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ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
IAP	Invasive Alien Plant
IAS	Invasive Alien Species
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CR	Critically Endangered
DEA&DP	Department of Environmental Affairs and Development Planning
DFFE	Department of Forestry, Fisheries and the Environment
EbA	Ecosystem-based Adaptation
EIIF	Ecological Infrastructure Investment Framework
EN	Endangered
ESA	Ecological Support Area
IUCN	International Union for the Conservation of Nature
LC	Least Concern
NBA	National Biodiversity Assessment
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environmental Management Act 107 of 1998
NEM:BA	National Environmental Management Biodiversity Act 10 of 2004
NEM:PAA	National Environmental Management Protected Areas Act 57 of 2003
PA	Protected Area
PAES	Protected Areas Expansion Strategy
PBSAP	Provincial Biodiversity Strategy and Action Plan
SANBI	South African National Biodiversity Institute
SWSA	Strategic Water Source Area
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
VU	Vulnerable
WC	Western Cape
WCBA	Western Cape Biodiversity Act 6 of 2021
WC BSP	Western Cape Biodiversity Spatial Plan

GLOSSARY OF TERMS

"Afforestation", the establishment of forest by natural succession or by the planting of trees on land where they did not formerly grow, e.g., establishment of monocultures of pines, eucalyptus, or wattles in in South Africa.

"Biodiversity", the diversity of genes, species and ecosystems on earth, and the ecological and evolutionary processes that maintain this diversity.

"Biome", a major portion of the living environment of a particular region, characterised by its distinctive vegetation and maintained largely by climatic conditions.

"Biota", the combined flora and fauna of a particular region or period.

"Carbon sink", carbon reservoirs and conditions that take in and store more carbon than they release (e.g., forests and oceans).

"Climate change", a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability overserved over comparable time periods.

"Conservation area", an area of land or sea not formally protected in terms of the National Environmental Management: Protected Areas Act (Act no. 57 of 2003; NEM:PAA) but managed for biodiversity conservation.

"Conservation estate", an inclusive term referring to all protected areas and all conservation areas.

"Ecological infrastructure", naturally functioning ecosystems such as healthy mountain catchments, rivers, coastal dunes, and corridors of natural habitat that generate or deliver valuable services to people such as water and climate regulation, soil formation and disaster risk reduction.

"Ecological processes", the physical, chemical, and biological actions or events that link organisms and their environment, such as decomposition, production [of plant matter], nutrient cycling, and fluxes of nutrients and energy.

"Ecosystem", a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

"Ecosystem services / contributions", the benefits that people obtain from ecosystems, including (i) supporting services such as productivity or biodiversity maintenance, (ii) provisioning services such as food, fibre, or fish, (iii) regulating services such as climate regulation or carbon sequestration, and (iv) cultural services such as tourism or spiritual and aesthetic appreciation. These are the flows of value to human society that result from a healthy stock of ecological infrastructure. If the ecological infrastructure is degraded or lost, the flow of ecosystem services will diminish.

"Endemic species", a plant or animal species that occurs and is restricted to a particular geographical region is said to be 'endemic' to that region, owing to factors such as isolation or response to soil or climatic conditions.

"Habitat degradation", a decline in species-specific habitat quality that leads to reduced survival and/or reproductive success in a population.

"Habitat fragmentation", the break-up of natural habitat into small non-contiguous parts. This becomes problematic when the portions are too small and isolated to function effectively on their own.

"Indigenous species", plants, animals, or microbes those are native to a particular area.

"Invasive alien species", species that are intentionally or unintentionally introduced to an area where they would not naturally occur, which then reproduce and invade areas beyond those into which they were originally introduced, impacting on natural habitats.

"Protected Area", an area of land or sea that is formally protected in terms of the NEM:PAA and managed mainly for biodiversity conservation.

"Protected area estate", refers to all nine types of protected area recognised in the NEM:PAA. The addition of "CapeNature" to this term specifically refers to the portion of the protected area estate that is managed by CapeNature.

"Strategic Water Source Area", areas of land that (a) supply a disproportionate quantity of mean annual surface water runoff in relation to their size and are considered nationally important; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b).

"Vulnerable groups", a social group that has been identified by the Constitution or by court judgments to face particular social, physical, or economic barriers in society. These groups include women, children, people with disabilities and older persons.

1. INTRODUCTION

Biodiversity in the Western Cape is immensely rich at a global scale. Two global biodiversity hotspots, namely the Cape Floristic Region and the Succulent Karoo, are located in the province (see Figure 1). These are both Centres of Endemism – sites of global importance based on their high endemism and species richness, and which are under immense pressure from human activities (Mittermeier *et al*., 2004).

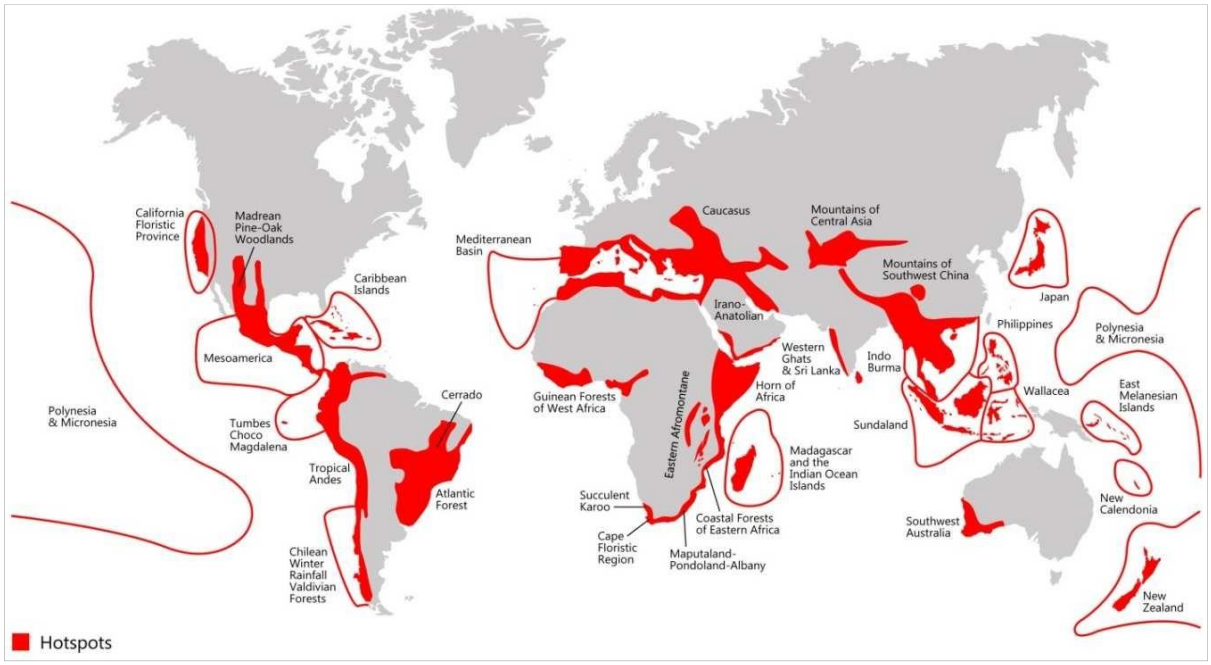

Figure 1: Global biodiversity hotspots (DEA&DP, 2018).

This richness is primarily due to the estimated 13 489 plant species recorded in the Western Cape, of which 6 776 (50.2%) are endemic (CapeNature, 2022). A total of seven biomes are present in the province as presented in Figure 2 (original extent), namely Fynbos, Succulent Karoo, Nama Karoo, Afro-temperate Forest, Albany Thicket, Grassland and Azonal Vegetation (CapeNature, 2022). The biodiversity richness in the province is further reflected by the 706 different terrestrial, freshwater, estuarine and shoreline ecosystems present (CapeNature 2023a).

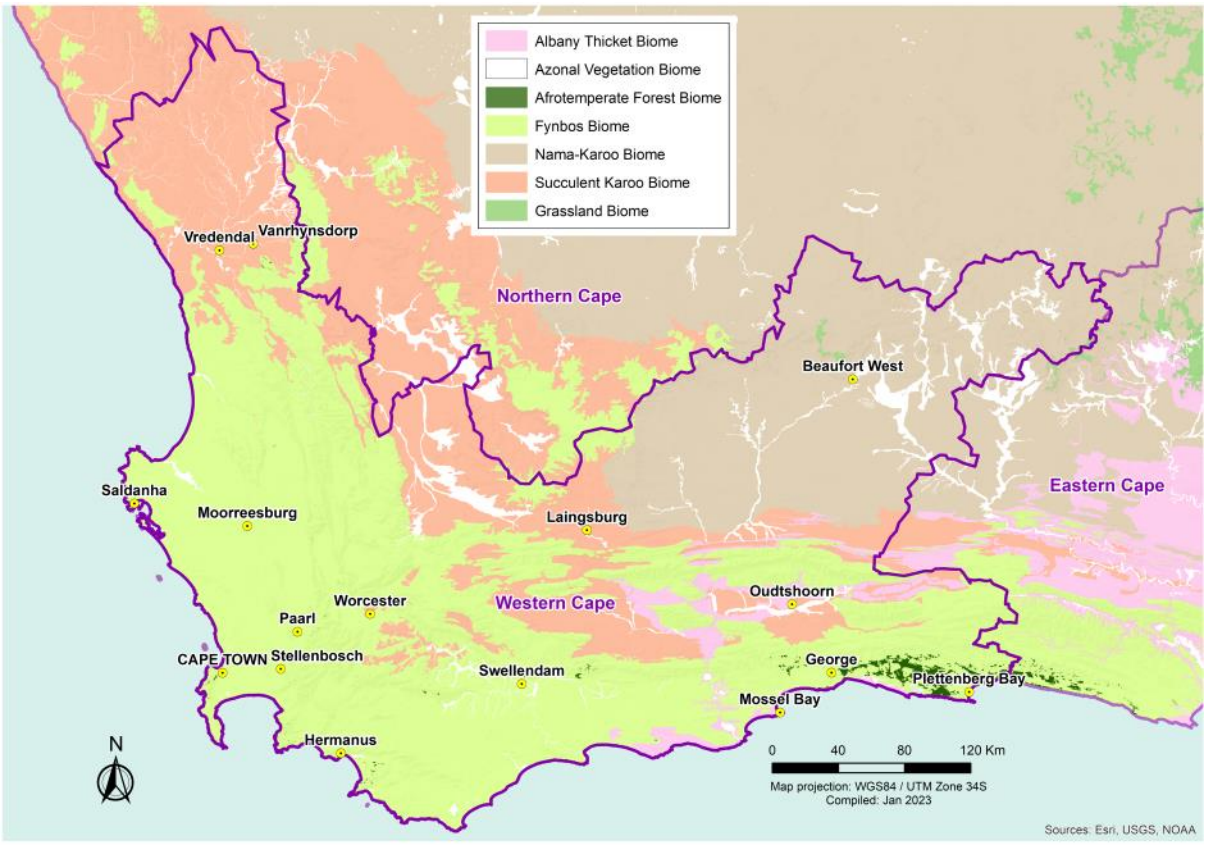

Figure 2: Map indicating the extent of Terrestrial Biomes in the Western Cape

Biodiversity forms the foundation for all ecosystem goods and services, which in turn provides the base upon which the economy and all of society functions. Examples of these ecosystem services include provisioning services (clean water, fishing grounds; grazing land; pollination services, soil formation; clean air), cultural services (sense of place, recreation, and tourism opportunities), and regulating services (climate regulation; flood attenuation and disaster risk reduction) (Cadman *et al.*, 2010). Biodiversity fundamentally sustains life and underpins many aspects of human well-being and socio-economic development (Millennium Ecosystem Assessment, 2005). The fact that healthy ecosystems are a critical foundation to human health is explicitly acknowledged in the One Health Theory of Change and Joint Plan of Action (FAO *et al.*, 2022). Reduced ecosystem services impact human health and food production, which is why one of the action tracks in the Joint Plan of Action is to "*protect, restore and prevent ecosystem and environmental degradation*".

