



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD



City of Cape Town BIODIVERSITY REPORT 2018

Celebrating a decade of biodiversity management 2008-2018



FOREWORD

Cape Town has been identified as the most biodiversity rich city in the world, so it is gratifying to read in this report that the City of Cape Town takes their responsibility of managing and conserving this rich heritage very seriously. This is no easy task for even the most skilled and dedicated team of conservationists, because conservation within an urban environment is extremely difficult and complex, with political, social, geophysical and ecological issues adding to the complexity of managing small and fragmented urban reserves.

Having been involved in developing the Management Effectiveness Tracking Tool (METT) and the Protected Areas Review for use by the City, it is therefore encouraging to read of the improvement in the management effectiveness of our protected areas. The gains towards meeting the target for protected area expansion must however be maintained, because a growing urban population places heavy pressure on land and increases the demand for ecosystem services (especially provision of clean water) from our already-stressed ecological infrastructure. Mainstreaming biodiversity into the City's Integrated Development Plan, therefore guides where and how development should take place. It also helps build the meaning and relevance of biodiversity into the everyday lives of ordinary citizens, in a way that strengthens local community structures.

This report comes at a time characterised by the turmoil of political change, land invasion, the water crisis and a myriad of other escalating threats to our biodiversity. Yet, a message of positive progress and hope comes through in this Biodiversity Report. I find this very heartening.

But what of the future? The single biggest threat to the city's biodiversity is without doubt, the increasing demands for residential land and services by a burgeoning urban population. It is therefore imperative, that our urban nature reserves continue to be relevant to surrounding communities. Because without their support, our natural spaces will surely disappear under rapidly expanding informal settlements or will face repeated threats of land invasions. So urban conservation today cannot only be about the protection of our biodiversity assets. We have to continue to develop the social values of all our nature areas and make them more accessible, relevant and desirable to neighbouring communities, so that they become the first line of defence to secure these precious resources. By way of example, traditional reserve fences will have to be replaced with clever "recreational barriers/zones" that channel people's activities around, through or over sensitive conservation areas, thereby conserving their biodiversity, while enhancing their social values.

The City's passionate and dedicated Biodiversity Management staff and partner organizations are clearly doing their best to avoid "Day Zero" for our biodiversity. But this responsibility cannot rest alone on their shoulders; it must be a shared thread of responsibility that runs throughout the city.

This report is a significant milestone for the City of Cape Town and I congratulate all who have contributed towards the achievements of the past ten years.



Howard Langley
CLOVELLY
June 2018

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EXECUTIVE SUMMARY

Cape Town's natural beauty and biodiversity are part of what makes the city a unique and desirable place to live and work. Cape Town is famous for its amazing variety of plants, collectively known as the Fynbos. Cape Town has irreplaceable biodiversity of international importance crammed into almost every open space and road verge. This led Thomas Elmqvist (leader of United Nation's City and Biodiversity Outlook Project) to note:

"Cape Town is the Most Biodiverse City in the World".

As well as important biodiversity, the City has adopted a people-centred approach to biodiversity management. Without buy-in from the general public, especially neighbouring communities, the continued protection of natural areas would not be possible. This is especially important in an urban setting such as Cape Town, where biodiversity sites must coexist surrounded by densely populated areas. The opposite is also true. People need biodiversity, not only for survival (we rely on essential ecosystem services), but also for recreation, stress reduction, employment, income-generating opportunities, and education. The City of Cape Town's nature reserves are often the only quality natural area remaining within a short distance of many communities. The most notable benefit to the citizens of Cape Town has undoubtedly been the significant job creation link to our biodiversity spaces.

The city urban footprint coincides with many unique vegetation types. Of the 53 Critically Endangered national vegetation types in South Africa, 11 occur in the city. Six vegetation types are found nowhere else but inside the city borders, and three of these are Critically Endangered. A sixth of South Africa's flowering plants grow in Cape Town – over 3 000 species. This is a remarkable figure considering that the city covers less than 0.1% of the country's surface area! Most of these plant species only occur in South Africa and 68% occur only in the Fynbos. At least 190 plant species are locally endemic to Cape Town. Of the 660 Red List plant taxa, 405 are threatened with extinction, many on the Cape Flats. Linked to this extremely rich plant diversity are rich small mammal, frog, reptile, insect and other invertebrate faunas. This special biodiversity and its associated habitats are critically important for the range of ecosystem services that they deliver. Well-managed catchments are being recognised as critically important in the current water crisis – these include the high mountain catchment areas (rivers, streams, dams and aquifers) and the lowland reserves (aquifers). Conservation of our precious natural resources is a critical part of a sustainable and resilient city that is adapted to climate change.

Analysis of vegetation remnant losses over the past decade shows that threatened lowland vegetation types continue to be the most negatively impacted. Cape Flats Sand Fynbos and Atlantis Sand Fynbos have lost the largest areas, followed by Swartland Shale Renosterveld and Lourensford Alluvium Fynbos. For some, such as Cape Flats Sand Fynbos and Swartland Shale Renosterveld, it is too late to achieve the necessary targets for adequate conservation. All remaining patches must be secured to keep some of this special biodiversity for future generations. For the few lowland vegetation types with enough habitat left to meet the required conservation targets (e.g. Atlantis Sand Fynbos), sufficient habitat has yet to be secured and managed for conservation.

Inappropriate development (urban sprawl) is the greatest threat to the remaining biodiversity in the city. The high immigration rate and demand for housing results in more and more land being developed to accommodate formal and informal settlements. Illegal squatting and land invasion on the Cape Flats is an ongoing challenge. The high level of crime in the city, particularly relating to personal safety, is of rising concern. The only option for future sustainability and improved quality of life is to make sure that the built, cultural and natural environments are integrated.

Invasive species are the second most important threat to biodiversity conservation in Cape Town (and globally). Fynbos is particularly susceptible to invasion by alien trees, mostly Australian *Acacia*, *Hakea* and *Eucalyptus*, and pines from the Northern Hemisphere. These trees out-compete the indigenous vegetation and alter ecosystem processes such as fire, nutrient cycling and the hydrological regime. In lowland habitats alien acacias with huge seed banks dominate. They require herbicide to prevent regrowth post-felling, and clearing is less successful. Pines continue to spread in water catchment areas, significantly reducing runoff into the dams.

Despite many challenges, good progress has been made in implementing the Biodiversity Network (BioNet), especially through protected area expansion. This has been enabled by the appointment of qualified management staff, individual commitment to conservation by various staff, and support through partnership projects. There are many highlights of the past decade worth celebrating.

Top 10 achievements of the past 10 years:

1. The BioNet of priority sites and corridors now includes biodiversity adaptation to climate change incorporated into the methodology. It was adopted as City of Cape Town (CCT) Policy in 2015 and incorporated into the Western Cape Spatial Biodiversity Plan 2017. In 2018, 64,8% of the BioNet is conserved compared to 34,1% a decade ago.
2. 15 000 ha CCT land formally proclaimed under the Protected Areas Act (Act 57 of 2003).
3. 18 Conservation Stewardship agreements with private landowners.
4. Innovative approaches to offset programmes, including conservation land banking.
5. Improved management effectiveness of Protected Areas through dedicated budgets, management plans, ecological burning, demarcation of boundaries, and monitoring the performance of management actions in relation to biodiversity goals.
6. Ecological restoration projects in progress to improve ecosystem functioning. Habitat condition assessments and restoration subsidiary plans for reserves, a restoration prioritisation study and a dedicated Restoration Facility support these efforts.
7. Invasive Species Control Programme CCT-wide tender for invasive alien clearing since 2010 has resulted in reduction in woody invasives, aquatic weeds, and 'early detection' weeds. Mallard, House Crow and Guttoral Toad are also part of this programme.
8. Job creation through the Kader Asmal Integrated Catchment Management Expanded Public Works Programme.
9. A multifaceted, formal skills development programme for staff, and on-the-job training for learners, students and interns.
10. An improved People and Conservation Programme that includes all environmental education, volunteers, tourism, events and visitor programmes.

The CCT, together with key partners, will continue to address the biodiversity conservation crisis in Cape Town. The Biodiversity Management Branch's overarching goal is that Cape Town's biodiversity is conserved and restored where appropriate, results in significant community involvement, and delivers benefits to its present and future citizens, in a way that is endorsed by the CCT. Several priorities of the CCT's Integrated Development Plan (2017 to 2022) are underpinned by the ecosystem goods and services provided by natural ecosystems and their biodiversity. Our biodiversity target by December 2022 is for 65,5% of the areas identified (in 2009) to be under formal management, including proclamation and perpetuity stewardship agreements. This will require increased investments in these biodiversity areas to build their role as key CCT assets.

BEKNOPTE OORSIG

Kaapstad se natuurlike skoonheid en biodiversiteit is deel van wat die stad so 'n unieke en begeerlike plek maak om in te woon en te werk. Kaapstad is bekend vir sy ongelooflike verskeidenheid plante wat gesamentlik as fynbos bekendstaan. Kaapstad beskik oor onvervangbare biodiversiteit van internasionale belang wat in byna elke oop ruimte en langs paaie te sien is. Dit het Thomas Elmqvist (hoof van die Verenigde Nasies se stede-en-biodiversiteitsvooruitsigprojek) genoop om die volgende te sê:

“Kaapstad is die mees biodiverse stad in die wêreld.”

Bo en behalwe belangrike biodiversiteit, het die Stad ook 'n mensgerigte benadering tot biodiversiteitsbestuur aangeneem. Sonder die algemene publiek se steun, veral van omliggende gemeenskappe, sou die voortgesette beskerming van natuurgebiede nie moontlik wees nie. Dit is veral belangrik in 'n stedelike omgewing soos Kaapstad, waar biodiversiteitsgebiede naas mekaar en omring deur digbevolkte areas moet voortbestaan. Die teenoorgestelde is ook waar. Mense het biodiversiteit nodig – nie net vir oorlewing nie (ons maak staat op noodsaaklike ekosisteedienste), maar ook vir ontspanning, vermindering van stres, werksgeleenthede, maniere wat inkomste genereer, en opvoeding. Kaapstad se natuurreservate is dikwels die enigste ware natuurgebiede wat nog binne 'n kort afstand van talle gemeenskappe bereikbaar is. Die vernaamste voordeel vir die inwoners van Kaapstad is ongetwyfeld die belangrike skakel tussen werkskepping en ons biodiversiteitsruimtes.

Die stad se stedelike voetspoor oorvleuel met talle unieke plantegroeitipes. Van die 53 krities bedreigde, nasionale plantegroeitipes in Suid-Afrika, kom 11 in Kaapstad voor. Ses plantegroeitipes kom nêrens anders as binne die stadsgrense voor nie, en drie daarvan word krities bedreig. 'n Sesde van Suid-Afrika se blomplante kom in Kaapstad voor – meer as 3 000 spesies. Dit is 'n verstommende getal as daar in aanmerking geneem word dat die stad minder as 0,1% van die land se oppervlakte dek! Die meeste van hierdie plantspesies kom slegs in Suid-Afrika voor en 68% kom slegs as fynbos voor. Ten minste 190 plantspesies is endemies aan Kaapstad. Uit die 660 plantordes op die Rooi Lys, word 405 met uitwissing bedreig, waarvan talle op die Kaapse Vlakte voorkom. Gekoppel aan hierdie uiters ryk diversiteit in plantegroei is daar faunas ryk aan klein soogdiere, paddas, reptiele, insekte en ander ongewerweldes. Hierdie spesiale biodiversiteit en gepaardgaande habitate is van uiterste belang vir die verskeidenheid ekosisteedienste wat hulle lewer. Opvanggebiede wat goed bestuur word, word in die huidige waterkrisis as uiters belangrik beskou – dit sluit in die opvanggebiede in hoë berge (riviere, strome, damme en waterdraers) en die laaglandreserwes (waterdraers). Die bewaring van ons kosbare natuurlike hulpbronne vorm 'n kritieke deel van 'n volhoubare en veerkragtige stad wat vir klimaatsverandering aangepas is.

Die ontleding van verliese in die laaste dekade ten opsigte van oorblywende plantegroei toon dat bedreigde laaglandplantegroeitipes steeds die meeste geaffekteer word. Kaapse Vlakte-sandfynbos en Atlantis-sandfynbos het die grootste areaverliese ervaar, gevolg deur Swartland-skalierenosterveld en Lourensford-alluviumfynbos. Vir sommige biome, soos Kaapse Vlakte-sandfynbos en Swartland-skalierenosterveld, is dit te laat om die nodige teikens vir voldoende bewaring te bereik. Al die oorblywende stroke moet beskerm word sodat van hierdie spesiale biodiversiteit vir toekomstige generasies bewaar kan word. Ten opsigte van die paar laaglandplantegroeitipes met genoeg oorblywende habitat om die vereiste bewaringsteikens te bereik (bv. Atlantis-sandfynbos), moet voldoende habitat nog bekom en vir bewaring bestuur word.

Onvanpaste ontwikkeling (stadspreading) hou die grootste bedreiging in vir die oorblywende biodiversiteit in die stad. Die hoë immigrasiekoers en behoefte aan behuising gee aanleiding

tot die ontwikkeling van al hoe meer grond om formele en informele nedersettings te akkommodeer. Onwettige plakkery en grondbesetting op die Kaapse Vlakte is 'n voortdurende uitdaging. Die hoë vlak van misdaad in die stad, veral ten opsigte van persoonlike veiligheid, is rede tot groeiende kommer. Die enigste alternatief vir toekomstige volhoubaarheid en verbeterde lewensgehalte is om te verseker dat die beboude, kulturele en natuurlike omgewings geïntegreer word.

Indringerspesies hou die tweede grootste bedreiging in vir die bewaring van biodiversiteit in Kaapstad (asook wêreldwyd). Fynbos is veral kwesbaar vir verdringing deur uitheemse bome, hoofsaaklik *Acacia*, *Hakea* en *Eucalyptus* uit Australië, en dennebome uit die noordelike halfrond. Hierdie bome ding mee met en verdring die inheemse plantegroei en verander ekosisteemprosesse soos veldbrande, voedingstofsirkulering en die hidrologiese sisteem. Uitheemse akasias met enorme saadbanke oorheers tans laaglandhabitate. Plantdoder moet gebruik word om opslag te voorkom ná hierdie bome afgekap is en uitwissing is dus minder suksesvol. Dennebome versprei steeds in wateropvanggebiede, wat afloopwater na damme aansienlik verminder.

Ondanks vele uitdagings is goeie vordering gemaak met die implementering van die biodiversiteitsnetwerk (BioNet), veral deur middel van die uitbreiding van beskermde gebiede. Dit is moontlik gemaak deur die aanstelling van gekwalifiseerde bestuurspersoneel, individuele verbintenisse tot bewaring deur verskeie personelede, en ondersteuning deur middel van vennootskapsprojekte. Daar is etlike hoogtepunte uit die laaste dekade wat gevier kan word.

Beste 10 prestasies van die laaste 10 jaar:

1. Die BioNet van prioriteitsgebiede en -korridors sluit nou ook biodiversiteitsaanpassing ten opsigte van klimaatsverandering by die metodologie in. Dit is as 'n beleid van die Stad Kaapstad (SK) in 2015 aangeneem en in 2017 by die Wes-Kaapse Ruimtelike Biodiversiteitsplan geïnkorporeer. In 2018 is 64,8% van die BioNet bewaar in vergelyking met 34,1% 'n dekade gelede.
2. 15 000 ha Stadsgrond is formeel geproklameer ingevolge die Wet op Beskermde Gebiede (Wet 57 van 2003).
3. 18 ooreenkomste vir bewaringsvoogdyskap met privaat grondeienaars.
4. Innoverende benaderings as teenwig vir programme, waaronder bewaringsgrondbeleggings.
5. Verbeterde bestuursdoeltreffendheid van beskermde gebiede deur middel van toegekende begrotings, bestuursplanne, ekologiese brande, die afbakening van grense, en die prestasiemonitering van bestuursoptrede in verband met biodiversiteitsdoelwitte.
6. Voortgesette herstelprojekte om ekosisteemfunksionering te verbeter. Toestandbepalings van habitate en aanvullende herstelplanne vir reservate, gesteun deur 'n herstellprioriteitstudie en 'n enkeldoelherstelfasiliteit.
7. Die Stadswey tender ten opsigte van die indringerspesiebeheerprogram vir die uitwissing van uitheemse plantegroei het sedert 2010 gelei tot 'n afname in houtagtige indringerplante, wateronkruid, en onkruid wat eerste verskyn. Die wilde-eend, huiskraai en gorrelskurwepadda vorm ook deel van hierdie program.
8. Werkskepping deur middel van die Kader Asmal- uitgebreide openbarewerkeprogram vir geïntegreerde opvanggebiedbestuur.
9. 'n Veelvakkige, formele vaardigheidsontwikkelingsprogram vir personeel, en indiensopleiding vir vakleerlinge, studente en dié wat internskappe deurloop.
10. 'n Verbeterde mense-en-bewaringsprogram wat alle omgewingsopvoeding, vrywilligers, toerisme, geleenthede en besoekersprogramme insluit.

Die Stad, tesame met sleutelvennote, sal voortgaan om die biodiversiteitsbewaringskrisis in Kaapstad die hoof te bied. Die tak biodiversiteitsbestuur se oorkoepelende doelwit is die bewaring en herstel, waar toepaslik, van Kaapstad se biodiversiteit, dat dit tot beduidende gemeenskapsbetrokkenheid sal lei, en dat dit tot voordeel van die Stad se huidige en toekomstige inwoners sal wees op 'n manier wat deur die Stad onderskryf word. Verskeie prioriteite van die Stad se geïntegreerde ontwikkelingsplan (2017 tot 2022) word ondersteun deur die ekosisteemgoedere en -dienste wat deur natuurlike ekosisteme en hul biodiversiteit gelewer word. Ons biodiversiteitsteiken is dat 65,5% van die gebiede wat (in 2009) geïdentifiseer is teen Desember 2022 onder formele bestuur sal wees, met inbegrip van proklamasie en ooreenkomste vir ewigdurende bewaringsvoogdyskap. Daar is toenemende belegging in hierdie biodiversiteit areas nodig om hulle rol as krities belangrike Stad Kaapstad bates te versterk.

ISISHWANKATHELO SABALAWULI

Ubuhle bemveli neentlobo-ntlobo zezityalo nezilwanyana zaseKapa zezinye zezinto ezenza esi sixeko sibe yindawo ekhethekileyo nonqwenela ukuhlala uze usebenze kuyo. IKapa lidume ngeendidi zezityalo, xa zidibene zaziwa njenge-Fynbos. IKapa lineentlobo-ntlobo zezityalo nezilwanyana nezezingenakuthatyathelw'indawo ezibaluleke kumazwe ngamazwe ezizalise naliphina ithafa nongqameko lwendlela. Yilento yabangela uThomas Elmqvist (inkokheli yeUnited Nation's City and Biodiversity Outlook Project) wathi:

"IKapa seSona Sixeko sineeNtlobo-ntlobo zeZityalo nezilwanyana eHlabathini".

Ngokuhambisana nezi ntlobo-ntlobo zezityalo nezilwanyana, iSixeko siye sanendlela esiyamkeleyo yokusekelezela ulawulo lweentlobo-ntlobo zezityalo nezilwanyana ebantwini. Xa uwonke wonke engenaxheba, ingakumbi abahlali abaselumelwaneni, akunakwenzeka ukuba imimandla yemveli iqhubeke ikhuselwe. Oku kubaluleke gqitha kwimeko yasedolophini efana neyaseKapa, apho iziza zeentlobo-ntlobo zezityalo nezilwanyana zimele ziphile ngaxeshanye zingqongwe ziindawo ezinenyakanyaka yabemi. Kuphinda kube yinyani oku naxa uyiguqula le meko. Abantu bayazidinga iintlobo-ntlobo zezityalo nezilwanyana, bengenzeli nje ukuziphilisa kwabo kuphela (sixhomekeke kwiinkonzo zendalo yokusingqongileyo ezibalulekileyo), kodwa zikwasinceda kwezolonwabo, ekunciphiseni uxinzelelo, kwingqesho, kumathuba okuzenzela ingeniso nezemfundo. Indawo zolondolozo lwendalo kwiSixeko saseKapa ubukhulu becala zizo ezingummandla wemveli osemgangathweni osaseleyo kumgama okufutshane kwiindawo zabahlali ezininzi. Eyona nzuzo iphawulekayo exhanyulwa ngabahlali baseKapa singaqiniseka sithi ibikukudalwa kwemisebenzi okubonakalayo okuhambisana neendawo zethu zeentlobo-ntlobo zezityalo nezilwanyana.

Umkhondo wesixeko wasedolophini ungqubana neendidi ezikhethekileyo ezininzi zotyani. Kwiindidi ezingama-53 zotyani lukazwelonke oluseNgozini eMandundu eMzantsi Afrika, i-11 kuloo meko ikwesi sixeko. Iindidi ezintandathu zotyani zifumaneka kanye phakathi kwimida yesixeko, kwaye emithathu kuyo iseNgozini eMandundu. Isiqingatha sesithandathu seentyatyambo zaseMzantsi Afrika sikhula eKapa – ngaphezu kweentlobo ezingama-3 000. Linani elikhulu kakhulu eli xa ucinga ngomba wokuba esi sixeko sigubungela ngaphantsi kwe 0.1% yomhlaba weli lizwe! Inkoliso yezi ntlobo zezityalo zikho eMzantsi Afrika kuphela kwaye i-68% yazo ifumaneka kuphela kwi-Fynbos. Ubuncinane iintlobo zezityalo ezili-190 zikhula apha eKapa kuphela. Kwiqela lezityalo ezikuLudwe oluBomvu ezingama-660, ezingama-405 zisengozini yokutshabalala, ezininzi kuzo zikwii-Cape Flats. Ezinye izinto ezinxibelelana nobu butyebi bungaka beentlobo-ntlobo zezityalo nezilwanyana, zizilwanyana ezincinane ezincancisayo, amasele, izirhubuluzi, izinambuzane nezinye izilwanyana zelizwe ezingenathambo lomqolo. Ezi ntlobo-ntlobo zikhethekileyo neendawo ezihlala kuzo zibaluleke kakhulu kudederhu lweenkonzo zokusebenzelana kwendalo ezizinikelayo. Iindawo zokubamba amanzi ezilawulwa kakuhle zijongwa njengezibaluleke ngokumandla kumanqam amanzi – ezi ziquka iindawo eziphezulu ezintabeni zokubamba amanzi (imilambo, imisinga, amadama namanzi aphakathi kwamatye) kwakunye nagcinwe kumazantsi omhlaba (ngaphantsi komhlaba phakathi kwamatye). Ulondolozo lobuncwane bethu obuxabisekileyo yinxalenye ebaluleke ngokumandla yesixeko esizinzileyo nesiluhlalima esilungele naziphina iinguqu kwimo-zulu.

Uhlolo lwelahleko yeentsalela zotyani kwishumi leminyaka elidlulileyo lubonisa ukuba iindidi zotyani olusemazantsi omhlaba ezisengozini ziyaqhubeka zithwaxeka ngendlela embi. ICape Flats Sand Fynbos ne-Atlantis Sand Fynbos iye yaphulukana nemimandla emikhulu kakhulu, ilandelwa yi-Swartland Shale Renosterveld and Lourensford Alluvium Fynbos. Kwezinye, ezifana ne-Cape Flats Sand Fynbos and Swartland Shale Renosterveld, zishiywe lixesha ukuba

zingafikelela imigomo efunekayo yolondolozo olwaneleyo. Yonke loo mingqandandana isaseleyo imele ikhuselwe ukuze kugcinwe ezi ntlobo-ntlobo zikhethekileyo ukwenzela izizukulwana ezizayo. Kwiindidi ezimbalwa zotyani olusemazantsi omhlaba ezisaselelwe yindawo eyaneleyo yokuhlala ukuze zifikelele umgomo ofunekayo wolondolozo (umz. i-Atlantis Sand Fynbos), kusafuneka kufunyanwe umhlaba owaneleyo eziza kuba kuwo uze ulawulwe ukwenzela ulondolozo.

Uphuhliso olungafanelekanga (ukuthontelana ezidolophini) yeyonanto ibeka engozini iintlobo-ntlobo ezisaseleyo kwisixeko. Inani elixhomileyo lemfuduko nemfuneko yezindlu ingunozala wokuba umhlaba ongakumbi uphuhlise ukuze kwakhiwe iindawo zokuhlala ezizinzileyo nezingazinzanga. Ukuhlala ngokungekho mthethweni nokungena ngetshova kumhlaba kwii-Cape Flats ngumngeni oqhubekayo. Izinga eliphezulu lolwaphulo-mthetho esixekweni, ingakumbi oluphathelene nokhuseleko lobuqu, lixhomis'amehlo. Inye into enokwenziwa kugcino lwendalo yokusingqongileyo lwexesha elizayo nokuphuculwa komgangatho wobomi kukuqinisekisa ukuba indalo esingqongileyo enezakhiwo, inkcubeko neyemveli iyahlanganiswa.

Iintlobo zezilwanyana ezingenelelayo ziyinto yesibini eyeyona ibalulekileyo eyingozi kulondolozo lweentlobo-ntlobo zezityalo nezilwanyana eKapa (nakwihlabathi lonke). I-Fynbos isesichengeni ngokukhethekileyo kungenelelo lwemithi engamaveza-ndlebe, inkoliso yi-Australian *Acacia*, *Hakea* ne-*Eucalyptus* nemipayini evela kwi-Northern Hemisphere. Le mithi iyalwisana notyani lomthonyama kwaye itshintsha iinkqubo zokusebenzelana kwendalo ezifana nomlilo, umjikelezo wezondlo nobukhosi bomjikelezo wamanzi. Kwiindawo zezityalo ezikumazantsi omhlaba iminga-mpunzi engamaveza-ndlebe eneengcambu ezinkulu ezingoovimba kugquba yona. Kufuneka izibulali-zityalo ukuze kuthintelwe ukuba zingaphindi zikhule emva kokuwiswa, kwaye ukugawulwa kwayo akuphumeleli kangako. Imipayini iqhubeka isasazeka kwimimandla yokubamba amanzi, iphungula ngokumandla ukuqukuqela ukuya emadamini.

Phezu kwayo nje le mingeni, kuye kwenziwa inkqubela entle ekusebenziseni uMxokelelwano weeNtlobo-ntlobo zeZityalo neZilwanyana (Bionet), ingakumbi ngokunabisa imimandla ekhuselweyo. Oku kwenziwe ngokuthi kuchongwe abasebenzi bezolawulo abavunyiweyo, ukuzibophelela komntu ngamnye kulondolozo ngabasebenzi abahlukahlukeneyo, kunye nenkxaso yeeprojekthi zokubambisana. Kukho iimbilasane ezininzi zeshumi leminyaka edlulileyo ekukuhle ukuba siyibhiyozele.

Izinto ezili-10 ezifikelelweyo kwiminyaka eli-10 edlulileyo:

1. I-BioNet yeziza ezihamba phambili nemidibaniso ngoku iquka ukulungelana kweentlobo-ntlobo notshintsho lwemo-zulu oludityanise kwiinkqubo zokusebenza. Oku kwamkelwa njengoMgaqo-nkqubo weSixeko saseKapa (CCT) ngo-2015 kwaza kwafakwa kwiSicwangciso esingeeNdawo ezingamaBala eBhayodayivesithi saseNtshona Koloni sango-2017. Ngo-2018 i-64,8% kwi-BioNet ilondolozwe xa kuthelekiswa ne-34,1% kwishumi leminyaka edlulileyo.
2. I-15 000 yeehekthare zomhlaba ozinzileyo we-CCT ovakaliswe phantsi koMthetho weNdawo eziKhuselweyo (uMthetho 57 ka-2003).
3. Izivumelwano ezili-18 zoThumo loLondolozo nabanini-mhlaba babucala.
4. Iindlela zongenelelo ezinamacebo amatsha ukuze kuqaliswe ezi zicwangciso, kuquka ukulondolozwa kweendawo zogcino lomhlaba.
5. Ukusebenza okuphucukileyo kolawulo lweeNdawo eziKhuselweyo ngebhaji ezinikelweyo, amacebo okulawula, ukutshisa ngomlilo kosebenzelwano lwendalo, ukusika imida nokubek' esweni ukusebenza kwezinto ezenziwa kulawulo ngokuvisisana nemigomo yeentlobo-ntlobo zezityalo nezilwanyana.
6. Iiprojekthi zokubuyiselwa kwentsebenzelwano yendalo esingqongileyo eziqhubekayo ukuze kuphuculwe ukusebenza kwentsebenzelwano yendalo esingqongileyo.

Ukuhlola imeko yeendawo zezinto eziphilayo nokubuyiselwa kwamacebo angaphantsi oovimba, ukubuyiselwa kophando lokubeka izinto eziza kuqala kunye nenkxaso yokuzinikela yeeNdawo zokuBuyisela kuxhasa le migudu.

7. IsiCwangciso sokuLawula iiNdidi zeZityalo neZilwanyana eziNgenelelayo se-CCT sokuba kugawulwe ezingenelelayo ukususela ngo-2010 kuphumele ekubeni kuphungulwe imithi engenelelayo, ukhula olusemanzini, kwakunye 'nokubona kwangethuba' ukhula. I-Mallard, House Crow and Guttoral Toad nazo ziyinxalenye yesi sicwangciso.
8. Ukudalwa kwemisebenzi kusetyenziswa iNkqubo eNatyisiweyo engeMisebenzi yoLuntu ngokujoliswe kuLawulo loNxweme ngokuHlangeneyo ka-Kader Asmal.
9. Isicwangciso sokuphuhlisa ubuchule esineenkalo ngeenkalo nesizinzileyo sabasebenzi, kunye noqeqesho lwaseMisebenzini kubantwana besikolo, abafundi nabaqeqeshwayo.
10. Inkqubo engoLondolo lokuSingqongileyo naBantu ephuculiweyo equka yonke imfundo engolondolo lwendalo, amavolontiya, ukhenketho, imisitho neenkqubo zabatyeleleyo.

I-CCT, kunye namahlakani ayo aphambili, iya kuqhubeka inika ingxelo malunga nengxaki yolondolozo lweentlobo-ntlobo zezityalo nezilwanyana eKapa. Eyona njongo iphambili yeSebe loLawulo lweentlobo-ntlobo zeZityalo neZilwanyana kukuba iintlobo-ntlobo zezityalo nezilwanyana zaseKapa zilondolozwe zize zibuyiselwe kwindawo yazo xa kufanelekile, okuza kubangela ukuba kubandakanyeke abahlali, kwaye kuzisa ukuxhamla kubahlali bayo abakhoyo ngoku nabexesha elizayo, ngendlela exhaswa yi-CCT. Izinto ekumele kuqalwe ngazo zeSicwangciso soPhuhliso ngokuHlangeneyo se-CCT (ngo-2017 ukuya ku-2022) zibonakaliswa ziimpahla zokusebenzelana kwendalo esingqongileyo neenkonzozo ezibonelelwa kukusebenzisana kwendalo esingqongileyo yemveli neentlobo-ntlobo zezityalo nezilwanyana. Injongo yethu ngokuphathelene neentlobo-ntlobo zezityalo nezilwanyana kukuba ngoDisemba 2022 i-65,5% yeendawo ezichongelwe (ngo-2009) ukuba zibe phantsi kolawulo oluzinzileyo, kuquka ukubhengezwa kwazo kunye nezivumelwano zonakekelo lwexesha elide. Oku kuya kufuna ukuba kwandiswe utyalo-mali kule mimandla yeentlobo-ntlobo zezityalo nezilwanyana ukuze kwakhiwe indima yazo njengee-asethi zexabiso kwi-CCT.

