DURBAN STATE OF BIODIVERSITY

REPORT: 2017/2018

BIODIVERSITY

Biodiversity is the term used to describe the variety of life on earth and all natural processes. This includes ecosystem, genetic and cultural diversity, and the connections between these and all species, including humans. Ecosystem services are the benefits provided by healthy biodiversity to all living things. There is growing recognition of the value of ecosystem services to human well-being in terms of health, social, cultural and economic needs. Read more about ecosystem services on page 2 of this report.

Produced: December 2018

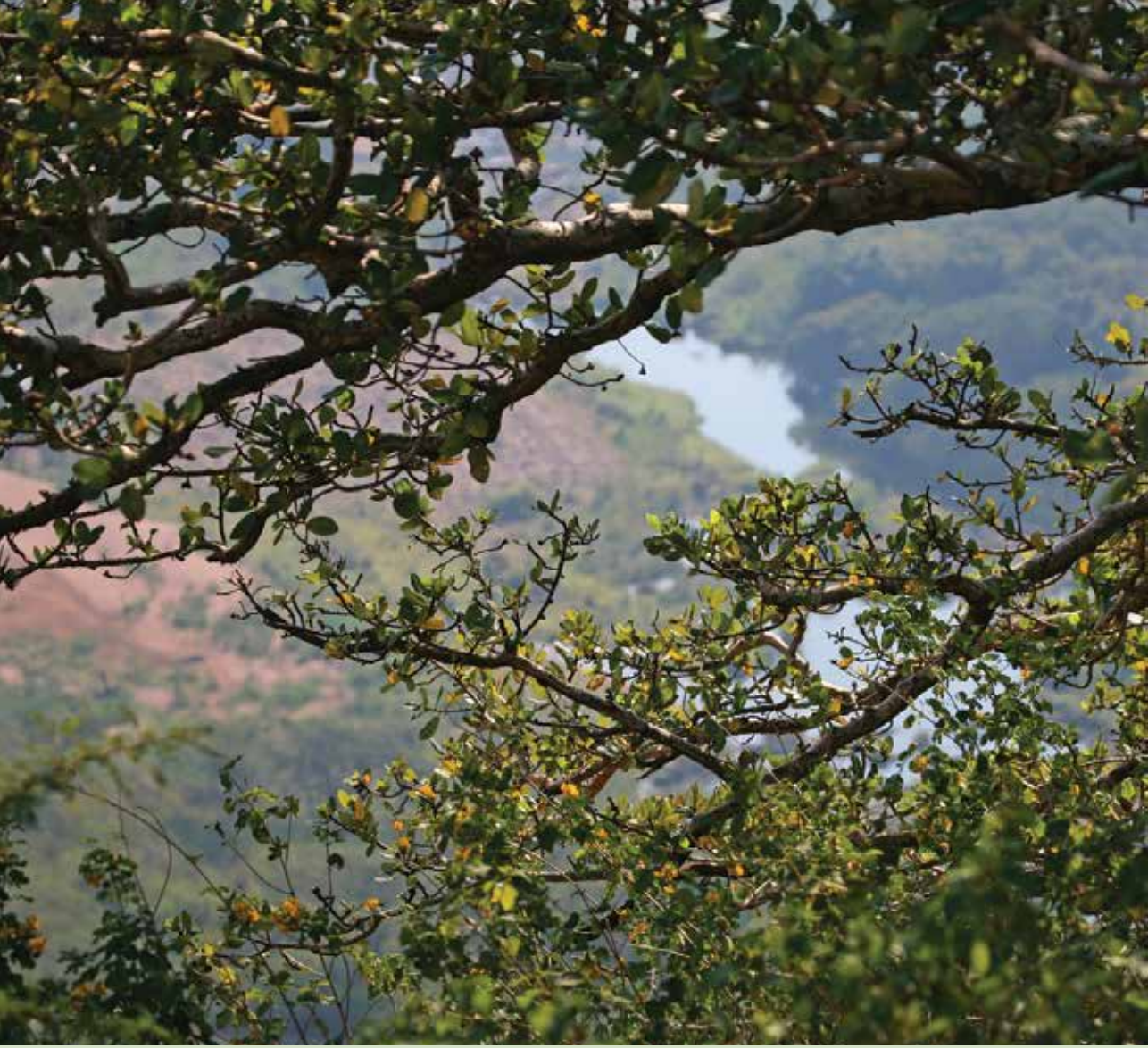
Compiled by: Natasha Govender, Senior Specialist Ecologist, Biodiversity Planning, EPCPD

INTRODUCTION

The intention of State of Biodiversity reporting is to present qualitative and quantitative data, which describe the status of biodiversity and ecosystem services in Durban, to highlight key threats to this biodiversity and to record actions aimed at protecting and managing biodiversity. These reports are produced annually and this is the eThekwini Municipality's 10th State of Biodiversity Report. This report collates data relevant to the 2017/2018 municipal financial year[1].

> **We should preserve every scrap of biodiversity as priceless while we learn to use it and come to understand what it means to humanity.**
>
> – *E.O. Wilson* (Biologist, theorist, author, and Humanist Laureate of the International Academy of Humanism).

1. *A municipal year starts on 1 July and ends on 30 June.*



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1. ECOSYSTEM SERVICES PROVIDED BY DURBAN'S NATURAL ENVIRONMENT

Biodiversity, short for biological diversity, is the term used to describe the variety of life found on Earth and all of the natural processes that underpin this biodiversity. This includes all species (including humans), habitats and ecosystems and the connections between these.

It is known that biodiversity provides us with essential ecosystem services. These are the benefits provided by healthy ecosystems to all living organisms. There is growing recognition of the value of ecosystem services to human well-being in terms of health, social, cultural and economic needs (Figure 1).

- **Food production:** e.g. fish, crops and fruit
- **Waste treatment:** removal and breakdown of excess nutrients in wetlands, detoxification of air pollution by vegetation
- **Water supply:** supply and storage of water by rivers
- **Disturbance regulation:** flood control, drought recovery
- **Cultural:** aesthetic, educational, spiritual and scientific use
- **Recreation:** eco-tourism, sports, fishing, swimming
- **Raw materials:** fuel, craft work and building materials
- **Pollination:** movement of pollen by certain species (e.g. bees) to enable plant reproduction

- **Biological control:** e.g. rodent and insect control (spiders controlling mosquito populations)
- **Refugia:** habitat for resident or migrant populations (e.g. nurseries for fish)
- **Nutrient cycling:** capture, storage and processing of nutrients (e.g. nitrogen fixation)
- **Soil formation:** e.g. weathering of rock by water
- **Climate regulation:** control of temperatures (e.g. wind reduction)
- **Gas regulation:** control of the chemical composition of the atmosphere
- **Genetic resources:** unique biological materials and products (e.g. plant and animal medicines)
- **Erosion control:** storage of soil within an ecosystem (e.g. wetlands)
- **Water regulation:** control of water flow (e.g. capture and release of water by vegetated landscapes for urban use)

Figure 1. Ecosystem services provided by Durban's biodiversity

2. PROFILE OF DURBAN

Table 1: Key statistics describing Durban in 2017/2018[2]