South Africa's legislation enshrines environmental protection and wise stewardship via the Constitution of the Republic of South Africa (section 24 of the Bill of Rights) through national legislation [the National Environmental Management Act 107 of 1998 (NEMA), National Environmental Management Biodiversity Act 10 of 2004 (NEM:BA) and National Environmental Management Protected Areas Act 57 of 2003 (NEM:PAA)], as well as provincial legislation such as the Western Cape Biodiversity Act [Act no. 6 of 2021 (WCBA)] and the Western Cape Nature Conservation Ordinance 19 of 1974 (the Ordinance). The NEM:BA and WCBA require reporting on the state of biodiversity at a national level and provincial level, respectively. CapeNature implements provincial biodiversity monitoring to enable the national process. This also aligns with the country's international obligations under Articles 6 and 7 of the Convention on Biological Diversity (CBD). The Aichi Biodiversity Targets that were applicable to the period 2010-2020 were replaced by the Kunming-Montreal Global Biodiversity Framework (GBF) and

its monitoring framework and includes an ambitious set of 23 targets. Among these, Target 2 aims to restore 30% of degraded ecosystems, while Target 3 seeks to conserve 30% of land, water and seas by 2030, the latter specifically including effectively conserved and managed areas that are representative across ecosystem types. Achieving a 30x30 conservation target for the Western Cape would require an increased rate of conservation estate expansion than that which is currently achievable based on existing resource allocations, and discussions are taking place at a national level on how the achievement of these targets will be resourced and supported. As of 2023, 17.6% of the Western Cape's total area is formally conserved in Protected Areas. Even taking into account that formal Protected Areas are only one of the categories that count towards the 30x30 target, achieving this target for the Western Cape would require an increased rate of conservation estate expansion than that which is currently achievable based on existing resource allocations.

This chapter explores the current state of biodiversity and ecosystem health in the Western Cape province and changes since the 2018 State of Environment Outlook Report. It details the drivers and pressures, indicators of and impacts on biodiversity and ecosystem health, and responses implemented to date by national, provincial, district and local authorities and other key role-players. The state of biodiversity and ecosystem health is tracked in the Western Cape using the following indicators:

- ecosystem threat status
- ecosystem protection levels
- species threat status
- biodiversity priority areas
- habitat degradation
- invasive alien species

Data on each of these aspects, and other indicators that could not be used, are discussed in this chapter. As the provincial conservation entity, CapeNature produces a Western Cape State of Conservation Report each year and a Western Cape State of Biodiversity Report every five years. Information from the most recent 2023 State of Biodiversity Report (CapeNature, 2023c) has been incorporated into this chapter.

2. DRIVERS AND PRESSURES

The key drivers of change to biodiversity and ecosystem health in the Western Cape are population growth, land degradation and habitat loss, biodiversity crime, and climate change.

Population growth puts pressure on biodiversity not only through the expansion of urban, agriculture and mining areas, but also leads to increased rates of unlawful occupation of land, discussed further in section 3.5.

The primary causes of land degradation and habitat loss are urban growth, agricultural expansion and unsustainable farming practices (e.g. overgrazing), climate change (particularly increase in temperatures and more frequent droughts), the spread of invasive alien species, over-exploitation of natural resources (including water abstraction), illegal harvesting of species, altered fire regimes, increased pollution and mining. Collectively these pressures lead to biodiversity loss or a decline in ecosystem health.

Climate change impacts on biodiversity stem from changes in average temperature and rainfall, as well as increase in the frequency and intensity of extreme events such as drought, fires and extreme heat events. The environmental changes brought about by climate change are happening at a pace that does not allow species the time to adapt, either through evolutionary changes or by species movement as climatic zones move. Changed climatic conditions may favour the spread and proliferation of invasive alien species (who are often generalists better able to adapt to a wider range of climatic conditions than indigenous species), which leads to increased biomass fuel loads. These increased fuel loads can significantly modify important natural ecosystems and further worsen the impact of future fires, by making fires burn hotter and slower than what indigenous fire-adapted vegetation would have sustained. This in turns impacts on both the survival on individuals as well as the survival of seeds.

A substantial number of threatened plant and animal species are illegally collected and traded in informal markets across the province or smuggled out of the country. Various plant species have a wide variety of applications, such as for traditional medicinal purposes, as a food source, as fibre and for use in gardens. Biodiversity crime relating to poaching of and trafficking in succulent flora increased significantly between 2017 and 2023; in addition to plants, the illegal harvesting and trade of invertebrates, marine fish, reptiles, and amphibians are also a concern (CapeNature, 2023c).

In addition to these drivers and pressures, the lack of financial and human resources is a major impediment to the implementation of key biodiversity and ecosystem management actions.

3. STATE

3.1. Ecosystem threat status

Ecosystem threat status indicates the degree to which ecosystems are still intact or, conversely, losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends.

Based on the proportion of each ecosystem type that remains in good ecological condition relative to a series of thresholds of ecosystem loss, ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC) as defined in Table 1 (SANBI, 2019).

Table 1: Ecosystem threat categories

Critically Endangered (CR)	Critically Endangered ecosystem types are considered to be at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost.
Endangered (EN)	Ecosystem types that are close to becoming critically endangered. Any further loss of natural habitat or deterioration of condition in these ecosystem types should be avoided, and the remaining healthy examples should be the focus of conservation action.
Vulnerable (VU)	Ecosystem types that still have the majority of their original extent left in natural or near natural condition but have experienced some loss of habitat or deterioration in condition. These ecosystem types are likely to have lost some of their structure and functioning and will be further compromised if they continue to lose natural habitat or deteriorate in condition.
Near Threatened (NT)	An ecosystem type that does not qualify for CR, EN or VU, but it is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Ecosystem types that have experienced little or no loss of natural habitat or deterioration in condition.

Figure 3A shows the trend in threat status of terrestrial ecosystems from 2011 to 2016 and Figure 3B shows the ecosystem threat status as of 2022. In 2018 the methodology of assessment changed, switching from using the South African Red List methodology to using the IUCN Red List methodology. This methodological approach and subsequent revised List were officially gazetted in 2022 (Skowno & Monyeki, 2021). As a result, the total number of recognised ecosystem types changed (163 to 171) as well as the classification of some ecosystem types, which means that the 2011-2016 status as reported on in the 2018 Western Cape State of Environment Outlook Report cannot be directly compared to the 2022 status.

In 2022, of the 171 recognised terrestrial ecosystem types in the Western Cape, 64 were threatened; 35 were classified as Critically Endangered, 27 were Endangered, and 2 were Vulnerable (CapeNature, 2023a).

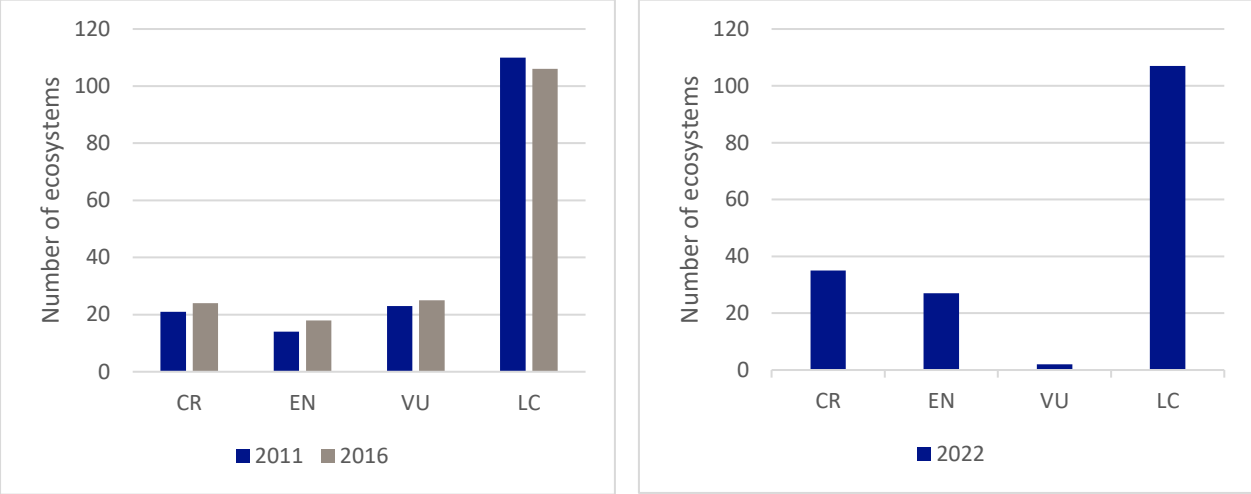

Figure 3: A) Change in Ecosystem Threat Status of terrestrial ecosystems between 2011 and 2016 (DEA&DP, 2018). B) Ecosystem Threat Status of terrestrial ecosystems in 2022 (CapeNature, 2023c). Note that A) cannot be directly compared to B) due to changes in methodology of assessment between 2017 and 2022.

Details for the threat status of terrestrial, freshwater, coastal and estuarine ecosystems is shown in Table 2 and mapped in Figure 4.

Table 2: Threat status for terrestrial, freshwater, coastal and estuarine ecosystems as of 2022 (CapeNature, 2023c).

Ecosystems	Critically Endangered	Endangered	Vulnerable	Least Concern
Terrestrial	35	27	2	107
Freshwater	73	18	20	37
Coastal	0	4	13	8
Estuarine	1	5	3	3
Total	109	54	38	155

Western Cape biodiversity is predominantly threatened by habitat loss / degradation, climate change impacts such as shifts in temperature and precipitation patterns, and pollution. Additional threats include too-frequent fires, invasive alien species, transport infrastructure, unsustainable harvesting, illegal harvesting and illegal trade.

