department of Geography, Geo-informatics and Climatic Sciences (School of Forestry)
<p>Development partners</p>	<ul style="list-style-type: none"> • Simon Mwesigye, Programme Coordinator, UN-Habitat Uganda Office • Manon Gruner Obarowski, Programme Coordinator SLICKS (Sustainable Livelihoods and Inclusive Cities Kampala-Strasbourg), GESCOD • Dr. Emmanuel Zziwa, Climate Change Scientist, FAO • Ronald Mc Gill and Hilda Nankya, Global Green Growth Institute • Tarryn Quayle, UNA Rivers project manager, ICLEI

ANNEX 3:

SEMI-STRUCTURED INTERVIEW GUIDE

The following interview questions are designed to elicit information on the current integration of biodiversity-related aspects in KCCAP and the potential to enhance such integration in future. Table 1 targets a broad range of stakeholders, whilst additional questions in Table 2 only relate to targeted actors and intervention areas.

Table 1: Biodiversity issues in relation to Kampala’s climate vulnerabilities, energy and GHG emissions

Theme	Questions for the respondents
Introduction	<ol style="list-style-type: none"> 1. How does your organization’s work relate to urban issues around biodiversity and/or climate change in <i>Uganda</i>? 2. Does your organization currently work on anything related to these themes in <i>Kampala</i>?
Climate vulnerabilities	<p>The state of natural assets and ecosystems affects the climate vulnerability of a society.</p> <ol style="list-style-type: none"> 1. In your view, which are Kampala's most critical natural assets and ecosystems? 2. Is there a planning mechanism in place that effectively prioritizes them? 3. To your knowledge, has there been any loss or gain in habitats/ecosystems and locally significant species in Kampala? Is there any data/report that you can share?
	<ol style="list-style-type: none"> 1. What are currently the main efforts in the city to protect or enhance nature? –by whom, at what scale? Please elaborate. 2. What are the successes and remaining challenges?
	<p>Wetlands offer important ecosystem services for Kampala (improving water quality, providing fish and wildlife habitats, storing floodwater, etc.).</p> <p>Do you have any knowledge of the state of wetlands (level of encroachment and degradation, health of wetlands ecosystems, biodiversity, etc.) and the impact on such ecosystem services? Please elaborate.</p>
	<p>Insufficient drainage systems contribute to flooding.</p> <ol style="list-style-type: none"> 1. To what extent is sustainable urban drainage (for example: bioswales, permeable paving, rain gardens, green roofs) implemented to manage storm-water locally? 2. Would you suggest any of these as appropriate solutions for wider implementation in Kampala, and if so, are some areas of the city better suited than others?
	<p>Climate change impacts water resources.</p> <ol style="list-style-type: none"> 1. What is currently being done to protect watersheds and recover rainwater? 2. What would you recommend to improve the situation?
	<p>Urban heat is projected to increase in future.</p> <ol style="list-style-type: none"> 1. What is currently being done to address this, and by whom? 2. How could urban nature become part of the solution?

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SEMI-STRUCTURED INTERVIEW GUIDE

Table 1: Biodiversity issues in relation to Kampala’s climate vulnerabilities, energy and GHG emissions

Theme	Questions for the respondents
Energy and GHG emissions	<p>One of the key priority areas of the KCAAP is energy.</p> <ol style="list-style-type: none"> Are there any natural solutions that can increase energy efficiency in Kampala? Could building codes/standards and eco-guidelines take any of such natural solutions into account? <p><i>[Probing questions, if not addressed: Do you see a potential for reducing the costs of cooling through green roofs and facades? If not, what are the hindrances in the context of Kampala?]</i></p>
	<p>Wetlands, trees and other natural areas can store carbon. To your knowledge, is there any information or ongoing research on the carbon sequestration potential of wetlands/trees/natural areas in Kampala?</p> <p><i>[Additional question to experts in this area: Are these issues being considered in the GHG inventory? To what extent, and what are the main challenges?]</i></p>
	<p>Urban agriculture promotion reduces transportation costs and the dependence on food production from areas outside of the city.</p> <ol style="list-style-type: none"> Do you know of any initiatives to promote urban agriculture in Kampala? What are the successes and remaining challenges? To what extent are practices of organic farming/ the abolishment of the use of chemical fertilizers and pesticides promoted, or any other measures to protect/enhance biodiversity?
	<p>Green spaces and trees capture carbon, and can enhance biodiversity but also contribute to flood resilience and human health.</p> <ol style="list-style-type: none"> How well is the potential of green spaces already used (i.e, to capture carbon; enhance biodiversity; and make the city flood resilient)? In your view, what are the successes and which challenges still need to be addressed - how? <p><i>[Probing questions, if not addressed:</i></p> <ol style="list-style-type: none"> Does green space planning consider connectivity (ecological corridors)? Are trees being planted strategically for stormwater runoff management? To what extent does green space planning and tree planting consider diversity of species for their impact on biodiversity of birds and pollinators, or the increase of primate population or other species?]

ANNEX 3:

SEMI-STRUCTURED INTERVIEW GUIDE

Table 2: Additional questions related to KCAAP`s intervention areas (targeted institutions ONLY):

Stakeholders	Issues to engage on and guiding questions
<p>KCCA</p>	<p>Progress on developing public transport mass systems (BRT/NMT/light rail/cable):</p> <ol style="list-style-type: none"> 1. Do you think that there have been any considerations for involving the planning of green infrastructure (trees and vegetation) on the roadsides/road reserves when developing the public transport systems? 2. Landscape policy: Is this policy in place? 3. Beyond aspects of beautification, to what extent does the landscape policy take into account ecological elements that enhance or maintain biodiversity? Please elaborate. <p>Building codes/standards and eco guidelines:</p> <p>Are building codes/standards integrating any considerations for working with natural elements (e.g., green roofs, facades, etc.)? Have there been any discussions around this? Please elaborate.</p> <p>Capacity</p> <ol style="list-style-type: none"> 1. How well is KCCA equipped to deal with biodiversity issues, natural protection, and enforcement of laws and regulations pertaining to the environment? 2. What is needed to enhance the situation? <p>Inter-agency coordination and collaboration on Climate Change</p> <p>How often do you engage or meet with other institutions concerned with climate change in KCCA? Does this also concern ecosystem or biodiversity-related issues?</p>
<p>Communities</p>	<p>Go Green including tree planting and creation of green/waste ambassadors:</p> <ol style="list-style-type: none"> 1. Please briefly explain what you have done and what were the main successes and challenges. 2. How effective are bylaws to protect trees and natural resources? 3. What else would be needed to enhance/protect urban nature in Kampala? <p>Capacity</p> <ol style="list-style-type: none"> 1. How well are communities in Kampala equipped to protect and enhance the natural environment? What would be needed to enhance the situation?
<p>Development Partners</p>	<p>Available financing mechanisms:</p> <ol style="list-style-type: none"> 1. Which avenues do you see for financing working with nature in Kampala – for the benefit of people and ecosystems? 2. What mechanisms (or entry points) are in place in the Ugandan context that Kampala could make use of?
<p>Architects/ Developers</p>	<p>Building codes/standards and eco guidelines:</p> <ol style="list-style-type: none"> 1. Are building codes/standards and eco-guidelines integrating any considerations for working with natural elements (e.g., green roofs, facades, etc.)? 2. Please comment on the feasibility of green roofs/facades (technical, financial, capacity, or culturally related) in the context of Kampala. 3. Is there any demand from clients for such natural elements/solutions?

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