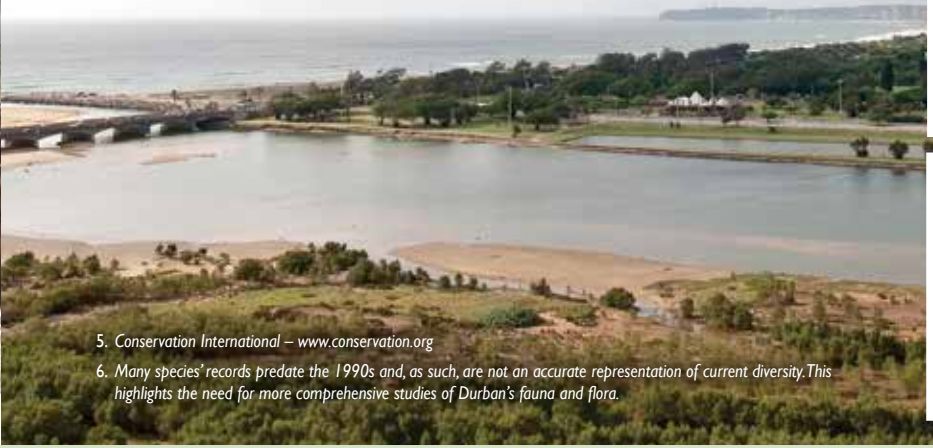
Municipal area	2 556 km^2
Population	3.86 million
Population growth (1996 – 2010/2011)	1.4 %
Percentage of people in poverty	24.6%
Total exports	R72.7 billion
Total imports	R105.2 billion
GVA[3]	R277 billion
GDP[3]	R304.4 billion
Unemployment rate	16.6%
Human Development Index[4]	0.67

2. *Source: Denny Thaver, Global Insight/Economic Development & Investment Promotion Unit/Procurement & Infrastructure: Development Engineering, eThekwini Municipality.*
3. *The Gross Domestic Product (GDP) is the total value of all goods and services produced within the economy in a given period. Gross Value Added (GVA) is the value of all goods and services produced in an area or sector of an economy, including taxes and less subsidies and is used in the estimation of Gross Domestic Product (GDP).*
4. *The Human Development Index (HDI) is a composite statistic of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development.*

3. THE NATURAL ENVIRONMENT

South Africa is the third most biodiverse country in the world[5], and Durban contains:

- Three of the country's nine terrestrial biomes, namely Savanna, Forest and Indian Ocean Coastal Belt;
- 11 broad nationally recognised vegetation types. These include: Eastern Valley Bushveld, KwaZulu-Natal Coastal Belt, KwaZulu-Natal Hinterland Thornveld, KwaZulu-Natal Sandstone Sourveld, Ngongoni Veld, Scarp Forest, Northern Coastal Forest, Sub-tropical Dune Thicket, Sub-tropical Seashore Vegetation, Swamp Forest and Mangroves;
- Over 2 200 plant species, 520 species of birds, 37 species of amphibians, 69 species of reptiles, 80 terrestrial mammal species, and 25 invertebrate species endemic to KZN[6];
- 97 kilometres of coastline with a diversity of beach types and productive rocky shores;
- 17 river catchments and 16 estuaries;
- 4 000 kilometres of rivers; and
- An open space system of approximately 95 000 ha (approved by the eThekwini Council in 2017/2018), representing almost one third of Durban's total municipal area.



5. *Conservation International – www.conservation.org*
6. *Many species' records predate the 1990s and, as such, are not an accurate representation of current diversity. This highlights the need for more comprehensive studies of Durban's fauna and flora.*

4. INDICATORS

4.1. Total area of D'MOSS

The Durban Metropolitan Open Space System (D'MOSS) is a system of open spaces incorporating areas of high biodiversity value (private- and public-owned) composed of a variety of habitat types linked together in an ecologically viable network. In 2017/2018, D'MOSS comprised 95 000 ha of open spaces, representing one-third of the eThekwini Municipal Area. This represents the D'MOSS that was adopted by the eThekwini Council in December 2017/2018. D'MOSS is a spatial layer, based on a systematic conservation planning approach, which identifies key areas that are selected to ensure representation and persistence of biodiversity and the supply of ecosystem services.

D'MOSS is incorporated into the city's Integrated Development Plan, associated Strategic Development Framework, regional Spatial Development Plans, and into the municipal Town Planning Schemes as a controlled development layer.

D'MOSS

Durban Metropolitan Open Space System

AREA OF D'MOSS

95 000 ha (approved 2017/2018)

THIS IS EQUIVALENT TO

1/3 of the EMA

TOTAL ASSET VALUE OF NATURAL AND SEMI-NATURAL AREAS

R47.8 billion

ANNUAL ECOSYSTEM SERVICE FLOW VALUE

R4.2 billion

Infographic produced by N. Govender (Senior Specialist Ecologist, EPCPD, 2018).

Environmental considerations inform the new Cato Ridge Local Area Plan

The Outer West of the eThekwini Municipality is home to highly threatened and underprotected grasslands – notably KwaZulu-Natal Sandstone Sourveld (KZNSS), a vegetation type that is endemic to KwaZulu-Natal (KZN). Only 11% of the original area of KZNSS remains and just over 0.1% is adequately protected (Jewitt 2018). Not surprisingly, the Environmental Planning and Climate Protection Department (EPCPD) has made the protection and management of KZNSS a priority and to date, 350 ha of this grassland type has been purchased in the Outer West for environmental protection. Acquired land has been rezoned for conservation and the process to proclaim these areas in terms of the National Environmental Management: Protected Areas Act (2003) has begun. Guards protect the sites from land invasion, illegal mining, poaching and harvesting of other natural resources. Management is undertaken by the Municipality's Fire and Invasive Species Control programme, which aims to reduce arson fires and implement a regime of controlled management burns. In time, public facilities will be introduced so that the areas may be used for activities compatible with the primary purpose of biodiversity conservation.

Notwithstanding achievements to date, the Municipality has insufficient resources to adequately protect the environment in the far Outer West and arrest the degradation of key environmental assets. The inclusion of the Durban-Free State-Gauteng logistics and industrial corridor (SIP2) in the South African Government's National Infrastructure Plan, has also intensified speculation and development interest in the area, especially along the N3 national road. Prompted by this interest, the Municipality initiated a review of the 2012 Cato Ridge Local Area Plan (CRLAP), including the preparation of Functional Area Plans and a draft Scheme. The Plan and draft Scheme were completed and adopted by the eThekwini Council in September 2018. The EPCPD was able to make significant input into this planning process by drawing on its fine scale systematic conservation assessment and by undertaking site inspections to fine-tune the environmental footprint. The quality of this environmental input allowed the Municipality, for the first time (possibly in South Africa too), to earmark land to be zoned for environmental conservation purposes regardless of ownership. This was done with care and where the environmental qualities of a site could not be adequately determined, the D'MOSS development control layer was used instead to flag the potential environmental value of the area. In the few cases where development opportunities are likely to be severely restricted or completely lost, tools are being considered to minimise impacts on landowners. These may include land acquisition, biodiversity stewardship and offset banking.

Reference:
Jewitt, D., 2018, 'Vegetation type conservation targets, status and level of protection in KwaZulu-Natal in 2016', Bothalia 48(1), a2294. https://doi.org/10.4102/abc.v48i1.2294

4.2. Percentage of D'MOSS that is protected

Only 8.2 % of the area of D'MOSS enjoys some form of protection (Table 2). This includes various categories of protection: proclaimed and unproclaimed private or public nature reserves; properties that have been bought through the eThekwini Municipality's (EM) environmental land acquisition programme; sites where sensitive portions have been protected by non-user conservation servitudes during the development approval process; and sites that have been rezoned to conservation.

Furthermore, less than 3% of the entire area of the eThekwini Municipality (EM) is protected (Table 2). This is well below the Convention of Biological Diversity's requirement for all governments to protect a minimum of 17% of terrestrial and inland water areas and 10% of coastal and marine areas.[7] In addition, is has been noted that these flat targets may be too small to adequately ensure the preservation of habitat types into perpetuity as it may not have a compelling ecological rationale. As a consequence, South Africa has adopted a more scientific-based approach to setting conservation targets.

Table 2: Area of D'MOSS with some sort of protection and categories of protection

The hierarchical classification was defined to categorise the various levels of protection from least protected (a private conservation area that may not have legislated protection) to a formally Proclaimed Nature Reserve (protected in terms of the National Environmental Management Protected Areas Act, (Act No. 57 of 2003. Such a classification prevents double counting when areas fall within more than one category.