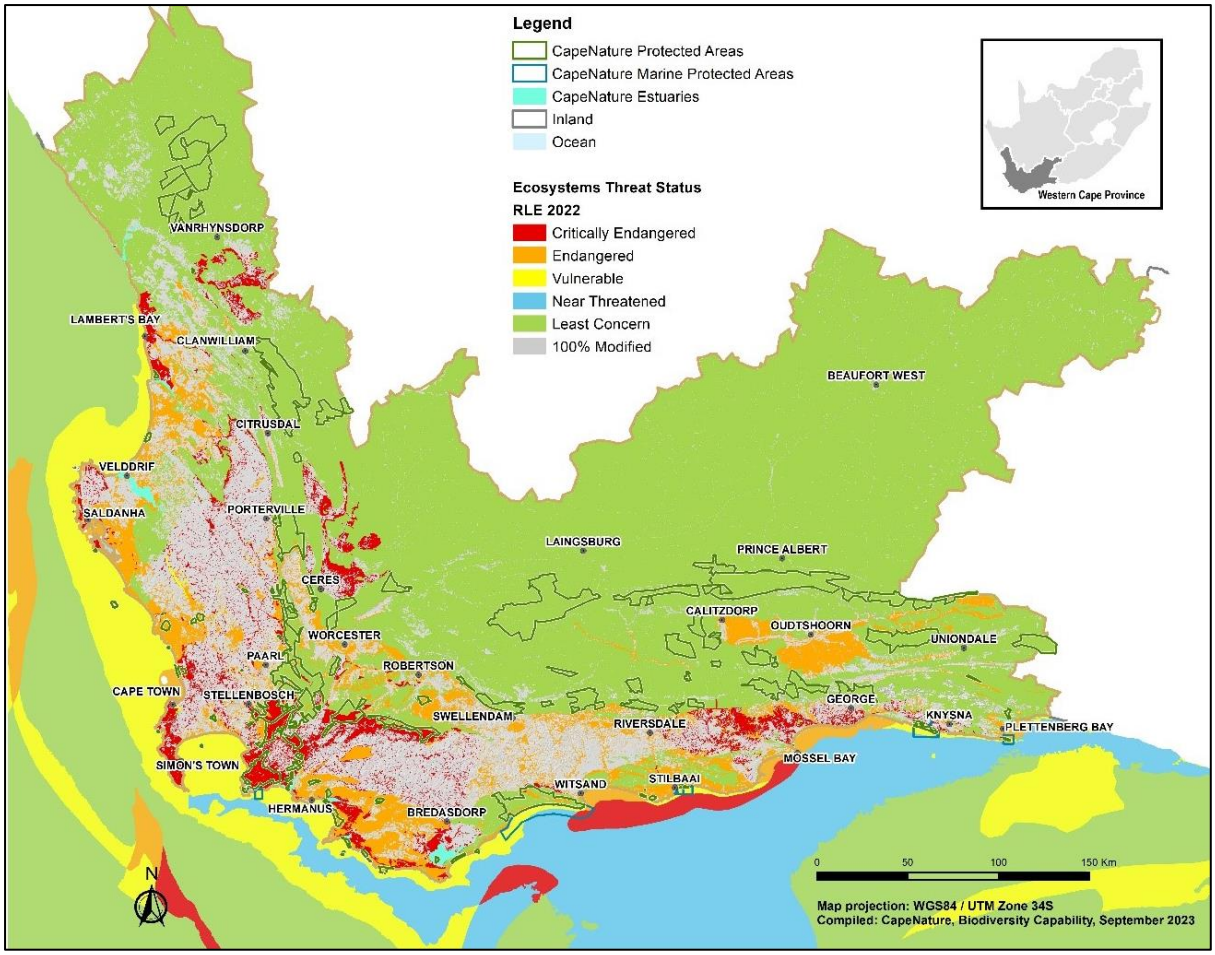

Figure 4: Terrestrial Threatened Ecosystems threat status and areas where no natural areas remain (CapeNature, 2023a).

3.2. Ecosystem protection level

Ecosystem protection level refers to whether ecosystems are adequately protected or under-protected. Based on the proportion of each ecosystem type that occurs within a protected area recognised in the National Environmental Management: Protected Areas Act (NEM:PAA), ecosystem types are classified as Not Protected (less than 5% of the conservation target for that ecosystem is met), Poorly Protected (5-50% of the conservation target is met), Moderately Protected (50-99% of the conservation target is met) or Well Protected (100% or more of the conservation target is met) (Skowno *et al.*, 2019). Overall Ecosystem Protection Levels have been incrementally improving over the last 13 years (see

Figure 5) in line with the expansion the Western Cape conservation estate (Figure 7). However, a significant proportion of the terrestrial ecosystems are still poorly or not protected (Figure 6).

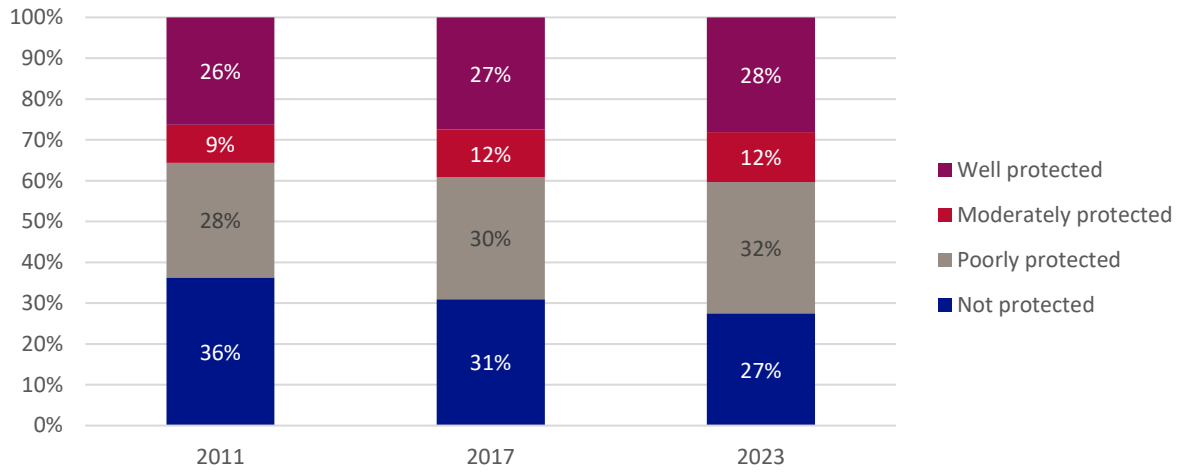

Figure 5: Change in the protection level of the 171 terrestrial Western Cape ecosystems over time. The percentages provided are as of March for the given year, and the assessment is based on the IUCN Red List Criteria, currently defined ecosystem types and what constitutes a Protected Area, applied retrospectively.

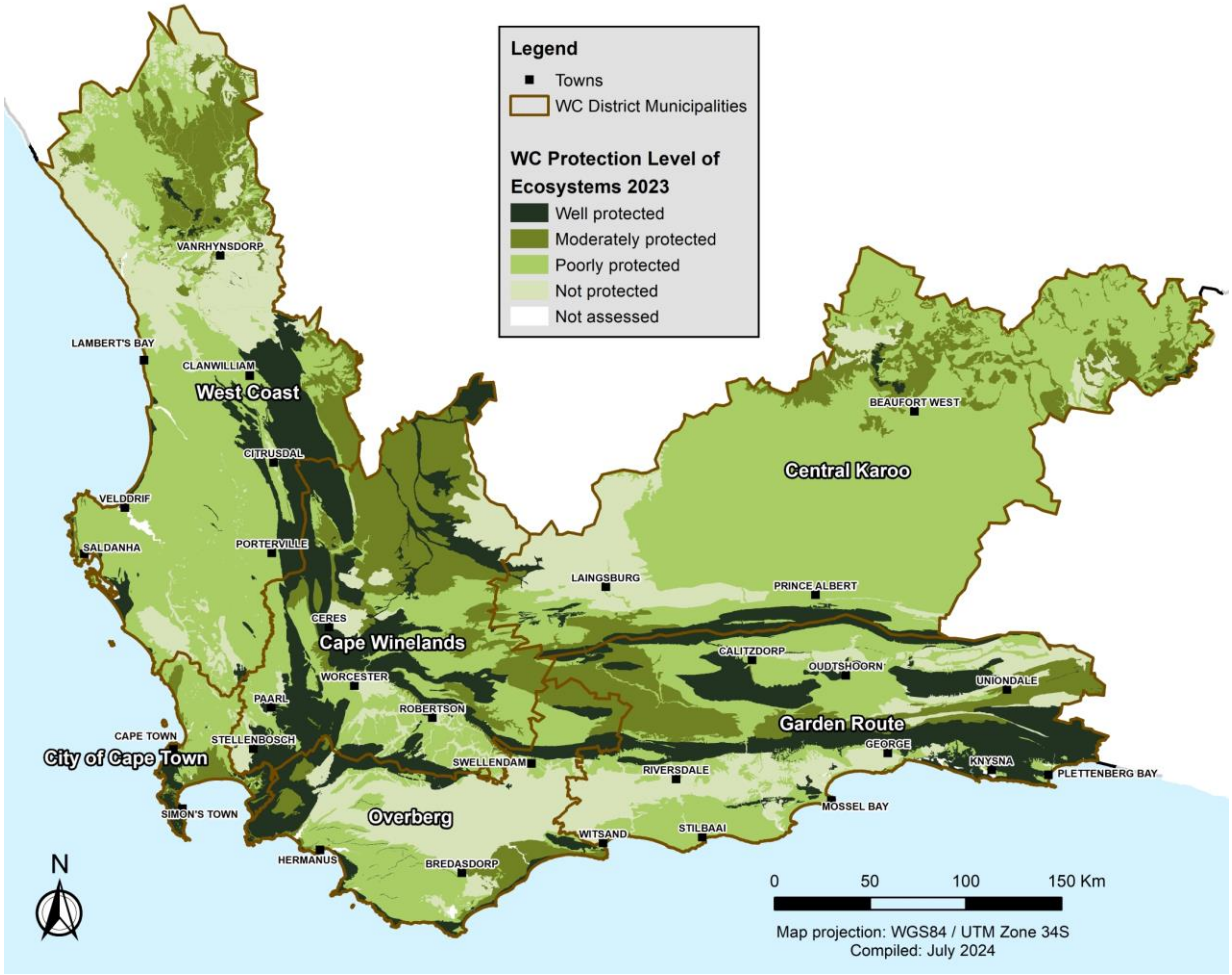

Figure 6: Ecosystem protection levels in the Western Cape as of March 2023 (CapeNature, unpublished data).

Of the land in the Western Cape that supports important biodiversity, about 80% falls outside formally protected areas (CapeNature, 2023c). The size and extent of the Western Cape

Protected Areas Estate in 2022 is reflected in Table 3. Forty-eight new protected areas were added to the conservation estate between 1 April 2017 and 21 March 2023 (CapeNature, 2023c; Figure 7). Figure 8 provides the breakdown of this increase by protected area category and indicates that the most significant increase was achieved through the addition of stewardship sites. Formally protected areas constituted 1 972 254 ha in 2011, 2 155 859 ha in 2017 [Boyd Escott (CapeNature) pers. comm., 2024] and 2 278 910 ha in 2023 (CapeNature, 2023c).

Table 3: The breakdown of the current Protected Area categories in the Western Cape Protected Areas Estate (adapted from CapeNature, 2023c).

