

MAINSTREAMING BIODIVERSITY INTO AFRICAN CITIES

LAND USE PLANNING | 2018

URBAN NATURAL ASSETS FOR AFRICA: RIVERS FOR LIFE



The role of bats as biodiversity indicator species in sustainable, biodiversity-friendly urban planning

A case study of Lilongwe, Malawi

Biological diversity and ecosystem services are the foundation of human existence. We rely on them for both survival and quality of life. However, until recently, many ecosystem services have gone unrecognised in city planning processes and continue to be under-valued. This has often led to cities having a direct contribution to biodiversity loss and degradation (Puppim de Oliveria et al., 2014). As a result, the need to integrate biodiversity and ecosystem services into city planning processes and decisions, especially in African cities, is increasingly being recognised. Africa, a continent rich in biodiversity, is characterised by rapid urbanisation and population growth (Gunalp et al., 2017). Bats, which form one of the most diverse groups of mammals remaining in urban areas, have a huge role to play in integrating biodiversity and ecosystem services into city planning processes and

decisions. More specifically, this case study highlights the role that bats can play in sustainable, biodiversity-friendly urban planning, using Lilongwe as a case study.

Why bats?

Bats are a biodiversity indicator species. This means that certain bat species can capture responses of a range of taxa and reflect components of biological diversity, such as species richness and species diversity (Jones et al., 2009). Bats are considered to be biodiversity indicators as they can be readily monitored and recognised, are taxonomically stable, are reactive to environmental stressors and lastly, because they are providers of a number of essential ecosystem services (Russo & Jones, 2015). This case study will focus on the latter two points.



Why bats?

Bats are environmental indicators

Bats are sensitive to a wide range of environmental stressors or disturbances to which they respond in predictable ways which can be readily observed and quantified (Jones, 2009; Russo & Jones, 2015). For example, bats are reactive to environmental stressors relating to habitat conversion and climate change (see Jones et al., 2009).

Bats can tell us a lot about the state of the environment as they are top predators of common nocturnal insects and are sensitive to changes in land use practices. The pressures they face, such as landscape change, agricultural intensification, development and habitat fragmentation are also relevant to many other species, making them exceptional indicators for the wider health of a city's natural assets (Pineda et al., 2005; The Bats Conservation Trust, 2018).

Bats as providers of environmental services

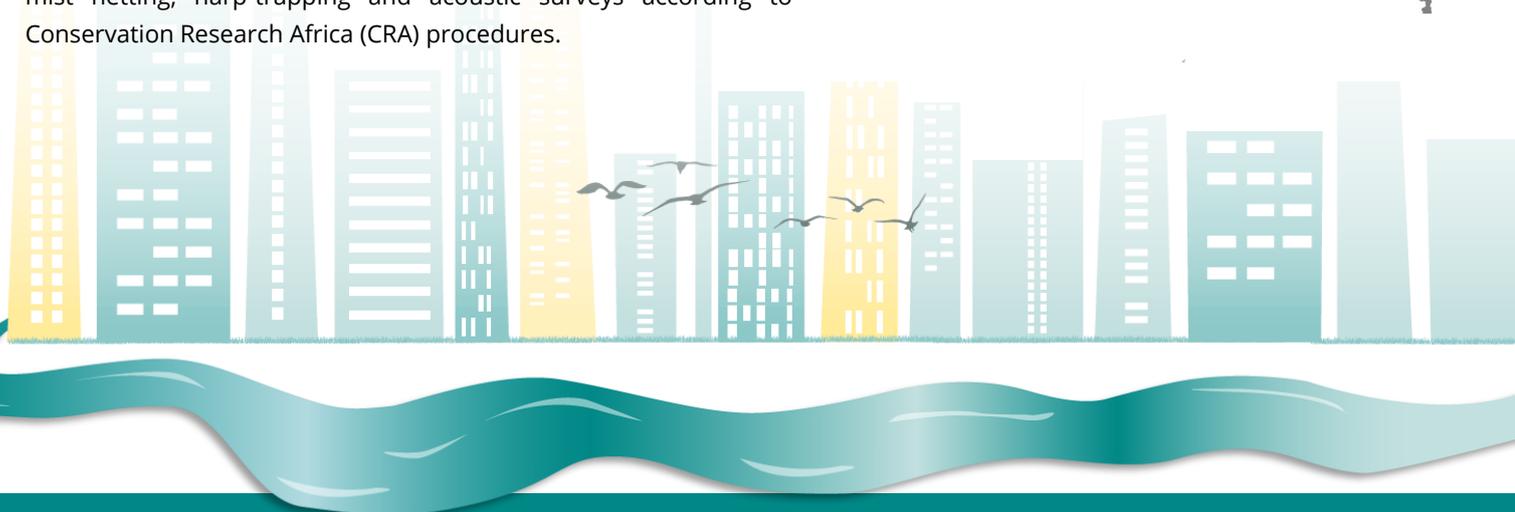
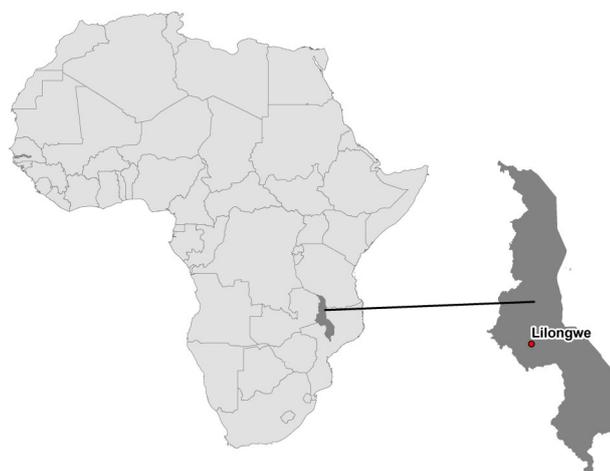
Many bat species play a vital role in many environments and help us in numerous ways. Certain plants, such as species of cocoa, mango and banana, rely on bats to pollinate their flowers or to spread their seed. Furthermore, bats also help control pests, by eating thousands of insects, including mosquitoes, during the night. Given that bats eat an array of insects in certain regions, they can also reduce the need for farmers to use pesticide sprays on their crops (Bat Conservation Trust, 2018; Jones et al., 2009).