Conservation area type	Total area in the EM (ha)	Hierarchical classification (ha)	Total per category_clipped to D'MOSS (ha)	Hierarchical classification areas_ clipped to D'MOSS (ha)	% D'MOSS
Private Conservation Area	375.5	373.1	369.8	367.4	0.47
Special Rating Area	228.0	205.5	228.0	205.5	0.26
NUCS	295.3	295.3	237.4	237.3	0.30
Private Conservation Area/ Municipal Nature Reserve	64.4	64.4	63.7	63.7	0.08
State Nature Reserve	1 951.5	1 951.5	1 937.1	1 937.1	2.46
Acquisition	641.2	22.6	632.6	17.8	0.02
Municipal Conservation Area	825.3	681.8	794.1	650.9	0.83
Council-owned Nature Reserve	967.8	316.7	955.6	312.5	0.40
Conservation Zone	3.5	3.5	3.5	3.5	0.00
Environmental Conservation Reserve	2 144.5	1 313.0	2 127.3	1 298.0	1.65
Proclaimed Nature Reserve	1 373.1	1 373.1	1 365.4	1 365.4	1.73
Total Protected		**6 600.5**		**6 459.2**	**8.20**

7. *Convention on Biological Diversity: https://www.cbd.int/sp/targets/rationale/target-11/*

4.2.1. Land acquisition

Land acquisition is one of the tools used by the Environmental Planning and Climate Protection Department (EPCPD) to secure and manage critical biodiversity areas within eThekwini Municipal Area (EMA). In line with Programme 3 of Plan 1 of the Integrated Development Plan (IDP), which outlines the requirement for ensuring the long-term sustainability of Durban's natural resource base, the EPCPD receive capital budget for the acquisition of environmentally sensitive land in the EMA.

In the 2017/2018 financial year, EPCPD acquired over 38 hectares of environmentally sensitive land within D'MOSS at a value of over R5.2 million. Over 21 hectares of the acquired properties consist of KZN Sandstone Sourveld grassland, a vegetation type that is Critically Endangered in KwaZulu-Natal. EM now owns approximately 300 hectares of this vegetation type. Over 2.5 hectares of natural Coastal Forest was also acquired to provide the linkage between Treasure Beach Nature Reserve and Bluff Nature Reserve. The same year saw the completion of the remaining transfer of Coastal Grassland from KZN Public Works, which forms the bigger part of the Treasure Beach Nature Reserve.

The preparations are underway to begin the proclamation of the acquired properties in Treasure Beach, Monteseel and Georgedale to ensure that these high conservation value properties enjoy the highest level of protection.

4.2.2. Nature Reserve proclamation

EThekwini Municipality is currently collaborating with Ezemvelo KZN Wildlife (EKZNW) to proclaim 11 municipal nature reserves in terms of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (Table 3). The areas to be proclaimed have varying levels of legal protection ranging from none to zoned Public Open Space, while there are a small number of sites 'zoned' Environmental Conservation Reserve. The formal protection afforded by the proclamation of these reserves will ensure the conservation of the sites, will allow their areas to be included in calculating national and provincial statistics for the conservation status of vegetation types, and should assist with attracting more resources for the management of the protected areas. EThekwini Municipality is also working with EKZNW in preparing management plans for the nature reserves.

A possible silver lining amidst a tragedy: Hope for Durban nature reserves?

Burman Bush, a municipal nature reserve situated in Morningside in Durban, was in the headlines over July and August 2018 following the fatal mugging of Simon Milliken – a nature enthusiast and prominent KZN-based musician – in the reserve. The incident happened a week after the Municipality made a huge conservation win by formally declaring nine conservation areas (including Burman Bush) as nature reserves on 23 August 2018.

EThekwini Mayor Cllr Zandile Gumede said that the Municipality is deeply saddened by this tragic incident and hopes that the proclamation will assist with improving infrastructure, security, and management of our reserves. "We need to work together to make sure these areas are safe for our residents and visitors. The City takes environmental issues seriously and acknowledges the vital role that our environment plays in building a resilient, caring, and liveable city," she explained.

The EPCPD, through a collaborative process with the Municipality's Parks, Leisure and Cemeteries Department, and EKZNW worked tirelessly over the last 10 years to ensure that these nine areas are formally protected. Many of these areas have historically been managed as nature reserves, however, could not be considered in the preparation of national protected area statistics because the future conservation land-use was not guaranteed.

Manager of EPCPD's Biodiversity Planning Branch Richard Boon, a close personal friend of Milliken, said that, "Simon's murder is tragic; he was one of the most intelligent and principled people I have ever met." Speaking on the importance of the proclamation, he said, "This declaration is a significant step for the country due to the critical role that cities play in ensuring the long-term protection of South Africa's natural heritage and biodiversity." This brings to 18 the total number of proclaimed nature reserves in Durban and will add approximately 810ha to the national network of protected areas declared in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003).

Head of the Development Planning, Environment and Management Unit Musa Mbhele stated that while he is deeply saddened by the recent incident at Burman Bush, the proclamation means "improving the management of our nature reserves, which can serve as a deterrent to crime through increased use and vigilance and taking advantage of the unique opportunities offered by the green economy such as community upliftment, poverty alleviation, and skills development." He added that in addition to raising eThekwini's status in the conservation stakes, the proclamation shows the "importance of collaborative working relationships within the City and with our external partners." In this regard, the Municipality's Parks, Leisure and Cemeteries Department has held a briefing outlining measures that will be taken to improve security at Burman Bush, which falls under their operations.

Durban is situated in a Global Biodiversity Hotspot, one of only 36 worldwide, and enjoys a high level of plant and animal diversity. "Durban's open spaces cover just over one-third of the entire municipal area and provide numerous direct and indirect benefits to Durban's citizens," said Bheka Memela, an EPCPD ecologist who was instrumental in the proclamation of the reserves. "The proclamation of these nine nature reserves will not only protect the important biodiversity contained within the reserves, but will ensure that these areas remain intact for future generations."

This milestone further entrenches the Municipality's global reputation as being a leader in urban biodiversity planning and climate adaptation and its vision of making Durban Africa's most caring and liveable City by 2030.

The nine newly proclaimed nature reserves are Burman Bush Nature Reserve; Giba Gorge Nature Reserve; Marion Wood Nature Reserve; New Germany Nature Reserve; Paradise Valley Nature Reserve; Pigeon Valley Nature Reserve; Silverglen Nature Reserve; Springside Reserve and Virginia Bush Nature Reserve.

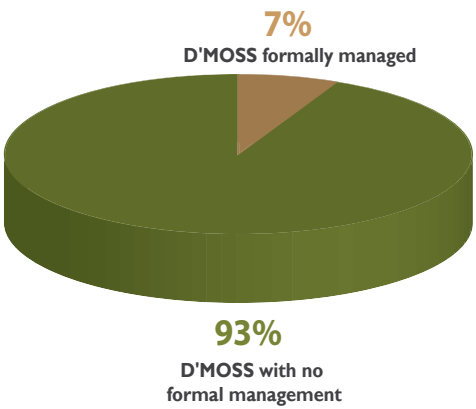
Table 3: Progress made with the Proclamation of 11 Municipal Nature Reserves in 2017/2018

Nature Reserve	Survey diagrams complete (yes/no)	Management and zonation plan	Approval by EM Heads	Approval of proclamation by EM Executive Committee	Approval by EKZNW's Executive Committee	Proclamation approved by the EKZNW's Board	Proclamation endorsed by the EM City Manager	Proclamation documents submitted to MEC (COGTA) & MEC (EDTEA)	Public participation process approved and commenced	Proclamation /Gazette Declaration
Burman Bush	Yes	1st draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Empisini	No	2nd draft complete	Yes	Yes	Yes	Yes	No	No	Yes	No
Marian Wood	N/A	2nd draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
New Germany	Yes	1st draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Paradise Valley	N/A	3rd draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pigeon Valley	N/A	2nd draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Silverglen	Yes	1st draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Springside	N/A	2nd draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Virginia Bush	Yes	1st draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Giba Gorge	N/A	1st draft complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Roosfontein	Yes	Complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4.3. Percentage of D'MOSS that is managed

Rapid urbanisation of cities increases the fragmentation of landscapes, making management interventions in natural areas even more important. This management may take the form of the removal of invasive alien species, periodic burning of grassland habitats, removal of litter from streams, prevention of illegal harvesting of species, etc. The management of D'MOSS in the eThekwini Municipal area is undertaken by various departments and agencies and overall, 7% of D'MOSS is formally managed (Figure 2). In future iterations of the State of Biodiversity, as our datasets become more refined, we will report on categories of management and management agencies.