				Area (ha)	% of total WC PA Estate
Western Cape Protected Areas Estate	CapeNature Protected Areas Estate	CapeNature Managed Protected Area Estate	CapeNature vested State Land/Sea Protected Areas	659 233	29%
			CapeNature Managed Protected Areas	169 209	7%
			CapeNature Protected Areas	210 932	9%
			Western Cape Protected Areas	1 239 537	54%
			Total	2 278 910	100%

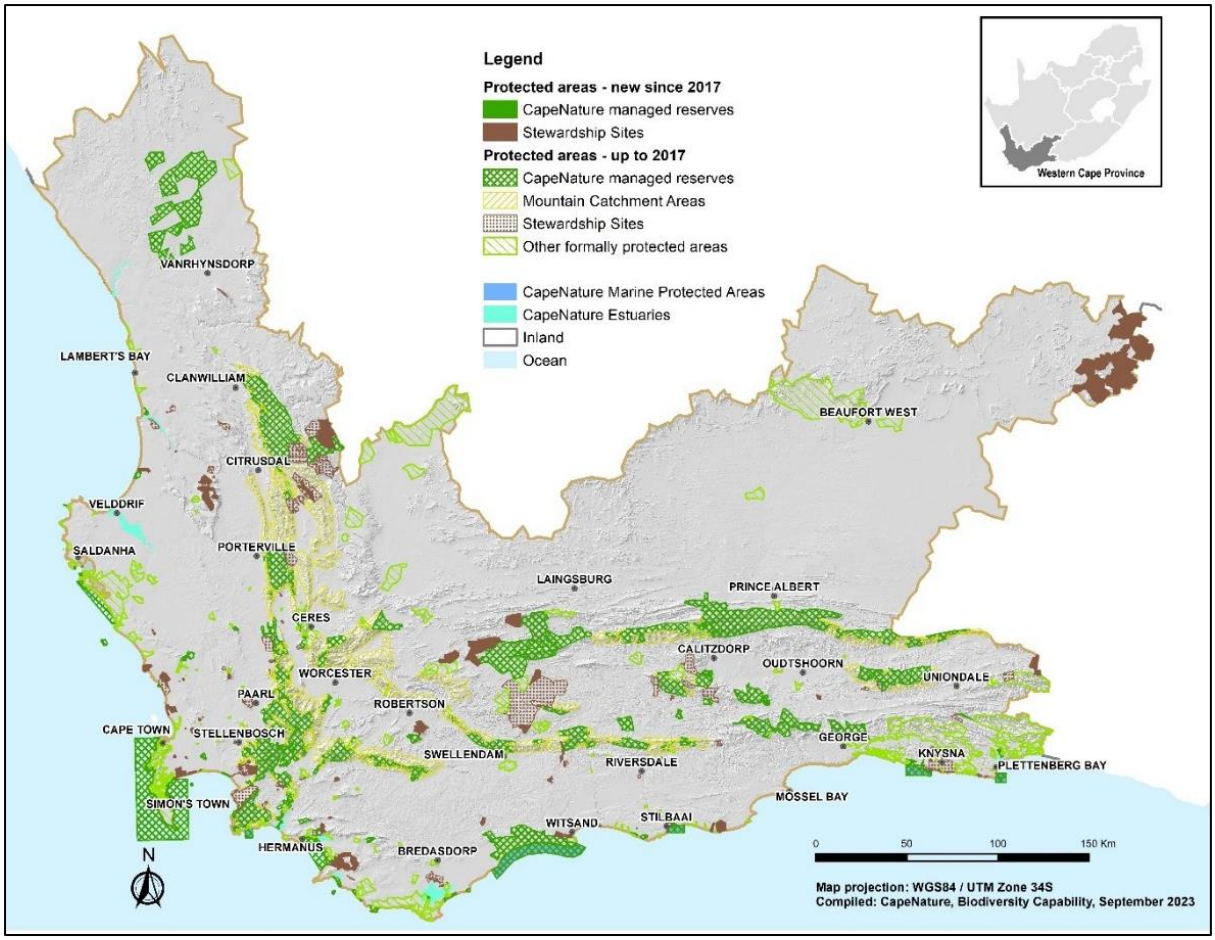

Figure 7: Increase in the Western Cape Conservation Estate from 2017 to 2022 (CapeNature, 2023c).

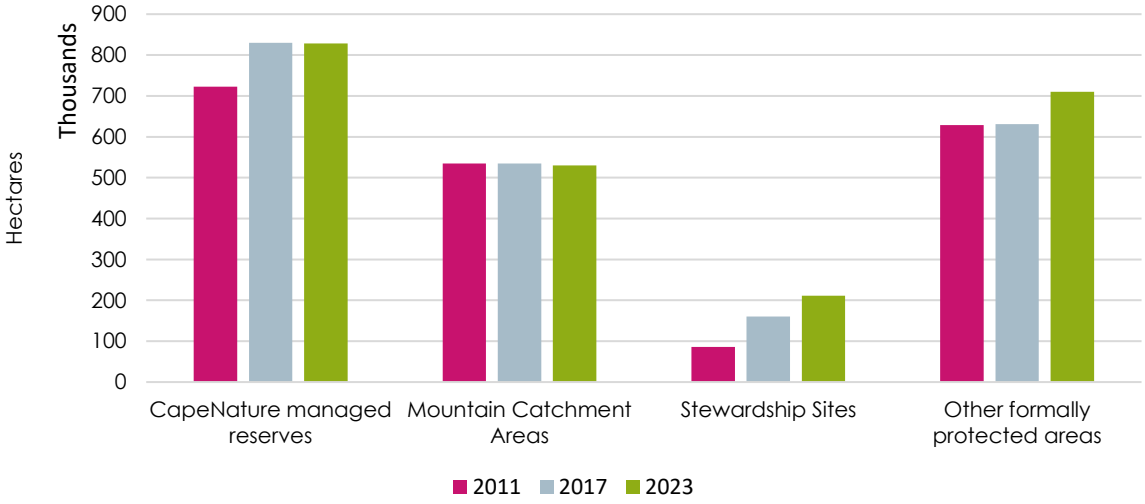

Figure 8: Total hectares in the conservation estate in 2011, 2017 and 2023. (CapeNature, 2023c)

3.3. Biodiversity Priority Areas

The draft 2023 Western Cape Biodiversity Spatial Plan (2023 WC BSP)[1] provides a single, province-wide spatial assessment of biodiversity features and ecological infrastructure, aimed at identifying the best minimal configuration of Biodiversity Priority Areas required to try to meet biodiversity and ecological infrastructure targets (CapeNature, 2023b). These Priority Biodiversity Areas are comprised of terrestrial and aquatic Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). Together, these CBAs and ESAs represent the most efficient suite of natural and semi-natural areas required to be protected formally or informally to ensure a representative proportion of all ecosystems and ecological infrastructure (including Climate Adaptation Corridors and Strategic Water Source Areas) to ensure the persistence of these features in the long-term (Figure 9).

The spatial informants map generated in support of the 2023 WC BSP builds upon the data and methodologies employed in the development of the 2017 WC BSP. This product thus represents an update of the 2017 WC BSP, with the changes realised reflecting updated datasets and target information only, thus ensuring that there is consistency between the two products.

A key aquatic informant considered in the development of the draft 2023 WC BSP is the Freshwayer Ecological Priority Areas (FEPA) map (Figure 10). There has not been any updates to the latter since the previous Western Cape State of Environment Report (2018).

[1] At the time of publication, the Draft 2023 Biodiversity Spatial Plan was available for comment as part of the public participation process as required by the Western Cape Biodiversity Act (Act no 6 of 2021).

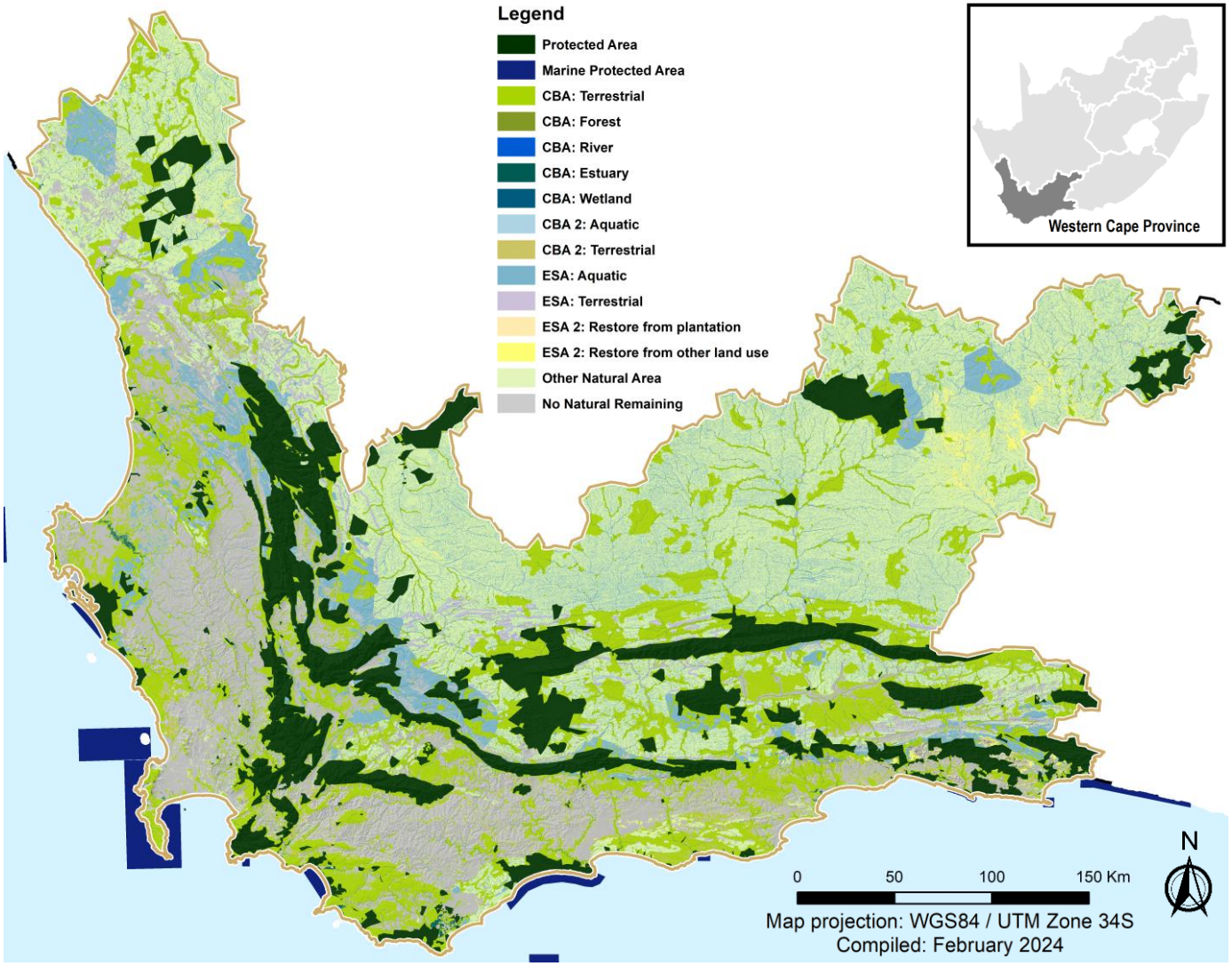

Figure 9: The draft 2023 Western Cape Biodiversity Spatial Plan Map of Biodiversity Priority Areas (CapeNature, 2023b)