ACRONYMS

BioNet	Biodiversity Network – the spatial conservation plan for the City of Cape Town
BMB	Biodiversity Management Branch of the City of Cape Town
CAPE	Cape Action for People and the Environment
CapeNature	Western Cape Provincial Conservation Authority
CCT	City of Cape Town; also referred to as the City
CTEET	Cape Town Environmental Education Trust
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
EMD	Environmental Management Department of the City of Cape Town
EPWP	Expanded Public Works Programme
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
LBSAP	Local Biodiversity Strategy and Action Plan
NBSAP	National Biodiversity Strategy and Action Plan
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks; the National Conservation Authority



Dalton Gibbs

Water Mongoose (*Atilax paludinosus*) among Greater Flamingo (*Phoenicopterus roseus*) in False Bay Nature Reserve

1. INTRODUCTION

1.1 PURPOSE OF THIS BIODIVERSITY REPORT

This document offers a dual opportunity to showcase the current state of biodiversity in Cape Town, and to review changes over the past decade. Much has been achieved since the last *City of Cape Town Biodiversity Report* was published in 2008.

1.2 LAYOUT OF THIS BIODIVERSITY REPORT

Chapter 2 describes Cape Town's rich biodiversity and profiles the status, value of and threats to this biodiversity. Chapter 3 focuses on biodiversity strategy and institutional arrangements, since conservation is the responsibility of all spheres of government and civil society. Chapter 4 tackles implementation – innovative responses to the challenges of conserving internationally recognised, irreplaceable biodiversity in an urban context.

1.3 CONTEXT OF THE CITY OF CAPE TOWN

Cape Town is the southernmost and second-largest city in South Africa. It is enveloped by a coastline of 307 km and covers an area of 2 456 km². Cape Town supports a population of over 4 million people, comprising a rich diversity of cultures and races. Gross population density in 2017 was projected at 1 700 people per km² across the entire municipal area. The municipality occupies only 1,9% of the Western Cape Province, but is home to 63,8% of the province's people.



City of Cape Town

Aerial view looking south over the Cape Peninsula

As the economic heartbeat of the Western Cape, Cape Town accounts for around 72% of economic activity in the province, and contributes 9,9% to the national gross domestic product (GDP). The Port of Cape Town is a hub for the busy shipping line in the Southern Atlantic Ocean and a thriving container port, second only to Durban in South Africa. Much of the produce and freight for the region is handled through the Port of Cape Town and Cape Town International Airport.

Cape Town is recognised as a world-class tourism destination. The tourism industry accounts for roughly 10% of the provincial GDP and workforce, and is thus an important driver of the economy through its catering and accommodation requirements.

Major socio-economic challenges in Cape Town include poverty, housing backlogs, crime and gang activity, substance abuse, and health concerns. HIV/AIDS and tuberculosis (TB) remain prevalent. The number of residents registered for antiretroviral treatment at municipal

clinics has steadily increased. Health levels have generally improved, and the infant mortality rate has dropped significantly in the past few years.

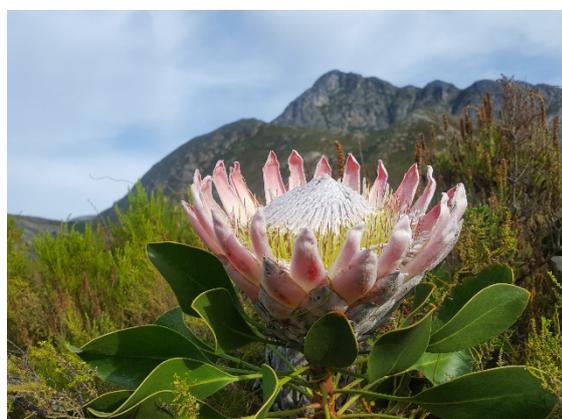
1.4 THE LOCAL AUTHORITY

Cape Town is run by the City of Cape Town (CCT) municipality (local government) with the Council made up of 116 ward and 115 proportional representation Councillors (231 in total). Each ward is grouped into 24 subcouncils. The CCT has over 22 000 employees distributed across 10 directorates.

The CCT's five-year Integrated Development Plan (IDP, July 2017 to June 2022) is required and mandated by legislation. The IDP is the principal strategic framework that guides decision-making within the municipality. The IDP also communicates to residents, business and investors the CCT's long-term vision, and how the organisation plans to achieve it. Several priorities of the current IDP are underpinned by the ecosystem goods and services provided by natural ecosystems and the biodiversity within them (refer to Chapter 3). The IDP also specifically mentions and recognises the importance of biodiversity, invasive species, and coastal management.

1.5 CAPE TOWN'S NATURAL ENVIRONMENT

Cape Town's natural assets and biological diversity are part of what makes the city a unique and desirable place in which to live and work. The city has a wealth of nature reserves, greenbelts, parks and public open spaces – the 'green lungs' of the city. Cape Town has a magnificent coastline and a varied skyline of rugged mountain peaks, gentle, rounded hills and flat sandy plains. These varied landscapes, together with the range of soil types and rainfall patterns, helped to shape over millennia the rich biodiversity that today characterises the region. Cape Town is renowned for its astounding variety of plants, collectively known as the Fynbos, including our national flower the iconic King Protea (*Protea cynaroides*). Cape Town's unique biodiversity (discussed in Chapter 2) is of global significance. The CCT, in partnership with other spheres of government, has a responsibility to ensure its adequate conservation for future generations. We need to conserve this biodiversity not only for its own sake, but also in order to ensure a sustainable future for people in Cape Town. It is biodiversity that underpins the ecosystem goods and services that we all depend on for our survival.



Cliff & Suretha Dorse

King Protea (*Protea cynaroides*),
South African national flower



City of Cape Town

Red Disa (*Disa uniflora*),
Western Cape emblem

2. CAPE TOWN'S BIODIVERSITY

2.1 BIODIVERSITY DEFINITION

Biological diversity (biodiversity) comprises the variety of life that clothes our terrestrial, aquatic (river and wetland), coastal and marine ecosystems; the many indigenous plant and animal communities within these ecosystems; as well as the genetic variety within and between the component species. Biodiversity is not just a list of plants (flora) and animals (fauna), but a series of relationships in a complex web. When one part weakens or disappears, other parts of this complex web are affected. Biodiversity is not confined to proclaimed nature reserves, although such areas are necessary to protect the most important biodiversity.

The world-renowned richness of Cape Town's biodiversity is in large part due to the wide range of biophysical (living and non-living) characteristics across the landscape, supporting many different terrestrial ecosystems, vegetation types, habitats and their associated flora and fauna.

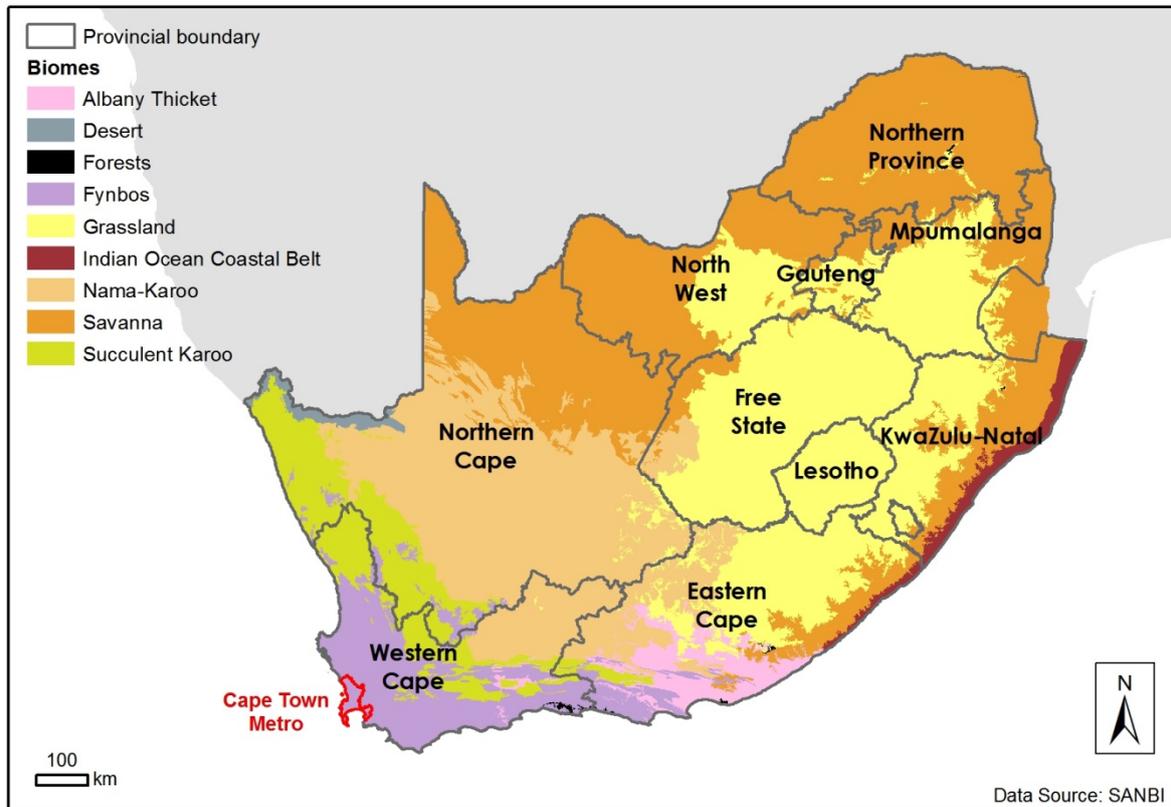
2.2 BIODIVERSITY DESCRIPTION

Cape Town lies in the heart of the Fynbos region (see Map 1). Over the decades, biologists have recognised the floristic distinctiveness of the Fynbos region and successively identified it as the Cape Floral Kingdom, the Cape Floristic Region, and more recently as the southern section of the Greater Cape Floristic Region – called the Core Cape Floristic Subregion. This region is located at the south-western tip of Africa between the latitude 30°S in the west and the longitude 27°E to the east. Roughly this overlaps the winter and all-year rainfall regions on the subcontinent.

The Cape Floral Kingdom was defined on endemics (locally restricted species) and highlighted the high number of unique species in the region. One in five plant species in Africa occurs here. The Cape Floral Kingdom is the smallest of the six global floral kingdoms, and the only one entirely within a single country. The Kingdom concept has been replaced by the Floristic Region which considers the flora in the southern African context. The Greater Cape Floristic Region comprises the Core Cape Floristic Subregion (Fynbos Biome; Map 1) and the Extra Cape Subregion (Succulent Karoo Biome); both subregions are global biodiversity hotspots in their own right.

The Core Cape Floristic Subregion is one of 35 global biodiversity hotspots. A biodiversity hotspot is a region of exceptional biodiversity, rich in endemic plant species, that has lost 70% or more of its habitat and is threatened with further destruction. It is remarkable to find such a big city in the middle of a biodiversity hotspot. The Core Cape Floristic Subregion is considered the 'hottest hotspot', because it is home to the greatest concentration of higher plant species in the world outside of the tropics. Although comprising only 4% of South Africa's land surface, the Core Cape Floristic Subregion contains nearly half of the country's 21 000 flowering plant species. Of these 9 300 species, 68% are endemic (i.e. confined) to the

region. Cape Town is a centre of endemism within the Cape Floristic Region owing to the high concentration of local range-restricted species found here.



MAP 1. BIOMES OF SOUTH AFRICA

The Fynbos Biome is a biophysical entity defined by the dominant growth forms, soils and climate ecology. Unlike the previous more geographically-defined regions, it excludes Succulent Karoo, Thicket and Forest vegetation types that occur within the region. The Fynbos Biome comprises the two dominant fire-prone vegetation types, Fynbos and Renosterveld; with Strandveld vegetation along the coast.

Fynbos is a diverse set of plant communities characterised by Cape reeds (restios), heaths (ericas) and proteas. Fynbos grows mainly on sandy, nutrient-poor soils. By comparison, Renosterveld has few restios, ericas and proteas and is dominated by aromatic, shrubby daisies (especially Renosterbos and Kapokbos) and grasses. Renosterveld grows on richer soils with higher clay content. Both communities are exceptionally rich in bulb species. Renosterveld largely has been destroyed for agriculture (wheat, other crops and pastures). Both are fire-driven ecosystems, grading to Succulent Karoo communities that are too arid to burn, or Thicket and Forest communities in wetter fire-protected areas. Strandveld grows on calcareous (alkaline) sands along the coast. Strandveld communities are dominated by shrubs and small trees with medium-sized leaves, succulent-leaved shrubs (vygies) and restios. Owing to its high succulent component, Strandveld burns less readily.

2.2.1 Terrestrial ecosystems

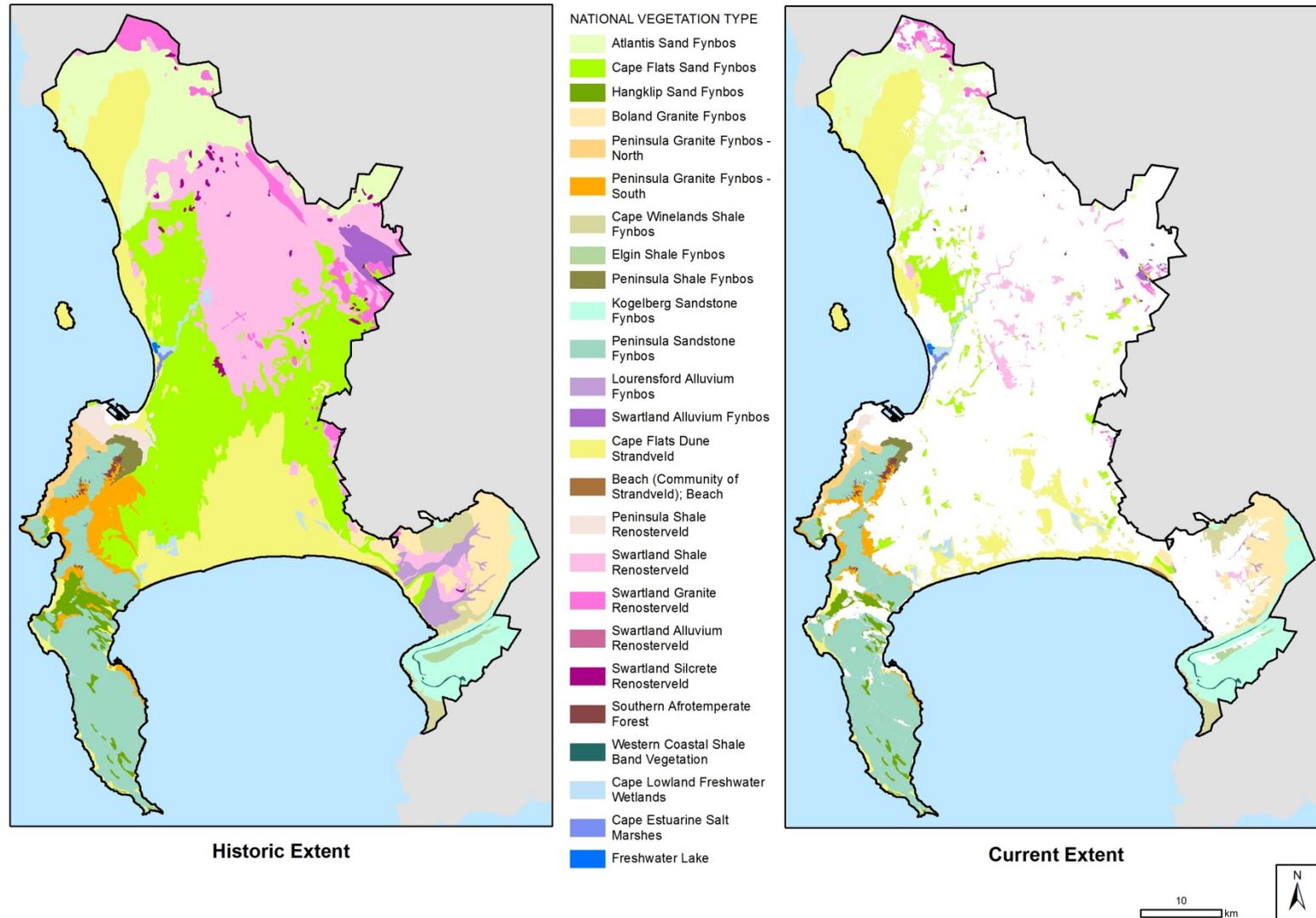
South Africa's terrestrial ecosystems are divided into vegetation types that represent biodiversity at the landscape scale. The Fynbos Biome supports 118 (27%) of the 440 national vegetation types, and a disproportionate 19 out of 53 Critically Endangered national vegetation types. Some of these are assigned this status owing to high levels of threatened species associations rather than habitat loss.

In Cape Town, eighteen national terrestrial and three azonal vegetation types are represented. In relation to conservation status, 11 of the terrestrial vegetation types are Critically Endangered, three are Endangered and two are Vulnerable, with only two Least Threatened (Table 1). The poor conservation status of many of the vegetation types within the city relates to the large-scale transformation that has taken place in the lowlands for commercial agriculture and urban development, as well as the importance of the mountain vegetation types for conserving threatened species associations. The high concentration of localised vegetation types and their associated biota in the south-western corner of South Africa coincides with the urban footprint of Cape Town (Map 2). Therefore, it is not surprising that we have been dubbed the 'biodiversity megadisaster capital of the world'!

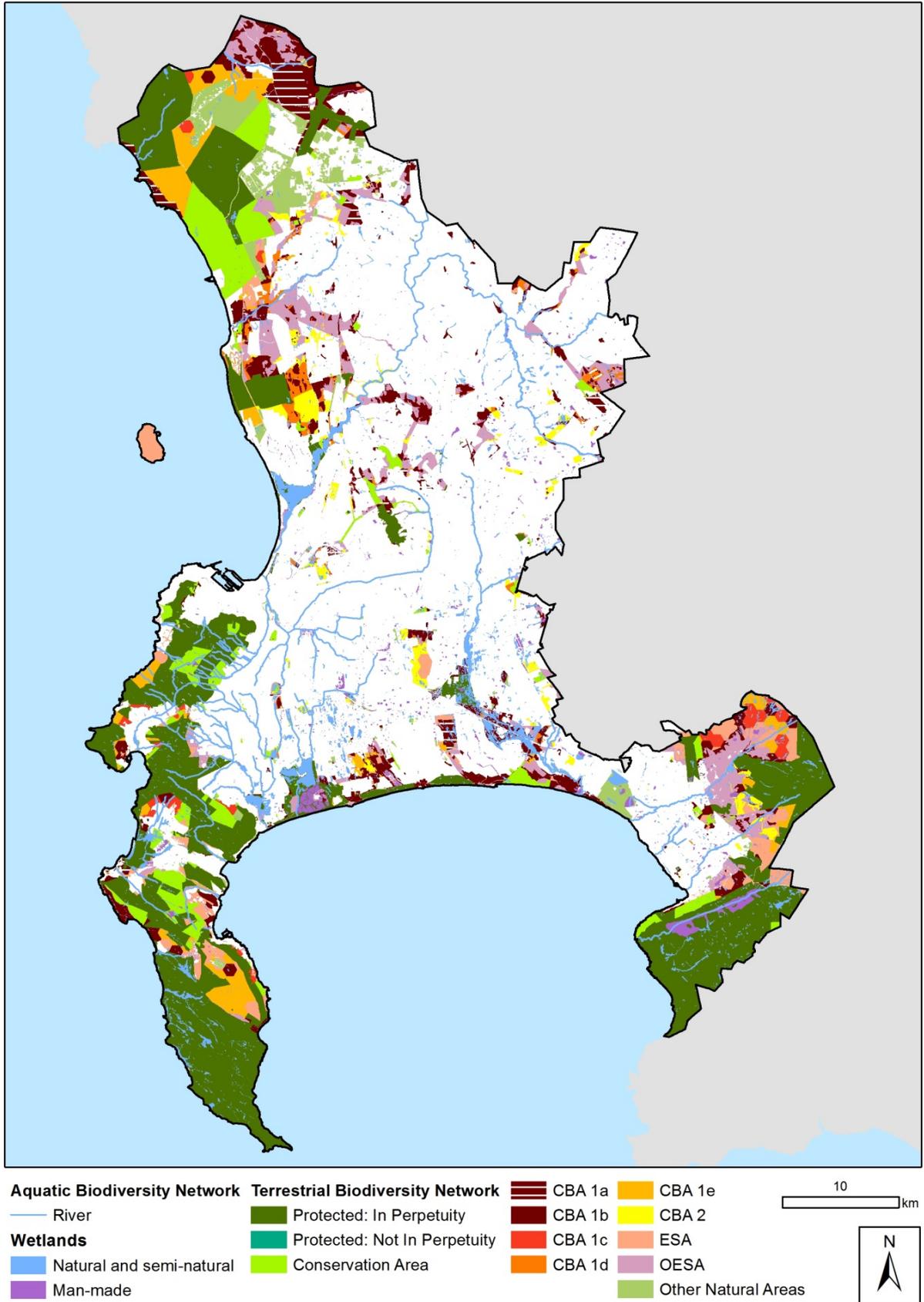
Currently, there is an intensifying biodiversity conservation crisis in the Cape Town lowlands (a large part of which is known as the Cape Flats), with only small areas of lowland vegetation formally conserved. The CCT's Biodiversity Management Branch (BMB) and CapeNature have identified in the Biodiversity Network (BioNet, Map 3) those remnants required to conserve samples of this biodiversity in striving towards meeting national and international biodiversity targets. Yet, for many vegetation types (e.g. Cape Flats Sand Fynbos and Swartland Shale Renosterveld) it is too late to achieve the necessary conservation targets for adequate conservation of this biodiversity. In these cases, all remaining remnants are crucial to secure in retaining some of this biodiversity for posterity. For the few lowland vegetation types with sufficient habitat remaining to meet the required conservation targets (e.g. Atlantis Sand Fynbos), there is as yet insufficient habitat secured and managed for biodiversity conservation.

An analysis of vegetation remnant losses over the past decade indicates that threatened lowland types continue to be the most negatively impacted. Cape Flats Sand Fynbos and Atlantis Sand Fynbos vegetation types have lost the largest areas, followed by Swartland Shale Renosterveld and Lourensford Alluvium Fynbos.

Biodiversity in the upper mountain habitats of the city remains relatively intact. For example, the Cape Peninsula mountain chain is well conserved in Table Mountain National Park. This narrow peninsula supports significant biodiversity and includes 2 285 plant species, 158 of which are local endemics (Helme & Trinder-Smith 2006). This concentration of plant biodiversity is attributed to the steep topographic, soil and climatic gradients on the Cape Peninsula, leading to a high number of distinctive habitats and a consequently high turn-over in plant species composition in communities (Simmons & Cowling 1996).



MAP 2. HISTORICAL VEGETATION TYPES AND CURRENT (2018) EXTENT IN CAPE TOWN



MAP 3. BIODIVERSITY NETWORK (BIONET) FOR CAPE TOWN SHOWING CONSERVATION AREAS, CRITICAL BIODIVERSITY AREAS (CBA) AND ECOLOGICAL SUPPORT AREAS (ESA, OESA)

2.2.2 Vegetation types

More detailed information on vegetation types is available in Rebelo et al. (2006). Refer to Table 1 for summary statistics on the national vegetation types that occur in CCT.

Sand Fynbos

Cape Town has three types: Cape Flats Sand Fynbos, which is confined to Cape Town; Hangklip Sand Fynbos, which occurs on the Peninsula and east of False Bay; and Atlantis Sand Fynbos, which extends north of Cape Town. Sand Fynbos occurs on moderately undulating and flat plains on leached, acid Tertiary sand. The vegetation comprises dense, moderately tall, fine-leaved shrubland containing scattered emergent tall shrubs. Common fine-leaved shrubs include *Metalasia densa*, *Staavia radiata*, and *Erica*, *Phyllica* and *Passerina* species. Proteoid and restioid fynbos are the dominant structural types, with asteraceous and ericaceous fynbos occurring in drier and wetter areas, respectively. All three Sand Fynbos types are species-rich and harbour a number of endemic plant species: for example, *Erica margaritacea* in Cape Flats Sand Fynbos and *Leucospermum parile* in Atlantis Sand Fynbos.



Pat Holmes

Atlantis Sand Fynbos

Alluvium Fynbos



Rupert Koopman

Lourensford Alluvium Fynbos

Cape Town has two types: Lourensford Alluvium Fynbos, which is confined to Cape Town; and Swartland Alluvium Fynbos, which extends north of Cape Town. Alluvium Fynbos is either found on low-lying plains with duplex, silty soils or on granite and shale metasediments often embedded with small cobbles and pebbles. They are low, medium dense shrublands with a short graminoid understorey. Structurally, restioid and asteraceous fynbos are dominant, although there is some evidence that proteoid fynbos

might once have been dominant. Some remnants are exceptionally rich in bulbs. Previously this was considered Renosterveld, but it is clearly a Fynbos type. Daisies such as *Athanasia*, *Stoebe* and *Marasmodes* species, and grasses *Themeda triandra* and *Tribolium uniolae* are common. There are several endemic species, such as *Diastella buekii* and *Marasmodes undulata* in Swartland Alluvium Fynbos.

Granite Fynbos

Cape Town has two types: Peninsula Granite Fynbos, which is confined to Cape Town; and Boland Granite Fynbos, which extends to the north-east of Cape Town. Granite Fynbos occurs on moderately undulating plains and hills or on steep to gentle slopes below the sandstone mountain slopes, with soils varying from extensive and deep, to localised deep soils between large granite domes and sheets. Structurally it is described as a fairly dense, 1-2 m tall closed shrubland with occasional low, gnarled trees dotted through the landscape. It



Pat Holmes

Peninsula Granite Fynbos on Constantiaberg

is a diverse type, dominated by scrub, asteraceous and proteoid fynbos, but with patches of restioid and ericaceous fynbos in wetter areas. Waboomveld (with *Protea nitida* overstorey) is very typical and extensive within Granite Fynbos. On the Peninsula, groves of Silver Trees (*Leucadendron argenteum*) occur on wetter slopes. Endemic taxa include *Leucospermum grandiflorum* (Boland Granite Fynbos) and *Hermannia micrantha* (Peninsula Granite Fynbos).

Sandstone Fynbos

Cape Town has two types: Peninsula Sandstone Fynbos, which is confined to the Peninsula Mountain Chain in Cape Town; and Kogelberg Sandstone Fynbos, which extends to the south-east of Cape Town. Sandstone Fynbos occurs in the high mountains, on steep to gentle slopes, and on undulating plains and hills of varied aspect. The soils are acidic lithosols derived from Ordovician sandstones of the Table Mountain Group (Cape Supergroup). The general structure of the vegetation is a low, closed shrubland with scattered emergent tall shrubs. Proteoid, ericaceous and restioid fynbos dominate, while asteraceous fynbos is rare.



Alex Rebelo

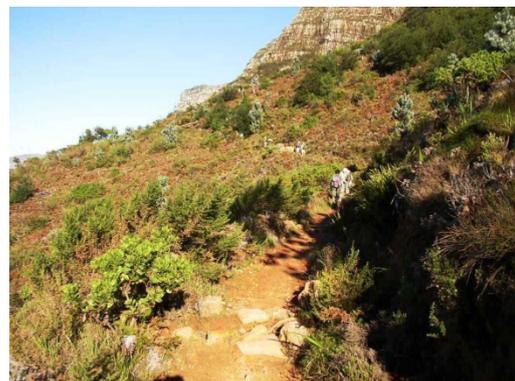
Peninsula Sandstone Fynbos at Cape Point

Patches of thicket or scrub fynbos are common in rocky outcrops. Numerous seeps and seasonally saturated mountain-plateau wetlands (locally called 'suurvlaakte') are very common and support restioid and ericoid (dominated by *Bruniaceae*) fynbos. Both these vegetation types are extremely species-rich with a staggeringly high concentration of local endemic species (over 130 in each). Examples are *Mimetes fimbriifolius* and *Leucadendron strobilinum* on the Peninsula and *Erica sitiens*, *Leucospermum bolusii* and *Aspalathus acanthiloba* on the Kogelberg.

Western Coastal Shale Band vegetation is a narrow 80–200 m linear feature nested within Sandstone Fynbos and extends eastwards from the Kogelberg range. Within the CCT, the shale band supports proteoid fynbos shrubland.

Shale Fynbos

Two types occur in higher rainfall areas where the shale soils are sufficiently leached of nutrients: Cape Winelands Shale Fynbos (incorporating Peninsula Shale Fynbos), which extends north-east of Cape Town, and Elgin Shale Fynbos, which extends to the east of Cape Town. Shale Fynbos occurs on moderately undulating plains and steep slopes against the mountains. Soils are acidic, moist clay-loams. Vegetation structure is an open to medium-dense, tall proteoid



Pat Holmes

Cape Winelands Shale Fynbos on Devil's Peak

shrubland over a matrix of moderately tall and dense evergreen shrubs, dominated by proteoid, asteraceous and closed-scrub fynbos, with ericaceous fynbos in the wetter sites. A large portion of Elgin Shale Fynbos in the city was under pine plantations (currently being exited) and the flooded area of the Steenbras Dam, whereas most remaining Shale Fynbos on the Peninsula is conserved in Table Mountain National Park. Many species are shared with Granite Fynbos and include several local endemics (e.g. *Leucadendron argenteum*, *L. daphnoides* and *Leucospermum grandiflorum*).

Renosterveld

Cape Town has four types: Peninsula Shale Renosterveld, confined to Cape Town; and three other types extending north of Cape Town on their respective soil types: Swartland Granite, Shale and Silcrete Renosterveld. Renosterveld occurs on soils with a heavier texture (clays and loams) where rainfall is not sufficiently high to leach out the nutrients (<600 mm p.a.). Clay soils are derived from Malmesbury Group Shales, and loams from Cape Granite or silcrete parent materials. Renosterveld is mainly found in the moderately undulating lowlands, hills and foot slopes. Structurally the vegetation is an open, small-leaved, low to moderately tall shrubland with many succulents, dominated by Renosterbos (*Elytropappus rhinocerotis*).



Peninsula Shale Renosterveld on Devil's Peak

Grasses are a prominent component and it is thought that prior to European colonisation, the vegetation may have been grassland. Heuweltjies (*termitaria*) cause distinctive vegetation spots on the landscape and give the Tygerberg Hills their name. Groups of small trees and tall shrubs are associated with heuweltjies and rocky outcrops. Some renosterveld vegetation is rich in bulbs. Endemic plants include *Asteraceae*, succulent and bulb species (e.g. *Marasmodes oligocephala*, *Lampranthus dilutes* and *Babiana longiflora*).

Cape Flats Dune Strandveld

This vegetation type largely is confined to Cape Town, and shares affinities with Coastal Thicket vegetation to the east and Succulent Karoo to the north. Cape Flats Dune Strandveld occurs on flat to slightly undulating dunefield landscapes. The soils are alkaline sands derived from Tertiary to recent calcareous sand of marine origin. Outcrops of limestone occur, particularly along the False Bay coastline. Structurally, Strandveld is a tall, evergreen, hard-leaved shrubland with abundant grasses, annual herbs and succulents in the gaps. Examples of prominent shrub species include *Euclea racemosa*, *Metalasia muricata*, *Olea exasperata*, *Osteospermum monilifera* and *Zygophyllum flexuosum*. Strandveld has few endemic species compared to fynbos, but one example is the succulent *Lampranthus tenuifolium*.