Figure 2: Area of D'MOSS that is managed



4.4. Species abundance

In terms of representing urban biodiversity, three taxonomic groups are commonly surveyed, i.e., plants, birds and butterflies. In Durban, reliable, quantitative data sets for most groups of organisms are difficult to obtain because of the lack of long-term monitoring initiatives. For the purposes of this report, only data that is collected consistently and quantitatively is utilised.

4.4.1. KwaZulu Dwarf Chameleon

Bradypodion melanocephalum is a regionally endemic chameleon and its range is restricted to the coastal belt of KZN. The two vegetation types most frequently inhabited by this chameleon are North Coast Grassland and South Coast Grassland, both of which are classified as Critically Endangered. These vegetation types have been largely transformed by sugarcane cultivation, urbanisation and timber farming. The population of the KwaZulu Dwarf Chameleon is, therefore, threatened with extinction, although its IUCN Red List status has not yet been finalised.

In 2002, Ezemvelo KZN Wildlife initiated the monitoring of this species at two localities in Durban, i.e., Chameleon Park and a plot of land within D'MOSS next to the Edwin Swales Business Park on Bellair Road. Since 2009, the monitoring of the abundance of chameleons at Chameleon Park has been reported on in the State of Biodiversity Report (Figure 3).

Biodiversity Targets

To conserve three viable free-living sub-populations of the population of the KwaZulu Dwarf Chameleon in perpetuity, the following are required:

1. At least three viable sub-populations of 7 000 adults each conserved across the range of the coastal population.
2. A viable sub-population conserved at Chameleon Park and connected D'MOSS areas.
3. A total of 100 adults conserved at Chameleon Park and the D'MOSS area adjacent to Edwin Swales Business Park.

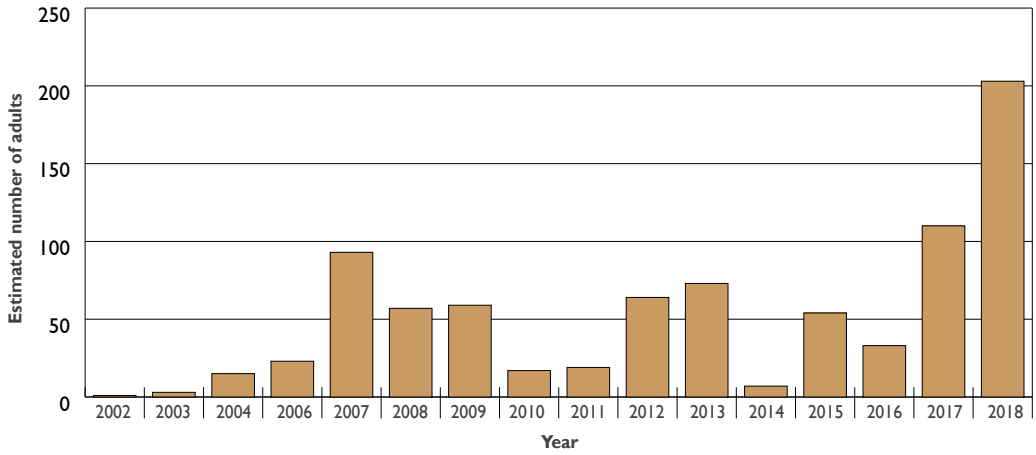
Status

For the second year in a row, the target for this species has been reached. Numbers of adults over the past five years have fluctuated below target apart from the numbers in 2017 and 2018 (Figure 3). Numbers fluctuate particularly in response to management interventions.

Key management actions for 2017/2018

It is critical that Chameleon Park is managed consistently and appropriately to increase the amount of suitable habitat for the KwaZulu Dwarf Chameleon. Management actions that are required include: regular, frequent and light alien plant control; mosaic defoliation of moribund grass and removal of moribund material off the site; securely fencing or hedging of the area with an impenetrable barrier plant (e.g. *Acacia ataxacantha*); and fitment of litter traps at storm water pipe outflows.

Figure 3: Estimated number of KwaZulu dwarf chameleon adults at Chameleon Park over the given period



4.5. Threats to biodiversity in Durban

Some of the major threats to biodiversity include:

- Transformation of natural areas (habitat destruction, degradation and fragmentation)
- Introduction of invasive alien species
- Over-exploitation (e.g. harvesting and sandmining)
- Pollution and diseases
- Human-induced climate change

Due to the lack of quantitative data relating to many of these threats, this report will only focus on transformation, invasive alien species and climate change. As more information becomes available, it will be included.

4.5.1. How much land has been transformed?

Transformed areas are those areas that have been altered dramatically from their natural state by human activities. This is one of the single greatest threats to biodiversity as it implies habitat loss, habitat degradation and fragmentation of natural areas. Transformation reduces the ability of natural areas to provide ecosystem services to the citizens of Durban. In Durban, scientifically-derived conservation targets for 13 of the City's vegetation types indicate that six of these are in all likelihood beyond the natural threshold required for long-term survival (Table 4) because they have been irrevocably altered from their natural state.

In 2015/2016, the EPCPD drafted detailed descriptions of the vegetation types and associated environmental determinants within the EMA[8]. Fine scale environmental variables, 1937 aerial photography, historical accounts and expert knowledge were used in the production of a reference/historic vegetation map. The map aims to represent the vegetation types and their extent ca. 1850, after which sugarcane farming resulted in the mass transformation of areas in Durban (Figure 4).

8. *Mclean, C.T., Ground, L.E., Boon, R.G.C., Roberts, D.C., Govender, N., & McInnes, A. (2016). Durban's Systematic Conservation Assessment. EThekwini Municipality, Environmental Planning and Climate Protection Department, Durban, South Africa.*

Figure 5 displays the remaining vegetation distributions of the EMA. A visual comparison between the historical and current vegetation distributions highlights the level of transformation and fragmentation that these systems have been subjected to.

