FOREST CONSERVATION IN A CHANGING CLIMATE: 
REFLECTIONS FROM KWAZULU-NATAL

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URBANISATION AND INDIGENOUS FORESTS

Over half of the world’s population resides in cities and this proportion is expected to increase to 60% by 2030 and 70% by 2050, according to reports by the United Nations. Urbanisation is taking place at an alarming rate, placing pressure on urban green space. Recognised as key components of sustainable cities, urban green spaces offer socio-economic, ecological and aesthetic benefits. In most parts of the African continent, there is a lack of awareness on how to interact optimally with urban green spaces while maximising their benefits. There is a need to identify urban green space for conservation under various climate change scenarios in South Africa’s rapidly developing cities. Present-day policy makers can no longer ignore the valuable role of green spaces in urban environments and this has resulted in the promotion of green space in conservation management.
Forests represent the smallest biome in South Africa, nonetheless, a wide variety of plant forms are found in the forests, which in turn support other biota. In addition to assisting in climate control, forests have other ecological benefits, including: erosion prevention by reducing rainfall force on the soil surface, absorbing water, reducing runoff and topsoil removal; acting as water filters, collecting and storing water as well as recharging underground water. Forests also increase the atmosphere’s humidity by transpiration, which affects temperature and rainfall.

The L-shaped Hawaan Forest originally covered 130 ha before the western part was cleared in the 1920s for sugarcane farming. In the 1950s the eastern part was cleared for the M4 road construction. Hawaan Forest presently covers about 55 ha and is situated west of the N2 national road and the Indian Ocean, in the northern part of the Umhlanga Rocks area (eThekwini Municipality). The northern boundary of the forest for the most part lies immediately south of the Umhlanga River. The plants from the various strata protect the forest floor which in turn plays an important role in protecting the environment.

**HAWAAN FOREST**

Hawaan Forest is dominated by trees such as the Flat Crown (Albizia adianthifolia), Dune False Currant (Allophylus natalensis), Coastal Silver Leaf (Brachylaena discolor), Natal Hickory (Cavaca aurea), White Stinkwood (Celtis africana), Southern Coshwood (Cola natalensis), Thorny Elm (Chaelacme aristata), Wild Apricot (Dovyalis longispina), Monkey Orange (Strychnos gerrardii) and Buffalo Thorn (Ziziphus mucronata).

The understory is dominated by Natal Box (Buxus natalensis), Jackalberry (Diospyros natalensis), African Cocaine (Erythroxylum emarginatum), Dwarf Loquat (Mitriostigma axillare) and Poison Olive (Peddleia africana).

Climbers and creepers found in the Hawaan Forest include Coast Climbing Thorn (Senegalia kraussiana), Thorny Rope (Dalbergia armata), Leg Ripper (Smilax anceps), Forest Grape (Rhoicissus tormentosa), Monkey Rope (Adenia gummiifera) and Lavender Star Plant (Grewia caffra) which are common and dominant on top of the canopy and sub-canopy.

Numerous patches of indigenous coastal forest that occur along the eastern seaboard of South Africa are threatened. Over the last century, urbanisation and transformation due to development have destroyed KwaZulu-Natal (KZN) coastal forests, despite national and provincial conservation efforts. Local municipalities, civil societies, volunteer groups and private citizens have independently contributed to the conservation of these forests. KwaZulu-Natal is home to unique coastal forests such as Hawaan, Umdoni and other privately-owned forest conservation areas. These indigenous forests host numerous tall to medium-height subtropical tree species that only occur on coastal plains and stabilised coastal dunes. There is great variation in species composition within the coastal forests, which have three recognisable strata: the canopy, sub-canopy and understory.

**CONSERVATION EFFORTS OF THE COASTAL FORESTS**

The fast-growing eThekwini Municipality falls within the Maputaland-Pondoland-Albany biodiversity hotspot and the municipality covers about 1.4% of the provincial area. With 68% of the total population of 3.5 million belonging to the working class, eThekwini Municipality is ethnically diverse with a cultural richness of mixed beliefs and traditions.

Approximately one-third of eThekwini Municipality is composed of peri-urban- and informal settlements that have emerged along the periphery and close to the remaining patches of indigenous coastal forest. Communities in these settlements are impoverished and unemployed, relying on natural resources to sustain livelihoods, which often results in degradation of the natural environment. In KZN, large patches of coastal forest are at risk due to anthropogenic pressures from agriculture, commercial forestry, recreation, mining, informal settlements and development. Urban expansion and sugar cane farming have transformed about 67% of coastal forest vegetation. Furthermore, forests are predicted to be negatively impacted by climate change, with important implications for forest conservation and management. Forests are naturally dynamic systems that must be monitored under a changing climate scenario to design appropriate forest management and conservation strategies. In this regard, botanical assessment tools such as vegetation surveys can be useful for understanding and quantifying plant biodiversity in these coastal forests.

The phenomena of global warming and climate change can no longer be ignored.