Identifying biodiversity hotspots in Lilongwe City, Malawi

Lilongwe City, the capital city of Malawi, is named after the Lilongwe River that passes through it. It is commonly known as a "Garden City" as it has many open green spaces which are home to a wide range of species (City of Lilongwe, 2013). However, due to the rapid urban expansion taking place within the city these green spaces are under major threat. For example, new developments have been built on river buffer zones, protected parkland has been bought for private developments and new housing plans have been made with no provision for green or public space (IIED, 2016).

Malawi is known for having a high diversity of bat species, making bats a suitable tool for identifying biodiversity hotspots. Hotspots are areas that are both biologically rich and are threatened with habitat loss and other human activities (Conservation International, 2018). Given the species diversity and richness in Malawi and their potential application of bats as biodiversity indicators, the Urban Natural Assets for Africa: Rivers for life (UNA Rivers) project, recognised the possible role that bats could play in developing sustainable, biodiversity-friendly, urban planning for the City of Lilongwe.

A bat survey, in addition to other survey methods, was conducted in Lilongwe as part of the UNA Rivers project. This was done to identify priority biodiversity areas within the city boundary, for which it would be advisable that limited development should occur. Bat species diversity and abundance was recorded at selected sample sites in habitats (parkland/ garden and riverine) using standardised mist netting, harp-trapping and acoustic surveys according to Conservation Research Africa (CRA) procedures.



**"I didn't know how important bats are for cities.
I now love bats! "**

- Cllr Elijah Botha, ex-chair of the health and environmental committee, Lilongwe