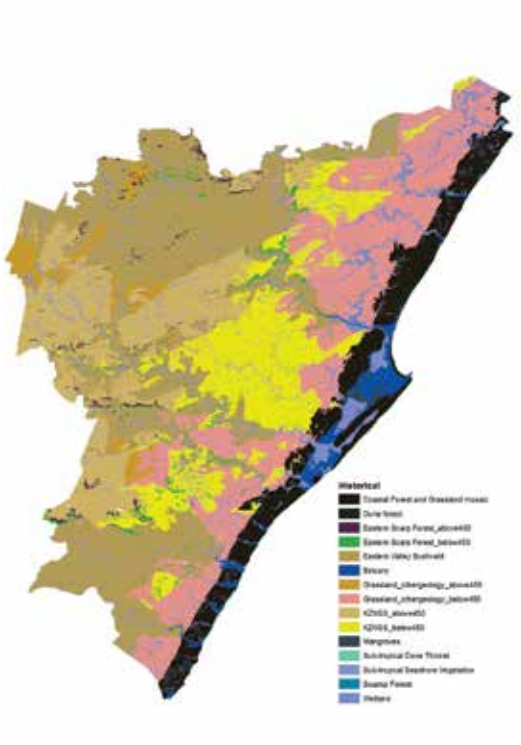


Figure 4: Historic vegetation map ca. 1850

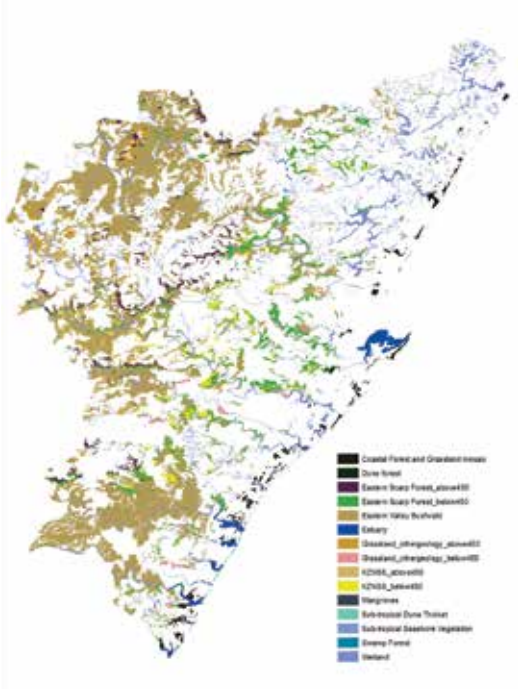


Figure 5: Remaining vegetation distribution in eThekwini.

Table 4: Targets and deficits for eThekwini vegetation types

Historical	Area (Ha)	Area remaining (ha)	Target	Target (ha)	Percent remaining (%)	Shortfall (ha)
Coastal Forest and Grassland Mosaic	20 690	1 720	0.72	14 833	8	-13 113
Dune Forest	2 039	590	0.69	1 411	29	-821
Eastern Scarp Forest – above 450	1 692	3 096	0.62	1 042	183	2 053
Eastern Scarp Forest – below 450	3 872	9 295	0.62	2 386	240	6 909
Eastern Valley Bushveld	76 340	40 377	0.25	19 085	53	21 292
Grassland – other geology – above 450	6 569	1 556	0.25	1 642	24	-86
Grassland – other geology – below 450	48 020	1 176	0.25	12 005	2	-10 829
KZNSS – above 450	35 730	7 043	0.25	8 933	20	-1 889
KZNSS – below 450	37 220	3 163	0.25	9 305	8	-6 142
Mangroves	492	82	1	492	17	-411
Sub-tropical Dune Thicket	199	199	1	193	100	6
Sub-tropical Seashore Vegetation*	17	17	1	16	100	1
Swamp Forest*	55	55	1	55	100	0
Wetland	16 860	11 673	0.24	4 046	69	7 627

* It was not possible to estimate the original extent of these vegetation types. It is important to note that the area of vegetation remaining does not contribute to conservation targets unless habitat is formally conserved.

A potential threat to Durban water bodies: *Hydrocleys nymphoides* (water poppy)

The South African National Biodiversity Institute (SANBI) is mandated to conserve South Africa's rich biodiversity. Its Invasive Species Programme (ISP), funded by the Department of Environmental Affairs, aims to reduce the threat of biological invasions through detection, identification, assessment and management of invasive species that may be contained or eradicated. SANBI ISP thus targets alien invasive species that have not yet reached their full invasive potential, i.e. populations that are relatively small/localised compared to established invaders. The benefit of this 'nip-it-in-the-bud' approach is to aim for eradication and to reduce the long-term management costs of invasive alien species.

Hydrocleys nymphoides (water poppy) is a rooted aquatic plant with leaves that float on the water surface connected to stolons. It is characterised by fleshy, round to heart-shaped leaves and cup-shaped yellow flowers with a reddish-brown centre. A native of South America, H. nymphoides has been declared invasive in England, USA, Japan, Fiji, and Australia where it was used mainly as an ornamental plant. This species poses threats to the ecosystem functioning of dams and wetlands. Although it can reproduce sexually, vegetative reproduction is a favoured mode of spread in South Africa. Its creeping stolons and broken stem fragments can form new plants and these are easily spread by running water, machinery, boats and people.

The only known naturalised population of *H. nymphoides* in South Africa has been recorded near Howick in the KZN Midlands. However, cultivated populations of this species have been reported from the Durban Botanical Gardens and Hillcrest (both populations have since been removed). Cultivated populations in gardens pose a threat to waterbodies in and around Durban.

Please report sighting reports to:
Menzi Nxumalo at m.nxumalo@sanbi.org.za or alternatively invasivespecies@sanbi.org.za.

Article compiled by Menzi Nxumalo, SANBI

4.5.2. Invasive alien species (IAS)

Invasive alien species are plants, animals, pathogens and other organisms that are not indigenous to an ecosystem, and which are capable of spreading naturally (often rapidly) into natural or semi-natural habitats. They can cause economic or environmental harm or can adversely affect human health. In particular, they impact adversely upon biodiversity, causing the decline or elimination of indigenous species through competition, predation or transmission of pathogens, and the disruption of local ecosystems and ecosystem functions.

HOUSE CROW CONTROL

EThekwini Municipality has initiated a programme aimed at controlling the numbers of invasive House Crows (*Corvus splendens*) within the eThekwini Municipal area. These predatory and scavenging crows are not indigenous to South Africa and in addition to robbing the nests and killing the chicks of indigenous bird species, they also carry diseases such as cholera, salmonella, and ento-amoeba. House Crows have been present in Durban for approximately 15 years and a highly successful initial control programme, undertaken by the Municipality, reduced numbers from over 2 000 to about 20 birds between 2009 and 2013. More recently (2013-2015), the National Department of Environmental Affairs' Environmental Programmes branch funded a House Crow eradication programme, which then brought crow numbers down to less than five individuals.

Subsequent monitoring of these crows has revealed that populations are again on the rise, with a risk of them dispersing into other coastal towns or inland areas. Since the House Crow is highly affiliated with human habitation, the most likely point of entry and establishment is around major ports. Currently, only three populations of House Crows are known in South Africa, namely: eSikhawini (near Richards Bay), Durban and Cape Town. In Durban, this species is reported to frequent areas near to, or south of, the city's central business district.

4.5.2.1. An audit of the eThekwini Parks and Nurseries

Table 5: The number of National Environmental Management Biodiversity Act (NEMBA) listed species in the audited nurseries (2005-2017)

Dashes indicated that the nursery was not operating in a given financial year. Counts reflect species assessed on nursery grounds.

Nursery		Number of listed species observed (NEMBA)							
		2011	2012	2013	2014	2015	2016	2017	2018
1	Botanic Gardens A (cultivation/storage)	11	19	5	3	7	4	4	2
2	Botanic Gardens B (production/display)	11	13	3	5	3	5	5	4
3	Botanic Gardens C (sales)	5	7	7	9	7	5	5	4
4	Bridgevale Nursery (production/display)	22	29	22	19	17	18	15	14
5a	Randles Nursery A (production/display)	6	7	9	4	4	4	2	2
5b	Randles Nursery B (decorative)	-	10	5	2	2	6	4	5
6	Farewell Nursery (cultivation/storage)	23	25	12	9	9	6	6	5
7	Hillary Nursery (production/display)	32	32	27	17	19	18	18	18
8	Amanzimtoti Nursery (cultivation/storage)	22	28	11	5	13	12	8	7
9	Silverglen Medicinal Plant Nursery (cultivation/storage)	9	21	19	8	9	8	8	7
10a	Buffelsdraai Storage Nursery A (EPCPD reforestation programme)	12	18	18	12	12	10	7	10
10b	Buffelsdraai Storage Nursery B (EPCPD reforestation programme)	–	–	–	8	10	7	7	8

Table 6: Number of NEMBA listed species observed in the audited Parks (2008-2015)