Cape Seashore Vegetation

This is considered a separate national vegetation type (Mucina & Rutherford 2006). However, we consider it as a community of Strandveld that occurs predominantly on the unstable foredunes above the beaches. Structurally, it is an open herbaceous and dwarf shrubby vegetation often dominated by a single pioneer species. Characteristic species include *Pelargonium capitatum*, *Tetragonia decumbens*, *Didelta carnosa* and *Carpobrotus acinaciformis*.



Vard Aman

Cape Flats Dune Strandveld at Macassar Dunes



Cliff & Suretha Dorse

Cape Seashore Vegetation on foredunes

Southern Afrotropical Forest

Southern Afrotropical Forest occurs in the Western Cape and Eastern Cape on a variety of substrata. In the Mediterranean-climate areas of the Core Cape Floristic Subregion forest is confined to fire-protected kloofs in the mountains. The emergent tree species have a subtropical affinity and are mostly widespread throughout South Africa. Tree species that occur in Cape Town's Southern Afrotropical Forest patches include *Podocarpus latifolius*, *Rapanea melanophloeos*, *Cunonia capensis*, *Curtisia dentata* and *Kiggelaria africana*.



City of Cape Town

Southern Afrotropical Forest

TABLE 1. NATIONAL VEGETATION TYPES IN CAPE TOWN AND THEIR NATIONAL ECOSYSTEM STATUS

National Vegetation Type	Historic km ²	Current km ²	% Remain	PA km ² [^]	Status [#]	CCT protection level*
Atlantis Sand Fynbos	251	147	58.7	36	CR	Poorly protected
Boland Granite Fynbos	96	59	61.5	19	VU	Moderately protected
Cape Flats Dune Strandveld	407	189	46.4	70	EN	Moderately protected
Cape Flats Sand Fynbos	540	59	11.0	10	CR	Poorly protected
Cape Winelands Shale Fynbos	53	29	55.7	19	VU	Well protected
Elgin Shale Fynbos	8	3	39.4	3	CR	Well protected
Hangklip Sand Fynbos	33	18	55.5	12	EN	Well protected
Kogelberg Sandstone Fynbos	95	92	96.6	79	CR	Well protected
Lourensford Alluvium Fynbos	39	3	7.0	39	CR	Hardly protected
Peninsula Granite Fynbos	92	40	42.9	24	CR	Well protected
Peninsula Sandstone Fynbos	219	210	95.9	156	EN	Well protected
Peninsula Shale Renosterveld	24	3	11.6	2	CR	Poorly protected
Southern Afrotemperate Forest	3	3	99.4	3	LT	Well protected
Swartland Alluvium Fynbos	24	3	11.2	0	CR	Not protected
Swartland Granite Renosterveld	70	18	25.7	2	CR	Poorly protected
Swartland Shale Renosterveld	457	34	7.5	7	CR	Poorly protected
Swartland Silcrete Renosterveld	11	1	13.6	<1	CR	Hardly protected
Western Coastal Shaleband	3	3	99.7	3	LT	Well protected

PA = Protected Area

[^] Excludes non-proclaimed conservation areas and transformed areas in Protected Areas

[#] CR = Critically Endangered, EN = Endangered, VU = Vulnerable and LT = Least Threatened

* According to SANBI criteria, but for areas within the city only

Vegetation types endemic to Cape Town in **bold**

2.2.3 Floral diversity

A sixth of South Africa's flora may be found in Cape Town (Table 2). This is a remarkable figure considering that Cape Town covers less than 0.1% of the country's surface area! It is even more remarkable considering that most of these plant species are endemic to South Africa and a high proportion (70%) endemic to the Core Cape Floristic Subregion. At least 190 plant species are locally endemic to Cape Town (i.e. found nowhere else in the world).

Unfortunately, Cape Town has already lost 49 plant species. Fourteen of these are confirmed globally extinct or extinct in the wild (Box 1). Many more plant species are dangerously close to extinction (see Box 2 for examples). The precarious status of many of Cape Town's habitats is reflected in the latest IUCN Red List total for plants, which includes a high tally of 660 taxa (Table 3). The number of threatened species per area in Cape Town is amongst the highest in South Africa and globally.

The highest concentration of threatened plant species in South Africa occur in Swartland Shale Renosterveld, with 35 endemic to the vegetation type, all of which are threatened. Swartland Shale Renosterveld once spanned the low coastal hills and plains from the Piketberg southwards to the Tygerberg and Sir Lowry's Pass near Gordon's Bay. Its fertile, shale-derived soils are highly suited to crop cultivation. As a result less than 8% of the original extent remains today, predominantly in the form of small patches on top of hills. The lowland forms, containing special habitats such as seasonal wetlands, vernal pools and ferricrete gravels, are all but gone.

Box 1. Already gone

Sadly, 14 plants unique to Cape Town are listed in the IUCN Red List as 'Globally Extinct'. Seven others are Critically Endangered, possibly extinct. These species or subspecies that are now extinct or extinct in the wild include:

1. Buchu family: Hairy Buchu *Macrostylis villosa* subsp. *minor* (1960s; vineyards in the Bottelary Hills)
2. Daisy family: Hairy Boneseed *Osteospermum hirsutum* (1800s; urbanisation)
3. Heath family: Kraaifontein Heath *Erica bolusiae* var. *cyathiformis* (1970s; urbanisation of northern suburbs; in cultivation at Kirstenbosch)
4. Heath family: Showy Heath *Erica turgida* (1970s; housing at Kenilworth; in cultivation at Kirstenbosch and reintroduced to Kenilworth, Rondevlei and Tokai)
5. Heath family: Whorl Heath *Erica verticillata* (1950s; flower picking and wetland destruction; in cultivation and reintroduced to Rondevlei, Kenilworth and Tokai)
6. Heath family: Alexander's Heath *Erica alexandri* subsp. *acockii* (1940s; urbanisation of Kraaifontein)
7. Heath family: Steenbras Heath *Erica foliacea* subsp. *fulgens* (1890s; pine plantations)
8. Heath family: Pyramid Heath *Erica pyramidalis* (1950s; urbanisation of southern suburbs)
9. Pea family: Cape Flats Gorse *Aspalathus variegata* (1890s; urbanisation of southern suburbs)
10. Pea family: Grass Mountain Pea *Liparia graminifolia* (1820s; urbanisation of Mowbray)
11. Protea family: Wynberg Conebush *Leucadendron grandiflorum* (1800s; vineyards at Wynberg)
12. Reed family: Table Mountain Window Reed *Willdenowia affinis* (1910s; pine plantations at

Kloof Corner)

13. Sedge family: Green-and-red *Isolepis bulbifera* (1950s; urbanisation of southern suburbs)

14. Snapdragon family: Peninsula Snapdragon *Nemesia micrantha* (date and cause of extinction unknown)

Species previously considered extinct but that have been rediscovered:

- *Babiana blanda*: FOUND at three sites. At Schoongezicht (100s of bulbs) and Woodlands (1000s). None of the populations are protected as yet.
- *Polycarena silenoides*: FOUND – a fire ephemeral: first two years after a fire in Renosterveld.

Box 2. Flora on the brink

Plant species in Cape Town are increasingly threatened as a result of various factors, such as habitat loss, alien invasion, inappropriate fire regimes, urbanisation, poaching and flower picking. Urgent action is required and the CCT, with its partners, is making every effort to protect plant species that are Critically Endangered (those at the greatest risk of extinction in the wild). Here are a few of their stories:

The world's smallest and rarest Protea, the Swartland Sugarbush (*Protea odorata*), is Critically Endangered. The CCT and WWF-SA (World Wide Fund for Nature – South Africa) are looking into how best to protect this Protea, now found only on a single farm in the Fisantekraal area. In 2016 there were only eight plants left in the wild, in urgent need of a fire to rejuvenate the population. Without fire, and after several years of drought, only five individuals were alive in April 2018, only three of which had seed heads. This species is in desperate need of conservation management if we are to prevent its imminent extinction.



Cliff & Suretha Dorse

Protea odorata

The Kraaifontein Spiderhead (*Serruria furcellata*) is a low-growing shrub in the Protea family. Only one naturally occurring plant remains in the North Pine area of Brackenfell. With the assistance of SANBI, cuttings of the plant were rooted and planted at the Bracken Nature Reserve in 2010, where they are doing well so far. Officially, under IUCN rules, these plants can only be considered to have been successfully restored if they survive for three generations. This would be about 45 years in lowland fynbos.



Cliff & Suretha Dorse

Serruria furcellata

The Strawberry Spiderhead (*Serruria aemula*) is only found on the sandy lowlands of Cape Town (Cape Flats Sand Fynbos). With nearly 100% of its habitat permanently transformed, a few remaining plants are scattered along road verges and tiny patches of vegetation where they continue to decline. The largest population is found at the Platteklouf Natural Heritage Site. A few individuals are conserved at the False Bay



Cliff & Suretha Dorse

Serruria aemula foeniculaceae

Nature Reserve: Rondevlei Section, and at Bracken Nature Reserve.

The Kraaifontein Heath (*Erica bolusiae* var *bolusiae*) is barely holding on, with fewer than 250 remaining plants in the wild. It is rapidly declining in numbers due to the continued spread of invasive species and too frequent wildfires.

Blouteebossie (*Psoralea glaucina*) has a tiny global distribution. It was thought to occur only in wetland depressions to the east of Muizenberg. The few remaining plants are within a small natural area in a residential development and another small population in the vicinity. Several plants were discovered in the wetlands near the Witzands Aquifer Nature Reserve near Atlantis. These plants are not protected and are threatened by farming activities.



Cliff & Suretha Dorse

Psoralea glaucina

Senecio cadiscus is an annual aquatic plant (living for only a few months during the wet season) occurring in Cape Vernal Pools vegetation along the Cape West Coast. As an annual that dies off in its entirety every year and has to grow back from seed the following year, it is extremely vulnerable to changes in climate and in its habitat. At present the species is only known from three privately owned seasonal pools along the N7 highway, none of which are conserved and all of which are heavily impacted on by livestock trampling. Efforts to establish a population in a nearby protected area have not yet been successful.

Lachenalia arbuthnotiae has one viable population in the world. In 2016, 389 were counted in flower at the Mitchells Plain Conservation Area. This constitutes the biggest remaining and only viable population. Although the site was set aside as a conservation area during the Environmental Approval process, it is in desperate need of management. The site belongs to the Provincial Public Works Department and several options to ensure the site is protected and managed in the long-term are being considered.



Cliff & Suretha Dorse

Lachenalia arbuthnotiae

Marasmodes: South Africa's most threatened plant genus

Swartland Shale Renosterveld is home to the majority of species in the *Marasmodes* genus, South Africa's most threatened plant genus. Extensive field surveys and a taxonomic study in 2008 revealed that there are in fact 13 species (previously only five were known), and all have highly restricted distributions within the Western Cape's coastal lowlands that contain most of South Africa's most threatened and poorly protected habitats. Of the 13 species in the genus, three are classified as Endangered, and the other 10 are all Critically Endangered, with one species, *Marasmodes reflexa*, possibly already Extinct.



City of Cape Town

Abraham Saaiman with a Critically Endangered *Marasmodes fasciculata* at Van Schoorsdrif. He searched intently to find it, then cleared a 50 m circle of gums around the little plant.



Flora in Cape Town

Top row, left to right: *Protea scolymocephala*, *Erica hirtiflora*, *Thamnochortus punctatus*
 Row 2, left to right: *Leucospermum parile*, *Macrostylis villosa*, *Salvia africana-lutea*
 Row 3, left to right: *Erica bruniades*, *Ruschia sarmentosa*, *Adenandra villosa*
 Row 4, left to right: *Babiana ambigua*, *Geissorhiza humilis*, *Erica cerinthoides*
 Row 5, left to right: *Mimetes fimbriifolius*, *Lachenalia pallida*, *Leucadendron xanthoconus*
 Bottom row, left to right: *Romulea hirsuta*, *Ixia versicolor*, *Serruria fasciflora*

(City of Cape Town, Cliff & Suretha Dorse, Tony Rebelo, Nigel Forshaw)

TABLE 2: TOTAL SPECIES COUNTS FOR HIGHER PLANTS AND VERTEBRATES IN CAPE TOWN

Taxon	Indigenous taxa in CCT	% of South African taxon	Endemic to South Africa	Endemic to CCT	Species of Conservation Concern [#]	Extinct in CCT	Naturalised species
Plants	3 050	16,7	±2 800	190	615	49	>350
Mammals	83	27,7	16	0	12	8	8
Birds	404	42,2	16	0	28*	9	10
Reptiles	60	13,9	29	0	8	3	5
Amphibians	27	21,6	25	5**	10	1	2
Freshwater fish	5	3,13	4	0	2 [#]	1	14

includes extinct in the wild

* excludes vagrant and pelagic species

** includes recently described *Cacosternum aggestum*, which is currently only known from the CCT but it may be more widespread

TABLE 3: GLOBAL STATUS OF RED DATA TAXA OF HIGHER PLANTS AND VERTEBRATES IN CAPE TOWN

Taxon	Red Data Taxa	Data Deficient	Near Threatened	Vulnerable	Endangered	Critically Endangered	Extinct in the wild	Extinct
Plants [#]	660	48	116	181	149	75	3	11
Mammals	12	1	4	6	1	0	0	0
Birds	28	0	13	7	8	0	0	0
Reptiles	8	0	4	3	1	0	0	0
Amphibians	10	1	4	0	2	3	0	0
Freshwater fish	3	2	0	0	0	0	0	1

underestimate of Red List threatened status as 161 plant taxa need to be resolved at subspecies or var. level for evaluation



Fauna in Cape Town

Top row, left to right: Cape Zebra Cockroach (*Temnopteryx phalerata*), Vivid Blue (*Tarucus thespis*), Cape Longhorn Beetle (*Ceroplesis aethiops*)
 Row 2: Common Baboon Spider (*Harpactira atra*), Rain Spider (*Palystes castaneus*), Lesser Thick-tailed Scorpion (*Uroplectes lineatus*)
 Row 3: Sand Rain Frog (*Breviceps gibbosus*), Cape Dwarf Chameleon (*Bradypodion pumilum*), Rose's Mountain Toadlet (*Capensibufo rosei*)
 Row 4: Bloubergstrand Dwarf Burrowing Skink (*Scelotes montispectus*), Cape Mountain Lizard (*Tropidosaurus gularis*), Southern Adder (*Bitis armata*)
 Row 5: Cape Siskin (*Crithagra totta*), Orange-breasted Sunbird (*Anthobaphes violacea*), Victorin's Warbler (*Bradypterus victorini*)
 Bottom row: Verreaux's White-footed Mouse (*Myomyscus verreauxii*), Cape Dune Mole-rat (*Bathergus suillus*), Cape Grysbok (*Raphicerus melanotis*)

(Cliff & Suretha Dorse, Vard Aman)

2.2.4 Faunal diversity

Compared to the exceptionally high plant diversity that characterises the Core Cape Floristic Subregion, the diversity of animals (especially large game) is often regarded as low. While faunal diversity cannot compare with that of the flora, the perception that fynbos has a low faunal species diversity is not accurate. Much of the fauna is inconspicuous, nocturnal and occurs at low densities. The wide diversity of habitats allows a large suite of faunal species (especially small vertebrates, insects and other invertebrates) to occur. Freshwater fish, amphibian, reptile and invertebrate groups display high levels of endemism. Additional surveys and taxonomic work will undoubtedly reveal new species within the city.

Amphibians

Of the 27 indigenous species of amphibian recorded from the boundaries of the CCT, 25 are endemic to South Africa and 10 are threatened with extinction. Several are known from only a few sites (see example in Box 3). Five amphibian species are endemic to Cape Town. Fortunately four are found within Table Mountain National Park. Unfortunately four of the five do have Red List status.

The enigmatic Table Mountain Ghost Frog (*Heliophryne rosei*) is considered Critically Endangered due to its minuscule global distribution, low population densities and impacts of impoundments on the perennial streams on which it is dependant. The Lightfoot's Moss Frog (*Arthroleptella lightfooti*) is a tiny (males are less than 15 mm long) and inconspicuous species found only in marshes and near streams on the Peninsula Mountain Chain. This Near Threatened species is seldom seen, but its incessant chirping is a feature of Peninsula Sandstone Fynbos wetlands and seeps in winter. The Rose's Mountain Toad (*Capensibufo rosei*) is Critically Endangered and only known from two localities on the Cape Peninsula.



Cliff & Suretha Dorse

Table Mountain Ghost Frog (*Heliophryne rosei*)

Cliff & Suretha Dorse

Lightfoot's Moss Frog (*Arthroleptella lightfooti*)

Box 3. Cape Platanna

The Cape Platanna (*Xenopus gilli*) is the lesser known but more attractive platanna ('clawed frog') of the two species that occur within the CCT, the other being Common Platanna (*Xenopus laevis*). It is a very special species as it is endemic to a limited number of low-lying, acidic, black waterbodies within the fynbos areas of the Western Cape. Sadly, a study on the distribution and habitat requirements of the Cape Platanna in 1980 painted a very bleak future for this species in that habitat destruction and degradation led to the extinction of this frog species from 60% of its known localities. The Cape Platanna is therefore classified as

Cape Platanna (*Xenopus gilli*)

Cliff & Suretha Dorse

Endangered. It was thought to have disappeared from all previously-known sites on the Cape Flats, but was rediscovered at Kenilworth Racecourse Conservation Area and the Rondevlei section of the False Bay Nature Reserve in 2013. This discovery was significant but still places this species in the dire position of only occurring in three remaining sites within the CCT. Having these two remaining populations on the Cape Flats, isolated from the other known population, emphasises the need to ensure their

effective management and protection long-term. Threats include urbanisation, habitat degradation and fragmentation, water pollution, hydrology changes to seasonal wetland systems, alien plant invasions, as well as hybridisation with the geographically widespread Common Platanna.

Reptiles

Approximately 60 species of reptile occur within the CCT. Twenty nine of these are endemic to South Africa and eight are considered to be threatened with extinction. Three species that used to occur within the CCT are now considered to be locally extinct: the Rinkhals (*Hemachatus haemachatus*), Southern Adder (*Bitis armata*) and Geometric Tortoise (*Psammobates geometricus*). There have been recent records of both Southern Adder and Rinkhals on the edge of the city but neither can be considered as having viable populations within the CCT.

Geometric Tortoise (*Psammobates geometricus*)

Cliff & Suretha Dorse

Birds

Over 400 of South Africa's 856 bird species have been recorded from the CCT area. Eighteen of these are endemic to South Africa and 28 have been assigned Red Data status. The very high number of bird species recorded in the CCT is due to a large diversity of habitats being present. This includes wetlands, coastline, mountains, agricultural areas and suburban gardens. Wetlands are particularly species rich with many migratory species augmenting the numbers during summer. Some of our most threatened species can be seen along our spectacular coastline. These include African Penguin (*Spheniscus demersus*), Cape Gannet (*Morus capensis*) and Bank Cormorant (*Phalacrocorax neglectus*), which are all classified as Endangered and are endemic to the southern African coast. Of special interest to bird enthusiasts are the six fynbos endemic birds, all of which are found within the CCT boundaries. These are Protea Canary (*Crithagra leucoptera*), Cape Siskin (*Crithagra totta*), Victorin's Warbler (*Cryptillas victorini*), Cape Rockjumper (*Chaetops frenatus*) and the nectar-feeding Orange-breasted Sunbird (*Anthobaphes violacea*) and Cape Sugarbird (*Promerops cafer*). Cape Sugarbird is the most important bird pollinator of proteas in mountain fynbos.



Cliff & Suretha Dorse

Protea Canary (*Crithagra leucoptera*)

Cliff & Suretha Dorse

Cape Sugarbird (*Promerops cafer*)

Mammals

Eighty-three mammal species are thought to occur within the city and sixteen of these are endemic to South Africa. White-tailed Mouse (*Myodomys albicaudatus*) is classified as Vulnerable and is one of 12 species of mammal with Red Data status found within the city. Many of the mammals in the Fynbos Biome are secretive and nocturnal, and therefore difficult to observe. Some of the larger mammals, especially carnivores, need home ranges larger than many of the CCT nature reserves to survive (Box 4). One can often see Small Grey Mongoose (*Galerella pulverulenta*), Striped Mouse (*Rhabdomys pumilio*), Rock Hyrax ('Dassie', *Procavia capensis*) or one of the small antelope [Cape Grysbok (*Raphicerus melanotis*), Steenbok (*Raphicerus campestris*) and Duiker (*Sylvicapra grimmia*)] when visiting the reserves. With luck, some visitors may see some of the more secretive species such as Cape Clawless Otter (*Aonyx capensis*) or Caracal (*Felis caracal*).

Box 4. The challenge of conserving animals with large home ranges in fragmented landscapes

The nature of conservation in urban areas is such that one invariably ends up with a protected area network that includes many small fragmented sites. This is especially the case in Cape Town where numerous reserves are required across the landscape in an attempt to conserve highly-localised, endemic and/or threatened species and habitats. Several animal species occur at densities too low to be considered viable at isolated sites. In many cases the result is that some animal species become locally extinct at certain sites. Ways to mitigate this are to ensure that sites are as large as possible, that they are connected via open space, or that there is intense management of certain species.

Some animals, such as the Honey Badger (*Mellivora capensis*), can never be effectively conserved in any of the nature reserves we have within the boundaries of the CCT. The home range (area over which animals regularly travel in search of food and mates) for a single Honey Badger exceeds the total area of all our reserves! While Honey Badgers do visit many of the CCT reserves, and individuals may even reside within the boundaries of some, the animals will regularly leave the reserves while foraging or looking for mates. The same applies to many other animals with large home ranges, including Caracal (*Felis caracal*), Leopard (*Panthera pardus*) and Aardvark (*Orycteropus afer*). Even on the large conservation areas such as Witzands Aquifer and Steenbras/Kogelberg these animals move out into and through



City of Cape Town

Honey Badger released in Blaauwberg Nature Reserve

agricultural and urban landscapes. It is therefore critical that our nature reserves do not become islands of nature surrounded by a sea of development. It is also critical that farmers (on whose land many of these animals spend a great deal of time) are educated about the value of these species and how they, as landowners, can contribute to their conservation.



Caracal at Westlake Conservation Centre



Leopards in Steenbras Nature Reserve

Freshwater fish

The CCT has a rather depauperate freshwater fish fauna largely due to the lack of major river systems within our boundaries. Of the five indigenous species recorded, two are listed as Data Deficient and a third as Extinct. The extinct species, a type of redfin (*Pseudobarbus* sp.), is reported to have been extirpated from the Eerste River. The *Galaxia* and *Sandelia* fish genera are, however, under taxonomic revision and this will result in new species being described. All our indigenous fish species are threatened by pollution, invasive vegetation and exotic fish species of which there are at least 14 alien species established within the city.

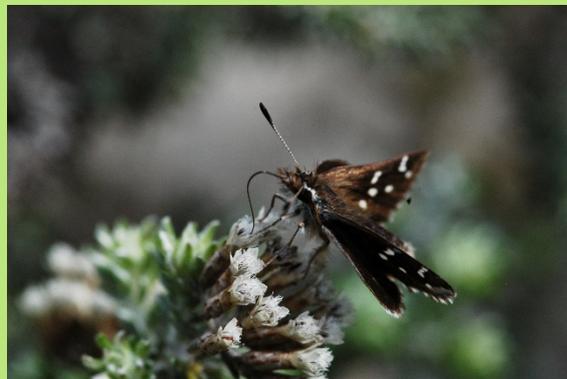
Invertebrates

While the small vertebrates have not been adequately sampled, it is glaringly evident that our invertebrate fauna has been grossly neglected! Insects and other invertebrate groups (animals without backbones) are exceptionally rich in the Core Cape Floristic Subregion. Well over 100 species of invertebrates are endemic to Cape Town, mostly on the Peninsula Mountain Chain. From the groups that are better-known, such as butterflies and dragonflies, it is evident that many species are under threat (Boxes 5 and 6) and some species have already been lost. The realisation that we are losing species we don't even know exist is a sobering thought!

Box 5. Butterfly on the brink

The Critically Endangered Barber's Ranger (*Kedestes barbarae bunta*) is a small brown skipper butterfly with elegant white markings particularly on the underwings. The only place in the world where you can see these butterflies is in the south-western corner of the Cape Flats near Strandfontein. The larvae of this butterfly feed solely on Cotton Wool Grass (*Imperata cylindrica*). The species used to be found in dune slack wetlands and damp grassy locations in Retreat and Steenberg. These localities have since been destroyed by development. The last remaining population is bisected by Strandfontein Road. Its continued survival is threatened by too frequent fires, alien vegetation encroachment, illegal dumping, road

upgrades, and drought conditions. The inclusion of Pelican Park into the False Bay Nature Reserve fortunately conserves a sizeable, intact patch of Endangered Cape Flats Dune Strandveld. This patch has the sole surviving Barber's Ranger population and an important population of the Endangered False Bay Unique Ranger (*Kedestes lenis lenis*) butterfly. It is critical that these butterflies and their habitat receive the needed conservation management to safeguard them for the future. Current conservation efforts are also focused on establishing captive rearing protocols and the rehabilitation of habitat where the Barber's Ranger used to occur. A key priority is to establish a second population close to the original locality at the Zandvlei Estuary Nature Reserve. In the absence of a conscientious conservation plan and action, the extinction of the Barber's Ranger is imminent.



City of Cape Town

Barber's Ranger (*Kedestes barbarae bunta*)

Box 6. Wild bees in nature reserves

The Cape Honey Bee (*Apis mellifera capensis*) is endemic to the winter-rainfall area of South Africa. Wild populations of Cape Honey Bee are important pollinators for 85% of fynbos flowers. Most wild Cape Honey Bee populations are healthy, because they use a wide variety of pollens and plant products to sterilise their hives and bolster their immune systems. Local bee populations are also genetically adapted to their local conditions, including types of forage and weather patterns such as wind strength and direction, (e.g. the wind-swept fynbos flats at Cape Point), and are therefore absolute specialists in their local environment. Globally however, wild bee populations are severely impacted by habitat loss, disease and parasites, pesticides, herbicides and fungicides and invasive alien species.

Fynbos is not only pollinated by honey bees. Other insects (such as butterflies, beetles, solitary bees, wasps and flies), birds and even small mammals (rodents and genet) play important roles in maintaining the incredible diversity of fynbos. The Core Cape Floristic Subregion is a global hotspot for beetles and solitary bees, which are among the most important fynbos pollinators.

Fynbos generally has low nectar and pollen productivity (despite the high plant diversity), so is not a sustainable commercial honey-production resource. Placing commercial bee hives in natural fynbos areas is unwise, as it yields only small amounts of excess honey. Commercial bee hives in or adjacent to conservation areas can swamp wild bees and other pollinators. This could negatively impact on the conservation of both local pollinator and plant species. Each hive has about 50 000 bees, so any commercial operation could introduce millions of additional pollinators. Many conservation areas are small and the status of the indigenous pollinators present could already be precarious. Furthermore, commercial hives risk introducing disease (e.g. American foulbrood). Commercial bees have been sourced from different areas in the past, resulting in hybridisation between the African Honey Bee (*Apis mellifera scutellata*) and the Cape Honey Bee, and loss of genetic integrity through mixing of different Cape Honey Bee genotypes. Although the former is now controlled by the industry,

the latter could cause a reduction in local adaptation by the wild bees when interbreeding between commercial and wild bee populations occurs.

For biodiversity conservation reasons, SANParks, CapeNature and CCT no longer allow bee hives on their nature reserves and conservation land in line with the legislation (Protected Areas Act regulations published in 2012). Allowing bee keeping would negatively impact on our core mandate of biodiversity conservation. If we safeguard our bees in the wild we should be able to protect our honey bees from massive collapse, which will set us apart from the rest of the world. Excess wild bee swarms are important for replenishing commercial bee hives. Therefore, safeguarding our bees and other pollinators helps to conserve our fynbos as well as the commercial bee industry.

2.2.5 Freshwater ecosystems

In addition to its rich terrestrial biodiversity, Cape Town supports a variety of wetlands and rivers. Historically a large proportion of lowland Cape Town was dotted with seasonal and perennial wetlands interconnected via the groundwater system (Day 1987). Low-lying areas of the Cape Flats that support marsh and floodplain wetlands are known locally as 'vleis'. As a result of urbanisation, most of the vleis and rivers on the Cape Flats have been modified, with vleis drained and the rivers channelised. An example is the Kuils River, which used to meander across the Cape Flats landscape on its way to the sea, and many adjacent oxbow lakes were integral to the catchment. As a result of urban development, the Kuils River was straightened over the years, and the links between most of these unusual wetlands and the main stream have been lost. The oxbows and other riparian wetlands consequently dried up, were filled in and developed. The vleis were mainly seasonal, but the few remaining have become permanent through stormwater and other inflows, giving them artificial characteristics similar to permanent lakes. This has resulted in loss of seasonal habitat for waders (waterbirds) and other specialised wetland fauna and flora. Nevertheless, these vlei areas remain critically important habitats for some waterbirds. For example, the False Bay Nature Reserve, which includes Rondevlei and Zeekoevlei together with the adjacent (Strandfontein) Cape Flats Waste Water Works ponds. Some examples of seasonal marsh vleis still exist, such as *Isoetes Vlei* on Edith Stephens Nature Reserve and seasonal salt marshes at Blouvlei, although these are now rare. The seasonal wetland types found in Cape Town generally are specialised plant communities nested within the terrestrial vegetation types described above.

Cape Lowland Freshwater Wetlands

These wetlands occur on the Cape Flats in landscape depressions, and may be permanently or seasonally flooded areas. Soils may be fine sands, silts or clays. Typically the vegetation in the seasonal wetlands comprises restio, sedge or rush-beds, as well as macrophytic vegetation embedded in the permanent waterbodies. Important species include *Senecio halimnifolius*, *Pennisetum macrourum*, *Triglochin bulbosa*, *Bolboschoenus maritimus* and *Juncus krausii*. An endemic species of seasonal marshes



Pat Holmes

Cape Lowland Freshwater Wetland

in the south is *Passerina paludosa*. Cape Vernal Pools are highly seasonal wetlands (20–100 m diameter), where the water level rarely exceeds 10 cm at the deepest point. They are located on fine clays or silts over an impermeable layer. Most have been lost to cultivation and few currently remain in Cape Town.

Cape Inland Salt Pans

These wetlands occur in areas that were formerly coastal lagoons that have been cut off from the sea and become seasonally dry. They are small depressions in the landscape dominated by low succulent scrub composed of creeping chenopods and salt-tolerant herbs and grasses. Examples may be seen at Rondevlei, Zandvlei Estuary and Table Bay Nature Reserves, and the Noordhoek Wetlands.

Estuaries

Estuaries connect the land with the sea. The CCT has two main estuaries at Zandvlei and Milnerton (Diep River Estuary). Although these estuaries suffer immense development and pollution pressures, they still support Southern Mullet (*Liza richardsonii*), Garrick (*Lichia amia*) and other estuarine fish; crustaceans and birds. These estuaries are important for biodiversity conservation. Zandvlei is the last functioning estuary on the False Bay coastline, supporting 34 fish species, of which two are Red List species and 24 indigenous. Zandvlei provides safe nursery habitat for fingerlings (juvenile fish) and is thus important for the recruitment of Leervis, Steenbras, two species of Stumpnose and other fish species. Estuaries are important stopovers for migratory birds because they offer rich feeding grounds in the shallow water.