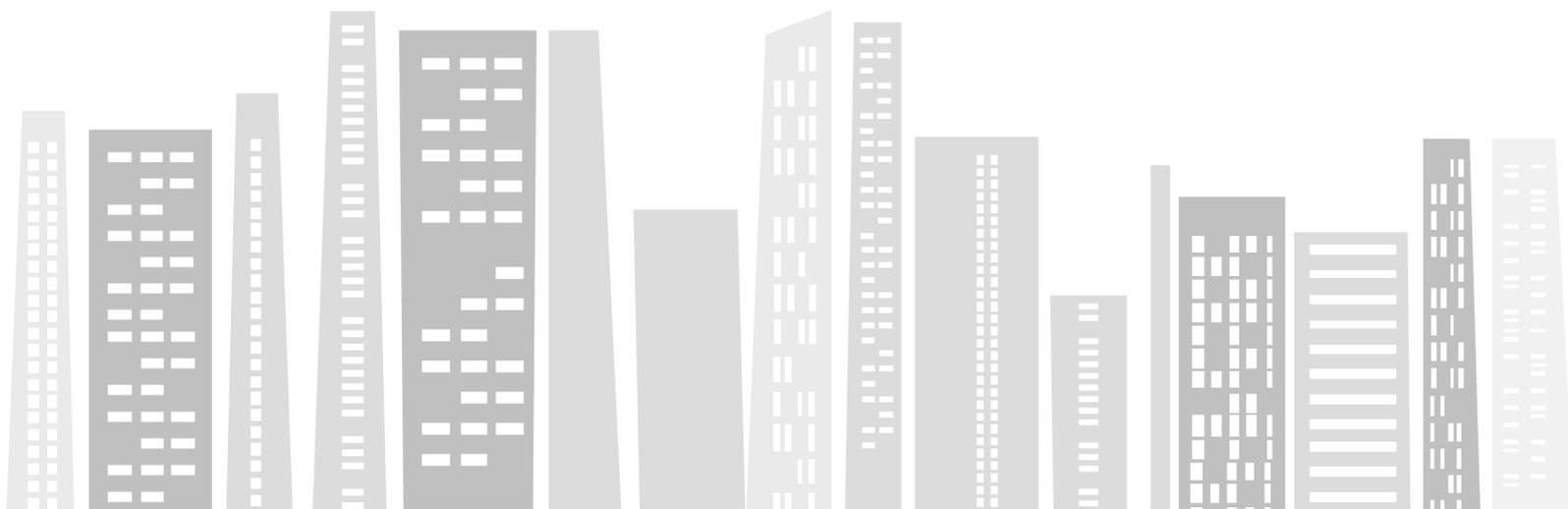
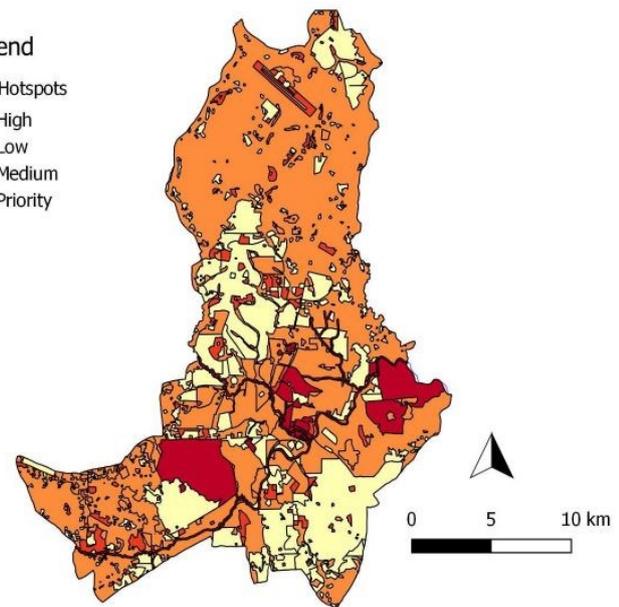
A total of 13 species and 6 species groups were recorded, of which *Scotophilus dinganii* (yellow-bellied house bat), *Epomophorus labiatus* (little epauletted fruit bat) and *Scotoecus hindei* (dark-winged lesser house bat), were most abundant. Results showed that riverine habitats are not significantly different from garden habitat in terms of both bat diversity and abundance. This highlights the importance of wooded garden habitats in Lilongwe, in supporting urban biodiversity. From these findings, it would be advisable that limited development should occur in wooded garden habitats. These findings from the bat survey together with a number of other survey's and data findings, resulted in the development of a map indicating the various biodiversity hotspots (See figure 1 below).

Conclusion

The potential application of bats as biodiversity indicators is increasingly being recognised, due to, amongst other things, their sensitivity to environmental stressors as well as the number of environmental services they provide. This is particularly true in areas of high bat specie richness and diversity, such as Malawi. The UNA Rivers Project conducted a bat survey in the city of Lilongwe in Malawi in order to identify biodiversity hotspots within the city, for which it would be advisable that limited development should occur. This case study highlights the role that bats, as biodiversity indicators, can play in identifying high value biodiversity areas that need to be taken into consideration during urban planning and

Legend

- UNA Hotspots
- High
- Low
- Medium
- Priority



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ABOUT THE PROJECT

Urban Natural Assets for Africa: Rivers for Life (UNA Rivers) is implemented by ICLEI's Cities Biodiversity Center.

This cutting edge project is designed to support the daily challenges that local governments in Africa experience around protecting and revitalising their urban natural assets, in particular their river systems.

It aims to integrate nature-based solutions into land use planning for increased resilience.

ABOUT ICLEI

ICLEI - Local Governments for Sustainability is the leading global network of over 1,500 cities, towns and regions committed to building a sustainable urban future. ICLEI promotes local action for global sustainability, supporting cities to become sustainable, resilient, resource-efficient, biodiverse, and low-carbon.

ICLEI Africa Secretariat is the Sub-Saharan office of ICLEI and serves our local and sub-national government members across the region in line with the ICLEI Strategic Plan. ICLEI Africa also hosts the global ICLEI Cities Biodiversity Center.

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