Park name		Number of listed species observed (NEMBA)					
		2013	2014	2015	2016	2017	2018
1	Memorial Park	9	8	13	15	10	15
2	Town Park	8	7	3	5	5	6
3	Japanese Gardens (Sarnia)	26	16	12	35	26	25
4	Japanese Gardens (DBN North)	38	36	29	40	33	33
5	Sunningdale Ponds	23	23	20	30	30	25
6	Phoenix Plaza	14	10	11	12	15	15
7	How Long Park	19	13	11	23	19	15
8	Amanzimtoti Bird Park	21	16	15	26	33	25
9	Havenside Park	22	21	18	26	28	23
10	Gugu Dlamini Park	2	2	2	3	3	3

Table 7: Listed IAPs commonly observed across nurseries

Botanical name	Common name(s)	CARA/ NEMBA category	Number of nurseries observed in					
			2013	2014	2015	2016	2017	2018
Ageratum conyzoides	Invading ageratum	1/1b	7	11	9	8	7	9
Melia azedarach	Syringa	3/1b (KZN)	4	6	5	7	4	4
Syngonium podophyllum	Arrow-head vine/ goose foot	1b (KZN)	5	6	6	5	6	5
Solanum mauritianum	Bugweed	1/1b	6	5	5	3	1	3
Aristolochia elegans	Dutchman's pipe	1b	4	4	4	2	2	3
Cardiospermum grandiflorum	Balloon Vine	1/1b	4	4	4	3	4	1

Table 8: IAPs (including emerging species) commonly observed across Parks

Botanical Name	Common Name	CARA/ NEMBA	Number of Parks observed in					
			2013	2014	2015	2016	2017	2018
Ageratum conyzoides	Invading ageratum	1	8	8	5	7	8	8
Achyranthes aspera	Devil's horsewhip	1	7	5	5	5	6	6
Melia azedarach	Syringa	3/1b (KZN)	6	7	6	6	7	7
Morus alba	White mulberry	3/2	7	7	5	6	6	6
Syngonium podophyllum	Arrow-head vine/goose foot	1b (KZN)	7	7	8	7	6	6
Callistemon rigidus	Stiff-leaved bottlebrush	X3/1b	6	6	4	6	6	6
Canna indica	Indian Shot	1/1b	7	6	6	6	7	7
Ipomoea purpurea	Common morning glory	1/1b	6	6	3	3	3	2
Ricinus communis	Castor-oil plant	2/1b	7	6	4	3	4	4
Chromolaena odorata	Triffid Weed	1/1b (KZN)	6	5	5	6	7	7

What are the NEMBA Invasive Alien Species categories and what do they mean?

Category 1a: Invasive species that may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway. These species need to be controlled on your property. Examples include *Campuloclinium macrocephalum* (Pom Pom Weed), and *Diplocyclos palmatus* (Lollipop Climber).

Category 1 b: Invasive species that may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway. Category 1b species are major invaders that may need government assistance to remove. All Category 1b species must be contained, and in many cases they already fall under a government sponsored management programme. Examples include *Ageratina riparia* (Creeping Crofton Weed) and *Ipomoea indica* (Purple Morning Glory).

Category 2: These are invasive species that can remain in your garden, but only with a permit, which is granted under very few circumstances. Examples include *Morus alba* (Common Mulberry), *Pinus elliottii* (Slash Pine).

Category 3: These are invasive species that can remain in your garden. However, you cannot propagate or sell these species and must control them in your garden. In riparian zones or wetlands all Category 3 plants become Category 1b plants. Examples include *Syzygium jambos* (Rose Apple), *Duranta erecta* (Pigeon Berry).

For more resources on invasive species in Durban, please visit the EPCPD publications website page: (http://www.durban.gov.za/City_Services/development_planning_management/environmental_planning_climate_protection/Publications) or the EPCPD offices (Room 200, City Engineers Building, 166 K.E. Masinga Road, Durban)

4.5.3. Climate change

In Durban, the following changes have been projected to occur:

- Increases in temperature of 1.5-2.5°C by 2045-2065 and 3-5°C by 2081-2100. Rainfall in Durban is projected to increase in the future (up to an additional 500 mm by 2081-2100). The distribution and variability of this rainfall will change, with rainfall events becoming more erratic.
- The sea level along the Durban coastline is rising at present by 2.7 cm every decade. Projections indicate that this rate is likely to accelerate in the future.
- Due to these changes in temperature and rainfall, the climatic conditions in which the fauna and flora of Durban exist could change or shift. This will place additional pressure on Durban's biodiversity as species may only be adapted to a narrow climatic range or may have limited ability to disperse to new areas where climatic conditions are suitable.

The Van Riebeeck Park Ecosystem Recreation Project

The Environmental Planning and Climate Protection Department (EPCPD) in the Development Planning, Environment and Management (DPEM) Unit at eThekwini Municipality is leading the planning for an environmental rehabilitation project at the south end of Van Riebeeck Park on the Bluff along Garcin Place. The aim of the project is to create wetland and grassland habitat on a closed landfill site. The newly created habitat will deliver a range of environmental, recreational and educational benefits. The EPCPD is being assisted by relevant municipal line functions as well as professionals in the environmental management field.

The van Riebeeck park restoration project stems from discussion held post environmental approval of the Clairwood logisitics centre and is additional to the formal environmental authorisation offset, which is located on the north bank of the Tugela River mouth. The project seeks to ensure that the south Durban community is provided an alternative green open space for their use. The project seeks to incorporate three key components namely; environmental restoration and recreation, recreational inclusion, and environmental education. A wetland, grassland, forest mosaic will be recreated on the approximately 14 ha municipal site with a board walk, bird hide, and information signage planned for members of the public to use.

4.6. Responses to threats

4.6.1. Greenhouse Gas inventory

A Greenhouse Gas (GHG) Emissions Inventory for the EM has been compiled for the 2016 calendar year and was made available in the 2017/2018 municipal financial year. The inventory identifies the sources of GHG emissions from both the government and community sectors within the eThekwini Municipal Area. The EM has compiled the emissions inventory to help plan climate change mitigation strategies within the Municipality.

The total greenhouse emissions recorded for the entire eThekwini Municipal Area was 28 417 885 **tCO_2e** for 2016. This was higher than the previous year's recording of **27 067 912 tCO_2e**, representing a 1 349 972 tCO_2e increase in emissions (Figure 6). As with previous inventories, the largest contribution to the total footprint was the transportation sector (40% of the total GHGs), followed closely by industrial emissions (34%). Local government emissions accounted for 6% of the total emissions for the eThekwini Municipal Area (Figure 7).

Figure 7. GHG emissions by sector

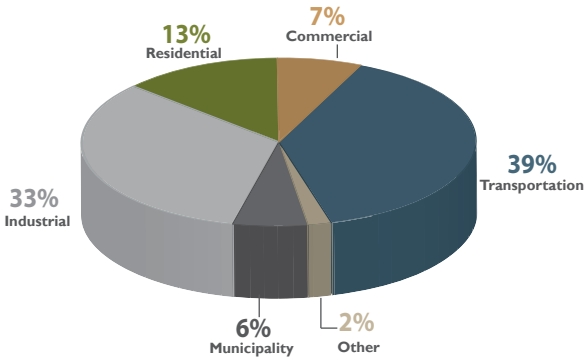
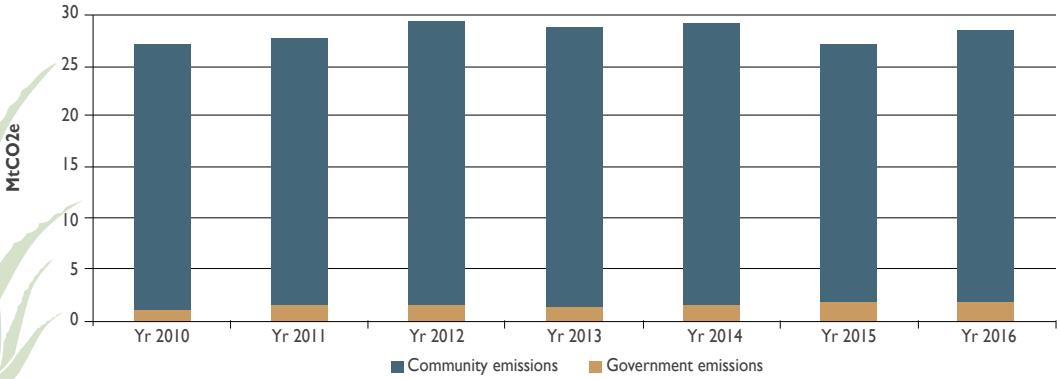