2.2.6 Marine ecosystems

Cape Town's shoreline is approximately 307 km long, stretching down the West Coast, around the Cape Peninsula, and beyond False Bay to the Kogelberg coast in the east. This shoreline displays different coastal landforms such as sandy beaches, rocky shores, tidal pools, estuaries, islands, coastal dunes and sea cliffs. As a result, the coastline supports an immensely diverse range of marine and coastal ecosystems, home to over 80 rare and endangered species. This is one of the most diverse and productive stretches of coastline in South Africa. An ecologically functional coastline provides an effective buffer to the city from storm surges. Our coastline also supports subsistence fishermen and their families. Cape Town's coastal zone is also an area of high recreational activity, and a sought-after living environment for local people, as well as national and international tourists. For these reasons, the city coastline is among its greatest ecological, social and economic assets.



Cape Point, the southern tip of the Cape Peninsula



Overlooking False Bay towards the Kogelberg

The coastal waters around Cape Town are in the transition zone between two biogeographic provinces: the cool temperate west coast, and the warm temperate south coast marine zones. The seas around the Cape Peninsula are rich in marine biodiversity, because this is where the distributions of the organisms of the cold Benguela and warm Atlantic currents overlap. In addition, there are organisms unique to the temperate waters of the transitional area between these major zones, centred on False Bay. Of the approximately 2 000 marine species in False Bay, 61% are endemic to South African waters and 14% of these to False Bay itself.

Intertidal habitats

The intertidal zone within the city consists of sandy beaches and rocky shores. It is a high energy coastline, which makes the sandy areas highly dynamic, and a limited number of organisms find this harsh environment suitable. Examples of sandy beach animals are Plough Shells (*Bullia digitalis*), White Mussels (*Donax serra*), and sea lice (e.g. *Tylos granulatus*). Seabirds that feed in these areas include Kelp Gulls (*Larus dominicanus*), African Black Oystercatchers (*Haematopus moquini*), Hartlaub's Gulls (*Larus hartlaubii*), White-fronted Plovers (*Charadrius marginatus*) and sandpipers (*Calidris species*). Sandy beaches are divided into three zones: the surf zones where waves break, the beach, and the dunes (both small, recently formed foredunes/embryo dunes and large, established backdunes).

The intertidal rocky shores are more diverse than sandy beaches, and are divided into five distinct zones. The distribution of animals and seaweeds across these zones is linked to their ability to withstand the physical stresses associated with the tides – battering wave action and cold water, alternating twice a day with drying out in the harsh sun and wind.



Dalton Gibbs

African Black Oystercatcher (*Haematopus moquini*)
feeding on mussels



City of Cape Town

Rock pools at Dalebrook Beach, Kalk Bay

The submerged rocky shores have even higher species richness, accredited to the diversity of microhabitats within this zone. Subtidal rocks provide a substrate for kelp beds (*Ecklonia species*) to establish. This creates a sheltered habitat for a myriad of marine species. Kelp bed habitat is one of the most productive systems in the world, surpassing even the best agricultural lands. Rocky reef systems are common, and are characterised by a wide range of plants (seaweeds) and animals (sponges, anemones, corals, soft corals, hydroids, flatworms, ringed worms, crustaceans, bryozoans, molluscs, starfish and other organisms). Cape Clawless Otters (*Aonyx capensis*) are shy mammals that frequent the intertidal zone along our coast. Seabirds that feed in these areas include cormorants (*Phalacrocorax species*) and African Penguins (*Spheniscus demersus*).

Coastal waters

In deeper waters, many of the bony fish species have been overexploited to the extent that their populations have collapsed, and although they still occur, are very rare. Examples of these fish are the Dageraad (*Chrysoblephus christiceps*), Red Stumpnose (*Chrysoblephus gibbiceps*), Poenskop (*Cymatoceps nasutus*), Musselcracker (*Sparodon durbanensis*), Red Steenbras (*Petrus rupestris*), Seventy-four (*Polysteganus undulosus*) and White Steenbras (*Lithognathus lithognathus*).

During summer, the west coast experiences a phenomenon known as upwelling that is rare in the rest of the world. The force of the prevailing south-easterly winds (locally referred to as the 'Cape Doctor'), and the Coriolis force of the earth's rotation, creates a situation where inshore surface water is driven offshore, and cold water wells up from the Atlantic Ocean to replace the surface waters inshore. This cold water is rich in nutrients, and when it becomes exposed to sunlight, supports rapid plankton growth. Plankton in turn supports large-scale food webs, including vast shoals of pelagic fish such as Cape Anchovy (*Engraulis japonicus*), Pilchard (*Sardinops sagax*) and Snoek (*Thysites atun*). The Cape Doctor, and the upwelling that it causes, plays an important role in clearing out polluted water within the Port of Cape Town.



Cliff & Suretha Dorse

Long-beaked Common Dolphin (*Delphinus capensis*)

The waters off Cape Town are home to White Shark (*Carcharodon carcharias*), one of the most spectacular large predators in the world. Sharks are vital to the healthy functioning of the marine ecosystem. The most common whales around Cape Town are Southern Right Whale (*Eubaleana australis*) and Humpback Whale (*Megaptera novaeangliae*). Long-beaked Common Dolphin (*Delphinus capensis*) and Dusky Dolphin (*Lagenorhynchus obscurus*) also frequent the city's shores.

Many interesting seabirds are found along the rugged coast. African Penguin (*Spheniscus demersus*), Cape Gannet (*Morus capensis*) and Bank Cormorant (*Phalacrocorax neglectus*) are all endemic to South Africa. Cape Town's coast includes breeding sites of seabirds on offshore islands. Some species of seabirds breed on the mainland and these are areas of concern for conservation agencies. The African Black Oystercatcher (*Haematopus moquini*) and African Penguin are dependent on these breeding sites, and vulnerable to disturbance. All four species of cormorant also breed along the coast. A unique feature of the Cape Peninsula is the sea cliffs at Cape Point that provide secure breeding habitats for many seabirds.



Dalton Gibbs

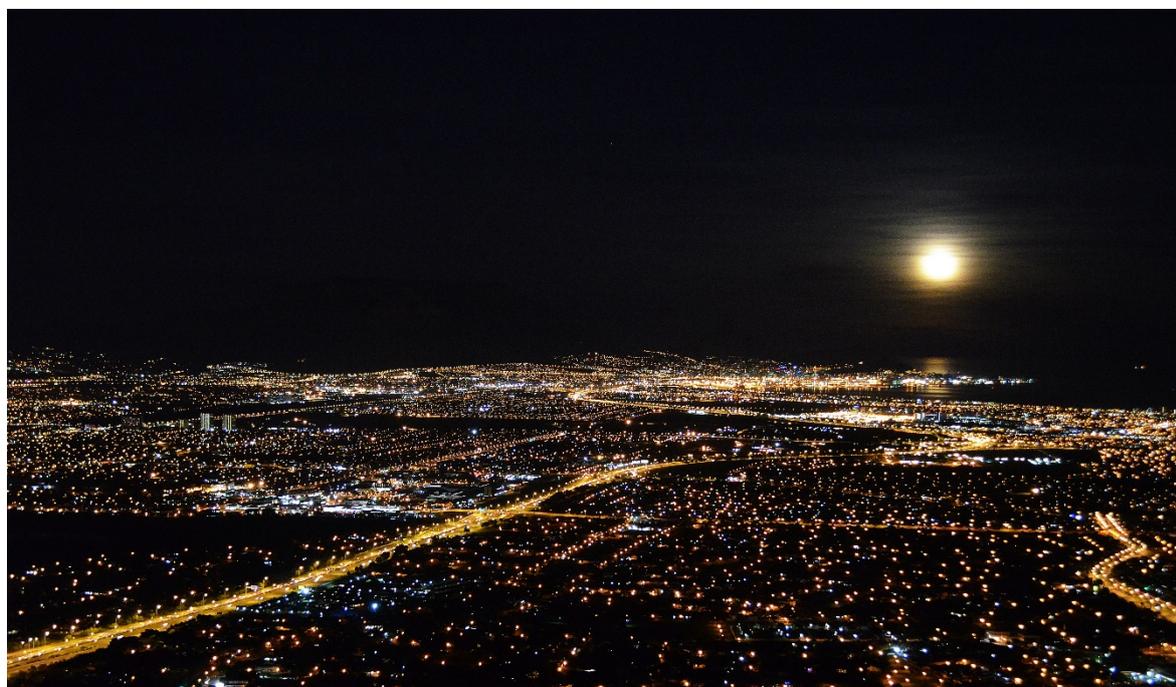
Bank Cormorant (*Phalacrocorax neglectus*)
breeding site on Castle Rock, False Bay

2.3 STATUS OF BIODIVERSITY

At the landscape scale, the status of biodiversity in lowland Cape Town is inversely proportional to the footprint of the urban city. As the city grows, more natural habitat is consumed or becomes negatively impacted by surrounding developments, with a concomitant loss of biodiversity (Map 4). Growth of Cape Town was slow until the mid-20th century, after which human population growth accelerated, but with a disproportionately high increase in the urban footprint.

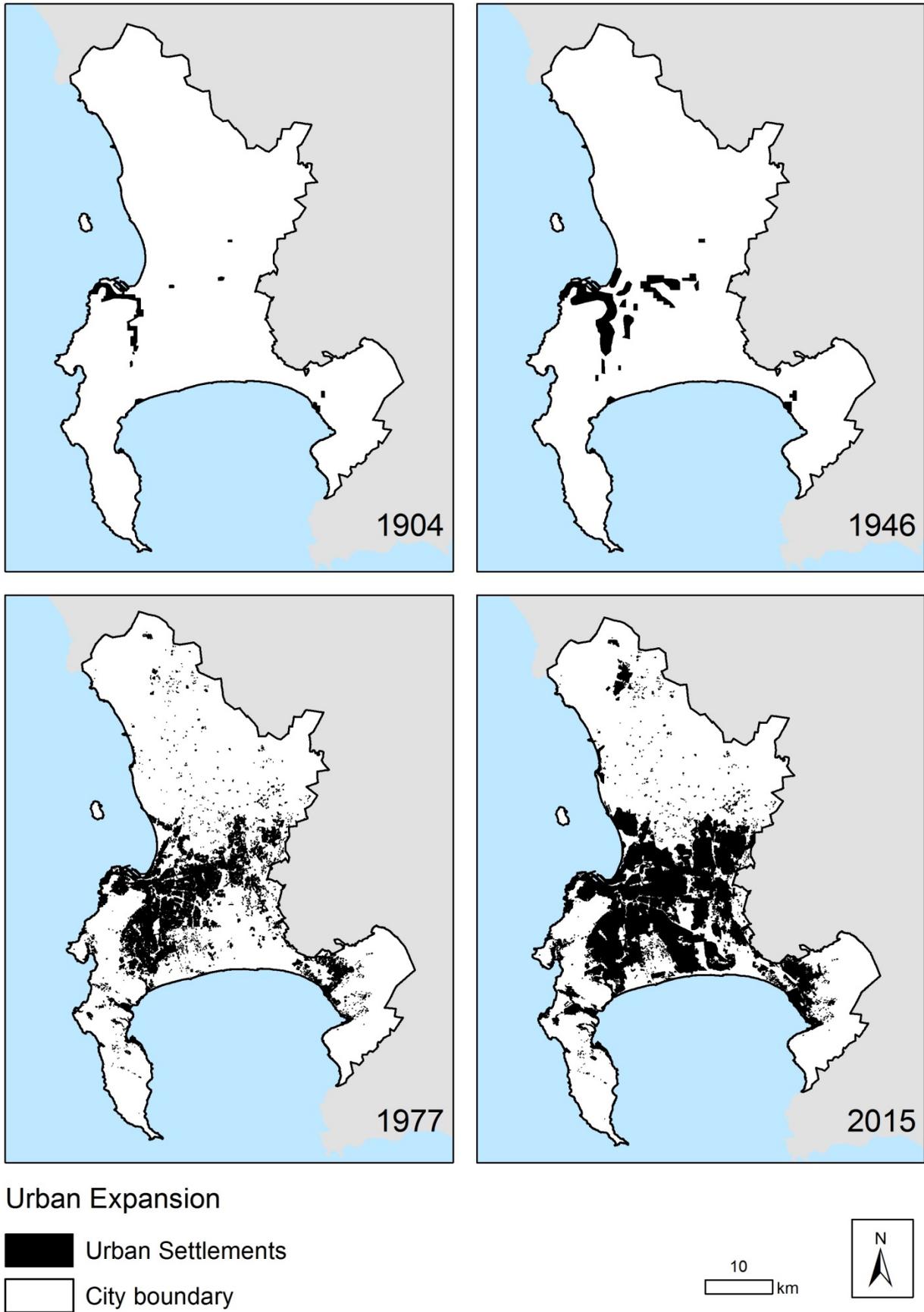
Biodiversity was also impacted by other land-use practices. The introduction of Australian acacias (now major invasive alien weeds) to the Cape Flats in the late 19th century was triggered by the need to stabilise extensive areas of drift-sands (Shaughnessy 1980). This indicates that vegetation had already been removed, probably through over-grazing and inappropriate attempts to cultivate the land, on parts of the Cape Flats prior to urban development. In areas of richer clay soils, such as in the Tygerberg and Swartland, land was cultivated from early settler times for crop production, especially cereals. However, the extent of cultivated land greatly increased after World War II with the introduction of more powerful agricultural machinery. Exceptions are steep slopes previously ploughed by horses that ceased to be cultivated (e.g. sections of Tygerberg and Blaauwberg Nature Reserves).

Loss of Cape Town's biodiversity has thus been most significant during the past eight decades. The most severe transformation impacts are in the lowland habitats (sand fynbos, wetland, alluvium fynbos, strandveld and renosterveld vegetation types), lower mountain slopes (renosterveld, shale fynbos and granite fynbos vegetation types) and arable land on the fertile hills (renosterveld vegetation types).



City of Cape Town

Early morning view over the city from Tygerberg Hill, in Tygerberg Nature Reserve



MAP 4. URBAN EXPANSION IN CAPE TOWN

2.4 VALUE OF BIODIVERSITY

Ecological goods and services accruing to humankind via the conservation of natural and semi-natural areas are many and include: clean water provision; flood attenuation; filtering of run-off and air pollution; replenishment of ground water; coastal protection; atmospheric carbon sink; oxygen production; tourism; recreational, educational, cultural and spiritual space; and existence and future-use values of plants and animals (Box 7). Thus conserving biodiversity offers many benefits to humankind, including an improved quality of life and health, although difficult to quantify in purely financial terms. In addition, restoration of natural areas contributes to climate change adaptation and mitigation (Box 8).

Box 7. Ecosystem goods and services

Ecosystem goods and services can be divided into four main types.

Regulating: Ecosystems regulate the climate, flows of water, soil erosion, diseases and pests, among other processes and thus assist in natural hazard regulation, such as reducing disease outbreaks, floods and coastal storm surges.

Provisioning: For example, ecosystems provide the following resources: clean water, rangelands for livestock production, fish and marine resources, fuelwood, wild flowers, thatch, medicines and genetic resources for the pharmaceutical and horticultural trades.

Cultural: Our natural areas underpin our vibrant recreation and tourism industries; and provide inspiration through natural beauty, aesthetic values and sense of place. They are important for environmental education and research, as well as for spiritual purposes and enterprises such as films and advertising.

Supporting: Ecosystem supporting services such as soil formation, primary production through photosynthesis, nutrient and water cycling, underpin life on earth and the above three types of ecosystem goods and services.

Ecological Infrastructure

The latest term applied to natural functioning ecosystems or assets that deliver valuable services to people is 'Ecological Infrastructure'. In the context of a city, this term is analogous to the 'built infrastructure' such as the reticulation and stormwater systems that provide essential services. Ecological infrastructure includes mountain catchments, coastal dunes, rivers, wetlands and patches of natural habitat, which together form a network of interconnected structural elements in the landscape.

Box 8. Biodiversity and climate change adaptation and mitigation

Global climate change is driven by increasing atmospheric CO₂ levels that results from the burning of fossil fuels and the destruction of natural vegetation cover. In Cape Town rainfall is predicted to decline, with a shorter winter rainfall season and possibly more intensive, heavy rainfall events or storms. Ambient temperature is predicted to increase, by as much as 2-3°C inland of the coast. Sea-level rise will result from the global warming process, eroding natural

vegetation along our coastline.

Second-order impacts of climate change include flooding, droughts, increased fire risk and invasions by alien species, and loss of ecosystem services. Maintaining healthy ecosystems is thus essential in creating a resilient city. Ecosystem-based approaches to climate change adaptation and mitigation have been shown worldwide to be cost-effective and generate multiple co-benefits to society.

Adaptation is defined as proactive actions that will reduce the risk of impacts from climate change. These actions are often referred to as Ecosystem Based Adaptation (EBA). An example is an ecosystem-based coastal defence strategy, with effective regulation of coastal development and activities to protect and retain coastal dune ecosystems, as well as the restoration of degraded coastal ecosystems to protect infrastructure. Another example is good catchment management to assist with buffering the effects of drought; and conserving wetlands to reduce the risk of flooding.

Mitigation is defined as actions taken to alleviate or reduce the continuation of climate change. Natural ecosystems play a critical role as carbon sinks. Ecosystem-based approaches include good management of natural areas to maintain resilience and species diversity, and the restoration of degraded vegetation areas. Research indicates that local ecosystems (e.g. fynbos and renosterveld) sequester more carbon than degraded land and agricultural areas. Therefore, by restoring structure and functioning to degraded vegetation areas, particularly in nature reserves and public open spaces, a significant contribution to climate change mitigation can be made.

Well-managed conservation and public open space areas are associated with enhanced property values, improved urban community relationships, and reduced levels of violent crime in adjacent areas. Yet, many communities on the Cape Flats view natural remnants as crime havens and a threat to their safety, largely because many sites are invariably covered in alien *Acacia* thickets and receive no management. The challenge is to find the necessary resources to implement effective management of these irreplaceable remnants and simultaneously change public perception to a positive one.

Natural ecosystem goods and services are so basic that they are often overlooked, and less often recognised for their importance. Natural assets represent the 'stocks' of environmental resources, while ecosystem goods and services are the 'flows' of benefits derived from these assets. Natural resource-based tourism is one of the highest income generators and includes angling, whale watching, birding, hiking, and a host of other outdoor pursuits.

Table Mountain National Park continues to be one of the top attractions for visitors, both local Capetonians and tourists. For example, Cape Point and the Table Mountain cableway recorded 280 000 visitors in December 2017 alone! Other paid entry points such as Silvermine and the Boulders Beach Penguin colony remain popular destinations. The CCT's nature reserves receive around 400 000 visitors annually, recorded mostly through manned access points. This figure is an underestimate, because the majority of CCT nature reserves are open access. These open access areas attract large numbers of visitors on a daily basis for sport and leisure activities.

World-wide, well-maintained natural areas have been shown to increase adjacent property values. A case study of the lower Silvermine River in Cape Town indicated a significantly positive net present value of rehabilitating the degraded wetland, primarily for flood control, but also to improve the ecological functioning, aesthetics and recreational potential of the area. Although the ecological benefits were not quantified, benefits of improved flood attenuation and improved aesthetics, related to habitat integrity, resulted in a benefit to cost ratio exceeding 4:1 (van Zyl et al. 2004).

2.5 THREATS TO BIODIVERSITY

Urbanisation

The city coincides with an extremely high concentration of unique biodiversity, making it almost impossible to completely avoid negative impacts of urban development. High immigration rates to Cape Town, and inappropriate development in the form of urban sprawl, constitute the greatest threats to remaining biodiversity in the city. Urbanisation causes fragmentation and loss of natural habitats, exposing flora and fauna to greater impacts of invasive alien species, pollution and other disturbances. In turn, these impacts lead to declines in indigenous plant and animal populations; and increased extinction risk. Loss of key species, such as insect pollinators, can then lead to a lack of seed production in plants.

Since the 1960s, town planning has favoured low-density housing developments remote from the city centre, and this trend continues in practice with most developments being green field, with single- or double-storey designs. Pressure from developers who lack an understanding of Cape Town's irreplaceable biodiversity adds to the threat of biodiversity loss in our remaining natural areas. However, the latest Municipal Spatial Development Framework indicates that urban sprawl should be halted and denser urban centres created to facilitate efficient public transport systems and the retention of quality green open spaces, including natural and agricultural lands.

Illegal squatting on lowland CCT nature reserves and other biodiversity sites is an ongoing challenge. The intention is to remove squatters within 24 hours by deploying ongoing patrols. Land invasion is a serious issue in protected areas such as the Slangetjebos Section of the False Bay Nature Reserve. This is being handled in a protracted legal process, but may result in the loss of biodiversity land. Continued surveillance of high-risk areas, in conjunction with CCT's law enforcement, is critical. Illegal land invasions are also rife on critical biodiversity areas not yet secured for conservation, for example in Mfuleni, Khayelitsha and Phillippi.



Illegal structure in the Zandwolf Section of False Bay Nature Reserve

Invasive species

The second most important threat to biodiversity conservation in Cape Town (and globally) is invasive alien species. The Core Cape Floristic Subregion is particularly susceptible to invasion by alien trees, mostly species of Australian *Acacia*, *Hakea* and *Eucalyptus*, and pines from the Northern Hemisphere. Many of these trees are considered ecosystem transformers as they out-compete the indigenous vegetation and alter ecosystem processes, such as

nutrient cycling, fire and the hydrological regime. In the mountains, the main invader species are pines and hakeas, the former having spread from forestry plantations. Pines continue to spread and densify in Cape Town's critical water catchment areas around the Theewaterskloof, Wemmershoek and Voëlvlei Dams, significantly reducing run-off into the dams.

In lowland and riparian habitats alien acacias predominate. These species require herbicides and clearance is often less successful. Biodiversity loss occurs through alien-related degradation of habitat and over-use of herbicides. The acacia species have large soil-stored seed banks, and in some species have strong re-sprouting capability, which makes their control extremely difficult, time-consuming and expensive.

Woody alien species accumulate much higher standing biomass than the indigenous vegetation. When wildfires occur these are of higher severity, resulting in damage to soils and indigenous soil-stored seed banks. The dense cover created by alien trees has various social implications as it creates cover for criminal activities.

In the lowlands, invasive alien herbaceous species also pose a threat to biodiversity; particularly annual grasses from the Mediterranean basin and the perennial grass Kikuyu (*Pennisetum clandestinum*) in moist sites. These grass species proliferate and out-compete indigenous herbaceous species, such as bulbs; and may increase fire frequencies via the rapid accumulation of dry biomass and thus eliminate slower growing indigenous perennial species.

Most of the invasive alien animals that are established in Cape Town were introduced over a hundred years ago. Most are restricted to urban areas, agricultural settings, woody plantations and sites of human disturbance. Only a small proportion of invasive invertebrates have established stable populations in undisturbed fynbos. On Table Mountain, invasive alien invertebrates have established populations in pine plantations, indigenous forest patches and fynbos. These include alien earthworms, snails, slugs, millipedes, woodlice, springtails, wasps and ants. At least 60 species of terrestrial alien invertebrates, including 17 species of terrestrial alien snails and slugs, have been recorded on the Cape Peninsula.

Not all invasive alien species have known and/or negative impacts on the indigenous biota. Invasive alien animal species that occur in Cape Town and are of concern include:

- Argentine Ant (*Linepithema humile*), which disrupts the fynbos seed dispersal mutualism with indigenous ants
- European Yellowjacket Wasp (*Vespula germanica*), which feed their young on chewed insects, are known to attack beehives and damage fruit crops such as apples, pears and grapes
- Mallard (*Anas platyrhynchos*), which hybridises with the indigenous Yellow-billed Duck (*Anas undulata*), putting the native species at risk
- House Crow (*Corvus splendens*), which preys on all small indigenous animal species and birds' eggs
- Guttural Toad (*Sclerophrys gutturalis*), which competes with the endemic Western Leopard Toad (*Sclerophrys pantherina*)

Some emerging threats come from alien organisms often too tiny to notice easily. Varroa mite (*Varroa destructor*) invades and destroys the hives of Cape Honey Bee (*Apis mellifera capensis*). Various pathogens (tiny organisms that cause disease) may be responsible for killing some fynbos plants and animals. The pathogen *Phytophthora cinnamomi* causes root disease in some protea species in the fynbos.

Agriculture

Most of the productive land in Cape Town has already been developed. However, the ploughing of marginal agricultural land still occurs, particularly for extension of vineyards; and this can impact negatively on threatened biodiversity. Examples include the recent losses of Granite Fynbos on high mountain slopes on the Cape Peninsula and Helderberg Basin. Irrigation technology is also opening up areas previously considered infertile for vegetable production, for example in the deep fynbos sands around Atlantis. Ploughing for the production of cut protea flowers is another source of habitat loss in the north. Agricultural activity has caused fragmentation of natural remnants, particularly renosterveld vegetation types, with similar impacts to those caused by urbanisation.

Inappropriate fires

Fynbos and Renosterveld are fire-prone shrublands that require summer fire for the long-term conservation of their species. However, if fires are too frequent, then slower-growing species may be eliminated. Conversely, if fires are excluded, then forest species invade and the rich fynbos or renosterveld community dies out.



City of Cape Town

Steenbras Nature Reserve

Not all vegetation types in Cape Town are fire-prone. For example, Cape Flats Dune Strandveld often has a high succulent and/or thicket component and does not require fire to persist, although it can withstand the occasional fire. Conversely, if this vegetation type is burnt too often in quick succession it becomes degraded and alien species, especially grasses, invade. Grasses in turn maintain the shorter fire-cycle and permanently change the vegetation structure, functioning and biodiversity value.

Mowing

Current CCT policy is to mow Public Open Spaces and road verges three times a year. In higher rainfall areas, mowing eliminates all but the hardiest indigenous plant species (some winter-flowering geophytes can persist) and leads to domination by grasses. In drier areas, mowing destroys most of the vegetation and reduces plant cover, with wind-blown sand often becoming a nuisance. However, because of the large scale of urban development in Cape Town, some of our vegetation types persist mainly in these pockets of Public Open Space systems, mostly managed by the CCT's Parks Department. In some cases, the vegetation is too transformed to be amenable to restoration, but in other sites indigenous seed banks remain and there is potential to restore portions of the sites for biodiversity conservation if mowing is stopped and conservation-friendly management implemented.

Over-exploitation

The majority of Cape Town comprises relatively unpalatable vegetation on nutrient-poor, sandy soils. Historically, stock would have been grazed for short periods in some of this vegetation then moved on to better grazing ground with higher carrying capacity, such as the inland renosterveld areas. However today, small stock farmers are herding cattle and

goats year-round on our low-nutrient vegetation types. This results in the vegetation being over-utilised, opening up gaps for alien grasses to colonise. In turn, this dried grass fuels frequent summer fires. Before long the vegetation becomes completely degraded and changed in structure from an indigenous shrubland to a low-diversity alien grassland, resulting in loss of biodiversity.

The proximity of such a large metropolitan area to the marine environment provides great challenges and opportunities for marine conservation. The exploitation of natural resources along the CCT coastline is an important source of recreation, employment and food. South Africans have been eating fish for at least 160 000 years. Unfortunately, the intensity of harvesting has exceeded the capacity of many fish species to recover, and many linefish species are severely overfished. Offshore species, such as Hake (*Merluccius*), Kingklip (*Genypterus capensis*) and West Coast Rock Lobster (*Jasus lalandii*), are also considered overexploited. Poaching of marine resources is still a significant threat to the marine biodiversity of the area. Abalone/Perlemoen (*Haliotis midae*) is the marine species worst affected by poaching. Abalone are caught and frozen or dried, before being illegally exported to East Asia. Consequently, both commercial and recreational Abalone fishing have been banned. The marine and coastal ecosystems surrounding the CCT need to be protected from further degradation and given the chance to recover.

Pollution

In terrestrial ecosystems, nitrogen deposition from car exhausts enriches the soil and makes it less suitable for fynbos species adapted to a low-nutrient regime. Where present, competitive, often alien species such as grasses, respond by growing more vigorously and out-competing other species. This changes the vegetation towards a more herbaceous structure and also causes a change in fire regime (as described above), usually resulting in more frequent fires.

A large part of the Cape Town lowlands comprises seasonal wetlands. These ecosystems and our rivers are all polluted to a greater or lesser extent via the stormwater system and failing sewerage systems. Nutrient enrichment of the wetlands causes the loss of indigenous plants and animals, and the colonisation by less sensitive, often alien species.

Plastic pollution is a growing problem for the environment, especially freshwater and marine life. Plastic waste kills many marine animals (especially seabirds) that mistake it for food or become entangled. Beaches that are littered with man-made debris (glass, metal, rubber, wood and plastic) support fewer crabs and other burrowing animals. Most plastic pollution on city beaches and surrounding coastal waters comes from South Africa (when people litter on land).

Hydrology

Changes to hydrology resulting from urbanisation on the Cape Flats include large-scale hardening of catchment areas, drainage and canalisation of streams. These changes alter natural ecosystem functioning in wetlands and vegetation remnants, and can lead to changes in species composition over time. Historically seasonal wetlands and rivers have become perennial systems owing to the inflow of stormwater during the dry season, whereas other areas have become drier owing to lowered infiltration in the catchment.

Increasing potable water requirements owing to a growing human population, coupled with several years of below-average rainfall, have resulted in a drought situation whereby demand exceeds supply from the dams. This has precipitated the fast-tracking of abstraction from the aquifers, including the Atlantis, Cape Flats and Table Mountain Group aquifers. The former two aquifers may be developed on already-degraded land, thus minimising direct negative impacts on biodiversity, and have potential for aquifer recharge using treated waste water. By contrast, drilling into the Table Mountain Group aquifer may directly impact pristine natural areas in the mountains. The infrastructure supporting an aquifer well field requires roads, pump houses, powerlines and pipelines in addition to the boreholes. Furthermore, abstraction will need to be carefully managed in order for it to remain sustainable in the long-term and not cause the drying of springs and wetlands, with associated flora and fauna that depend on ground water linked to the aquifer.

Crime

The high level of crime in the city, particularly relating to personal safety, is a major threat to the conservation of our natural ecosystems, because people perceive bushy remnants as areas that harbour criminals. Security threats to visitors, staff and contractors in nature reserves are of concern and are among the largest budget expenses, but remain inadequately addressed. Until crime prevention is countered more successfully, natural areas will be under threat from developments that may seem in the short-term to be more expedient, such as sand mining and housing. However, well-managed remnants generally support relatively low-stature vegetation, whereas unmanaged remnants become invaded by alien trees, especially *Acacia saligna* and *A. cyclops*, which grow taller than the indigenous vegetation and screen illegal activities. Therefore, good vegetation management can contribute to reducing criminal activity in local areas. Illegal activities such as dumping rubble, rubbish and toxic waste; harvesting and poaching; squatting and land invasion; and arson all directly impact negatively on biodiversity.



Illegally harvested bulbs

City of Cape Town



Poached Grysbok

City of Cape Town

3. BIODIVERSITY STRATEGY

3.1 HISTORY OF BIODIVERSITY MANAGEMENT

Historically, the conservation of natural areas and biodiversity was undertaken in a disjointed and ad hoc manner (Box 10). The spectacular Peninsula Mountain Chain received more attention than the Cape Town Lowlands (Cape Flats) and was consolidated and declared a National Park in 1998. The Biodiversity Management Branch was formed in 2005 and immediately set about updating Cape Town's Biodiversity Network (BioNet) and initiating a protected areas expansion plan. By 2008 (date of last Biodiversity Report), the Table Mountain National Park had been consolidated and a few reserves had some level of protection: Driftsands (CapeNature), Durbanville, Wolfgat, Rietvlei, Rondevlei, Zandvlei, Bracken, Helderberg and Tygerberg Nature Reserves. The CCT protected areas only accounted for 2 294 ha and overall (including other protected areas in Cape Town) only 34.12% (29 003 ha) of the BioNet was conserved.