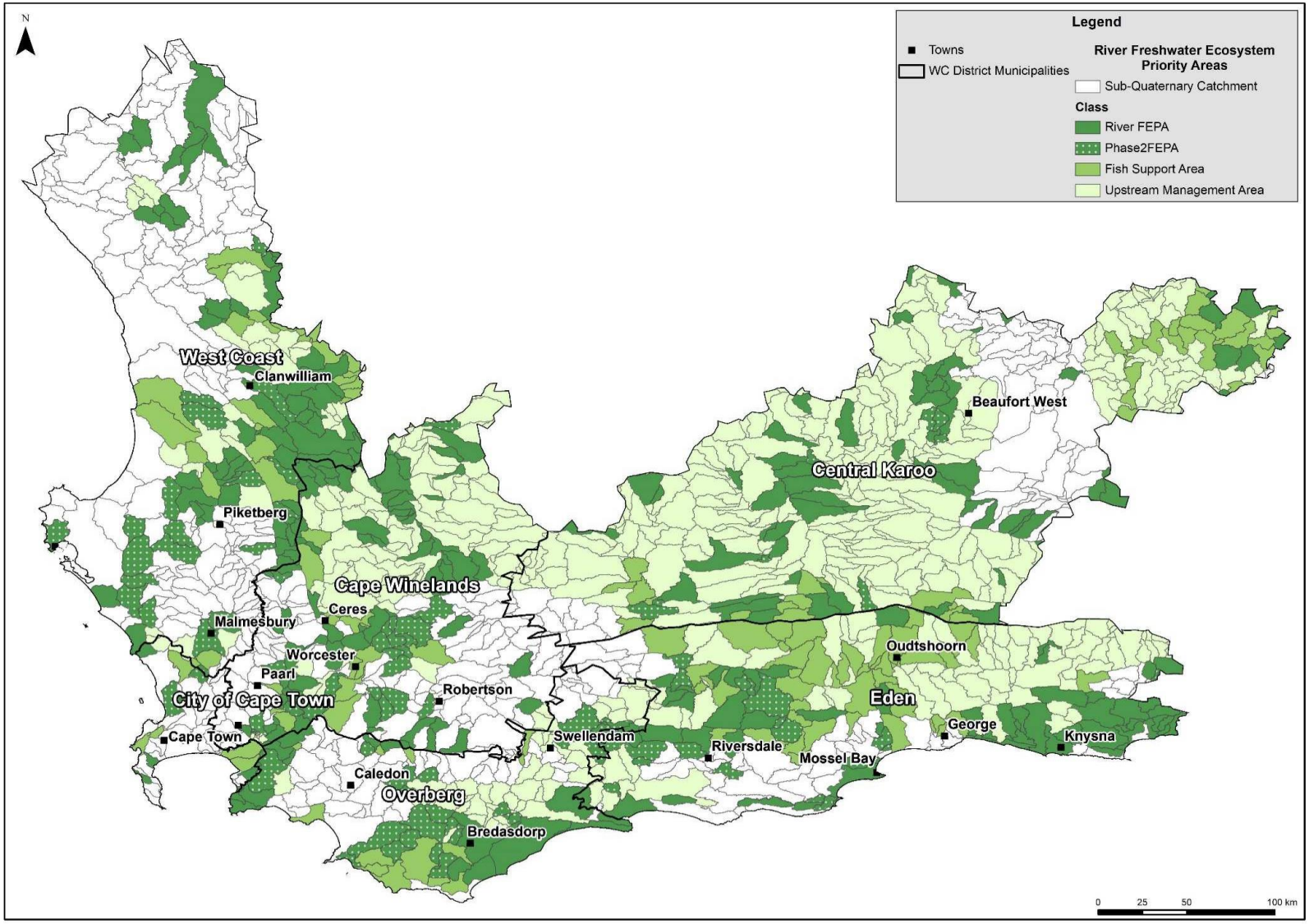

Figure 10: Freshwater Ecosystem Priority Areas in the Western Cape (DEA&DP, 2018).

From 2017 to 2023, there has been a 15% increase in the total size of protected areas, 7% increase in the area classified as CBAs and 6% increase in the area classified as ESAs in the Western Cape (Table 4).

Table 4: The increase in protection of Priority Biodiversity Areas in the Western Cape (WC) Conservation Estate between 2017 and 2023 (CapeNature, 2023c).

	2017		2023		Change	
Biodiversity Areas	**Area (ha)**	**% of WC**	**Area (ha)**	**% of WC**	**Area (ha)**	**% change 2017-2023**
Western Cape Provincial Extent	12 942 655		12 942 655			
Protected Area	1 843 030	14	2 123 696	16	280 666	15
Critical Biodiversity Area	2 859 785	22	3 052 179	24	192 394	7
Ecological Support Area	1 644 500	13	1 740 298	13	95 798	6
Other Natural Areas	4 137 040	32	3 758 549	29	- 378 491	-9
No Natural Remaining	2 445 210	19	2 267 932	18	- 177 278	-7

Climate adaptation corridors, also known as ecological corridors or climate corridors, are areas of connected habitat that facilitate the movement of species in response to changing environmental conditions due to climate change. These corridors serve as pathways that allow plants and animals to migrate to more suitable habitats as temperatures rise, precipitation patterns shift, and other environmental conditions change.

The Climate Adaptation Corridors are presented relative to the Conservation Area Estates for 2017 and 2023 respectively (Figure 11). Over this period, an additional 4 951 ha (0.29%) of the original Climate Adaptation Corridor Network extent (1 733 274 ha) was placed under formal protected. However, over the same period 102 057 ha were lost through land-use change (CapeNature, 2023c).

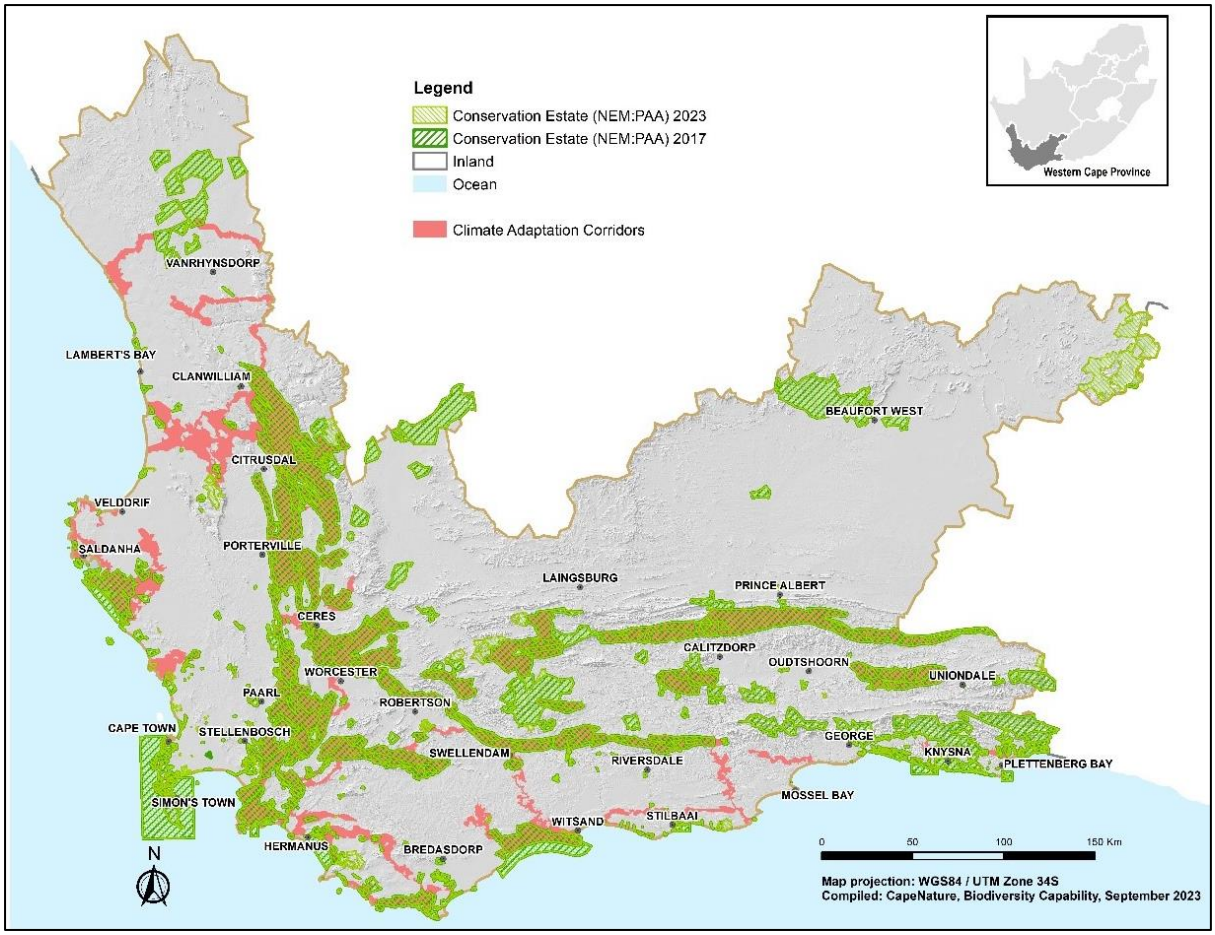

Figure 11: A comparison of the protection levels of the Climate Adaptation Corridors over the period 2017 to 2023 (CapeNature, 2023c).

Surface water Strategic Water Source Areas (SWSA) are priority areas that contribute significant surface water run-off in relation to their size. The total area of surface water SWSAs in South Africa, Lesotho and Swaziland represent approximately 8% of South Africa's surface area yet they produce a mean annual runoff representing approximately 50% of the region's total mean annual runoff (Nel *et al*., 2013). Likewise, groundwater SWSAs provide strategic groundwater resources, many of which are also associated with the surface water SWSAs. Following a national prioritisation process, 22 surface water and 37 groundwater SWSAs were identified as the most important for both people and the environment. This included the establishment of eight focal surface water[2] and eight focal groundwater[3] SWSAs in the Western Cape (Le Maitre *et al*., 2018).

SWSAs accounts for 1 813 516 ha of the Western Cape (14%) and includes the Boland, Groot Winterhoek, Kouga, Langeberg, Outeniqua, Swartberg, Table Mountain and Tsitsikamma. Table 5 reflects the landcover composition of these eight surface water SWSAs (StatsSA, 2023).

[2] Table Mountain; Boland; Groot Winterhoek; Langeberg Mountains; Swartberg; Outeniqua; Kougaberg and Tsitsikamma (the latter extends into the Eastern Cape)
[3] George and Outeniqua; Overberg Region; South Western Cape Ranges; Cape Peninsula and Cape Flats; Tulbagh-Aston Valley; North-western Cape Ranges; West Coast Aquifer ; Sandveld

Table 5: Percentage landcover composition of the Western Cape surface water SWSAs as at 2020 (StatsSA, 2023).