This motivated the formation of the KZN-Forest Conservation Network (KZN-FCN) that brings together stakeholders from academia, civil society, government and the corporate sector to get actively involved in the conservation of coastal forests at the local level. The creation of this network will hopefully facilitate the dissemination of information about forest conservation to the general public and the corporate sector. In the long term, it will encourage citizens to spearhead and lobby for urban conservation within the rapidly developing eThekwini Municipality.

**KwaZulu-Natal Forest Conservation Network (KZN-FCN)**: Conserving forests through multiple stakeholder engagement

The importance of citizen science as a tool for enhancing peoples’ knowledge about nature and conservation spurred the creation of the KZN-FCN. The University of KwaZulu-Natal (UKZN) in partnerships with other entities such as non-governmental organisations will facilitate research in coastal forests. The network’s specific objectives include:

1. disseminating scientific information on forests to the broader public and private sector;
2. encouraging citizen science and conservation within indigenous forests;
3. allowing students and academics to interact directly with the concerned residents/communities surrounding these forests.
forests to forge an alliance based on a shared vision for forest conservation and the dissemination of conservation-related knowledge; and,

4 designing and implementing forest conservation practices based on scientific research.

This newly formed network has assisted in conceptualising, funding and implementing undergraduate and post-graduate student research projects aimed at characterising biotic and abiotic dynamics within various coastal forest patches in the eThekwini Municipality (see below).

Non-academic members, stakeholders and custodians of forests support student projects and research by allowing access (permission), suggesting sites for specific studies and even assisting students in actual data collection. The research projects generate valuable data and regular reports. For example, a number of non-academic members have assisted students in floristic surveys, collection of seeds of selected forest species and identifying areas of the forest subjected to alien species invasion.

There is a need to interact with other stakeholders within the network in decision-making. Management involves not only predicting how ecological or physical systems are likely to respond to interventions, but also identifying what management options are available, what outcomes are desired, how much risk can be tolerated, and how best to choose among a set of alternative actions. The challenge confronting forest managers is to make good decisions in this complex environment with varying options.

Bringing together civil society, academia, the corporate sector and government in forest conservation will hopefully result in more robust decision making in the management of KZN coastal forests at a local scale (i.e. eThekwini Municipality).

RESEARCH PROJECTS CONCEIVED AND FACILITATED BY THE NETWORK

A number of studies have investigated the importance of forests in urban areas but few have focused on the value and use of green spaces. The initial findings of a study conducted on the Bluff Reserve and Conservancy by Sarushen Pillay and Rashmeer Pahlad, initiated by the network, suggested that rural people perceive and use forests differently to urban dwellers.

In rural areas people are often directly dependent on forest provisions such as food, water, wood (fuel and construction) and medicinal plants. Moreover, forests also serve as a source of income through trading in natural resources. Apart from these tangible benefits, rural communities also use forests as cultural sites, places of worship and leisure. Therefore, in rural areas of KZN forests are viewed as vital components of livelihoods. Initial findings of these social studies have also shown that forest use and perception of forest conservation differ greatly depending on socio-economic status.

Olivier Kambaj - lead author of this article and a doctoral candidate at UKZN - is investigating whether the conservation status of coastal forests can be predicted by relating floristic data to factors such as seedling recruitment and soil nutrient status in selected coastal forests. This project will also be used to set up long-term monitoring sites for climate change within these forests and provide baseline data for future comparisons.

Key findings on biogeochemical processes, seedling recruitment and floristics could potentially be used by the network to better comprehend and plan for forest responses to climate change and disturbances. The preliminary data emanating from this study suggests that the Hawaan Forest is biologically diverse and is still in an intact state.

Recently the network conceived a project that will focus on forest gap dynamics. The initial phase will involve members and naturalists reporting gaps with notable alien plant invasions which will be mapped and characterised floristically. These gaps will be revisited periodically in the long-term to monitor recruitment of indigenous species. This project will also facilitate early detection of alien plants which is a particular challenge for coastal forest managers.

THE WAY FORWARD

The phenomena of global warming and climate change can no longer
be ignored and the uncertainty associated with this is a reason for concern particularly for global forest conservation. Forest resources are also being reduced alarmingly throughout the world given that close to 30% of forests are used for production of wood and non-wood products, and more than a quarter of modern medicine originates from forest plants. Many other desirable products such as gums and spices are also found in forests around the globe. Forests are important to humans and ecotourism is one way to use and promote forest conservation in a sustainable manner. Trees are also fundamental to our wellbeing and quality of life. Their size, number and age make them one of the most visible and continuous aspects of our lives.

Forests may hold up to 50 times more carbon than ecosystems that generally replace them, and this carbon is released into the atmosphere as forests are transformed. The KZN-FCN believes that understanding and predicting climate-induced changes in forests are key to conserving and managing forests in a changing climate. This presents several challenges. There is an urgent need to generate baseline data on forest floristics and abiotic parameters within various forests at a local scale. The participatory model adopted by the network for characterising, monitoring, conserving and managing selected patches of coastal forest is unique and worthy of replication. However, this model must also be adaptive in its design, approach and recommendations as the key to dealing with climate change is to be open to change!

LITERATURE AND FURTHER READING