Two regional initiatives, the Fynbos Forum and CAPE (Box 9), have supported the CCT in its efforts. CAPE especially focused attention on the poor conservation status of the lowlands, raising their profile from the previous perception of some conservationists who viewed them as 'isolated degraded environments' to unique, valuable gems worthy of the highest conservation effort.

Box 9. Fynbos Forum and CAPE



In the Core Cape Floristic Subregion, there is a long-established practice of lesson-sharing dating from the Fynbos Biome research project that was initiated in 1977. Annual meetings were initiated in 1979. On closure of the externally-funded research programme in 1989, the conservationists of the region resolved to continue with annual conferences and created a forum for the independent exchange of information. This commenced in 1990 and in 1992 this independent annual meeting was formally named the Fynbos Forum (Wood et al. 2013). The Fynbos Forum is an affiliation of professionals working in the Fynbos region with the main activity being an annual meeting where lessons are shared, action plans discussed, and important overarching projects are initiated for the research, planning, conservation and management of the region's biodiversity. The Forum, which is hosting its 40th annual meeting in August 2018, is an example of networking, a community of practice, and sustained partnerships and conservation effort over many years. The history of the Fynbos Forum is currently being documented in a book due to come out later this year.

In the late 1990s, members of the Fynbos Forum supported the development of the Cape Action for People and Environment (CAPE), with the strategy formally approved in 2000. CAPE is a 20-year formal partnership (2000 to 2020) of implementing agents, aimed at 'uniting government and civil society in a strategy to conserve and restore the biodiversity of the Cape Floristic Region and the adjacent marine environment, while delivering significant

benefits to the people of the region' (Ashwell et al. 2006). Thus at the outset, the CCT's biodiversity management work was guided by lessons learnt and the knowledge that came largely from the (CAPE) Partnership and the Fynbos Forum Community. The CAPE partnership is at present undertaking a CAPE legacy project to document successes as 2020 approaches and look to the future.

www.fynbosforum.org.za

www.sanbi.org/biodiversity/science-into-policy-action/mainstreaming-biodiversity/cape-programme/

Cape Town is home to over 4 million people with an unemployment rate of 25.3% (since this report was first published in 2008, the population has grown by 800 000). There remains a massive demand for housing, resulting in more and more land being developed to accommodate both formal and informal settlements. The CCT must plan and direct housing to suitable areas, while balancing the needs of our precious natural heritage. In line with CAPE and other international conservation efforts, a recent paradigm shift has resulted in the recognition that the protection of natural and cultural resources is everyone's concern, and critical for a sustainable future.

Box 10. History of conservation planning in the CCT

The first Council plan that incorporated natural vegetation areas was the 1982 'Greening the City Report', which identified some Cape Flats vegetation remnants as a priority to conserve. It resulted in Wolfgat Nature Reserve on the False Bay Coast being proclaimed in 1986. Earlier existing reserves such as Helderberg were proclaimed on a site-specific basis without a systematic prioritisation approach being applied to ensure the conservation of representative and highly threatened lowland vegetation types. In the 1990s, the Botanical Society and CCT collaborated to identify floral conservation priority areas. The 'Core Flora Conservation Areas on the Cape Flats' report (Maze & Rebelo 1999) identified 37 sites as critically important contributors to Cape Town's floral diversity.

In 2002, the first fine-scale systematic biodiversity planning study to identify the minimum set of conservation areas required in the city was initiated using the latest biodiversity planning methodology and spatial software. Data informants included a vegetation remnant layer derived from 1998 aerial imagery, plant species locality information and a local vegetation map. This study concluded in the Biodiversity Network Prioritisation Report (2004)¹ that included a map of the Biodiversity Network nodes and corridors (BioNet). This systematic biodiversity plan was the first to be published for any municipal area in South Africa. A systematic biodiversity plan indicates Critical Biodiversity Areas and Ecological Support Areas that are needed towards meeting biodiversity targets for terrestrial and wetland ecosystems and to ensure optimal ecosystem functioning.

In the mid-2000s several new biophysical datasets were developed that the BioNet analysis needed to incorporate. Therefore, in 2006, a revised desktop systematic biodiversity planning analysis was conducted using the latest remnant layer derived from 2005 aerial photography, new species locality information, and a vegetation map aligned to the 2006 national vegetation map (Mucina et al. 2006). This version of the BioNet was approved by council in 2006, subject to continuing collaborations with the Spatial Planning and Urban Design Department, thus promoting the BioNet as the basis for implementation in the Local

Biodiversity Strategy and Action Plan (LBSAP). In 2008, after extensive ground-truthing of vegetation remnants during 2007-8, the remnant layer was again updated and the systematic planning analysis re-run using habitat condition as an additional informant and adopting the national biodiversity targets in selecting the minimum set of required areas. An additional software programme was applied to optimise selection of remnants to improve connectivity in the network. All wetlands and rivers in this and earlier versions are considered part of the BioNet.

Several re-runs of the BioNet systematic planning analysis have been done in the past decade, using updated input data. Importantly, in the 2011 and 2016 analyses, best practice in terms of biodiversity adaptation to climate change was incorporated into the methodology. Details of the methodology and results are available in the Biodiversity Methods and Results report (Holmes & Pugnalin 2016). Incorporating climate change adaptation strategies into the analysis resulted in a 1% increase in the area required towards meeting targets. This small change resulted from the high levels of biodiversity in the city and the large extent of transformation that has caused limited choice in selecting different sites. The 2016 BioNet has been incorporated into the 2017 Western Cape Spatial Biodiversity Plan.

Adaptation for climate change

Best practice strategies for biodiversity adaptation for climate change involve 1) land and water protection, 2) direct species management, 3) monitoring and planning, and 4) law and policy. Systematic biodiversity planning can strengthen adaptation by improving representation and replication of biodiversity features within protected area networks; and protecting movement corridors, stepping stones, refugia, and steep ecological gradients such as elevation and soil gradients. Existing protected areas should be managed and restored to reduce other stressors, such as invasive alien vegetation, to improve ecological functioning. Evolutionary resilience to climate change may be further enhanced by conserving sufficient genetic diversity and habitat for populations to persist. For threatened species, minimum viable populations should be conserved in order to promote in situ adaptation.

Spatial Planning and the BioNet

The BioNet is a key informant in forward spatial planning in the CCT and forms the spatial basis of the Bioregional Plan. The Cape Town Bioregional Plan was adopted as CCT Policy in July 2015 and comprises a biodiversity profile for the bioregion, the BioNet map (refer to Map 3) and management guidelines. The purpose of a Bioregional Plan is to inform and guide spatial planning, environmental assessment and natural resource management by a wide range of sectors whose policies and decisions impact on biodiversity. The Bioregional Plan is aligned with the National Spatial Biodiversity Assessment and National Biodiversity Framework, and serves as CCT Policy for biodiversity priority areas in Cape Town. In addition, the contents of the plan must be aligned with future revisions of the CCT Integrated Development Plan (IDP), Municipal Spatial Development Framework (MSDF), Environmental Management Frameworks (EMFs), and District Spatial Development Plans.

¹ CCT biodiversity reports are available on the EMD website:

www.capetown.gov.za/Departments/Environmental%20Management%20Department

Although planning for conserving Cape Town's biodiversity began in the early 1980s (as described in Box 10), implementation was initially slow. There were pockets of activities

around some of the established reserves including Helderberg, Tygerberg, Rondevlei and Zandvlei. In the early 2000s, the CCT together with the Botanical Society of South Africa, SANBI and the Table Mountain Fund (TMF) launched a project to focus on sustainable people-centred conservation on the Core Flora sites. This project, called Cape Flats Nature, also attracted international funding from the Critical Ecosystem Partnership Fund (CEPF) and aimed to involve community champions in pilot conservation sites that had little or no management, namely Wolfgat, Macassar, Edith Stephens, Harmony Flats and Witzands Aquifer. They also placed five young conservators at these sites, three of whom are now permanently employed in the CCT managing proclaimed protected areas.



Charline McKie, Lewine Walters and Luzann Isaacs

Biodiversity Conservation in the CCT is consolidated under the Biodiversity Management Branch (BMB) which forms part of the Environmental Management Department (EMD). This function currently operates with a permanent staff component of over 180 (including over 50 qualified conservation and environmental management staff), and manages 16 protected areas (with a total area of over 15 000 ha). The BMB also undertakes systematic conservation planning, protected area expansion, biodiversity stewardship, a range of off-protected area activities, invasive species control, job creation, skills development, environmental education and awareness, and land-use advice.

In Cape Town irreplaceable biodiversity of international significance is crammed into almost every open space and road verge! In addition to Biodiversity Management, many other CCT line departments are involved in biodiversity and resource conservation. Several line departments are also involved in invasive species removal, which is coordinated by the BMB's Invasive Species Unit (Box 11). Coastal Management is driven by EMD's Coastal Management Branch.

The recognition and commitment by Council, supported by the CAPE community, has boded well for the mammoth task of conserving biodiversity of the unique, threatened ecosystems in Cape Town. The next decade will be a period of bedding down the gains that have been made, while planning for the future.

Box 11. History of the Invasive Species Unit

The Cape Argus Ukuvuka Operation Firestop Campaign was initiated in the wake of the extensive fires in January 2000, which burnt 8 370 ha of land along the Table Mountain Chain. It was devised as a four-year campaign, with principle support from the predecessors-in-title to the CCT, SANParks, Department of Water Affairs (Working for Water poverty alleviation programme) and the private sector. The campaign proved successful in many respects and was the forerunner of many of the fire and invasive species management strategies currently implemented within the CCT and in Table Mountain National Park. It also led to a substantial advancement in the quest to rid the Cape Peninsula of invasive alien vegetation, identified as a major aggravating circumstance in the destructiveness of wildfires. The CCT benefited

from Ukuvuka by receiving funds for critical stormwater work, invasive species clearing and various consultancies. A direct legacy of Ukuvuka was the establishment of the CCT's Invasive Species Unit in November 2008, within the EMD's BMB.

Initially, controlling invasive alien plants cost the CCT in the region of R8 m per year, of which R1 m (13%) was spent on protected areas. This financial burden was carried by the CCT alone until 2010, when external funding was received from SANBI to implement an Early Detection and Rapid Response (EDRR) Programme for invasive plant management. The successful implementation of the first external grant resulted in a further commitment from SANBI of an additional R1,6 m and R7,9 m from the DEA: NRM Programme for the 2012/13 financial year. A further R10 m was granted via DEA EPWP.

Invasive species management is a major job creation opportunity with an initial 100 job opportunities in 2010/11 growing to over 500 job opportunities in the following financial year. This was further strengthened by the Kader Asmal Integrated Catchment Management Expanded Public Works Programme (EPWP), established in 2012 to honour the late Kader Asmal. This inter-departmental, multi-stakeholder initiative aims to contribute to a healthy and sustainable natural environment for the benefit of all in Cape Town.



City of Cape Town

EPWP team clearing invasive alien *Acacia*

On average, R14 m of funding is obtained via the Mayor's Special Project: Integrated Catchment Management in Memory of Kader Asmal. The EPWP projects funded by the CCT are supported by the Department of Environmental Affairs' Natural Resource Management programmes, and focus on employing residents local to a reserve or green space.

In addition, the Invasive Species Unit manages projects for other CCT Departments via the CCT-wide tender to the value of around R13 m. This process ensures improved service delivery and a significant reduction in the threat posed by invasive species to the environmental and socio-economic assets of the CCT. This holistic approach to invasive species management has already saved the CCT in the region of R3 m, and it can be demonstrated that this approach will result in savings totalling R21 m over the next three years.

3.2 ANALYSIS OF PERFORMANCE TO DATE

3.2.1 Successes to date

Mainstreaming biodiversity conservation

Mainstreaming biodiversity conservation into the CCT structures has been successfully accomplished through development of a dedicated and staffed conservation effort. The Biodiversity Strategy was instrumental in facilitating the successful establishment in 2005 of the Nature Conservation Branch (now called the Biodiversity Management Branch). This, with the consolidation of the coastal function, is key to elevating the importance of biodiversity in the CCT functions.

Fine-scale conservation plan

Council approved a scientifically-sound, fine-scale conservation plan in 2008. The BioNet (incorporating climate change parameters) and management guidelines were combined into the Bioregional Plan that was approved as Council Policy in July 2015. The BioNet is a base layer to the CCT's Municipal Spatial Development Framework, is an important component of the CCT's IDP, and has been included in the Western Cape Biodiversity Sector Plan.

Conserving the BioNet in perpetuity

The BioNet, through improvements and iterations, remains the core of the CCT's strategic approach to biodiversity conservation. The success of this is directly evident in the growth of areas under formal conservation management. In 2009 around 34% of the BioNet was protected and in 2018 this has grown to 64,8% (54 745 ha); a doubling in less than a decade! The target for 2022 is 65,5% – since the 'low hanging fruit' have already been 'harvested'. About 8% of ecologically representative ecosystems within the CCT boundaries are conserved, still far below the internationally accepted Convention on Biological Diversity' Aichii target of 17% (Box 13). The mechanism to formally secure conservation land is critically important for success.

Invasive species

The CCT's Invasive Species Unit takes a catchment- and holistic-management approach; and continues to be a leader in invasive species control in South Africa. For example, the CCT is one of few municipalities that submitted invasive control plans as required by national regulations. The Invasive Species Unit has ongoing projects tackling invasive plants, invasive animals, EDRR, biocontrol of aquatic weeds, and wetland rehabilitation.

Job creation: a co-benefit

CCT has been highly successful in creating jobs focused on management of biodiversity and green spaces. Job creation is spread across the BMB, but the biggest intervention is in invasive species control, so this is where the most jobs can be created. Since 2011, the Invasive Species Unit has catalysed EPWP funding opportunities to the cumulative value of almost R145 m (external funding plus CCT funding). This translates to around 450 000 person days and 6 000 training days.

Skills development

Supporting and running parallel to the job creation programme are training and formal skills development programmes. These include on-the-job training for learners, students and interns. Training of EPWP, formal skills development programmes, students and internships are all critically important. Permanent worker and field ranger posts are advertised locally and EPWP workers are encouraged to apply.

People and Conservation

The protected areas in Cape Town are essential to community well-being. Local community members benefit from eco-centres, friend/community groups, volunteer and education programmes, recreation and tourism, as well as temporary and permanent job opportunities. Local communities are represented on the CCT's 11 Protected Area Advisory Committees (PAACs). Environmental Education Programmes have always been part of our protected area management approach.

Protected area management

While necessary, formal declaration of a protected area is not enough to adequately conserve its biodiversity in perpetuity. Biodiversity needs to be carefully and appropriately managed in order to be conserved. Thus, the Management Effectiveness of protected areas is critical for sustained success (Box 12).

Box 12. The METT

In 2006, Biodiversity Management identified the need for a system to monitor management in the CCT's protected areas. The Management Effectiveness Tracking Tool (METT), a tool developed by the World Bank and Global Environment Facility (GEF), is a high-level overview and can be used globally for reporting on protected areas. CCT was a leader in adapting the METT for use in South Africa and was the first conservation organisation to use it widely. The CCT-modified METT was then taken as the model to be used in all reserves under the CAPE banner. This model has now been refined (METT version1 2008, METT version1 2012, and METT-SA03 2017) and has been adopted by DEA as the system to monitor all protected areas in South Africa (Wood et al. in press).

3.2.2 Challenges for biodiversity management

Refer to the threats to biodiversity detailed in Chapter 2.

Security and law enforcement

The crime situation has increased exponentially in recent years, as has illegal squatting on CCT nature reserves and land invasion. The most serious issue is the land invasion at Slangetjebos Section of False Bay Nature Reserve; which is being handled in a protracted legal process. The security situation at Zoarvlei section of Table Bay Nature Reserve has recently improved as the result of an agreement with Paarden Eiland City Improvement District and the Cape Town Environmental Education Trust (CTEET). This agreement placed a reserve supervisor at Zoarvlei.



Dalton Gibbs

Land invasion in the Slangetjebos Section of False Bay Nature Reserve

Comments on development

Environmental Impact Assessment (EIA) comments and recommendations (based on the BioNet and Bioregional Plans) are seldom adopted in development decision-making by the Department of Environmental Affairs and Development Planning (DEA&DP). Developments are often approved without sufficient mitigation for biodiversity loss.

3.2.3 Reasons for successes and challenges

An increase in on-the-ground presence, through appointing qualified management staff and support via partnership projects, has greatly increased the probability of successful biodiversity conservation. Individual commitment to conservation by various staff members has also played an enormous role in overcoming various challenges. However, some of the

challenges remaining to be tackled include the currently inadequate operational budgets to effectively manage the nature reserves and other important biodiversity sites, and the separation of different departments that impact on biodiversity.

3.3 LINKS TO GLOBAL AND NATIONAL BIODIVERSITY GOALS

3.3.1 International

South Africa is a signatory to various international conventions, treaties, protocols and other agreements. The most important biodiversity conventions for CCT include (date of ratification by South Africa in brackets):

UN Convention on Biological Diversity (1995)

The tenth meeting of the Conference of the Parties (COP), held in October 2010 in Nagoya, Japan, adopted the updated Strategic Plan for Biodiversity 2011-2020, including the Aichi Biodiversity Targets (CBD 2011); see Box 13.

Box 13. Aichi Targets

The Aichi Biodiversity Targets are significant for CCT as each country's National Biodiversity Strategy and Action Plan (NBSAP) needs to align to these international targets. CCT's targets and implementation feed into the NBSAP and thus contribute to the Aichi Targets. These international targets could not be met were it not for the on-the-ground work of local management authorities.

The 20 Aichi Targets under the Strategic Plan for Biodiversity 2011-2020 are grouped under five strategic goals:

- Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society
- Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use
- Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity
- Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services
- Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.

The Aichi Targets are broad-ranging, covering aspects from avoiding extinctions of threatened species, to reducing subsidies that are harmful to the natural environment, to protecting 17% of the Earth's land surface and 10% of its seas by 2020. The CCT's LBSAP's strategic objectives and actions contribute to 80% of the 20 Aichi Targets.

Internationally, there is a specific emphasis on invasive species due to their negative impact on biodiversity, ecosystem services, and livelihoods. For this reason, countries across the globe developed strategies and legislation to prevent the introduction of potentially invasive species, and manage those species that are already in a country. South Africa ratified section 8h of the Convention on Biological Diversity whereby it undertook to manage invasive species.

UN Framework Convention on Climate Change (1997)

Natural systems play a key role in climate change mitigation and adaptation. Protecting and restoring natural areas enhances the CCT's climate change resilience.

Convention on Wetlands (popularly known as the Ramsar Convention) (1971)

The CCT-owned False Bay Nature Reserve was declared a Ramsar site (site 2219; designated on 2 February 2015), one of 22 in South Africa and five in the Western Cape. It is the only truly urban Ramsar site. It provides the CCT with a wonderful opportunity to ensure that this reserve benefits and local communities are educated on biodiversity issues. It is a huge achievement, and a just recognition of the importance and uniqueness of the CCT's natural assets and its ability to manage these assets.



City of Cape Town

False Bay Nature Reserve Ramsar site declaration (2 February 2015)

World Heritage Convention (1972)

South Africa is home to eight (four cultural, three natural and one mixed) world heritage sites, as determined by the UNESCO World Heritage Committee. Two occur in Cape Town: Robben Island (cultural); and the Cape Floristic Region (natural) represented by various sites, including Table Mountain National Park.

UN Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1975)

CITES has bearing on threatened biodiversity in the CCT, especially in the marine environment, e.g. Abalone.

UNESCO Man and Biosphere Programme (MAB)

The CCT contains sections of three biosphere reserves: Kogelberg Biosphere Reserve, Cape West Coast Biosphere Reserve, and Cape Winelands Biosphere Reserve.

3.3.2 National and provincial

South Africa 'needs to protect the natural environment in all respects, leaving subsequent generations with at least an endowment of at least equal value' *Executive Summary of the National Development Plan 2030*. The NBSAP (Government of South Africa 2015) is a requirement of contracting parties to the Convention on Biological Diversity and sets out a strategy and plan for contracting parties to fulfil the objectives of the Convention. This requirement is laid out in Aichi Target 17.

The Provincial Government of the Western Cape is at present finalising their Provincial Biodiversity Strategy and Action Plan. This plan will provide the link between the NBSAP and the CCT's LBSAP. The CCT was represented on the Steering Committee of this project in order to ensure alignment.

3.3.3 City of Cape Town

All municipalities in South Africa are required to complete and adopt an Integrated Development Plan (IDP) that guides decision-making and communicates its vision to its constituents. The IDP is linked to the Municipal Spatial Development Framework. The IDP recognises Cape Town's critical environmental assets, globally important biodiversity, and the significance of its 307 km coastline. The IDP focuses on sustainable development and creating a resilient City, as envisaged in Goal 11 of the Sustainable Development Goals.

The conservation of biodiversity falls under the IDP's strategic goals of being a *well-run city*, an *inclusive city*, and specifically, an *opportunity city*. Biodiversity management is aligned to seven of the 11 priorities listed in the IDP. Examples covered under Resource Efficiency and Security in the IDP 2017-2022 include the adapting to climate change project, biodiversity management project, and invasive species management project.

The **Local Biodiversity Strategy and Action Plan (LBSAP) 2009-2019** was approved in 2009 (Box 14). The LBSAP document provides an action plan for the protection and conservation of the CCT's biodiversity and natural assets, including the work done to implement the BioNet.

Box 14. What is LBSAP?

A Local Biodiversity Strategy and Action Plan (LBSAP) is a guiding strategy, complemented by specific actions and adopted by local governments to achieve optimal and realistic governance and management of biodiversity and ecosystem services. An LBSAP is essentially the local equivalent of NBSAP, which is the primary instrument used by national governments for implementing the Convention on Biological Diversity (CBD). LBSAPs were formally recognised in decision X/22 at the 10th Meeting of the Conference of Parties (COP) to the Convention on Biological Diversity, in 2010. The decision asks parties to encourage local governments to develop and implement LBSAPs in support of NBSAPs and the Convention.

City of Cape Town LBSAP 2009-2019

Vision

To be a City that leads by example in the protection and enhancement of biodiversity. A City within which biodiversity plays an important role, where present and future generations benefit from healthy and vibrant biodiversity. To be a City that actively protects its biological wealth and prioritises long term responsibility over short-term gains.

Goal

Biodiversity in the City of Cape Town is conserved and restored where appropriate, has resulted in significant participation by, and has delivered opportunities and benefits to its present and future generations.

Strategic Objectives

1. Develop and maintain relevant policies and strategies to ensure alignment with relevant International, National, Provincial and City of Cape Town legislation, policies and strategies.

2. Secure formal conservation status, manage, maintain and restore identified and existing terrestrial and wetland priority sites.
3. Identify, enhance and optimise socio-economic benefits and opportunities that are ecologically sustainable focusing particularly on the provision of green jobs and skills development programmes.
4. Significantly reduce the threat posed by invasive species to the City of Cape Town's natural, economic and social assets.
5. Increase communication efforts to enrich the City of Cape Town citizens' knowledge of our local biodiversity.
6. Ensure effective and efficient management of the Biodiversity Management Branch.

The LBSAP is coordinated and led by the EMD's Biodiversity Management Branch. Many other CCT line departments are involved in and responsible for biodiversity and resource conservation, and invasive species removal.

3.4 DESIRED STATE OF CCT PROTECTED AREAS

The **current state** of CCT nature reserves is that:

Their unique biodiversity and valuable ecosystems have been recognised as worthy of conservation, supported by the targets set in the BioNet and plans in the IDP. However, conservation targets are not yet achieved and the connectivity between areas currently conserved needs improvement. All CCT conservation sites have some requirement for ecological restoration, to promote optimal ecosystem functioning. Addressing priority infrastructure requirements to meet conservation and visitor requirements is underway as budget allows. All sites have a high risk profile for biodiversity protection and security. The CCT's commitment to the conservation of Cape Town's natural heritage is embodied in the fact that our nature reserves have been proclaimed under the Protected Areas Act 57 of 2003, and are managed according to the principles laid out in the Act.

The **desired state** of our nature reserves is to ensure that:

The CCT's conservation sites are conserved in perpetuity, proclaimed as nature reserves under the Protected Areas Act 57 of 2003. The CCT's protected area network is grown to ensure that a representative sample of our unique natural ecosystems is protected, as per BioNet targets. The CCT's nature reserves are well-managed ecologically functioning entities, with unique heritage protected and restored where appropriate, while providing critical ecosystem services and mitigation to climate change. Capetonians are proud of our nature reserves and the unique and irreplaceable natural heritage they contain; the areas are utilised by a diverse range of user groups for sustainable activities; the infrastructure is adequate to facilitate such sustainable use; and the areas are considered valuable assets to the surrounding communities and users of the site. Biodiversity and security risk is managed appropriately.

3.5 INTERACTION WITH OTHER AGENCIES

Not all conservation land within the municipality is owned and/or managed by the CCT (Table 4, Figure 5). CCT interacts with other agencies and private landowners to conserve the BioNet.

SANParks is mainly responsible for managing the Table Mountain Chain and liaises with the CCT's BMB on areas of mutual concern such as land consolidation, the BioNet, baboon conflict, penguin management, and enforcement especially in the marine environment. The CCT also has formal links with the management of biodiversity in the Table Mountain National Park via a bilateral forum and working groups.

CapeNature manages the provincial nature reserve Driftsands. The University of the Western Cape manages the Cape Flats Nature Reserve. Eskom (the country's electricity supplier) manages Plattekloof Natural Heritage Site and Koeberg Nature Reserve. Several other government departments, parastatals and private landowners 'manage' large tracts of Cape Flats land on which critical biodiversity is found. Certain private landowners manage land which is formally contracted to CapeNature through the Biodiversity Stewardship programme.

CapeNature, as the provincial nature conservation authority, has some responsibility for off-reserve biodiversity management and feeding into CAPE and National conservation targets. They are similarly responsible for invasive alien management and 'problem animal control', as well as the implementation of the provincial ordinance covering protected species. The CCT works closely with CapeNature to ensure common goals are achieved, and a Memorandum of Understanding deals with all these issues.

TABLE 4. BREAKDOWN OF CONSERVED LAND IN CAPE TOWN

Management Authority	Area	BioNet*
City of Cape Town	17 101 ha	20,12%
SANParks	25 100 ha	29,53%
CapeNature	7 822 ha	9,20%
Stewardship (CapeNature and CCT sites)	2 242 ha	2,64%
Eskom	2 826 ha	3,32%
Total	55 091 ha	64,81%

*Percentage of the 2009 BioNet, as of June 2018

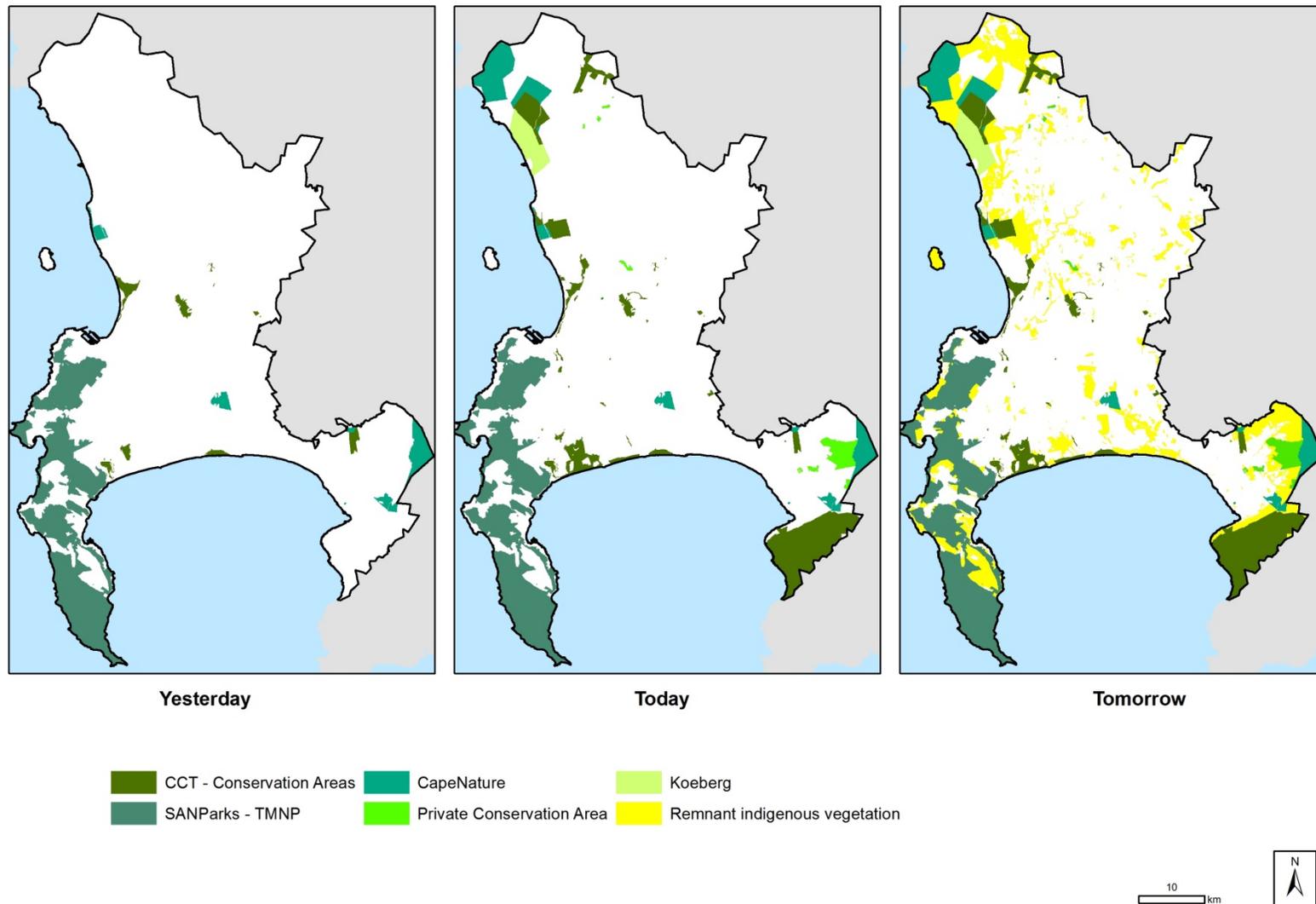


FIGURE 5. PROTECTED AREA EXPANSION IN CAPE TOWN: YESTERDAY (2008), TODAY (JUNE 2018) AND TOMORROW (FUTURE)

4. BIODIVERSITY MANAGEMENT ACTIONS

Effective biodiversity conservation in Cape Town can only be achieved through innovative responses to the challenges of conserving internationally recognised, irreplaceable biodiversity in an urban context. Given the rapid rate of urban expansion, there is an urgency to implement effective protected area expansion mechanisms in the CCT before the remaining key biodiversity sites are lost. Sites that are secured need to be actively managed to maintain and improve their biodiversity status. Not only do we need to monitor the state of our biodiversity, but also continually monitor the performance of management actions in relation to biodiversity goals. It is also vital to involve and benefit local communities in the protection of these precious places.

This chapter showcases a selection of the many successful implementation tools and biodiversity projects that our dedicated, passionate staff and partners are involved in. Some of these were initiated before the first biodiversity report was published in 2008, while others are in response to advances in technology and knowledge gained through scientific research. Most reflect the positive growth and development of the BMB.

4.1 PROTECTED AREA EXPANSION MECHANISMS

Securing CCT owned land

The process to secure and proclaim CCT owned land is ongoing. In the last 10 years, 15 000 ha of CCT owned and managed land have been formally proclaimed as nature reserves under the Protected Areas Act.