SWSA	Natural / semi-natural	Commercial field crops	Orchids and vines	Timber plantations	Urban	Mines
Table Mountain	50.4%	2.7%	1.1%	2.5%	39.8%	0.4%
Boland	69.5%	8.6%	10.9%	2.6%	5.1%	0.1%
Groot Winterhoek	87.1%	6.9%	3.9%	0.2%	0.3%	0%
Langeberg	77.5%	16.6%	0.5%	3.3%	0.5%	0%
Swartberg	98.5%	1.3%	0%	0%	0%	0%
Outeniqua	74.3%	6.9%	0.2%	14.6%	3.0%	0%
Kouga	99.1%	0.1%	0%	0%	0%	0%
Tsitsikamma	74.7%	12.3%	0.4%	9.5%	2.4%	0%

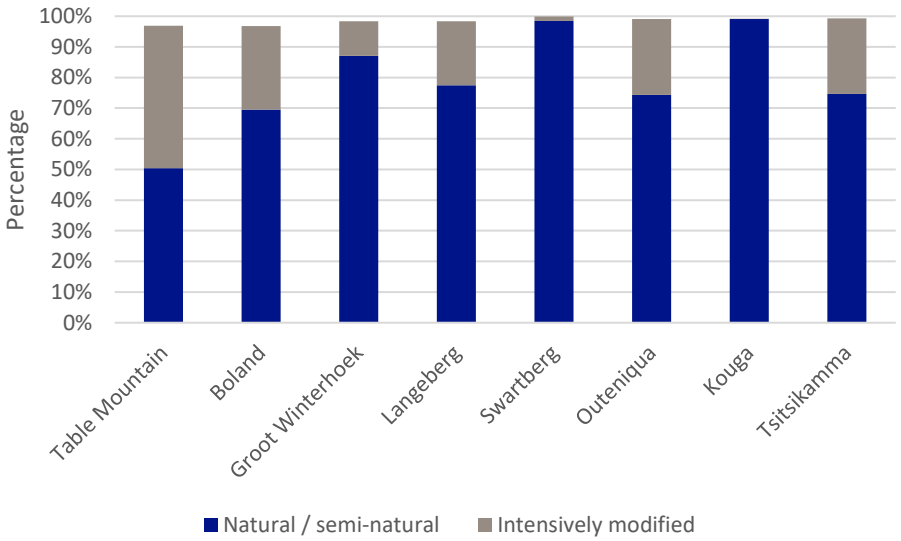

Figure 12: Proportion of Western Cape SWSAs that have been intensively modified as of 2020 (StatsSA, 2023).

The proportion of SWSAs that have been intensively modified is reflected in Figure 12. These modifications are primarily made up of commercial field crops, subsistence crops, orchids and vines, timber plantations, urban expansion, and a small proportion of mining (StatsSA, 2023).

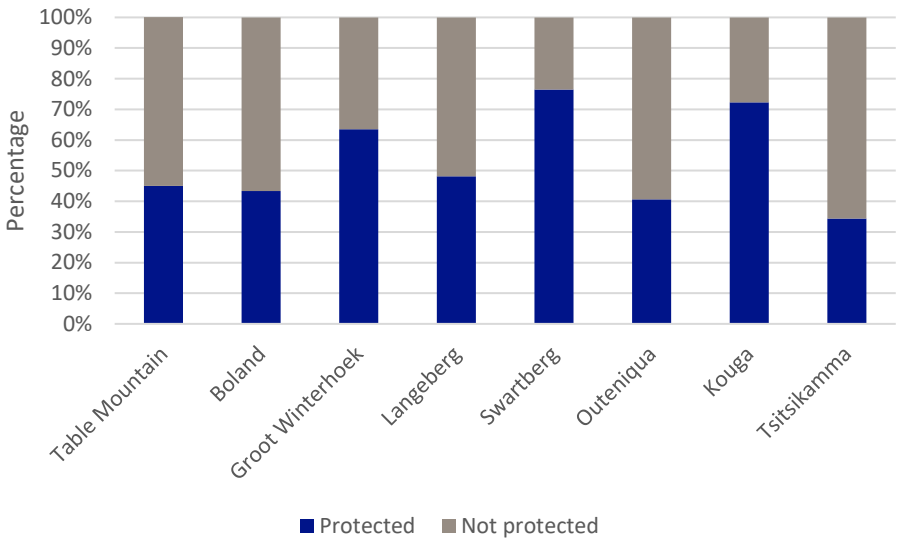

Figure 13: Western Cape SWSA protection levels as of 2020 (StatsSA, 2023).

The SWSA protection levels are reflected in 3. Despite the importance of the SWSAs, the majority of them are only partially protected.

3.4. Habitat degradation

Table 6 illustrates the comparison of loss rates within the different Red Listed Ecosystem categories between 2013/2014 and 2020 using the updated Western Cape Land Cover Products developed by CapeNature (CapeNature, 2023d & 2023e); over this period 13% of Critical Endangered ecosystems were lost, with a further loss of 12% from both Endangered and Vulnerable ecosystems also recorded. Figure 4 in Section 3.1 indicates the current extent of threated ecosystems in the Western Cape, and also shows which areas have been 100% modified. Figure 14 shows the rate of change detected between the modified land-use categories using the CapeNature amended Land Cover products for 2014 and 2020. This not only indicates where habitat loss has taken place, but also provides an estimated rate of change over the period indicated.

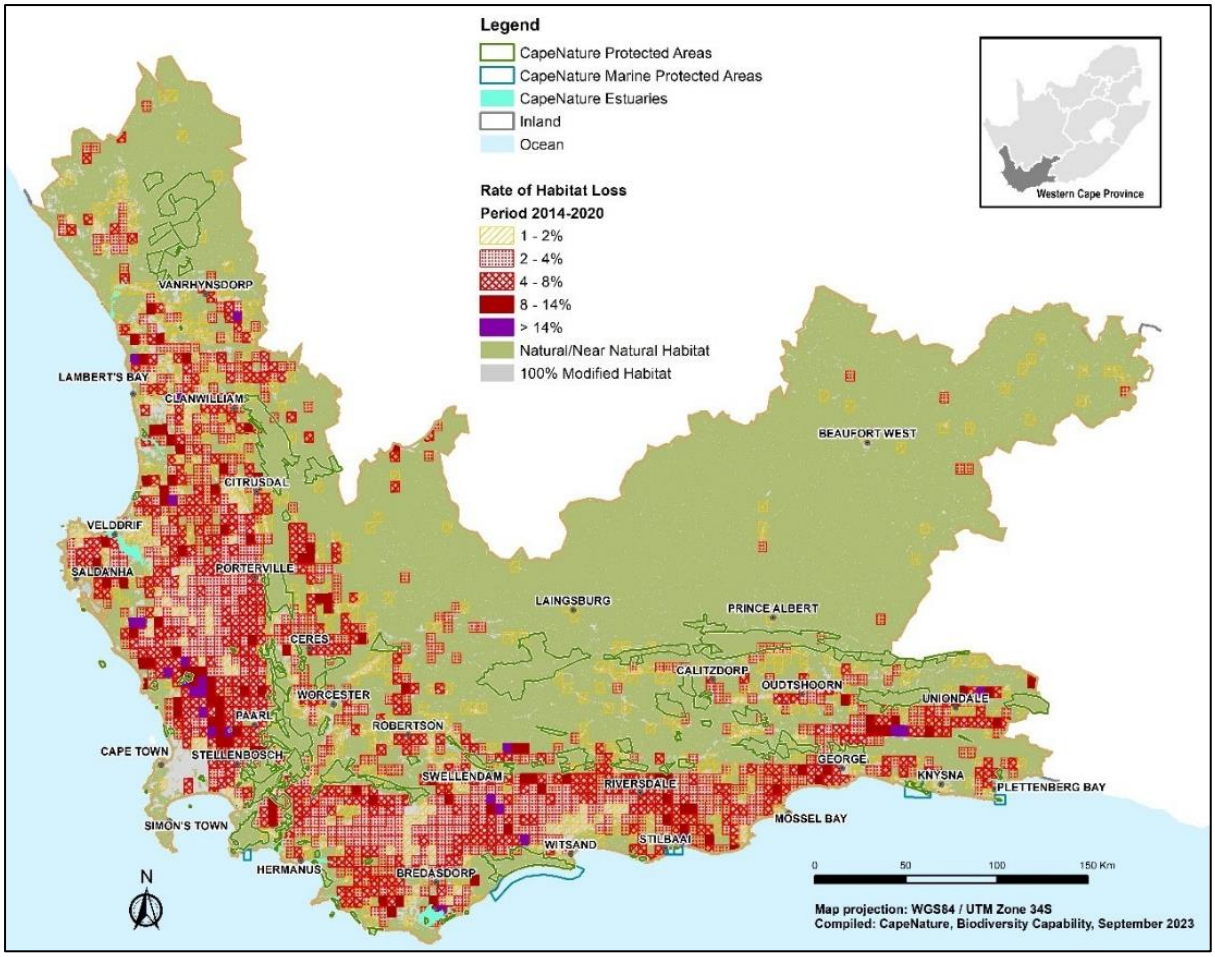

Figure 14: The degree of change between the modified land-use categories extracted from the Amended Western Cape Land Cover datasets, between 2014 and 2020 (CapeNature 2023c).

Table 6: Comparison of the relative loss for the 2013/2014 and 2020 time periods expressed per Red Listed Ecosystem category (CapeNature 2023c).

Ecosystem Threat Status (2022)	No. of Ecosystems	Remaining ha (2013/14)	Remaining ha (2020)	Ha lost	% lost
CR	35	647 891	563 749	84 142	13
EN	27	1 163 446	1 028 460	134 986	12
VU	2	5 427	4 758	676	12
LC	107	8 879 437	8 742 181	137 256	2

The population in the Western Cape have increased by more than 1.6 million between 2011 and 2022 (StatsSA, 2012; StatsSA, 2022), which drives an increased demand for services and urban development. Coupled to this driver is the pressure from increased unlawful occupation of land, particularly occupation of protected areas and land earmarked for protected area regularisation and expansion, which has a potentially irreversible impact on biodiversity and severely constrains financial and human resources. The impact of an unlawful occupation in a protected area impacts severely on protected area management effectiveness, potentially leading to significant biodiversity loss and ultimately the loss of protected areas through de-proclamation. Driftsands Nature Reserve and Lourensford River Protected Natural Environment are both examples of natural areas that have been impacted by unlawful occupation in recent years, with varying levels of impact on biodiversity, including complete deproclamation

of Driftsands. CapeNature developed a Strategy on Unlawful Occupation of Protected Areas in 2020; however, this and other rapid response and operating procedures were not effective in staunching the flow of unlawful occupation due to the implications of COVID-19 regulations and associated inability to mobilise law enforcement.

Changes in fire regimes linked to climate change increases fuel loads from invasive alien plants which results in hotter and slower fires than what would have occurred in uninvaded areas, resulting in further modification of important natural ecosystems.

3.5. Species threat status

The indigenous fauna and flora of the Western Cape, which contains high levels of endemism, is under threat from a range of pressures such as habitat loss; increased frequency of extreme events, shifts in species distributions and altered ecosystem dynamics associated with climate change; invasive species; non-sustainable land-use practices; biodiversity crime; and pollution. This section describes the current state of threatened species as well as changes in species threat status since the 2018 Western Cape State of Environment report. Species threat status as reported on in this chapter is categorised by the South African Red List criteria as follows (SANBI, 2010):

- **Extinct (EX)** species are species for which there is no reasonable doubt that the last individual has died;
- **Extinct in the Wild (EW)** species are known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Critically Endangered, Possibly Extinct (CR PE)** are CR species that are suspected of being extinct, but for which the exhaustive surveys required for classifying the species as Extinct has not yet been completed;
- **Critically Endangered** species are considered to be facing extremely high risk of extinction;
- **Endangered** species are considered to be facing very high risk of extinction;
- **Vulnerable** species are considered to be facing high risk of extinction in the wild;
- **Near Threatened** species do not qualify as Critically Endangered, Endangered or Vulnerable now, but is likely to become at risk of extinction in the near future;
- **Least Concern** species do not qualify as Critically Endangered, Endangered, Vulnerable or Near Threatened, are considered to be at low risk of extinction and include species which are widespread and abundant.