Figure 6. Historic emissions data for the eThekwini Municipality (tCO_2e)



4.6.2. Restoration ecology

Restoration ecology, a science that emerged as a separate field in ecology in the 1980s, looks at renewing and restoring ecosystems that have been degraded or destroyed by human activities to a stable, healthy and sustainable state. It is the practice of employing human intervention and action for conserving biodiversity and ecological integrity. Examples of ecological restoration include the active management of habitat for species e.g. burning of grasslands or removal of invasive alien species, and creation of new habitats in areas that may have been historically transformed for farming and other human activities e.g. replanting forests or recreating wetlands.

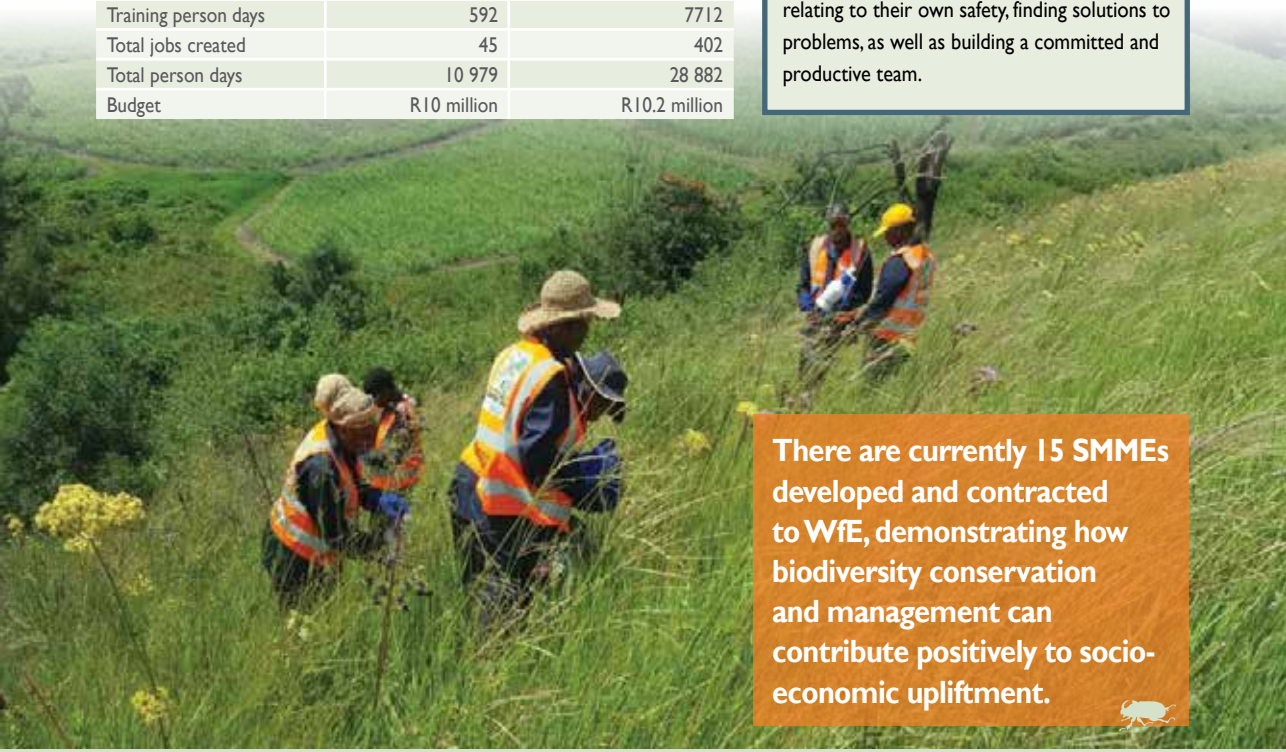
In the 2017/2018 municipal financial year, the Restoration Ecology Branch of the EPCPD had a budget of **R22.2 million** allocated to invasive alien species control and a further **R11.4 million** for reforestation. The management of natural areas allows for a unique opportunity to address one of the biggest threats to biodiversity, i.e. poverty. Two programmes, Fire and Invasive Species Control (FISC) and Working for Ecosystems (WfE), have been developed to tackle the problem of invasive alien species in Durban. Both FISC and WfE are sustainable development programmes that aim to alleviate poverty and develop skills by employing people to manage aspects of the environment such as burning of grasslands and invasive alien species. Both programmes also have a strong education and training component.

Table 9: Breakdown of EPCPD invasive alien plant control (IAP) for the 2017/2018 municipal financial year

Programme	Fire and invasive species control	Working for Ecosystems
Total area of invasive alien plant (IAP) control	906.7 ha	3 517.6 ha
- Initial	54.6 ha	52.3 ha
- Follow-up	202.8 ha	3459.3 ha
- Maintenance	649.3 ha	n/a
Burning	417.9 ha	n/a
Training courses	14	9 (incl. 226 toolbox talks)
Training person days	592	7712
Total jobs created	45	402
Total person days	10 979	28 882
Budget	R10 million	R10.2 million

TOOLBOX TALK

A Toolbox Talk is a specialised and focused training kit designed for WfE staff members. The objectives are to reinforce safety in the workplace, to refresh staff on handling work mechanisms, to increase the compliance to work ethics and to stress the importance of hygiene in the workplace. It is an effective way to get employees involved in matters relating to their own safety, finding solutions to problems, as well as building a committed and productive team.



There are currently 15 SMMEs developed and contracted to WfE, demonstrating how biodiversity conservation and management can contribute positively to socio-economic upliftment.

Table 10: Working for Ecosystems programme KPI comparison year-on-year for 2012 to 2018

KPI	Financial year						
	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018
Total area of IAP (Invasive Alien Plant) control (ha)	1 088	1 852	1 778	2 951	2 396	2 453	3 517.6
Total training courses	11	34	39	68	35	10	9
Total training person Days	335	525	1230	1064	2651	4231	7712
Total jobs created	304	171	298	307	390	416	402
Total person days	17 900	13 118	23 918	24 946	27 666	25 529	28 882
Youth employment	54%	89%	76%	65%	68%	63%	61%
Female employment	30%	70%	61%	30%	37%	40%	48%
WfE Budget	R3.6 m	R4.7 m	R7.8 m	R7.8 m	R8.3 m	R8.9 m	R10.2 m

Table 11: Fire and Invasive Species Control programme KPI for the years 2010-2018

KPI	Financial year							
	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2018/2018
IAP control – initial (ha)	114	48	16	22.9	1070.7	235.1	182	54.6
IAP control – follow-up (ha)	564	655.5	320	103.3	442.4	24	202	202.8
IAP control-Maintenance	-	-	-	-	-	-	-	649.3
Total area of burning (ha)	38	98.4	233	137.8	266.7	53.53	338	417.9
Total training courses	12	20	17	20	15	13	20	14
Total training person days	1254	549	1005	308	270	592	496	592
Total jobs Created	52	61	63	42	60	50	52	45
Total person days	14 042	17 119	14 921	12 838	26 560	7 046	12 672	10 979
Female employment	37%	38%	37%	36%	36%	22%	21%	28%
WoF Budget	R4.7 m	R4.9 m	R7.1 m	R7.2 m	R7.8 m	R9.8 m	R 10 m	R 10 m

4.6.2.1. Community Reforestation Project (CRP)

The EPCPD has partnered with the Wildlands Conservation Trust (WCT) in order to restore selected indigenous forest areas in the EMA. The reforestation programme has adopted the Community Ecosystem Based Adaption (CEBA) model, which demonstrates the strong and vital link between socio-economic upliftment and biodiversity conservation, enhanced ecosystem functioning and carbon sequestration. 'Treepreneurs' propagate trees at their homesteads, through the Indigenous Trees for Life Programme developed by WCT. Treepreneurs then trade their trees for basic food items, clothes, building materials and even school fees. Ninety percent of people who now benefit from this project were earning wages below the poverty line, and are, therefore, from some of the most vulnerable communities in the country. Many of these Treepreneurs are women and children, unemployed adults and pensioners.