CCT owned land – Biodiversity Agreement areas

Some important areas of CCT owned land did not meet the protected area status criteria determined by Provincial Nature Conservation (CapeNature)'s protected areas review panel. Instead, they were given Biodiversity Agreement status as defined in the Western Cape Nature Conservation Board Act (No. 15 of 1998). A formal agreement has been signed between the CCT and CapeNature.

State owned land

State owned land identified as a Critical Biodiversity Area in the BioNet was selected and a process to acquire the land is ongoing between the CCT, CapeNature and Department of Public Works (the department responsible for State owned land). One of these, part of the Bothasig Fynbos Nature Reserve has been resolved and the land is now vested with CapeNature with the CCT taking full management responsibility for the entire area.

Private land – Biodiversity Stewardship

Biodiversity Stewardship (also known as Conservation Stewardship) is a cost effective method of growing the conservation estate. Conservation-minded private and communal landowners contribute towards the formal protection and management of threatened and high quality biodiversity on their properties by entering into an agreement with conservation authorities, who then support and incentivise the landowners for their conservation efforts. To date, the CCT has facilitated 18 stewardship agreements with private landowners.

The process is driven by the provincial conservation authorities in South Africa and recognises the landowners as the custodians of the biodiversity on their land. Biodiversity Stewardship is based on voluntary commitments from landowners with the owner retaining full control and title of their property at all times. The degree of commitment is determined by the landowner. Stewardship Agreements are tailored as such with the level of support from the conservation authorities increasing with the level of commitment made by landowners. Certain agreements are formally declared Protected Areas in terms of the Protected Areas Act, holding equivalent status to a National Park or Provincial Nature Reserve, while other agreements are contractual agreements between the owner and the provincial conservation authority (in the case of the Western Cape this is CapeNature).

The first private landowners joined the CCT Biodiversity Stewardship Programme in 2009, establishing the Nirvana Fynbos Conservation Area (Box 15). The Biodiversity Stewardship programme continues to grow and build positive relationships between private landowners and the various conservation authorities. One such flagship Biodiversity Stewardship initiative is the Dassenberg Coastal Catchment Partnership (Box 16).

Box 15. Restoring Nirvana at Cape Town's first Stewardship site

It all started in 2005 when Rosh Sewpersad and Tony Martin bought a piece of land in the Klein Dassenberg small holdings area, south of the town Atlantis. The property came at a good price, but only because it had been severely neglected and was densely overgrown with alien vegetation. They had no idea that once they started clearing the overgrown vegetation that they would uncover a host of threatened Fynbos species that had survived the barrage of invasive acacias that dominated the property. Rosh got into contact with the BMB, who were piloting a project, funded through the Wilderness Foundation Africa and the Table Mountain Fund, to establish a series of private protected areas within the most threatened Fynbos ecosystems of Cape Town. Rosh and Tony were the first landowners to join the programme in 2009 establishing the Nirvana Fynbos Conservation Area spanning more than 75% of their property. They were the perfect stewardship candidates, being very passionate about their portion of the Fynbos Biome. Their interest was initially sparked by their discovery of the spectacular Pink Wild Gladiolus (*Gladiolus caryophyllaceus*) on their property. With the assistance of the BMB, their farm manager, and a lot of hard work, nearly 20 ha of invasive species eventually were cleared.



Nirvana Private Fynbos Conservation Area

City of Cape Town

The next step was to conduct an ecological burn of the 30 year old, senescent Fynbos to rid the veld of pathogens and to stimulate renewed growth and seed germination. In March 2011 the first ecological burn was carried out on a 2,1 ha section of Nirvana where the Fynbos was most senescent. With the assistance of BMB staff and CCT Fire and Rescue

Services the ecological burn was successfully carried out and even with the dry winter experienced, the seedlings and resprouters were back in full force the following year. The Custodians of Rare and Endangered Wildflowers (CREW) of the Friends of Tygerberg Hill volunteers assisted Tony and Rosh with the compilation of a species list for the site. Over 160 plant species have been identified, 27 of which are threatened with extinction. Some of the gems uncovered include the Critically Endangered Flats Silky-puff (*Diastella proteoides*), Endangered *Gladiolus jonquilliodorus*, *Disa draconis* and the restio *Cannomois arenicola*.

Tony and Rosh established their own website www.nirvanafynbos.co.za where they publish their botanical findings. The farm today hosts small-medium events, workshops and exhibitions in their quiet, idyllic natural surroundings. Their stables are available for livery with six resident horses that are well cared for. Future plans include the establishment of an Environmental Education Centre, outdoor amphitheater, a private sculpture studio and garden with Reiki healing therapies. For all their hard work and spent resources, Rosh and Tony have featured in many publications and articles. *Mail & Guardian* newspaper named Rosh one of 2012's 200 young South Africans, an annual campaign recognising people under the age of 35 who are doing extraordinary things. They are true champions for the Biodiversity Stewardship programme and dedicated custodians of the spectacular biodiversity on their land.

Box 16. The Dassenberg Coastal Catchment Partnership

An important part of the BioNet is to create a viable ecological link between the Dassenberg Hills and the coast. The Dassenberg Coastal Catchment Partnership (DCCP) spans approximately 34 500 ha as a landscape-scale conservation initiative and multiple stakeholder partnership. The area is unique for its unmatched levels of threatened biodiversity, water security, climate change adaptation corridors, natural and cultural heritage, and associated socio-economic opportunities. Landownership within this area is a melting pot of State (national, provincial and local authority), private and communal. Mechanisms to protect and manage the land include a range of different Biodiversity Stewardship Agreements with the private and communal landowners, the conservation of State-owned land, land acquisition and development offsets as part of the Environmental Authorisation process.

Bokbaai private nature reserve

Bokbaai is a spectacular coastal property of approximately 1 000 ha of extremely high biodiversity value situated in the west of the DCCP. The conservation-orientated owners voluntarily purchased the property with the aim of formal conservation and management of the property through Biodiversity Stewardship.

The process is led by CapeNature and Bokbaai qualified as a nature reserve, based on its biodiversity value as assessed by the

Provincial Protected Area Expansion Review Committee. This will lead Bokbaai to being formally declared as a nature reserve, with long-term security and management of the site.



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Bokbaai spring flowers

Reactive stewardship

In some cases, as part of the development environmental approval process, a conservation site is secured. The conservation area may be given to the CCT and then proclaimed. This was the case with a section of the Diep River floodplain, which was incorporated into Table Bay Nature Reserve.

Private land acquisition

Table Mountain National Park has a land consolidation process to secure critical properties. One of the notable successes was to secure 450 ha of privately owned land. This incorporated the Noordhoek Wetlands, an extensive area of seasonal coastal brackish wetlands and seasonal intertidal sand lagoons. This acquisition was a partnership project between SANParks (managers of the Table Mountain National Park), CCT, other conservation partners, WWF-SA and the Table Mountain Fund.

Land acquisition by the CCT – land banking

Key biodiversity properties are proactively purchased and conserved to mitigate the loss of biodiversity remnants within the urban edge and industrial area of Atlantis, thereby facilitating new investment opportunities. This scheme is supported by Province's DEA&DP and CapeNature. To date, 873 ha have been secured in this conservation land bank. A total of 95 ha of development has been facilitated in Atlantis, with a further 68,37 ha in progress.

Innovative offset programmes

The Metro Southeast Strandveld Conservation Implementation Plan (CIP) is a collaborative CCT-led project including external conservation partners such as CapeNature, DEA&DP and SANBI. Owing to the urgent need for housing development land in the metro southeast, and the rapidly shrinking area of endemic and endangered strandveld vegetation in the area, this project was initiated to identify a key set of areas required to secure biodiversity resources and vital ecosystem services, and to set aside other less critical BioNet land for development. A framework and set of maps for this plan were approved in January 2014 and a proportion of the required operational budget has been allocated towards management of the smaller set of critical BioNet areas.



Metro Southeast strandveld
on the False Bay coast

City of Cape Town

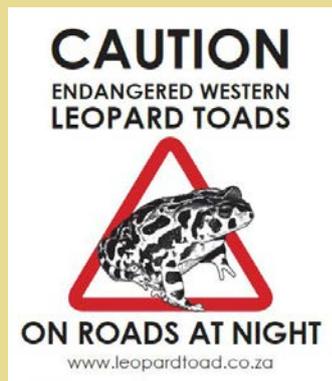
Conservation outside protected areas

Many species are not confined to protected areas. Greenbelts, open spaces, road verges, schools and private gardens provide habitat and can contribute to conservation. For example, the Endangered Western Leopard Toad (*Sclerophrys pantherina*; Box 17) lives for most of its life in natural vegetation, people's gardens or open space. It breeds in rivers or wetlands for a short period in August or September. The CCT line departments have agreed via a Service Level Agreement to not mechanically clean stormwater canals and rivers in these months. This has gone a long way towards the protection of this charismatic frog species.

Box 17. Western Leopard Toad – a flagship for urban conservation

The Western Leopard Toad (*Sclerophrys pantherina*) is a charismatic species that is in danger of extinction. This large toad, named for the leopard-like spots on its back, unique to each individual, only occurs in the coastal region extending from the Cape Peninsula and Cape Flats to the Agulhas Plain.

The majority of known breeding sites are unprotected waterbodies in public open space or on private land. The few protected sites are surrounded by urban sprawl, which threatens and restricts the foraging areas of the toads. Therefore, the cooperation of residents whose gardens form foraging and sanctuary areas for the toads is vital for the continued survival of



this endangered frog. Another major threat is road traffic and many toads are killed by vehicles while moving to and from their breeding grounds in late winter to early summer. In addition, the introduction of exotic fish species to, excessive abstraction from, and the pollution of the waterbodies in which these frogs breed can further diminish their numbers and negatively impact on their breeding success.

The significant threats faced by this species within its urbanised environment were recently increased by the introduction of the Guttural Toad (*Sclerophrys gutturalis*). The Guttural Toad naturally occurs in the north-eastern parts of South Africa, but was introduced to Cape Town. These explosive breeders now further threaten the survival of our Western Leopard Toads through competition for resources. To assist in managing the invasion of the Guttural Toad, please contact: invasive.species@capetown.gov.za.

It is important to note that Western Leopard Toads are a protected species and it is illegal to collect, translocate, keep or sell them. To learn more about leopard toads and to become more toad friendly visit: www.leopardtoad.co.za.



Western Leopard Toad (*Sclerophrys pantherina*)



Guttural Toad (*Sclerophrys gutturalis*)

Core Flora Sites

The Core Flora Sites form an important component of the BioNet lowlands (refer to Map 3 BioNet) and have remained a priority to secure by the conservation partners in the city. In 1999, of the 37 sites only 7 (or 22% by area – Figure 1) had some protection status either as a local authority or provincial nature reserve, or Protected Natural Environment:

- Rietvlei, Durbanville, Bracken, Wolfgat, Rondevlei and Tygerberg managed by various previous municipal substructures; and
- Driftsands managed by CapeNature.

One site, Cape Flats Nature Reserve, was managed for conservation by the University of the Western Cape.

By June 2018, apart from Driftsands and Cape Flats (where the original sites have decreased in area), six sites have dramatically increased in conserved area and are being proclaimed under the Protected Areas Act. Nine additional sites have been proclaimed, three are in process and four are managed (PAA status is planned). Almost 65% of the original Cape Flats Core Flora sites have been secured for conservation. Figure 1 below shows the status by area (hectares). In addition to this, four sites are managed with no conservation status: Blouvlei, Cape Flats Nature Reserve, Macassar Dunes and Kenilworth Race Course.

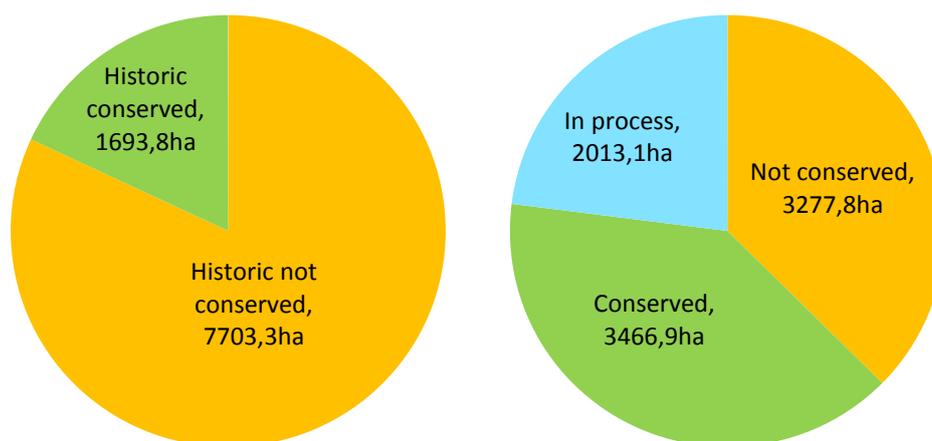


FIGURE 1. CONSERVATION STATUS OF CORE FLORA SITES IN 1999 (LEFT) AND 2018 (RIGHT)

4.2 INVASIVE SPECIES CONTROL

The BMB's Invasive Species Unit coordinates various projects related to invasive species control. The Early Detection and Rapid Response (EDRR) team target 15 plant species for control (see www.capetowninvasives.org.za/edrr for more information). Control of invasive alien plant species, especially acacias and pines, is the biggest intervention. Clearing invasive trees, especially in water catchment areas (Box 18), is crucial to reduce the risk of severe wildfires, restore our biodiversity and safeguard our scarce water resources. Control of invasive plants is managed more effectively through integrated control methods. In addition to mechanical removal and herbicide to prevent regrowth, biological control (biocontrol) agents help remove the invasive plants' competitive edge. Commonly used biocontrol agents are insects, mites and pathogens (disease-causing organisms such as fungi) that are the plants' natural enemies. They damage the plants by feeding on the roots, stems, leaves,

flowers or seeds. Aquatic weed growth can be prolific under poor water quality conditions and aquatic weeds quickly become a management challenge. One of the many aquatic weeds under control in Cape Town is Water Hyacinth (Box 19). Invasive alien animals include vertebrates (especially birds), invertebrates (such as slugs, snails, ants and wasps), parasites and pathogens that were deliberately or accidentally introduced by humans. Invasive animal control is an ongoing challenge (Boxes 20 and 21). Given the enormity of the problem, invasive species control facilitates the most job creation and skills development in the BMB.

Box 18. Water and invasive alien plants

Recent weather patterns and environmental events have once again highlighted human reliance on scarce natural resources, particularly water. Society pays the high costs of poor environmental management: severe vegetation fires in areas supporting stands of invasive alien trees (including pine plantations) that destroy built infrastructure; and reduced water yields from alien-invaded catchment and aquifer recharge areas. Invasive alien trees (especially wattles, pines, hakea and gums) are of larger stature than fynbos species and consume much more water, thus reducing run-off from our catchment areas into dams and reducing aquifer recharge. Ecologists regularly highlight the importance of good catchment management, particularly invasive alien control and fire, in order to conserve fynbos biodiversity and safeguard the ecosystem services upon which we all rely.

We rely on some catchments outside of the CCT boundary to provide much of our water, including the Boland and Groot Winterhoek mountains. We need to ensure that sufficient resources are being allocated towards invasive alien species control in these areas as well as priority sites within the CCT boundary. The BMB's Invasive Species Unit focuses on five key water catchments for the city:

Wemmershoek Catchment

The CCT owns and manages 2 400 ha (30%) of the Wemmershoek Catchment area, with the rest managed by CapeNature as part of the Limietberg Nature Reserve. The CCT shares 98% of the Wemmershoek Catchment boundary with CapeNature. To date, 2 075 ha have been cleared of invasive species.

Steenbras Catchment

The Steenbras dam, located in the Steenbras Nature Reserve, is managed by the CCT. The rest of the catchment area falls outside the City boundary. So far, 134 ha have been cleared of alien vegetation in this catchment.

Atlantis Aquifer

The Atlantis Aquifer spans the Witzands Aquifer Nature Reserve and Brakkefontein Biodiversity Agreement site. To date, 350 ha have been cleared of alien vegetation. In collaboration with the Cape Town Water Fund, Pond 7 and Pond 6 have been prioritised for invasive plant clearing and rehabilitation to optimise water infiltration and improve water quality.

Cape Flats Aquifer

The Cape Flats Aquifer covers an area in excess of 400 km² and extends from False Bay in the south, to Tygerberg Hills in the northeast and Milnerton in the northwest. In collaboration with

various CCT departments, nature reserves, public open spaces, rivers, canals and wetlands have been cleared and maintained of invasive alien species. The challenge for departments other than EMD is that invasive species management is not their primary mandate, so they do not have a budget allocation for invasive species control; thus much work is done reactively. Invasive plant control operations within nature reserves across the Cape Flats Aquifer cover 1 436 ha.

Lourens River Catchment

The upper reaches of the Lourens River Catchment are relatively natural, with some negative impact from commercial pine plantations. The removal of natural riparian vegetation along the river banks has resulted in invasion by alien plants from seeds dispersed downstream. The Lourens River runs mostly through privately-owned properties, thus making it a challenge to manage as a unified catchment. Nevertheless, through the Kader Asmal programme progress has been made, and CCT departments have collaborated to tackle this challenge by integrating their objectives; as a result there are 41 848 ha cleared and in follow up.



Initial clearance

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Targeted removal of invasive alien plants and maintenance of cleared areas will remain a leading priority for the BMB's Invasive Species Unit, so that further spread can be prevented. By eradicating invasive alien plants (especially trees), the base flows of rivers can increase and augment our water supply. This is especially effective where clearing takes place upstream of existing dams. A key strategy is thus targeted clearing combined with the aim of securing the ecological flow requirements of these rivers and estuaries. In a water-scarce municipality, quantifying the impacts of invasive alien plants, and understanding the associated management needs, must take place on the basis of ongoing and comprehensive monitoring.

Box 19. Black River clean-up

Water Hyacinth (*Eichhornia crassipes*) from tropical South America is the world's worst water weed. It has invaded lakes, dams, rivers and canals in Cape Town and can double its growth every ten days in summer, choking these waterways! In February 2012 a project began on the Black River to clear dense Water Hyacinth, using Working for Water, Working for Wetlands and the Mayor's Special Project: Kader Asmal Integrated Catchment Management funding sources. The river was divided into six reaches and floating booms (made from recycled materials) placed across the river to allow teams to tackle the river section by section, and to prevent the wind from spreading the Water Hyacinth. An integrated approach was adopted, using a combination of herbicide spraying, mechanical removal and manual removal. It took 40 workers four months of intensive labour to manually remove the Water Hyacinth. A long-boom excavator was used in one of the reaches and a team of workers made sure that any Water Hyacinth plants that were left behind were removed. Follow up clearing continues as needed. Flamingos and other waterbirds have returned to the river.



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Black River, Cape Town, choked with invasive Water Hyacinth (*Eichhornia crassipes*)

Black River after the intensive Water Hyacinth clearing operation

Box 20. House Crow control in Cape Town

House Crow (*Corvus splendens*) is a Category 1b invasive alien bird species from Southern Asia targeted for eradication in Cape Town. It can be identified by its glossy black body with dark grey chest. House Crows feed largely on waste and as a result are commonly found around human settlements and roost in Nyanga, Langa and Mitchells Plain. House Crow populations have adverse impacts on indigenous birds and other small fauna through predation, harassment, crop raiding, predation of smaller livestock and as potential vectors of human pathogens. They are even reported to harass school children and vendors to steal their food!

The first House Crow here was recorded at the Cape Town harbour in 1979, thought to have entered the country through ships sailing down the east coast. With a climate and urban environment suited to the crow's needs, the House Crow quickly adapted and established populations in Durban, Richards Bay and Cape Town. In Cape Town, the population was estimated to have risen to about 10 000 birds. In 2009 the CCT's Invasive Species Unit implemented a control programme, supported by the Cape Bird Club, Centre for Invasion Biology, CapeNature, Cape of Good Hope SPCA and other stakeholders. The population has since been reduced to fewer than 300 birds.

House Crows are controlled through trapping, and baiting (with laced bait). Traps are set up near the roost sites (or areas with high crow movement) and baiting is conducted at popular feeding sites. Both trapping and baiting are most effective between January and May, just after the



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House Crow trap



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House Crow (*Corvus splendens*)

breeding season. Juvenile crows fresh out the nest are the easiest to trap, and the most likely to feed on the laced bait.

Since the House Crow control project started, there has been an increase in indigenous bird species in Nyanga and other areas of the Cape Flats. The House Crow population here remains confined to the Cape Flats. Residents living around the roost have complemented the CCT for great work done to reduce the crow numbers and the resultant decrease in noise. Awareness has strengthened among residents. Cape Town's House Crow eradication programme has been used as a case study to replicate in countries such as Tanzania.

Box 21. Save our indigenous water fowl programme

The CCT started implementing a Mallard (*Anas platyrhynchos*) control project in 2011. Mallards, originally from Europe and North America, were introduced to South Africa through the pet trade. They are characterised by green heads with white collars in males, grey/brown plumage in females, and orange legs and feet, with upward-curved feathers on their tail. There is also the all-white farm yard variant. Mallards are a threat because of their ability to cross-breed with the indigenous Yellow-billed Duck (*Anas undulata*) and create fertile hybrids. If Mallards are allowed to move and breed freely we may lose our indigenous duck species to this genetic pollution. One of the biggest challenges with the Mallard control project is the severe public interference. Mallards have a long relationship with humans and are easily domesticated. As a result, the public are very sensitive to Mallard control. There have been protests, Facebook outbursts, newspaper articles and more condemning the Mallard control project. Control operations have been conducted at various sites across the CCT, including Sonstraal Dam in Durbanville and (most recently) Marina Da Gama in Muizenberg. Nearly all of these operations were hindered by public interference on the day. However, awareness of the severe negative impacts of Mallard invasion is spreading and there are an increasing number of residents who support the control teams while they work.



Mallard capture operation
in Marina Da Gama



Mallard (*Anas platyrhynchos*)
male (front) and females

4.3 FIRE AS A MANAGEMENT TOOL

Fynbos and Renosterveld are fire-prone and fire-dependent ecosystems. Without periodic summer fire to stimulate vegetation regeneration, species die out and biodiversity declines. Fire is thus a critical management tool for both maintaining and restoring biodiversity (see example in Box 22).

The BMB has developed guidelines and standard operating procedures for prescribed ecological burning and stack fuel burns, respectively. Ecological burns must be done before the end of the dry season (by early April) otherwise there are negative impacts on local plants and animals that are adapted to summer fires. Stack burns on the other hand are for fuel reduction following invasive alien clearance and are best done in winter to minimise damage to soils and indigenous seed banks.

Although fire cycle frequency can be quite broad (4-40 years), Fynbos is best burnt on a 10-15 year cycle (longer in the mountains) and Renosterveld more frequently (5-10 years). By implementing this fire cycle in conjunction with invasive alien plant control, the BMB optimally manages ecosystem functioning and plant and animal biodiversity.

Ecological burns must be carefully planned to optimise vegetation regeneration and minimise risks to adjacent communities and infrastructure. By being proactive in this regard, and preventing the build-up of dense fuel beds, the BMB simultaneously reduces the risks of a severe wildfire occurring under dangerous summer weather conditions (high temperatures and wind speeds) when controlling fire is very difficult and dangerous. Collaborations with City Fire and Working on Fire have greatly facilitated prescribed burning in CCT nature reserves over the past decade and many burns have been safely conducted. The CCT is a member of the Cape Peninsula Fire Protection Association (www.cpfpa.org.za).

Box 22. *Erica verticillata* – rediscovered and restored into the wild, with an unexpected twist

The Cape Flats Erica, or Whorled Heath, *Erica verticillata*, once grew as a narrow endemic, restricted to the southern edges of Cape Flats Sand Fynbos in Cape Town. Given the perilous state of its host vegetation type (<2% conserved), *Erica verticillata* succumbed to the combined pressures of urban development, small-scale farming, draining of wetlands, alien vegetation and extensive picking by flower sellers owing to its summer-flowering pattern when little else flowers on the Cape Flats.

By 1950 this species was extinct, being last seen near the shores of Zeekoevlei, and believed to be lost to the world. This changed in the late 1980s and the 1990s, when five plants were discovered in cultivation across the globe. The most remarkable was material in the Belvedere Palace Garden in Austria, grown from cuttings taken from the Cape in 1792/93! Between 1997 and 2003 cuttings from the five collections were



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Cape Flats Erica (*Erica verticillata*)
and Arum Lily Frog
(*Hyperolius horstockii*)

reintroduced to Rondevlei, where they thrived and produced viable seed. Since then two other populations have been established in natural habitat at Kenilworth Race Course and Tokai section of Table Mountain National Park. It will remain considered 'Extinct in the Wild' until it has regenerated naturally and proved to be self-sustaining.

March 2013 was important in the history of restoring *Erica verticillata*, with the first ecological burn put through the population at Rondevlei since it was planted in 1997. This was a first step in re-establishing a wild population and downgrading the species to Critically Endangered. Three generations are needed to achieve this, and so it was with eager anticipation that staff set fire to 150 of these plants. It was expected that the fire would race through the 2 ha population since the vegetation was tinder-dry and a good 15 km/h northerly wind was fanning the flames. Cameras were readied as flames engulfed the first plant. There was a burst of flames as the leaves torched up the tall bush and then (most unexpectedly) the fire passed on, leaving behind a dead plant skeleton. We thought that the first plant was an anomaly and keenly watched the next bush. The same thing happened: after a brief burst of burning leaves, the fire died down. What was more remarkable was that even the old dry twigs weren't burning. This is not typical fynbos fire behaviour in the dry fire season!



First ecological burn of
Erica verticillata

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Rondevlei immediately post-burn, March 2013;
note the unburnt skeletons of *Erica verticillata*

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The *Erica* population that burnt was planted and grew as a dense stand, excluding other species and creating a small localised node of dominance that is often witnessed in fynbos ecosystems. Plants on the outer edges of the population seemed to absorb the brunt of the fire, losing their leaves and being scorched, whereas those inside the population left burnt skeletons with their dry twigs and swollen seed capsules in place. Within a few hours these had burst open and with wind action were doing a perfect 'salt and pepper shaker' action scattering seeds across the newly burnt ground.

Although this behaviour was not anticipated, it is possible that the plant has evolved to dampen fires in order to protect its ripe seed capsules and thus optimise post-fire seed dispersal. This plant is revealed as a master of its fire-prone landscape, where it has managed to live in the midst of highly combustible neighbours who like their fires hot and furious, whilst taming these same flames to provide a cool fire environment for its fine seeds (Gibbs 2014). Now we wait in anticipation for the next two fire cycles so that we can say with confidence that the exquisite *Erica verticillata* is no longer extinct.

4.4 ECOLOGICAL RESTORATION

Ecological restoration in threatened ecosystems needs to be scaled up if we are to halt biodiversity loss. However, doing so in highly alien-invaded areas has proved challenging and requires research. In the early days, the BMB dabbled in active restoration in nature reserves and other conservation sites. Through scientific research and lessons learnt, best practice methods and success rates of restoration interventions have improved. Large-scale fynbos restoration projects have been initiated after removal of acacias (Box 23) and pines (Box 24), and small-scale renosterveld restoration interventions after ploughing (at Tygerberg Nature Reserve). Wetland restoration projects are helping to restore what was once lost (Box 25).

Restoration prioritisation study

Much remaining habitat in the city is threatened, but many areas are degraded and require restoration in order to contribute towards conservation targets. However, owing to this need and the high resource-intensity of ecological restoration, prioritisation was needed. We used an interactive analytical hierarchical processing tool, which enabled staff to agree on a set of criteria and sub-criteria for biodiversity and ecological functioning (including ecosystem services) prioritisation. These sub-criteria and criteria were weighted, the spatial datasets prepared and the spatial analyses run. Vegetation types within reserves that gave the highest scores were listed as priorities and the outputs used to assist with restoration planning. Priority areas were then assessed in terms of other factors, such as fire and invasive plant clearance, in order to schedule an appropriate date for active restoration interventions (i.e. post-fire sowing and/or planting) according to the subsidiary restoration management plans.

Box 23. Blaauwberg Sand Fynbos Restoration Project

In 2010, the BMB initiated a large-scale ecological restoration project east of Blaauwberg Hill in Blaauwberg Nature Reserve. Over 400 ha of dense invasive alien Port Jackson Wattle (*Acacia saligna*) is being cleared and restored to Cape Flats Sand Fynbos.

Site restoration potential was assessed by BMB staff by mapping fynbos vegetation remaining under the alien trees. A GIS intern then used historical imagery to map land cover classes that influence restoration potential, including previously ploughed areas, duration of alien invasion, and fires, to supplement the survey information. Many fynbos species have long-lived seed banks stored in the soil that may germinate after alien clearing and fire.

Alien clearance began in September 2012, coordinated by the BMB's Invasive Species Unit. As manager of Blaauwberg Nature Reserve, BMB was instrumental in providing on-site resources for 96 ha of alien clearance and follow up, a 32 ha ecological burn in April 2013, and extensive fynbos seed collecting. Within the 96 ha experimental area, two alien clearance treatments were tested in replicated 1 ha-sized plots: Fell and Burn in early autumn; versus Fell and Stack, with stacks burnt in winter.



Aerial image of the restoration treatments

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The important research component of this project resulted from collaborations among CCT, the Millennium Seed Bank project at Royal Botanic Gardens Kew (United Kingdom) and Stellenbosch University's Department of Conservation Ecology and Entomology. The Millennium Seed Bank project based at Kirstenbosch, SANBI, assisted with seed collection and storage. Two full-time post-graduate students registered at Stellenbosch University completed their research to investigate optimal restoration treatments (PhD thesis) and seed ecology (MSc thesis). Research findings have been presented at Fynbos Forums and are being published in scientific journals. Workshops were held with local stakeholders to discuss the results in terms of management and future research needs. Good progress has been made in identifying useful active restoration interventions. The best-practice lessons from research results have fed directly into reserve management and restoration interventions. However, further research is needed to explore more cost-effective interventions. To this end, the local partnership between CCT and Stellenbosch University is continuing and further research and alien clearing funding applications have been submitted.



Kirstenbosch staff assist with planting in plots



Restoration plot (fell & stack) monitoring in 2016

Box 24. Helderberg Nature Reserve restoration of pine plantations

The areas targeted for active ecological restoration in Helderberg Nature Reserve were historically under pine (*Pinus radiata*) plantations from the mid-1960s as an income-generator for the nature reserve.

Following wildfires in the area (1991 and 1994), three large pine plantation compartments were harvested. No active restoration interventions were implemented then and the veld was allowed to re-establish from indigenous seed banks in the soil which had persisted during 30 years of growth. An improvement to this practice would have been to sow local protea species that were eliminated by the pines as they store seeds in their canopies, and not in the soil.

Trees from the remaining three compartments were harvested in the winter of 2014, following about 50 years of growth. In this case, reserve staff collected seeds of local protea species and sowed these following harvesting and burning of the slash in autumn 2015. A research study by Stellenbosch University, Department of Conservation Ecology and Entomology, showed that in these areas, little of the native soil seed bank persisted and the number and cover of fynbos species regenerating was much lower than in the areas under pines for 30 years. Active restoration to reintroduce species from surrounding natural fynbos was



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Habitat condition assessment (May 2017) of the old pine plantation (felled 2014) above the dam

recommended on the 50 year old sites, in addition to the proteas sowed, to ensure the recovery of a representative community of the indigenous plants that once grew there, and to minimise possible soil erosion on the cleared and burnt areas. It was further recommended that to save resources, pine plantations and areas invaded by pines should be cleared before the trees reach 40 years (Galloway et al. 2017).