Overall, 16% of Western Cape fauna and flora taxa[4] are considered Endangered or Critically Endangered (CapeNature 2023b). There are 10 778 recognised plant taxa in the Western Cape, which constitutes 53% of South Africa's flora; 61% of the former are endemic (CapeNature, 2023c). The current SA Red List threat status of Western Cape flora and fauna taxa are highlighted in Table 7 and Table 8, with the changes in IUCN Red List threat status between 2012 and 2020 illustrated in Table 9. As per Table 7, 1 939 plant taxa in the Western Cape are classified as threatened, with 334 being Critically Endangered, 648 Endangered and

[4] The Western Cape State of Biodiversity 2023 (CapeNature, 2023c) reports on taxa, not species. Taxa includes species, subspecies and lineages.

957 Vulnerable. These taxa account for up to 63.8% of the threatened plant taxa in the country; 1 814 of these are endemic to the Western Cape (CapeNature, 2023c).

Table 7: Combined number of assessed Western Cape Floral and Faunal taxa per the South African Red List as of 2023 (CapeNature, 2023c).

Species type	EX	CR	EN	VU	NT	LC	Not yet assessed**
Flora	23	334*	648	957	349	7689	801
Fauna	14	47*	72	74	61	1160	337

* Includes Critically Endangered – Possibly Extinct
** Includes Data Deficient

Table 8: Number and percentage of Western Cape taxa per South African Red List category as of March 2023 (CapeNature, 2023c).

Taxonomic group	EX*	CR-PE	CR	EN	VU	Total threatened	Percentage threatened
Plants	unknown	42	292	648	957	1939	18
Beetles, *Colophon*	unknown	0	8	7	0	15	88
Beetles, *Scarabaeinae*	unknown	0	0	4	8	12	10
Dragon- and damselflies	unknown	0	0	3	4	7	11
Butterflies	1	5	12	11	4	32	11
Spiders	unknown	0	8	9	10	27	3
Linefish	unknown	0	0	2	10	12	13
Fish, freshwater	unknown	0	4	13	7	24	69
Amphibians	unknown	0	5	3	0	8	14
Reptiles	unknown	0	1	2	4	7	5
Birds	7	0	1	11	15	27	8
Mammals	6	0	3	7	12	22	14

* Globally and/or provincially extinct

Table 9: Changes in IUCN threat status for threatened indigenous plants between 2012, and 2017 and 2020 (Le Roux *et al.*, 2012; Jacobs *et al.*, 2017; SANBI, 2020).

IUCN Threat status	2012	2017	2020
EX	21	20[5]	20
EW	3	3	3
CE PE	37	38	42
CR	296	292	292

[5] The apparent change between 2012 and 2017 is the result of improvements in the classification of different species.

Since 2016, assessments of species on the South African Red List have resulted in the uplisting of 64 species to more threatened categories due to real changes in threat status [i.e., this does not include changes in red list category for other reasons, e.g., improved data (CapeNature, 2023c)]. These include 53 plants, nine butterflies, and two reptiles (Figure 15). In terms of the IUCN Red List criteria 26 taxa have been uplisted and 20 have been downlisted, as per Figure 16. However, changes to the IUCN Red Listed species were for a variety of reasons including improved information available and prior incorrect application of Red List criteria, and do not necessarily indicate changes in threat status. South African assessments show that in general threat intensity has increased between 2017 and 2023, pointing towards a worsening overall species threat status in the Western Cape.

	LC	NT	VU	EN	CR	CR-PE
LC		13 plant	27 plant	3 plants 2 butterfly	3 plants 3 butterfly	
NT			1 plant	1 reptile		
VU				5 plant 1 butterfly 1 reptile	1 plant	
EN					1 butterfly	
CR						2 butterfly
CR-PE						

Red List categories.	
LC	Least Concern
NT	Near Threatened
VU	Vulnerable
EN	Endangered
CR	Critically Endangered
CR-PE	Critically Endangered, Possibly Extinct

Figures above the grey horizontal are uplistings, indicating increased threat intensities. There are no downlistings (figures below the horizontal).

Figure 15: Changes in South African red list status between 2016 and 2023 for plant, butterfly, and reptile species (CapeNature, 2023c).

	LC	NT	VU	EN	CR	CR-PE
LC		8 bird 2 mammal 3 reptile		1 mammal		
NT	4 bird 4 reptile		1 mammal	1 bird 1 mammal 2 reptile		
VU	2 mammal 1 reptile	1 reptile 2 dragonfly		3 bird 2 mammal 1 reptile	1 mammal	
EN	1 bird		1 bird 1 mammal 1 reptile			
CR			1 dragonfly	1 dragonfly		
CR-PE						

Red List categories.	
LC	Least Concern
NT	Near Threatened
VU	Vulnerable
EN	Endangered
CR	Critically Endangered
CR-PE	Critically Endangered, Possibly Extinct

Figures below the grey horizontal are downlistings and figures above the horizontal are uplistings.

Figure 16: Changes in IUCN red list status between 2016 and 2023 for mammal, bird, reptile, and dragonfly species (CapeNature, 2023c).

3.6. Invasive alien species

An alien species is a species that is present outside its natural range as a result of human intervention. Such a species becomes invasive when it sustains self-replicating populations over several life cycles, produces large numbers of offspring, and has the potential to spread over long distances (SANBI and CIB, 2020).

Invasive Alien Species pose a major threat to the Western Cape biodiversity as there are at least 344 Invasive Alien Species recorded in the Western Cape (SANBI and CIB, 2020), of which 193 species have been recorded as being present within CapeNature protected areas (CapeNature, 2023c). While the 2018 Western Cape State of Environment Report lacked comprehensive data to definitively ascertain an increase in invasive species within the province, SANBI's 2024 Biological Invasions Report, employing the IUCN methodology, offers clearer insights. According to the latter, 36 invasive species have undergone impact assessments using the IUCN's Environmental Impact Classification of Alien Taxa (EICAT) method. Among these, 19 are reported to inflict either 'Major' or 'Massive' impacts across mainland South Africa (SANBI and CIB, 2023).

3.6.1. Invasive Alien Plants (IAPs)

The south-western and southern parts of the Western Cape have greater densities of IAPs and are dominated by Pines, Hakeas and Australian Acacias, which often occur in high densities. While the more arid interior of the province also has some IAP presence it does not usually support high densities of IAPs (CapeNature, 2023c). Invasive alien species result in an array of challenges for both the natural environment and society. For IAPs these include higher levels of surface and ground water uptake than indigenous species leading to reduced water availability, increased fire risk and intensity, outcompeting indigenous species which results in natural habitat loss, and increased erosion of topsoil, amongst others.

Figure 17: Mediterranean Cluster Pines (*Pinus pinaster*) are one of the dominant IAP species in the mountain catchment fynbos areas (CapeNature, 2023c).

The change in densities of IAPs in CapeNature protected areas from 2018 to 2023 (Figure 18) shows that despite the implementation of alien clearing programmes in CapeNature protected areas, there are still large proportions of areas that have shown moderate increases in IAP density that exceed the moderate decreases achieved through clearing efforts (CapeNature, 2023c).

Most of the strategic planning associated with the eradication of AIPs within South Africa is underpinned by the National Invasive Alien Plan Survey (NIAPS), which was conducted in 2007 and published in 2010 (Kotze *et al*., 2010). While a more recent (2017) national IAP survey has been undertaken, the revised NIAPS data has only recently been published, and hence this section of this report only covers IAP data inside CapeNature managed areas.

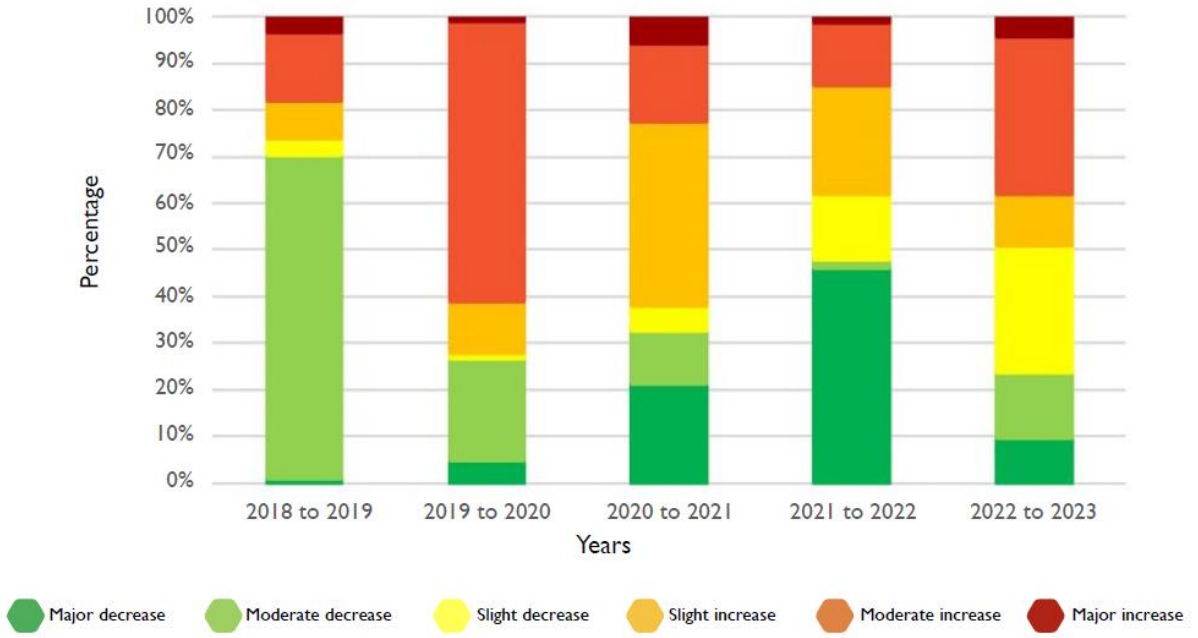

Figure 18: Change in Invasive Alien Plant density in CapeNature protected areas from 2018 – 2023 (CapeNature, 2023c).

3.6.2. Invasive alien animals

Invasive animal species are a major threat to biodiversity and negatively impact entire ecosystems by transforming the structure and species composition, dominating or excluding native species, hybridising with native species, and introducing and/or spreading diseases, which caused severe declines or even localised extinctions of native biota. There are also significant costs associated with invasive animal species, especially within the context of agricultural landscapes. The management of invasive species is resource intensive and requires ongoing resource allocation over a long period of time (CapeNature, 2020).

To date, the province has 15 alien freshwater fish species (CapeNature, 2020). Invasive fish species are the primary threat to the long-term survival of the majority of indigenous fish species, through direct predation and competition for resources. Management of invasive fish is challenging as many invasive fishes are considered conflict species, i.e., species that are of socio-economic importance, but also have a known negative ecological impact. Local examples are black bass (*Micropterus* spp.) and European Carp (*Cyprinus carpio*) (CapeNature, 2023c).

Feral pigs (*Sus scrofa*) pose a risk to the critically endangered renosterveld in the West Coast. As a result, from 2016 to 2018 CapeNature implemented the Feral Pig Eradication Programme funded by DFFE Natural Resource Management Programme in the West Coast area, and then again from April 2020 until March 2023. During the 2020 to 2023 period, a total of 526 individual pigs were euthanised by the DFFE contractor (CapeNature, 2023c).