Table 12: Reforestation projects for the 2017/2018 municipal financial year

Key Performance Indicator (KPI)	Achieved
Total IAP control (ha)	241.84
Total initial IAP control (ha)	104.01
Total follow-up IAP control (ha)	25.86
Total maintenance IAP control (ha)	111.97
Total training person days	198
Total staff trained (incl. SMMEs)	46
Total Treepreneurs trained	20
Total Treepreneurs who traded trees	147 out of 203
Total jobs created	80
Total contractors	52
Total permanent jobs	24
Total part-time jobs	4
Total temporary jobs	0
Total person days	12 820
Total plants planted	53 452
Total planting area (ha)	73.67
Value of plants traded	R308 745.00
Total wages	R1 130 264.40
Total SMME spend	R1 954 932.72

Table 13: Community Reforestation programme KPI and budget comparison 2008-2018

KPI	Financial year								
	2008/2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018
Total permanent jobs	22	36	49	55	118	94	57	59	43*
Total temporary jobs	220	82	76	30	37	61	61	4	4**
Total part-time jobs	7	10	10	16	4	4	18	9	0**
Active Treepreneurs	685	659	776	606	495	674	200	168	147$
Area planted (ha)	82	189	118	120	65	137	13.68	79.33	73.67
No. plants planted	106 484	218 481	125 695	132 884	138 785	138 378	15 539	41 571	53 452
Budget (incl. VAT)		R7.38 m	R10.9 m	R12.2 m	R10.8 m	R11.4 m	R14.8 m	R12.7 m	R 11.4 m#

* Includes Wildlands and Newlook teams only | ** Includes Wildlands teams only

$ No Treepreneurs traded | # Includes Wildlands, 1World, Lwazi, Newlook, Fatima and Architectural Professional Team

SPOTLIGHT ON FISC TEAM

Alisha Chatrooghoon

Current position: **GIS & Data Analyst**

Alisha is the GIS & Data Analyst for the FISC project. She joined the programme in May 2016 as a BSc. Honours in Environmental Science graduate. Her roles in the FISC project include: communicating with the field staff to calibrate and collate data via their GPS handheld devices on a monthly basis – this data is used to create maps on ArcGIS, which depict the areas worked by the team; compiling the monthly reports and KPIs; and updating various databases and websites – particularly that of the 'DurbanInvasives.org'. Other responsibilities involve: attending meetings and minute taking; communicating with current and prospective clientele; marketing and public awareness; tending to quotations and invoices; general office admin; as well as ad-hoc requests from both internal and external colleagues and undertaking any potential research initiatives.

Since her participation in the FISC project, her knowledge of invasive alien plant species and fire management has been greatly enhanced – so much so that she intends on pursing a Master's degree in this regard – with grassland site-specific management plans.

She has also attended various workshops and training courses such as: ESRI Development Workshops; Sustainable Living Exhibition (2016 and 2017); Greener, Liveable City & USE-IT Seminar; Snake Awareness and Identification training; Waste Laws 2008-2016 and Waste Classification Course; Weed Buster Seminar; Urban Restoration Ecology Workshop (EPCPD); Sustainable Development Goals Workshop; SAGIC Invasive Species and NEMBA Compliance Training; and the ISO14001: 2015 Implementation and Understanding of Environmental Management Systems.

Alfred Sigigaba Sosibo

Current position:
Crew Leader Type 1

Alfred began work with Working on Fire (WoF) in April 2008 as a Fire Fighter. In October 2010, he enrolled in the WoF Leadership Course (Crew Leader Type 2) and in August 2012, furthered his leadership training to become Crew Leader Type 1.

He has worked with teams in the Drakensberg and the Midlands regions and joined the eThekwini FISC Project in November 2015. He is furthering his training in Wildlands Firefighting and hopes to complete the Pest Control Officer training in the near future.

Mzama Basil Shozi

Current position:
Crew Leader Type 1

Mzama started working with Working on Fire in August 2005 as a firefighter. In 2007, he completed the Crew Leader type 2 training, and then furthered his leadership training in 2011 to Crew Leader Type 1. Before joining eThekwini FISC Project in 2014 as Crew Leader Type 1, Mzama worked with the Midlands Region crews. He has obtained Safety Officer training, Computer Skills training and has been trained in performing veld condition assessments. He has enlisted for the International Rope Access Technician Course.

Innocent Khumbulani Mtshali

Current position:
Driver

Innocent joined Working on Fire as a firefighter and after completing a Chainsaw Operator course, worked as a chainsaw operator. In 2011, he was promoted to the position of driver in the eThekwini FISC project. In his spare time, Innocent is a Maskandi artist who released two albums between 2016 and 2018.

Xolisile Patriana Sithole

Current position:
Rope Access Technician

Xolisile joined the FISC team in 2011 as a firefighter. She successfully completed a number of courses, including First Aid, Computer Skills, Safely, Health and Environmental Hazards, and Rope Access Technician Level 1. Xolisile has a keen interest in running to maintain her physical fitness levels and has even taken first place in the popular Spar Women's Race in Durban. She is currently in the process of obtaining her driver's licence.

Howard Ntsako Mathebula

Current position:
Assistant Project Manager

Howard joined Working on Fire – eThekwini Project in 2012 as a firefighter, and then obtained a First Aid certificate that gave him the opportunity to be appointed as an operating first aider. He then furthered his training to become a team leader in the period 2013-2014.

From 2014 to 2015, he obtained a Rope Access Technician certificate and progressed to High Altitude Team Leader before he became an Assistant Manager for the eThekwini Project. He has successfully completed the Incident Investigation, Hazard Identification and Risk Assessment, Advanced Occupational Health & Safety, Applying SHE Principles and Procedures, Environmental Awareness, Prescribe Burning, Waste laws and Waste Classification, Environmental Weed Management, Supervision – ELW 001, Pest Control Operator, Project Management and Veld Condition Assessment training.

He plans to further his studies in Project Management in the future.

Nosipho Nkabane

Current position:
Assistant Administrator

Nosipho started working for Working on Fire's eThekwini Project in April 2010 as a firefighter. In 2012, she became a stock controller for the Project. In 2014, she underwent Computer training and in 2016, she successfully completed ArcGIS Basic 10.3 training at ESRI SA. Nosipho has been trained in Applying SHE Principles and Procedures (ASHEPP) and passed Advanced Occupational Health and Safety Act Training at NOSA. In 2017, she completed Basic HR & Incident Investigation training. She is currently studying part-time at UNISA towards her Degree in Teaching. Nosipho wishes to further her studies in Environmental Management and Office Management in the near future.

CONCLUSION

This is the eThekwini Municipality's tenth State of Biodiversity Report. The next report will be for the 2018/2019 municipal financial year and will be produced in December 2019.

ACKNOWLEDGEMENTS

The Environmental Planning and Climate Protection Department would like to extend sincere thanks to the following people for their time, cooperation and commitment in compiling the information published in the State of Biodiversity Report 2017/2018 for eThekwini Municipality. The following individuals have supplied either information, photos or comment on the publication, and all contributions have made this report possible.

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