Moddervlei, a small ephemeral wetland of five hectares, was infilled during canal construction in 1958. In 1994 this area was incorporated into the False Bay Nature Reserve and cleared of alien vegetation. The wetland is a resurgence wetland, receiving ground water. Between 1995 and 1997 the overburden sand was excavated, exposing the original soil layers and their dormant seed banks. Once unearthed, the original seed banks germinated after being covered for 38 years, resulting in six indigenous plant species returning, one of which is Critically Endangered. This wetland is in Cape Flats Dune Strandveld, an Endangered vegetation type endemic to Cape Town.



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Moddervlei in False Bay Nature Reserve

The BMB Restoration Facility

The BMB habitat restoration facility, based at the Westlake Conservation Centre, collects and processes local indigenous seeds and propagates priority indigenous plant species for selected ecological restoration projects in the CCT. Most restoration projects are located in degraded areas of highly threatened ecosystems.



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Smoke treatment of fynbos seeds



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Seed processing for propagation at the Westlake Restoration Facility

Box 25. Skilpadsvlei Conservation Area – bringing back what was once lost

Skilpadsvlei was described in 1915 as a beautiful wetland that was ‘a paradise for wild birds, terrapins and frogs’. Like many urban wetlands, the Skilpadsvlei wetland system was filled in and drained during the 1900s for urban expansion and a portion of the area planted with alien Kikuyu grass (*Pennisetum clandestinum*) to create a campsite. These actions effectively destroyed the only known breeding site for the Endangered Western Leopard Toad (*Sclerophrys pantherina*) in Kommetjie. Fortunately, a portion of the site was retained over the years as public open space and some 70 years later the CCT embarked on the restoration of this system to bring back the lost wetland and facilitate the Western Leopard Toad breeding in Kommetjie again.

After years of planning around various constraints, securing approvals and partnerships, the CCT commenced with excavations in April 2012 to remove fill material from the wetland area. The fill was used in an Oceanview Housing project and excavated rocks were used for landscaping and habitat creation. The project entailed the re-establishment of a deeper waterbody to provide adequate habitat for adult Western Leopard Toads to breed and the tadpoles to have enough water to develop fully over the six month period (from July to December) they need. The second phase entailed removal of fill from an adjacent area and shaping to re-establish a seasonal wetland area. These areas were planted with carefully selected locally indigenous plant species to ensure the habitat would be optimal and to restore wetland functioning. To ensure that the area was also a public asset, pathways and boardwalks were methodically installed, service infrastructure was upgraded, the unsightly pump station was beautified and signage installed to provide information on the project.

The success of this project was significant and evident on many levels. The Western Leopard Toads returned and started breeding successfully in September 2012. This is now one of the more important breeding sites in the city and significantly contributes towards the conservation of this threatened species. The restored wetland areas also provided additional habitat for frog species including Cape Sand Frog (*Tomopterna delalandii*) and Flat Caco (*Cacosternum platys*), mammals such as Cape Serotine Bat (*Neoromicia capensis*), dragonflies such as the Red-veined Dropwing (*Trithemis arteriosia*), and birds such as Yellow-billed Duck (*Anas undulata*). Skilpadsvlei is once again a functioning wetland system and a well-used public asset for the residents of Cape Town. The SA Wetland Society gave the project a National Wetland Award in 2014. It also fostered wonderful partnerships, both among CCT departments and with external partners, notably the Kommetjie Environmental Awareness Group (KEAG) and the Kommetjie Residents and Ratepayers Association (KRRA).



Seasonal wetland before (2012)

Seasonal wetland after (2014)

Main excavation (July 2014)

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SANBI Threatened Species collaboration

Building on previous collaborations for threatened flora conservation and restoration, the CCT, BMB and SANBI Kirstenbosch Gardens recently entered into a formal agreement to partner in conserving threatened plant species in the city. This partnership will include the sharing of ex situ stock plants that are used to produce cuttings and/or seeds for species restoration projects. Kirstenbosch has specialised seed bank facilities for longer-term seed storage of species that need reintroduction at a later stage, for example following habitat restoration. Kirstenbosch has expertise in plant propagation that can benefit the CCT Restoration Facility through information sharing, while BMB manages threatened species in situ in nature reserves. This requires optimal management of their habitats including invasive alien plant control, ecological burns and monitoring.

4.5 MONITORING PERFORMANCE IN RELATION TO BIODIVERSITY GOALS

The effectiveness of management in CCT nature reserves has been assessed annually since 2007 using the Protected Area Review (PA Review), a customised version of the METT-SA (Management Effectiveness Tracking Tool developed for South Africa to meet international conservation management standards). The PA Review assessment has helped reserve managers prioritise efforts to improve management effectiveness, in line with the standards set and assessed by the METT-SA conducted every five years. The scores from both assessments can be used as an indication of the improvement in the management of the reserves over the past 10 years (Figure 2).

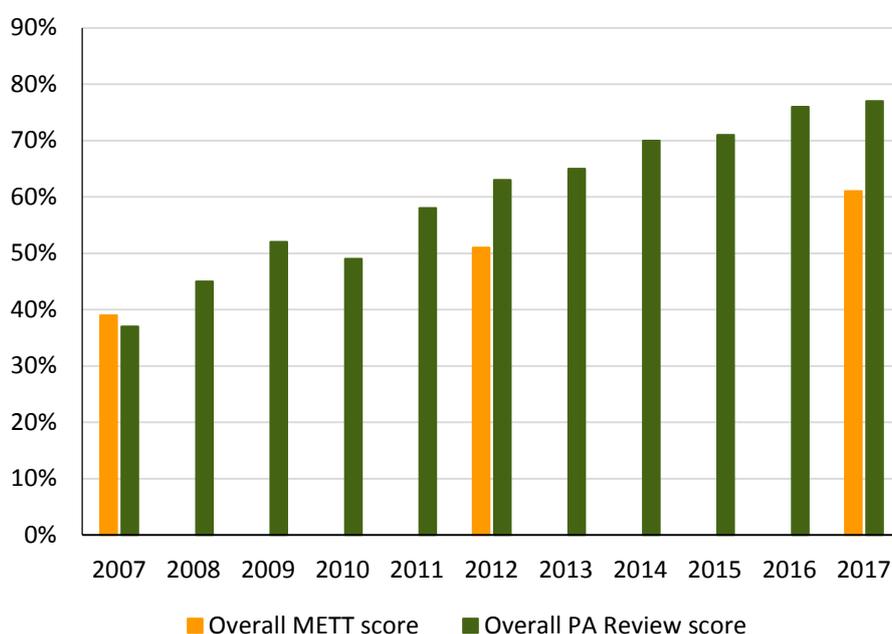


FIGURE 2. BIODIVERSITY MANAGEMENT EVALUATION 2007-2017

In 2007 most protected areas had 'clearly inadequate' (less than 33%) management. In 2012 all protected areas were in 'basic management with significant deficiencies' (33-67%). By 2017, 12 protected areas had 'basic management with significant deficiencies' (33-67%) while four had progressed to 'sound management' (>67%).

The massive improvement in the scores between 2007 and 2012 was mainly attributed to processes across the protected areas: consolidation of the BMB, division of budget so that each protected area had a dedicated budget, preparation of management plans for each area, demarcation of boundaries, and the process to obtain formal conservation status. Further improvement from 2012 to 2017 may be attributed to preparation of subsidiary plans; increase in budget, staff and equipment; better systems; habitat condition mapping; and improvement of databases. A more detailed management effectiveness tool, the Protected Area Review, is undertaken yearly. There is now 10 years' worth of Protected Area Reviews and METT assessments available for analysis. Results are being used to compile an updated Protected Area Review to support preparations for the updated METTs assessment format (METT-SA03). The CCT baseline METT-SA03 was undertaken in early 2018. Protected Area management is no easy task (Box 26).



Biodiversity Management Branch staff and reserve management activities
(City of Cape Town)

Box 26. A day in the life of a protected area manager

There are many things in life that are uncertain, but for a protected area manager one thing is certain: the most unexpected things can happen at the most unexpected times. Perhaps a blue-green algal bloom will render your recreational waterbody useless on the day before a big sports event. Perhaps a wildfire will start on Friday afternoon after all the staff have gone home for the weekend. Perhaps a dry pan will start to blow off a cloud of dust in the strong Southeaster. Or your neighbours will complain about the Bulrush (*Typha capensis*) pollen, or irritating swarms of midges ('miggies'). Perhaps a cargo ship will become stranded on a portion of your beach. Perhaps all the fish in your lake will suddenly turn belly-up overnight. Perhaps an underground sewer pipe will spring a leak into your estuary. Perhaps the flood of a lifetime will hit your area on the public holiday. You know your phone will be ringing off the hook, and your mailbox will be flooded with complaints. You sigh.

The satisfaction associated with the work of a protected area manager is often preceded by months of dedicated planning, applications for permission, and public participation. The actual enjoyable event often only lasts a few hours at most: a prescribed ecological burn, a game relocation operation, completion of a management plan, the proclamation of your nature reserve, the grand opening of your new information centre. These are the things that make it all worthwhile... but the feeling of joy is often fleeting, and the glory is quickly forgotten.

You are responsible for a piece of land with immeasurably valuable biodiversity on it. You are charged with protecting this and managing everything that could possibly affect it. You are doing it for the people of your city. It is a very large responsibility. All your training and experience doesn't always give you all the answers. You don't always know what to do, but you are committed to shoulder the burden.

Back to the grindstone: you have five meetings back-to-back, and no free time today. A colleague is sick. The toilet leaks. The bakkie has a puncture. The internet is off-line. People line up at your door. A pile of messages awaits you. Your mailbox is full. What more could go wrong in one morning? You get an email from the Communications Office that you must respond to a media enquiry about a public complaint that you have already dealt with, and they want your response very urgently. You type a reply and send it off... it's out of your hands now. Life goes on, but the next disaster will strike soon. It often feels like it never ends.

And at the end of the quarter, you lock yourself in your office. You need some quiet time to reflect on the impact that you and your team have had, and how your nature reserve is doing under all the pressures. You have to wrap-up all the work that was done and put it all in your report. For a moment you forget about the outside world, because you must finish your report. You set yourself a deadline. You stay late until it is done. You insert a few mentions of your partnership relations. They might appreciate it. You add pictures of the most exquisite wildlife sightings, groups of laughing children, team events, action from the field. People relate to such images. You click send. You close the laptop and head home to rest.

When you get in the next morning there might be a few emails that say "great report," "well done," and "thank you!"

Biodiversity is monitored in CCT reserves, with projects in place to track changes in vegetation (long-term plots) relative to management activity; fauna activity including top predators and herbivores (Box 27); and presence/absence of selected threatened and endemic species. A standardised process to assess biodiversity habitat condition has been designed and conducted at all proclaimed CCT nature reserves and key conservation sites on the BioNet. This baseline assessment facilitates restoration planning and prioritisation. The assessment method can be repeated to track habitat condition change over time.

The extent of invasive alien vegetation and clearing activity is monitored by the Invasive Species Unit, and various projects are underway to test the efficacy of some clearing methods and techniques.

The area of biodiversity remnants lost to developments or secured for conservation is tracked. This allows performance to be assessed in relation to the CAPE goal, as well as national and international conservation targets.

An internet-based interactive database has been functional since 2007. This facilitates recording details of all sightings at each site, tracking of persistence of species on sites, translocation of species between sites; and automates the production of a species list per site. In total, 115 521 sightings have been logged to date (end June 2018).

Box 27. The return of the herds

Many of the larger game species that historically occurred in the Western Cape were probably at much lower densities and with larger home ranges when compared to the savanna regions. Most of the game that moved through Cape Town in the past was probably highly nomadic and would move great distances in response to food availability, particularly favouring recently burnt vegetation. Game animals were soon eradicated once the Cape was colonised. Many of the CCT nature reserves are too small to be viable for the introduction of the larger game species such as Eland and Red Hartebeest. Nevertheless, the role these herbivores play in ensuring sound ecosystem functioning is recognised. The BMB's primary obligation is to ensure that our nature reserves are managed according to ecologically sound principles. To this end, the reintroduction of game will only occur when it is clear that this intervention will benefit ecosystem functions and processes on a site and the area is large enough. The generally small sizes of our reserves and the lack of large carnivores dictate that all populations of large mammals will require intensive management.

Nine Eland and five Red Hartebeest were donated to BMB and released at Blaauwberg Nature Reserve, a site considered suitable; and some have bred since. The movement of the introduced animals is being monitored by camera traps and regular patrols. A vegetation monitoring project is underway to measure the effect of these species on the different vegetation types and the fynbos restoration area on site.

(Small yet persistent) – Although declared a threatened species due to loss of habitat, the Cape Grysbok is probably the most plentiful antelope in the city. Management activities include frequent counts to estimate numbers per site; capture of animals from overpopulated sites to release at underpopulated sites; rescue and care of animals injured due to inappropriate human activities; and movement of individuals between isolated sites

in the same area to facilitate genetic interchange.

There is a concern that the lack of activity by large browsers in some areas is leading to unnatural formation of thickets that persist despite fire. The Gantouw Project was initiated in 2015 to test a method that simulates the process of natural herbivory by large herbivores. Through the Gantouw Project, a small herd of five Eland have been hand-reared and habituated to being herded daily onto a small site (about 10 ha) from a boma close by. Project staff measure the impact of the Eland activity by recording what plant species they eat, their effect on plant species dominance and biomass, the degree of shrub cover on site, as well as their effect on the level of activity of other species on site. If this method proves to be feasible and beneficial, it can be used to replicate the process of herbivory by large browsers on the small, fragmented conservation sites that are threatened with unnatural bush encroachment.



Gantouw Project

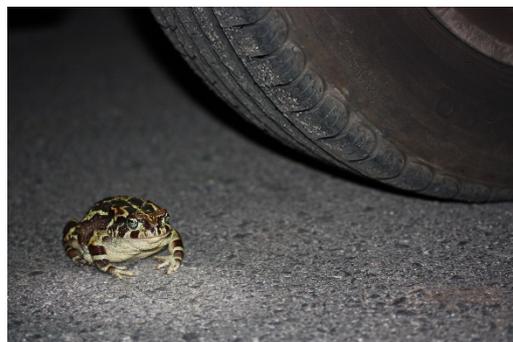
A young Eland brought to False Bay Nature Reserve

4.6 URBAN WILDLIFE CONFLICT

Many of us are lucky to experience birds and other wildlife in our backyards, public parks and open spaces. Some animals have adapted to living in cities and take advantage of human food sources, shelter and safety from predators. Sometimes animals such as baboons and snakes become 'problems' because of our actions and increasing urbanisation. Some are considered pests. Most animals are helpful. For example, insectivorous bats can eat 50-70% of their body weight in insects in one night... that's a lot of mosquitos!

We must be aware and mindful that we live next to nature; that animals are not confined to nature reserves; and our actions have consequences. Too many wild animals die as a result of irresponsible use of pesticides and poisons, becoming entangled in or choking on plastic and other litter, predation by domestic cats, or roadkill.

Motorists are urged to reduce their speed and be more vigilant when driving near nature reserves, especially at night, to avoid knocking down wildlife. Animals such as owls, grysbok, caracals, otters, baboons, porcupines, mongoose, genets, tortoises, and snakes are killed on our city roads every year. Many of these animals are nocturnal, so it makes it difficult for motorists to see them at night when they unexpectedly cross roads searching for food, new territories or mates. In most cases, animals are hesitant to cross roads as these are foreign environments, so they often do so suddenly and unexpectedly. By slowing down, motorists can ensure their own safety, the safety of other road users, and the protection of our wildlife.



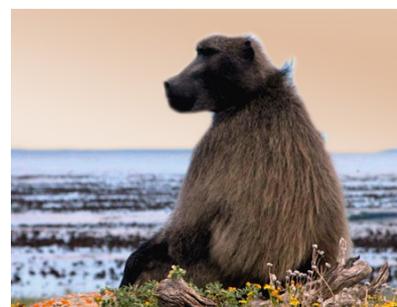
Dalton Gibbs

Many animals are killed on roads at night

Baboon Management

Chacma Baboon (*Papio ursinus*) forms a part of Cape Town's rich biodiversity and is a considerable tourism asset. Despite management interventions, conflict between baboons and humans (residents, property owners, businesses such as wine farms and restaurants, fishermen and tourists) continues to be a problem in several areas on the Cape Peninsula and in Gordon's Bay.

In the city, the Cape Peninsula has received most of the attention and funds for baboon management. Since 2010, 11 of the 16 to 17 troops have been managed via a tender (the remaining 4 or 5 troops are considered largely non-raiding and are found in and next to the Cape Point section of Table Mountain National Park). The current service provider (since 2012) is Human Wildlife Solutions (HWS). The tender runs until June 2020 and costs about R12 m per year. The primary cost is for baboon rangers to ensure that baboons are kept out of the urban areas.



Chacma Baboon (*Papio ursinus*)

City of Cape Town

Baboons are wild animals and run real risks of injury and death when they enter the urban environment. The project has been very successful and it has been proven scientifically that the welfare of baboons rises when the conflict between baboons and urban dwellers is managed. Fewer baboons died as a result of conflict between 2010 and 2018, than during the period 2006-8 when contact between baboons and society was at its worst. During this early era, monitoring was simplistic and walking tours among the baboons encouraged. Interaction between urban dwellers and baboons ultimately brought retaliation from angry residents by way of poisoning, shooting and injuries caused by motor vehicle collisions.

Baboon management considers that the increased habituation of troops in the southern Cape Peninsula meant that they were less afraid of humans, became increasingly comfortable with raiding, and the conflict in the suburbs was consequently high. After many years of management, the Peninsula baboon population is steadily growing and is thus not considered to be under threat.

The existing programme continues to deliver excellent results and the partnership with the community via the joint Baboon Technical Team (BTT) comprising CCT, SANParks, CapeNature and the Navy; and the Baboon Liaison Group (BLG) comprising Councillors, representatives of the affected ratepayers, SPCA and Baboon Research Unit (UCT), is going from strength to strength. The programme run by the service provider HWS, however, remains costly. Troops spend 99,5% of their time out of town (the tender stipulates that troops need to stay out of town for over 90% of the time). Individual baboons only raid for 5,1% of the time. The hotline calls for the last year are one indicator of high urban conflict areas. Welcome Glen and Glencairn are where the Da Gama troop is located and whose individual males spend a lot of time in town. Similarly, Simons Town is visited by the Waterfall troop.

Waste Management still remains a challenge throughout all the sections. This is particularly relevant to properties under the stewardship of the SA Navy and SANParks. In other areas such as Heron Park, local restaurants and waste generated by households continue to be a problem as they provide feeding stations for baboons. Without adequate waste



Female baboon unable to decipher the double-lock system on a bin bay door

City of Cape Town

management in these baboon-affected areas, waste will remain an attractant to baboons and hamper management efforts.

Recently, there were several dispersing males in the northern population. Some of these males could potentially be moved to the south to maintain genetic diversity. However, there needs to be a vacancy in the receiving troop in order for the translocation to be viable. Unfortunately, if there were no vacancies, some dispersing males had to be euthanised.

In addition to the baboons on the Cape Peninsula, the BMB manages baboon troops in the Steenbras Nature Reserve. In 2016 the Virtual Fence system was implemented to limit human-baboon conflict in Gordon's Bay. This management method takes the baboon behavioural traits into consideration and simulates the formation of a boundary which the baboon troop no longer finds desirable to cross. This management technique is proving extremely successful at keeping the animals out of town, enabling the reserve staff to focus on other important conservation management activities. The success of this programme is being evaluated with a view to roll it out in other areas with similar challenges both within and outside the CCT and potentially for the Cape Peninsula baboons.

4.7 COASTAL MANAGEMENT

The CCT's Coastal Management Branch assume accountability and management of the City's coastline (seaward of the defined Coastal Urban Edge as reflected in the Municipal Spatial Development Framework) so as to ensure ongoing economic growth and nodal development opportunities, increased access and social value, coastal risk reduction, and the management and conservation of the natural coastal environment and systems.

Marine Protected Areas

In 2004, Table Mountain National Park (TMNP) declared the Marine Protected Area (MPA) around the Cape Peninsula to help ensure that commercial and recreational use of the ocean's resources is sustainable. Its jurisdiction includes 1 000 km² of the seas and coastline around the Cape Peninsula. This has promoted the sustainable management of the coast, and secured specific restricted areas to protect its ecosystems and associated rich marine and coastal biodiversity. Fishing is allowed in the majority of the MPA – subject to valid permits from the National Department of Agriculture, Forestry and Fisheries, regulations and seasons. However, the MPA includes six restricted or 'no-take' zones where no fishing or extractive activities are allowed. These no-take zones are important breeding and nursery areas for marine life. By leaving these undisturbed there should ultimately be an increase in marine stock and threatened species are being given a chance to recover.

On 29 December 2000 (GN R1429), the Helderberg MPA was declared under the Marine Living Resources Act (MLRA) with the intent to improve management of the area; increase marine and coastal monitoring and law enforcement; promote and expand marine and environmental education; and promote regular coastal clean-ups, arranged with the help of local communities and organisations. Helderberg MPA lies on the north-eastern side of False

Bay, in Strand; within the jurisdiction of CCT and includes the last portion of untouched sandy beach in False Bay. It comprises 4 km of sandy beaches with mobile dune systems that dominate the coastline in the area, with offshore low lying sandstone rocky reefs, kelp beds, sandy soft sediments and pelagic environments. It harbours the last relic population of the Giant Beach Pill-bug (*Tylos granulatus*) south of Yzerfontein. It is an important roost site for up to 20 000 terns, which migrate each year from Finland, Estonia and other Balkan countries.

Marine animals – tourism promotion and conflict avoidance

The CCT, in collaboration with partner organisations, is involved in innovative initiatives to protect marine animals, promote responsible and sustainable nature-based tourism activities, and minimise marine wildlife conflict with humans.

The sharks, whales and dolphins of the Western Cape support rapidly growing ecotourism (e.g. whale-watching), adventure tourism (e.g. shark cage diving), and video documenting industries. We have some of the world's best whale-watching spots on shore from which to enjoy whales, especially Southern Right Whale, which visit our waters between June and November. The Shark Spotters Programme (Box 28) aims to find a balance between recreational water safety and White Shark conservation by reducing human-shark interactions.

Box 28. Shark Spotters

In response to a spate of shark bite incidents that began in 2004, community-driven shark-spotting initiatives developed in Muizenberg and Fish Hoek. These have evolved into the formal shark-spotting programme co-ordinated by the CCT. A warning flag system is used as follows:

- a **green** flag means visibility for the spotters is good, and no shark has been seen;
- a **black** flag means visibility for the spotters is poor, but no shark has been seen;
- a **red** flag means a shark has been seen recently, but is no longer visible to the spotters;
- a **white** flag with a black shark, along with a loud siren, means a shark has been sighted, and bathers should leave the water immediately; and
- **no flag** means spotters are not on duty.

The programme improves beach safety through both shark warnings and emergency assistance in the event of a shark incident. It also contributes to research on shark ecology and behaviour, raises public awareness about shark-related issues, and provides employment opportunities and skills development for shark spotters.

False Bay hosts a high number of large White Shark, linked to the availability of food in the form of South African Fur Seals on Seal Island. Research has shown that White Sharks remain close to Seal Island from autumn until spring. This corresponds with the time the seal pups spend prolonged periods in the water, learning to catch their own prey. The pups are weaned in August/September and then disperse, after which the sharks leave the vicinity of the island and move closer inshore, swimming parallel to the coastline. It is predominately female White Sharks that patrol the inshore areas during summer. Therefore, sharks are most likely to be seen off beaches in False Bay during the summer months (October–March).

Penguins are an iconic species, loved by locals and tourists alike. Cape Town has one of only two mainland African Penguin colonies (Box 29) in South Africa. At the colony in Simon's Town, penguin monitors are employed to make sure penguins are kept safe and not harassed by members of the public.

Box 29. African Penguin (*Spheniscus demersus*)

The African Penguin was the first of the world's penguins to be discovered by Europeans and records dating back to 1497 make reference to huge populations in South Africa and Namibia. That changed dramatically in the early 1840s with the global guano rush where vast quantities of seabird droppings ('white gold') were removed over a matter of months for fertilizers. These guano 'caps' on the breeding islands had accumulated over thousands of years and provided optimal nesting habitat for penguins. Without this spongy insulation, nests were left exposed to the elements and predators, and penguin numbers plummeted. The impacts on penguins continued with commercial egg collection, over-fishing and oil pollution. Most historically large penguin colonies were on the west coast of South Africa, but starting in the mid-1990s their prey (mostly sardines and anchovies) moved to the south coast. This means that penguins have to swim further to find food.

At the start of the 20th century it is likely that there were in excess of 2 million African Penguins. By 1950 there were fewer than 300 000 and in 2001 the global population was estimated at 179 000. In 2016 the global population was estimated at only 50 000 breeding individuals, and therefore, African Penguin is now classified as Endangered.



African Penguin (*Spheniscus demersus*)



African Penguin adult with juveniles in the nest

In Cape Town we are privileged to have one of only two mainland African Penguin breeding colonies in South Africa. The first African Penguin egg was laid at Boulders Beach in Simon's Town in March 1985 and the colony steadily grew since then. Although African Penguin numbers in South Africa have continued to decline, the Simon's Town colony has been relatively stable with approximately 854 breeding pairs. The colony is mostly within the Boulders Section of the Table Mountain National Park, but there are nesting pairs at Burgher's Walk outside of the national park. The CCT, SANParks, CTEET and SANCCOB (South African Foundation for the Conservation of Coastal Birds) are working together to best protect this important colony from threats such as road mortality, feral and domestic cats and dogs, pollution and physical disturbance. Land-based colonies are also vulnerable to wild predators, including caracal, mongoose, seals (who also threaten island colonies) and even leopard in some areas. In addition to conservation efforts to overcome these threats, the

marine environment adjacent to the penguin colony is the Boulders Restricted Zone within the TMNP MPA, in which fishing is not allowed and activities such as diving are regulated. With passionate people and wide-ranging conservation initiatives, we will do our best to ensure the long-term survival of this charismatic species in Cape Town.

4.8 CARING FOR HERITAGE ASSETS IN BIODIVERSITY AREAS

In addition to the two proclaimed World Heritage Sites within the CCT, there are many heritage treasures located in the biodiversity areas that require conservation. The Biodiversity Management Branch has received invaluable assistance and support from the heritage practitioners in the Environment and Heritage Branch to assess heritage sites and assets in nature reserves to allow for correct management decisions. Special thanks also go to researchers, Friends groups and volunteer teams that assist in improving knowledge, interpreting and conserving elements and sites of historic value. Assessments of all heritage assets in the CCT protected areas is still underway. These assessments will ultimately be used to compile integrated heritage management plans to guide activities at these sites.

Noteworthy heritage work on conservation sites in the past ten years include:

Research and excavation of the Wolfgat Cave by Iziko Museums: This sea cave has proven significant for eliciting more data towards our understanding of the Cape Flats as it existed 10 000 to 100 000 years ago. A replica of this cave is planned for construction in the new Wolfgat Environmental Education Centre to allow for interpretation of this knowledge to be more accessible to all, and encourage visitors to the Wolfgat Nature Reserve.



Looking for fossils in the limestone cliffs at Wolfgat Nature Reserve



Fossil bones from the Brown Hyena den dating back to c.45 000 years ago

Further research into the Early to Late Stone Age sites along the west coast of the CCT: Some of these special coastal areas are now protected as part of the Blaauwberg and Witzands Aquifer nature reserves.

Delineating the routes and location of the Battle of Blaauwberg and further research in the area: Guided tours and re-enactments of this significant battle between the Dutch and British in 1806 are offered by the Friends of Blaauwberg. Efforts to improve interpretation and education of this and other military history assets located at Blaauwberg Nature Reserve continue.

Relocating the old 1700s Call-Up Gun System signal cannons to original sites across the Cape: Some cannons (that have been cared for by the Cannon Association of South Africa) have been placed on the original signal locations now protected in nature reserves in the City. The original 12 pounder cannon was returned to a site in Tygerberg Nature Reserve in 2012. The signal site at Bracken was restored to its former signal status with the placement of a 6 pounder, donated by the SA Navy and renovated by the Friends of Bracken. This cannon was fired on site in commemoration of Heritage Day in 2013, and every September since. Kanonkop has been acquired by the CCT for biodiversity management (as part of Witzands Aquifer Nature Reserve), and so has the cannon. This 8 pounder will be returned to site once fully restored.



City of Cape Town

Firing the 6 pounder cannon in Bracken Nature Reserve on Heritage Day 2013

4.9 PEOPLE AND CONSERVATION

A people-centred approach to biodiversity management is central to the BMB's ethos. Without buy-in from the general public, especially neighbouring communities, the continued protection of natural areas would not be possible. This is especially important in an urban setting such as Cape Town, where biodiversity sites must coexist surrounded by densely populated areas. The opposite is also true. People need biodiversity, not only for survival (we rely on essential ecosystem services), but also for recreation, stress reduction, employment, income-generating opportunities, and education. The CCT's nature reserves are often the only quality natural area remaining within a short distance of many communities.

By implementing strategic environmental education, training, awareness and community conservation efforts, the BMB has become more efficient in achieving its core objectives.

4.9.1 Environmental Education

Various environmental education initiatives are run by the CCT to ensure that both children and adults are provided with the knowledge and skills required to become better custodians of our environment, whether as learners, teachers, parents, community members, or nature conservators.

Ensuring safe, quality programmes

A set of minimum standard criteria was developed by the BMB in order to regulate how environmental programmes are run. Initially, a few programme standards were set, targeting the most critical areas of business, such as curriculum alignment for schools programmes run during the school day. Next, the focus shifted to environmental talks, holiday programmes, overnight camps and other activities that do not take place during the school day, and include both children and adults. Standards were set with each programme in mind. A risk assessment and prevention protocol was added to the minimum standards to enable People and Conservation Officers to address all potential risks that they may face during an outing.

Environmental Education facilities

The CCT manages 14 Environmental Education facilities in 11 nature reserves, including two overnight facilities. The False Bay Environmental Education Centre and the Rondevlei Bush camp overnight facilities are managed in partnership with the Cape Town Environmental Education Trust (CTEET; Box 30). These Environmental Education facilities service most communities in and around Cape Town. Almost 40 000 learners from over 1 000 schools participate in formal Environmental Education programmes annually, resulting in approximately 54 000 person days of education. When other educational events are added, it equates to 84 000 person days of education each year!

Box 30. The Cape Town Environmental Education Trust

The Cape Town Environmental Education Trust (CTEET) is a Not for Profit Organisation established in 2001 as a partnership between the CCT and the Table Mountain Fund. The aim of the programme was to positively impact the lives of underprivileged children from the Cape Flats with a life-changing environmental experience. The Trust is run by a board of Trustees and employs a number of fixed-term contract employees (varying between 10 and 60) funded out of donations and partner sponsorships.



CTEET continues to run the Environmental Education Camps at False Bay Nature Reserve, outreach and other education programmes. CTEET has also been running conservation-related training and development initiatives since 2007 and accredited learnerships since 2014. Through these programmes, over 90 youth have been empowered to enter year-long, work-based training programmes on nature reserves across the city. Graduates have moved on to jobs in conservation with positions such as Field Rangers with CCT and Security Officers at Quemic South Africa (active at CCT reserves).

Whereas most day-programmes run for three hours, a weekend camp allows facilitators to engage with learners for two days. Camps allow participants to experience nature reserves at night, and get a feel for what nature conservation is all about. Camps help re-establish personal connections, allow a sense of independence, and allow for better creativity. Most importantly in today's ever-growing age of technology, camps are a tech-free environment that facilitates the practice of essential life skills.

Various environmentally-themed holiday programmes are hosted across the city. These programmes offer parents a safe space for their children to spend time during the holidays. Children benefit by learning, having fun and getting active outdoors. These programmes provide an opportunity for facilitators to connect with learners for a longer period than in a traditional day programme, especially for those who attend year after year. This long-term connection with nature, reinforcing how important the environment is to our survival, builds the conservators of tomorrow.

Environmental calendar days

Each year the CCT offers programmes linked to Environmental Calendar Days, such as Wetlands Month (February), Water Week (March) and Biodiversity Month (May). Schools are invited to participate in celebrating these special days at a reserve and for those who are unable to do so, the CCT staff visit the schools through its outreach programme.



Environmental Education programme themes include biodiversity, water and wetlands, heritage, sustainable living, marine and coastal, waste and energy, and climate change (City of Cape Town and CTEET)

4.9.2 Training and skills development

The BMB is involved in various skills development programmes in collaboration with the Wildlife and Environment Society of South Africa (WESSA), Cape Peninsula University of Technology (CPUT) and CTEET. The CCT's nature reserves and specialised biodiversity units support learners in need of practical experience and skills development. Support is offered throughout different stages of a young conservator's life: from school programmes, to student and internship programmes, and continues for employed conservation staff and teachers.

The BMB affords nature conservation, nature management and environmental management students the opportunity to complete their Work Integrated Learning (WIL) at a nature reserve or specialised unit. Students are given a series of training opportunities throughout the year. Students gain valuable work experience and complete projects required to graduate.

Through the CCT's internship programme, the BMB offers opportunities for young graduates to develop skills and gain valuable work experience. Additional internship placements are enabled through partner organisations. Around 50 youth (learners and interns) are placed at ten reserves yearly through the CTEET-CCT partnership.



'Growing Together' intern induction 2017

City of Cape Town

As part of the CCT's training policy and ethos, CCT students, interns and staff are afforded training opportunities provided by external service providers relevant to their work situation (Box 31). Examples of training include fynbos identification, fire and first aid. Other internal training interventions such as Smart Living training, and Customer Service are held at regular intervals and staff are invited to participate. With the wealth of

experience and knowledge within the BMB, training interventions such as the Bioblitz Monitoring Training are held annually for conservation students. Content covered includes anti-poaching, and bird, mammal, frog and plant surveys.

Box 31. Skills Development Programme: turning lives around for the benefit of nature

In many parts of Cape Town, unemployment rates are high, and households have little or no access to income or further education. Biodiversity conservation is sometimes perceived as a hindrance to development. Many low-income communities do not or cannot access nature reserves for recreation and so fail to take ownership of natural open spaces. Efforts are made to target unemployed people in low-income communities for job creation, skills development and training programmes, like the Expanded Public Works Programme (EPWP). However, many of these programmes are short-term or temporary sources of income, and often do not directly link to further opportunities.

Since 2005, the BMB has been collaborating with internal and external partners to establish a multifaceted skills development programme for biodiversity management. This comprises

eight programmes at different levels, and allows candidates to progress through these while working closely with permanent Biodiversity Management staff on CCT nature reserves. The programme challenges the barriers to training, capacity building and sustainable income by providing ongoing opportunities for skills development and career progression in biodiversity and nature conservation. This clearly demonstrates strategic alignment with national, provincial and CCT objectives to address high unemployment rates.

Grant (Garnet) Revell is a shining example of how this skills development programme is successfully uplifting and upskilling individuals for a career in biodiversity management and conservation. Grant came from a disadvantaged upbringing in Mitchells Plain. He dropped out of school at an early age, and turned to a life of crime as a drug dealer. Running with the gangs meant he needed protection and started receiving death threats. After he got married and had his first child, he realised he needed to turn his life around. In 2006, he secured a temporary job with the BMB on the shores of Zeekoevlei, first cleaning and then clearing alien plants. He was chosen for a nine-month skills development programme in 2007, where he



Grant (Garnet) Revell

learned about fire-fighting, chainsaw brush-cutting, basic computer skills, driving, first aid, and social interaction (how to talk to fellow workers). His potential was quickly recognised by management and he was given other projects to work on, with increasing responsibility. Grant and several programme participants were then offered permanent jobs with the CCT. Grant, as team leader, foreman and project manager, now mentors others on skills development programmes. He was honoured with the Fynbos Forum's 'New Conservator' award in 2012. Grant is currently employed at False Bay Nature Reserve as a field ranger, manages the hall bookings, and has a far more positive future ahead of him.

In order to create a better understanding in local communities about the work that we do, the BMB offers strategic community training sessions that cover topics such as greening and smart living. Approximately twenty such community conservation training sessions are held annually with over 250 community members trained.

4.9.3 Communication

The CCT functions as a local conservation authority, and as such must adequately and effectively communicate biodiversity management goals and activities to stakeholders.

Strategic communication

Biodiversity communication within the EMD formerly was conducted on an ad hoc, sporadic basis. Communication was largely reactive, and lacked clear, consistent messaging that profiled and promoted biodiversity management. In response, the BMB developed a Biodiversity Communication Strategy and Action Plan 2011, revised in 2014. The strategy outlines the scope for biodiversity communication in the BMB, and defines specific actions for its implementation. It is designed to contribute towards achieving the goals of the CCT, LBSAP, EMD and BMB. By implementing strategic biodiversity communication, the CCT has become more efficient in biodiversity communication efforts and makes better use of

resources. This strategic approach ensures that all biodiversity communication follows the same vision, principles and goals of overarching CCT policies.

Target audiences

Various priority target audiences have been identified, as it would be over-ambitious and unsuccessful to target our diverse population under one campaign. Therefore, communication efforts are focused on well-defined target audiences to test and maintain a continuous flow of consistent messages and activities. Internal (CCT staff) audiences include EMD staff especially the BMB, Councillors and decision-makers. External (public) audiences include private landowners, developers, schools and learners, the media, conservation partners, Friends Groups and volunteers, as well as Capetonians at large.

Brand development

To ensure consistent communication, and to maintain a professional approach, a nature conservation co-brand was developed by the CCT in 2010, and refreshed to complement the CCT's new brand and logo in 2015. The purpose of the co-brand is to enhance the visibility and accessibility of the CCT's nature conservation function to the public. Branding helps distinguish CCT staff from other nature conservation organisations (CapeNature, SANParks) that operate in Cape Town. To ensure brand recognition for the nature conservation function and what we do, various templates were developed to ensure that all nature reserves, specialised units and BMB staff use the same branding.

4.9.4 Resources

Publications

Each year roughly 160 biodiversity resources are reviewed or developed by the BMB. All these resources add to the goal of communicating with target audiences across Cape Town in order to create a better understanding of biodiversity, its importance, what threatens it and what can be done to protect it. Various biodiversity-related books, pamphlets and posters cover the reserve network, species and vegetation types, better conserving Cape Town's biodiversity, education, and smart living.

Signage

Signs draw attention, reinforce branding and convey information about an organisation. At the CCT's nature reserves directional, zonation, access point and name signs provide important information to visitors. Informational signs assist visitors with orientation, explain activities that are and are not allowed in an area, provide contact details, and management authority information. Interpretive signs provide biodiversity awareness and educational opportunities for visitors. In 2012 a standardised signage style guideline was developed to ensure consistency across the reserves and add specialist communication input into signage content. Green, white and yellow colours were selected so that signed areas are instantly recognisable as conservation areas. Since the inception of the signage style guide over 1 000 signs have been designed, produced and installed.

4.9.5 Media and public relations

Media exposure

Over 120 media matters are dealt with by the BMB each year, approximately 20% being proactive, with the remainder in response to a particular event or query from journalists. In

this way biodiversity-related matters gain valuable exposure through various channels including television, radio, magazines, newspapers and newsletters. The CCT’s website is a powerful tool used to gain exposure for biodiversity and the CCT’s nature reserves. The CCT’s social media platforms, especially Facebook and Twitter, are used to relay specific messages to the general public about topical biodiversity matters.

Our nature reserves receive exposure from external organisations and partners through their websites and social media pages. Certain CCT nature reserves have even been listed on Trip Advisor. This is a useful tool to receive feedback from the public and measure how a reserve is doing in comparison to other local facilities. In 2017, Helderberg Nature Reserve received a certificate of excellence from Trip Advisor and was listed in the top three places to visit in the Helderberg area.

Internally, CCT staff are exposed to the work of the BMB through the staff newsletter *CONTACT Magazine*, and *e-nform* the staff news log. Both platforms showcase BMB work and acknowledge staff for their contributions in the field of conservation.

Each year in May CCT computers are loaded with a biodiversity-themed background for two weeks to celebrate the International Day for Biological Diversity (22 May). Approximately 20 000 CCT staff members have access to computers and therefore exposure to this important message promoting the work done by the BMB to conserve Cape Town’s unique, irreplaceable biodiversity.



Biodiversity-themed CCT desktop background from May 2017 (left) and May 2018 (right)

Public relations



Osman Asmal (Director: EMD) and Julia Wood (Manager: BMB) at the BMB staff recognition day (2016)

The BMB hosts a staff performance recognition and team-building day in November. This has bolstered staff morale. Each year various awards are handed out and this has become a motivator for staff throughout the year and a highlight on the day. The most sought after award, ‘Reserve of the Year’, is an excellent motivator for teamwork throughout the year.

Since 2011, the BMB has presented its annual progress report to all Subcouncils in September. Presentations keep the councillors abreast of the work done within the BMB. The Subcouncils are invited to visit their choice of the CCT’s nature reserves. Reserve visits allow for networking

opportunities and ensure connections are made for work that needs to be transversal. Over 100 Subcouncil staff and Councillors visit the nature reserves each year.

The BMB participates in various external public relations activities that target the public. Maintaining the balance between the needs of people and the needs of biodiversity can be tricky, so the BMB continually engages with relevant communities and stakeholders. Most nature reserves invite communities for open days to experience the reserve. Community meetings are held on a continual basis. Exhibitions are a great way to reach out to local communities across the city. The BMB participates in three types of exhibitions: educational, general awareness and careers exhibitions.

4.9.6 Protected Area Advisory Committees

In 2015 the CCT established Protected Area Advisory Committees (PAAC) for 12 Nature Reserves and Protected Natural Environments in terms of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003). These are: Blaauwberg, Bracken (including Perdekop), False Bay (including Rondevlei, Zeekoevlei, Pelican Park, Slangetjebos, Zandwolf and Strandfontein Birding Area), Helderberg, Lourens River, Table Bay (including Rietvlei, Diep River, Milnerton Racecourse and Zoarvlei), Tygerberg (including Bothasig Fynbos), Witzands Aquifer, Wolfgat, and Zandvlei Estuary. In 2017 an additional PAAC was established for Steenbras (including Harmony Flats).

The PAACs are constituted in terms of the Regulations for the Proper Administration of Nature Reserves published under Government Notice R99 in Government Gazette 35021, 8 February 2012. The objectives of the committees are to facilitate interaction, communication, engagement, and the development of partnerships with stakeholders and surrounding communities to promote the objectives of the Nature Reserves. The Constitution for the Establishment of PAACs within the CCT, was adopted by the Portfolio Committee on Energy, Environmental and Spatial Planning in November 2014, and determines how these Committees are operated. Committees are mandated to give advice and input on strategies, management plans and reports, as well as monitor progress of implementation, promote involvement in decision-making and facilitate linkages and integration of nature reserves with surrounding communities.

The PAACs consist of members from different user groups, community organisations, non-governmental organisations, academic institutions and residents' associations of neighbouring communities who have a real interest in nature reserves. Two CCT councillors are also appointed to each PAAC and CCT Departmental and private specialists are invited to attend quarterly meetings when necessary.

In 2018, the existing PAACs are being reviewed according to Section 5 of the Advisory Board's Constitution. Members of the existing advisory committees or management forum in relation to any of the above Nature Reserves must re-apply for membership and the appointment of members will again not exceed a period of three years. In 2018 two new PAACs will be established: Edith Stephens and Durbanville (including Uitkamp Wetland and Botterblom). The Lourens River PAAC will expire and will not be renewed. Renewals happen every three years, so Steenbras PAAC will be reviewed in 2020. A PAAC Chairpersons Forum was initiated in 2016. This Forum meets regularly to allow for more holistic integration of all PAACs.



PAAC quarterly meeting

City of Cape Town



PAAC site visit

City of Cape Town

4.9.7 Visitors

Events

Twenty to thirty special events are held each year, with over six thousand people attending. Annual events include the False Bay Birdathon and the Peninsula Paddle. More frequent, smaller events include the monthly Tygerberg Full Moon Walk/Run and Helderberg Nature Reserve Summer Concerts. Not all events are held on a reserve, for example the annual Eco Fun Day held at the Navy Sports Field in Glencairn.

Recreation

The CCT's nature reserves offer incredible inland, coastal and wetland areas that can be used for a wide variety of recreational activities. Activities range from popular social activities (picnicking and braaiing) to more specialised activities (such as sand boarding, trail running and orienteering) (Box 32). Fishing spots are available at many of the reserves, with Table Bay Nature Reserve popular. Water sports such as canoeing, sailing and motor boating are also popular with visitors. Non-motorised boating activities such as canoeing and windsurfing are catered for at Table Bay, False Bay, Blaauwberg and Zandvlei Estuary Nature Reserves. Swimming is mostly limited to the coastal reserves, but hikers can enjoy a dip in the rock pools at Steenbras Nature Reserve. Hiking can be self-guided or a guided hike booking can be made for a variety of routes, which include night walks and full moon walks. Over 2 000 people opt for a guided hike each year. The CCT's nature reserves offer unrivalled birding opportunities (see Box 33). The CCT's reserves offer 13 facilities for functions and can accommodate over 800 people across the city at any given time. Some venues offer facilities for smaller groups for meetings, workshops or children's birthday parties. Others offer venues suited to larger events, weddings and conferences. Blaauwberg Nature Reserve's overnight accommodation, Montispectus, offers the opportunity to enjoy an almost 360 degree view of Cape Town, including Robben Island and Table Mountain. Imagine waking up to that unrivalled view!



View of Table Mountain from Blaauwberg Hill, with *Aloe perfoliata* in bloom

City of Cape Town



Montispectus, the hilltop accommodation in Blaauwberg Nature Reserve

City of Cape Town

Box 32. Activities accommodated on the nature reserves

Nature appreciation: Bird watching, walking, hiking, photography, specialised nature appreciation (frog walks, plant identification (CREW), bird ringing, spider walks and spring walks to see flower displays), star gazing, night walks, full moon walks, guided day walks, city views and weekly eco ranger programme. Environmental centres, information centres and bird hides. Accessible natural ecosystems for research (five major institutions in the vicinity – UCT, SU, UWC, SANBI and CPUT).

General recreation: Picnicking, braaiing, dog walking, jogging, peace of mind, religious outings (Easter sunrise), prayer sessions, geocaching, orienteering, treasure hunts and wine tasting walks.

Watersports: Fishing, canoeing, yachting, kite surfing, wind surfing, dragon boating, recreational boating (small motor), model boats, power boating and water skiing.

Adventure recreation/tourism: Kloofing, 4x4, sandboarding, quad bikes, mountain biking and trail running.

Conference and functions (outdoor and indoor venues):

- Private: Kids parties, birthday parties, engagements, hen parties, bachelor parties, wedding ceremonies, wedding photos, baby showers, tea room, film shoots, and overnight accommodation (Blaauwberg).
- Corporate: Christmas and end-of-year functions, corporate team building, conferences, workshops, training, organisational AGMs, security forum meetings, City departmental meetings and Provincial government meetings.
- Public: Sunset concerts, yoga classes, Kite festival, Bird-a-thon, heritage events (canon firing, Battle of Blaauwberg), markets, fun runs, mountain bike fun rides, tourism companies with tours, wheelchair paths, and outings for wheelchair-bound and mobility-impaired people.

Environmental Education: School groups, school hikes, scout groups, rovers, orphanages, old age homes, mentally and physically challenged youth, and youth at risk. Overnight Environmental Education camps at False Bay (permanent overnight facilities), Tygerberg, Witzands and Macassar.

User groups: Over 200 user groups including friends groups, bird clubs, reptile clubs, Volunteer Wildfire Services, FGASA, Universities, SANBI, Millennium Seed Bank and SAEON.

A PhD study (2010), entitled Identity and Belonging: Urban Nature and Adolescence Development in the City of Cape Town, “demonstrated that the assumptions that teenagers are generally alienated from nature were unfounded, in fact the great majority of youth from all socio-economic groups related positively to nature. It was found that nature provides teenagers with a positive context in which to reflectively develop their identities” (Ashwell 2010).



Activities and events in nature reserves
(City of Cape Town)

Box 33. Strandfontein birding

Bird watching is an extremely popular (addictive and often competitive!) hobby. The Strandfontein Birding Section (around the Strandfontein Waste Water Treatment Works) in the False Bay Nature Reserve is considered one of the best birding sites in South Africa, and arguably the best waterbird locality in Cape Town. It is possible to spot 80 species of bird on a summer's morning... from the comfort and security of your car. Over 200 species of bird have been recorded at this site. In good years, 20 to 30 thousand waterbirds use this site.

In July 2016, a Rufous-Tailed Scrub Robin (*Cercotrichas galactotes*) was spotted near the Zeekoeivlei picnic area. This caused great excitement in birding circles, because it was the first record for this species in southern Africa and only the second African record south of the equator.

In late 2016 another extremely rare bird, a Temminck's Stint (*Calidris temminckii*), was found in the Strandfontein Birding Section. This was the first record of the species in southern Africa for over 30 years and over 1 200 people made the pilgrimage to see it. There have only been four twitches (birding events) of more than 1 000 people in southern Africa's birding history. It is highly significant that three of those occurred at CCT protected wetland sites!



City of Cape Town

Birders flock to the Strandfontein Section of False Bay Nature Reserve

The good wader habitat available in the Strandfontein Birding Section is in part due to CCT (in partnership with Cape Bird Club) conservators manipulating water levels in some of the pans, and thereby creating a wide diversity of habitats. False Bay Nature Reserve is recognised by BirdLife South Africa as a globally Important Bird and Biodiversity Area (IBA). It is also a Ramsar site (Wetland of International Importance), designated on 2 February 2015.

4.9.8 Volunteers

Volunteers significantly contribute towards the protection and management of our biodiversity sites. As budgets tighten and staff complements are stretched across the growing network of conservation areas in the CCT, unpaid volunteers fill critical gaps and get work done that otherwise would be impossible given capacity constraints. In 2016 the BMB took a more formalised, structured approach towards its volunteer programme. This centralised approach allows for better coordination of volunteers between nature reserves and in specialised units (the Restoration Facility and Invasive Species Unit). BMB volunteers assist with various management tasks, environmental education, invasive species clearance, and litter clean-ups. For vocational volunteers this is a win-win situation. Local and international students benefit by gaining valuable work experience. Job shadow learners get a taste of a career in conservation. Volunteers that are not linked to an educational institution are also welcomed. There are many ways you can help in your everyday life (Box 33).



Volunteers assist with clearing invasive alien plants, restoration planting, seed collecting and environmental education (City of Cape Town and CTEET)

Box 33. How YOU can help

We can live in harmony with nature and reduce conflict with wild animals. There are lots of practical things that we all can do, and a variety of local initiatives that we can join.

In your garden and home:

- Plant locally indigenous, water-wise flowers, shrubs and trees.
- Remove invasive alien species.
- Plant an organic food garden.
- Make a compost heap to reduce reliance on waste removal.
- Use natural compost and pest avoidance techniques.
- Avoid harsh chemicals, pesticides and herbicides.
- Plant indigenous groundcovers or mulch your soil to save water.
- Harvest rainwater.

Be a responsible citizen:

- Save water and electricity. This saves money!
- Reuse and reduce waste. Avoid single-use plastic and unnecessary packaging.
- Slow down on roads near nature areas.
- Never throw a burning cigarette out of your car window.
- Never start a veld fire. Be responsible when cooking over open fires.
- Do not litter, dump or destroy our veld, rivers and wetlands.
- Keep rubbish bins tightly closed.
- Take rubble and garden refuse to an established dump – do not leave it in the veld.
- Oil and other chemicals must be disposed of at an established dump – do not throw them away in the veld or down your water drains.
- Put a collar and bell on your cat to alert and protect small indigenous animals.
- Keep pets (especially cats) indoors at night.
- Keep your dogs on a leash when walking in forests and other natural areas.
- Keep livestock and poultry in covered enclosures at night.
- Do not feed wild animals, especially baboons. It is illegal and you will be liable to a fine.
- Do not approach, corner or harm wild animals, especially baboons.
- When you see a snake, leave it alone. Most snakes are harmless to people, and the few that are venomous will only bite if they feel threatened.

Get involved:

- Become aware of the main environmental needs and issues in your community.
- Learn more about the animals that share your space. Birding is a rewarding hobby.
- Visit and enjoy nature reserves and conservation areas.
- Make use of the recreational and educational facilities our nature reserves offer.
- Help us detect new invasive alien species before they become a problem.
- Join the Botanical Society, Cape Bird Club, CREW or a Friends group.
- Volunteer.

Let's act together to care for Cape Town's special plant and animal life.
Our lives depend on nature.

GLOSSARY

Alien species: Species introduced to areas outside their natural range. See 'invasive species'.

Biodiversity (biological diversity): All the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Biodiversity Network (BioNet): The conservation plan for the City of Cape Town, which spatially locates the sites that are needed for conservation to meet National Conservation Targets as determined by SANBI.

Biodiversity Stewardship: A model for expanding protected areas in which the State conservation authority enters into legal agreements with landowners to place land that is of high biodiversity value under formal protection. Also called Conservation Stewardship.

Biodiversity Target: The minimum proportion of each ecosystem type that needs to be kept in a natural or near-natural state in the long-term in order to maintain a viable representative sample of all ecosystem types and the majority of associated species.

Biome: An ecological unit of wide extent, characterised by complexes of plant and animal communities and ecosystems; determined mainly by climatic factors and soil types.

Bioregional Plan: A biodiversity sector plan that has been published in the Government Gazette in accordance with the Biodiversity Act (Act 10 of 2004); produced in accordance with the nationally agreed Guideline for Bioregional Plans as published in the National Biodiversity Framework (Notice No.291, Government Gazette No. 32006, March 2009).

Climate change: Long-term changes in weather patterns, including temperature, wind and rainfall, whether due to natural variability or as a result of human activity.

Climate change adaptation: Initiatives and measures to reduce the vulnerability of natural and human systems to the actual or expected impacts of climate change.

Ecosystem: An assemblage of living organisms, the interactions among them and with their physical environment.

Endemic: Restricted or exclusive to a particular geographic area, occurring nowhere else. *Endemism* refers to the occurrence of endemic species or ecosystems.

Fynbos: A biome dominated by shrubby vegetation, mostly with very small, narrow ('fyn' meaning 'fine' or 'narrow') leaves, like heather; along with wiry, reed-like plants called restios, and taller shrubs and bushes with broader, leathery leaves, like proteas. Fynbos occurs predominantly in the south-western Cape.

Habitat: The area or environment occupied by a species, or groups of species, due to the particular set of environmental conditions that prevails there.

Indigenous: A species that occurs naturally in an area, and has not been introduced by humans either accidentally or intentionally. Also referred to as 'native' species.

Integrated Development Plan (IDP): A strategic development plan required by law and developed through participatory processes, to guide and inform all planning, budgeting, management and decision-making in a municipal area in South Africa.

Invasive species: Any species whose establishment and spread outside of its natural distribution range threatens ecosystems, habitats or other species; or has demonstrable potential to threaten ecosystems, habitats or other species; and may result in economic or environmental harm or harm to human health.

Protected Area: An area of high biodiversity, formally proclaimed (protected) by law and managed primarily for biodiversity conservation. Several categories are defined by the Protected Areas Act (Act 57 of 2003); determined according to management objectives, permissible land-use types, and management authority. These include Nature Reserves and National Parks.

Red Data: Inventory of the global conservation status of plant and animal species. Regional red lists are produced by countries to evaluate the extinction risk of species within a political management unit.

Red List: Provides information on the regional conservation and threat status of species.

Restoration: All interventions designed to aid the repair or recovery of degraded ecosystems, in some cases with a focus on restoring basic ecological functioning, and in others with restoring structure and composition as well.

Spatial Development Framework (SDF): A spatial plan developed as part of an IDP to indicate current and future patterns of land use by all sectors including agriculture, housing, industry and conservation. The SDF guides and informs all decisions of the municipality relating to planning, development and use of land.

Systematic biodiversity planning: A scientific method for determining areas of biodiversity importance involving mapping biodiversity features and information related to these features and their condition; setting quantitative targets for biodiversity features, analysing the information using software linked to GIS; and developing maps that show spatial biodiversity priorities. Also called 'systematic conservation planning'.

Threatened ecosystems: An ecosystem that has been classified as Critically Endangered, Endangered or Vulnerable, based on an analysis of ecosystem threat status. A threatened ecosystem has lost, or is losing, vital aspects of its structure, composition or function.

Threatened species: A species that has been classified as Critically Endangered, Endangered or Vulnerable, based on a conservation assessment (Red List), using a standard set of criteria for determining the likelihood of a species becoming extinct in the near future.

Veld: A South African term referring to open land containing natural vegetation.

Note – this is not an exhaustive glossary, but offers an explanation for the most-used technical terms in this report

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To download conservation strategies and plans, please visit:

www.capetown.gov.za/Departments/Environmental%20Management%20Department

For additional biodiversity information, please visit:

www.capetown.gov.za/Explore%20and%20enjoy/Nature-and-outdoors/Our-precious-biodiversity

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FRONT COVER PHOTOGRAPHS

Main image: Table Mountain viewed from Rietvlei in Table Bay Nature Reserve (City of Cape Town)

Left to right, top row:

- Cape Sugarbird (*Promerops cafer*), endemic to fynbos, on Waboom (*Protea nitida*) (Cliff & Suretha Dorse)
- Expanded Publics Works Programme job creation benefits local people and management of biodiversity, especially through invasive alien control programmes (City of Cape Town)
- Swartland Sugarbush (*Protea odorata*), Critically Endangered, the world's smallest and rarest Protea (Cliff & Suretha Dorse)
- Environmental Education programmes reconnect people with nature (City of Cape Town)
- Wolfgat Nature Reserve protects Cape Flats Dune Strandveld and coastal limestone (City of Cape Town)

Left to right, bottom row:

- Caracal (*Felis caracal*) persist in the urban landscape (City of Cape Town)
- Zandvlei Estuary Nature Reserve protects the last functioning estuary on the False Bay coast, and like many nature reserves is surrounded by dense formal and informal urban development (City of Cape Town)
- Biodiversity Management staff enjoying the spring flowers at Bracken Nature Reserve (City of Cape Town)
- Cape Flats Erica (*Erica verticillata*) extinct, rediscovered and restored into the wild (City of Cape Town)
- Fire can be used as a management tool in fynbos (City of Cape Town)

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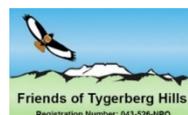
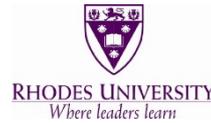
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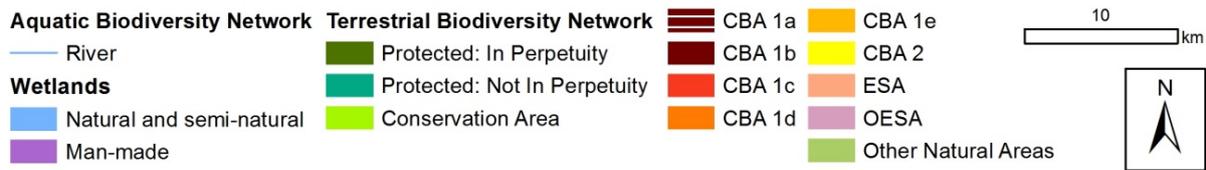
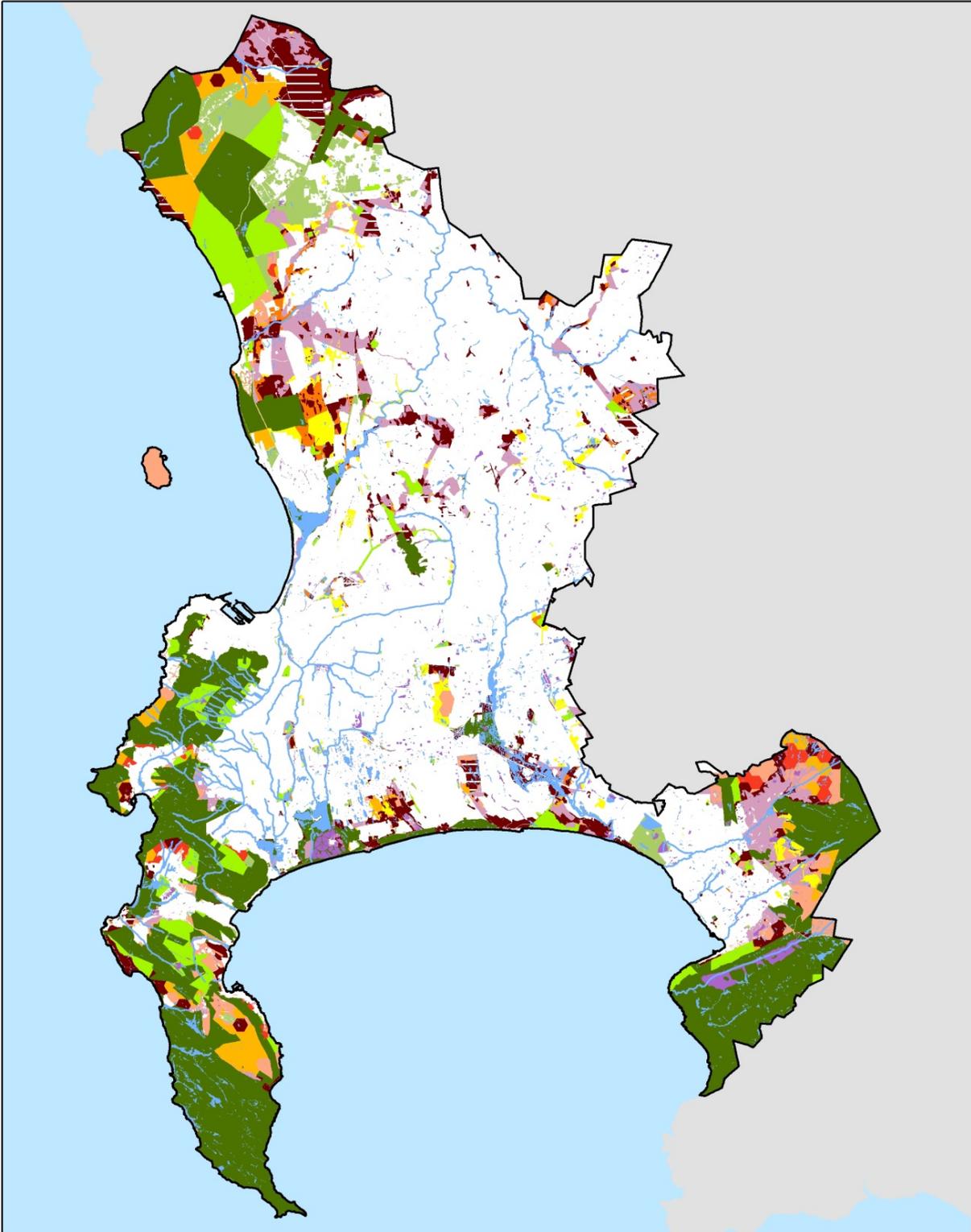
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BIODIVERSITY NETWORK (BIONET) FOR THE CAPE TOWN METRO (JUNE 2018)