Two domestic exotic species of amphibian are present in the wild in the province. The introduced guttural toad persisted between 2012 and 2017 in areas around Cape Town, although its spread has been limited by active management. As of 2018 the painted reed frog was continuing to expand its range in the province. No invasive alien amphibians originating outside South Africa have become established in the province (DEA&DP, 2018).

The Common dwarf gecko (*Lygodactylus capensis*) has expanded its distribution since the 2018 report and is now established and breeding in numerous urban areas in the province, and further spread is likely. The species' translocation has been attributed to human transportation between urban areas (Rebelo *et al.*, 2019). There are few studies on the species and its impacts, thus control, if needed, of this species will be difficult.

The presence of the house mouse (*Mus musculus*) on Dassen Island is a major concern as they impact on the breeding success and health of many seabirds. Humane mouse control methods are being investigated, while data is being collected for research purposes (CapeNature, 2023c).

The Polyphagous Shot Hole Borer (PSHB) beetle (*Euwallacea fornicatus*) poses a significant threat to South African trees (Figure 19). Together with its fungal symbiont, *Fusarium euwallaceae*, it can rapidly kill highly susceptible host plants. Infestations are impacting native species, urban areas, important forestry as well as agricultural crop species. The beetle-fungus complex has several biological traits that have likely facilitated its rapid spread across the country since its first detection in 2012 (Van Rooyen *et al*., 2021), including all but one province.

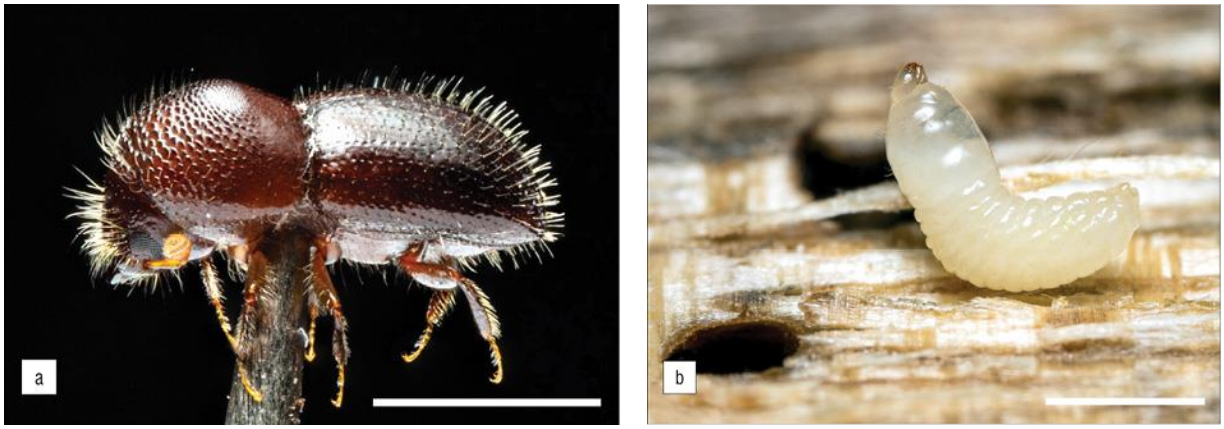

Figure 19: (a) Adult and (b) larva of the Polyphagous Shot Hole Borer; scale bars = 1 mm. (Van Rooyen *et al.*, 2021).

4. IMPACTS

The loss of biodiversity and a decline in ecosystem health results in a range of negative impacts that in their turn impact on the economy as well as human health and wellbeing, including:

- Habitat degradation and loss of habitats (vegetation types/ecosystems), species and ecological processes;
- Increased habitat fragmentation;
- Reduction in water resources;
- Increase in disease vectors and transmission of disease; and
- Reduction in ecosystem services/ecological infrastructure.

4.1. Habitat degradation and loss of habitats, species and ecological processes

Habitat degradation is typically caused by the absence of or higher than natural frequency of fire events, the spread of invasive alien species, land modification, pollution and unsustainable use of natural resources. However, habitat degradation does not necessarily result in the outright loss of all biodiversity, but frequently results in the loss of habitats, species, ecological processes, and the ecological infrastructure that gives rise to ecosystem goods and services. As discussed in Section 3, analyses indicate an alarming ongoing trend of land modification in areas that already represent the most threatened ecosystems.

The distribution of habitats in the province is directly correlated with the wide array of soil types, local topography and rainfall patterns. As a result, many of these habitats occupy unique niches. The reduction in extent of such habitats leads to the loss of fauna and flora dependent on such habitats for their survival. In turn, the loss of these habitats and species leads to a reduction or disruption of important ecological processes such as the water cycle, nutrient cycles and carbon sinks.

The One Health Theory of Change establishes a link between loss of genetic diversity in biodiversity and reduced health in humans and animals (One Health High-Level Expert Panel, 2022). Threats to genetic diversity include habitat fragmentation, impacts that decrease populations below an effective population size, accidental or ill-advised species introductions outside their natural range, accidental or ill-advised movements of eco-typical species, and artificial selection for specific physical characteristics, e.g., game colour morphs.

4.2. Increased habitat fragmentation

Habitat fragmentation restricts the movement of species between areas to more favourable environments, which further reduces their prevalence in the landscape and impedes genetic exchange. Fire is often either excluded or occurs at higher frequencies than would be the case without human intervention, both resulting in species decline. This in turn reduces the long-term viability of rare and unique plants and animals, and the habitats in which they are located.

Large-scale infrastructure such as roads, pipelines, electrical lines etc. are all increasing the extent of habitat fragmentation in the province. Climate change simultaneously poses one of

the biggest threats to biodiversity while at the same time further compounding the negative impacts of habitat loss and fragmentation.

Preserving intact ecosystems and species populations, maintaining connectivity, and ameliorating compounding anthropogenic stressors supports ecosystem functioning and can increase resilience to climate change impacts in both natural and managed systems. Climate change manifests in altered weather patterns, heightened frequencies of extreme events, habitat loss, and shifts in species distributions, all of which challenge ecosystem stability. However, intact ecosystems provide indispensable services like carbon sequestration, water purification, and soil stabilisation, countering climate change effects and buffering against environmental disruptions. Moreover, their diverse species assemblages enhance ecosystem resilience by bolstering stability and functionality. Species populations, particularly those with genetic diversity and expansive geographic ranges, contribute to resilience by fostering adaptability and aiding in ecosystem recovery post-disturbance. Through the preservation of intact ecosystems and species populations, we fortify the capacity of natural and managed systems to endure and rebound from climate change impacts, ultimately safeguarding biodiversity, and advancing human well-being.

4.3. Reduction in water resources

Water is a limited, yet critical resource required for the survival of society, and our ecosystems. Water resources in the province are limited by the strong seasonal Mediterranean climate in the western extent of the region. Coupled with this, is a disparity between water availability and water demand, which is expected to become more pronounced due to the projected effects of climate change such as elevated temperatures and reduced precipitation levels contributing to the onset of drought conditions (see Figure 20 and Figure 21), as well as population growth in the province. Water intensive activities, such as intensive crop production, residential and industrial development, and mining, are impacted by limited supply or degradation in the quality of available water.

Over-abstraction of both ground and surface water also impacts biodiversity, which in turn reduces the provision and effective delivery of water-related ecosystem services, such as water purification and flood attenuation provided by wetlands and ecologically healthy rivers. The dominance of invasive alien species along water courses and in catchment areas that extract large volumes of water further limits water availability for human consumption, economic activities and natural ecosystems (Le Maitre *et al*., 2015 and 2016) as discussed further in the Inland Water chapter .

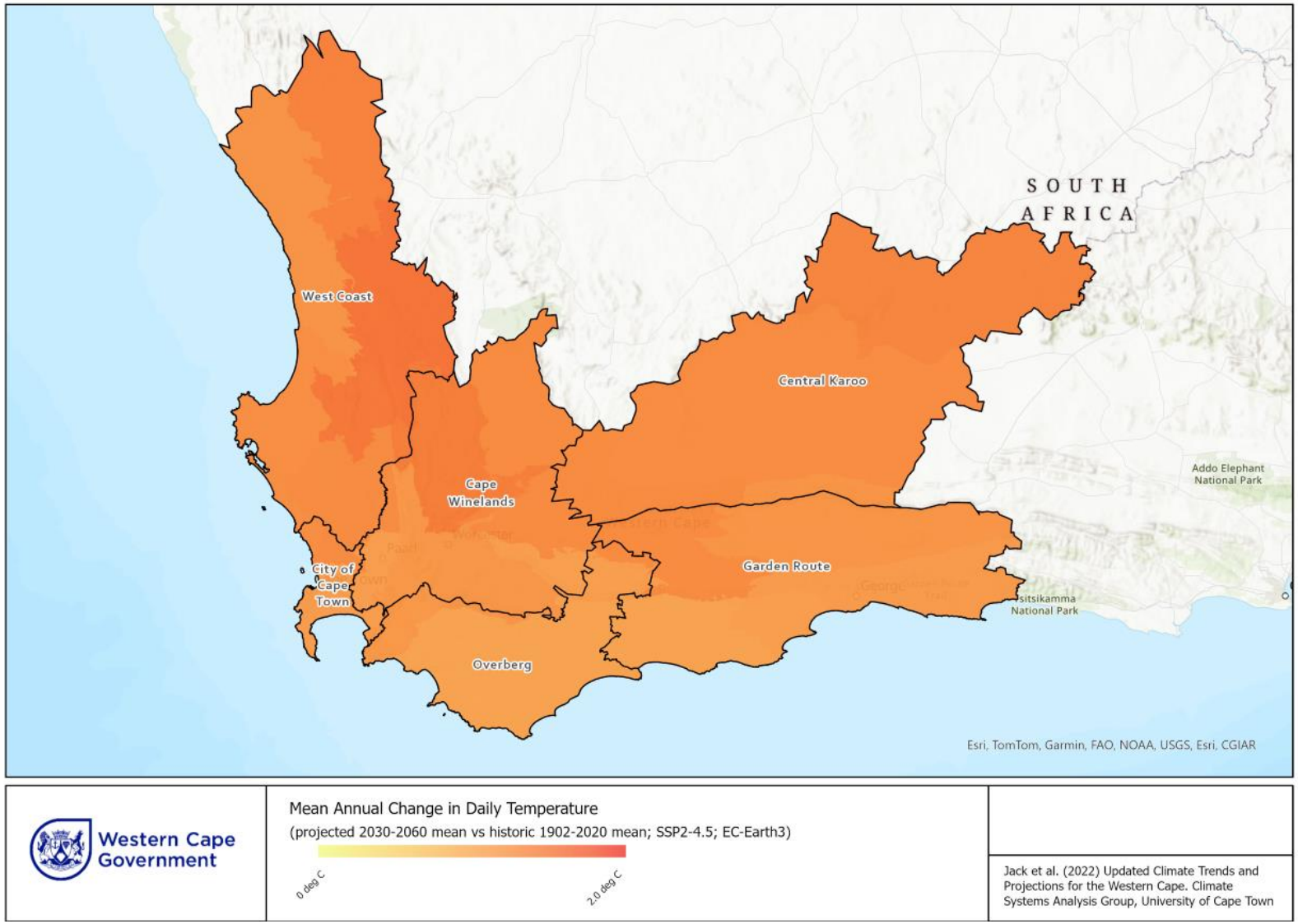

Figure 20: Projected change in average daily temperature in the Western Cape for the period 2030-2060, as compared to 1902 to 2020 (Jack *et al*., 2022).

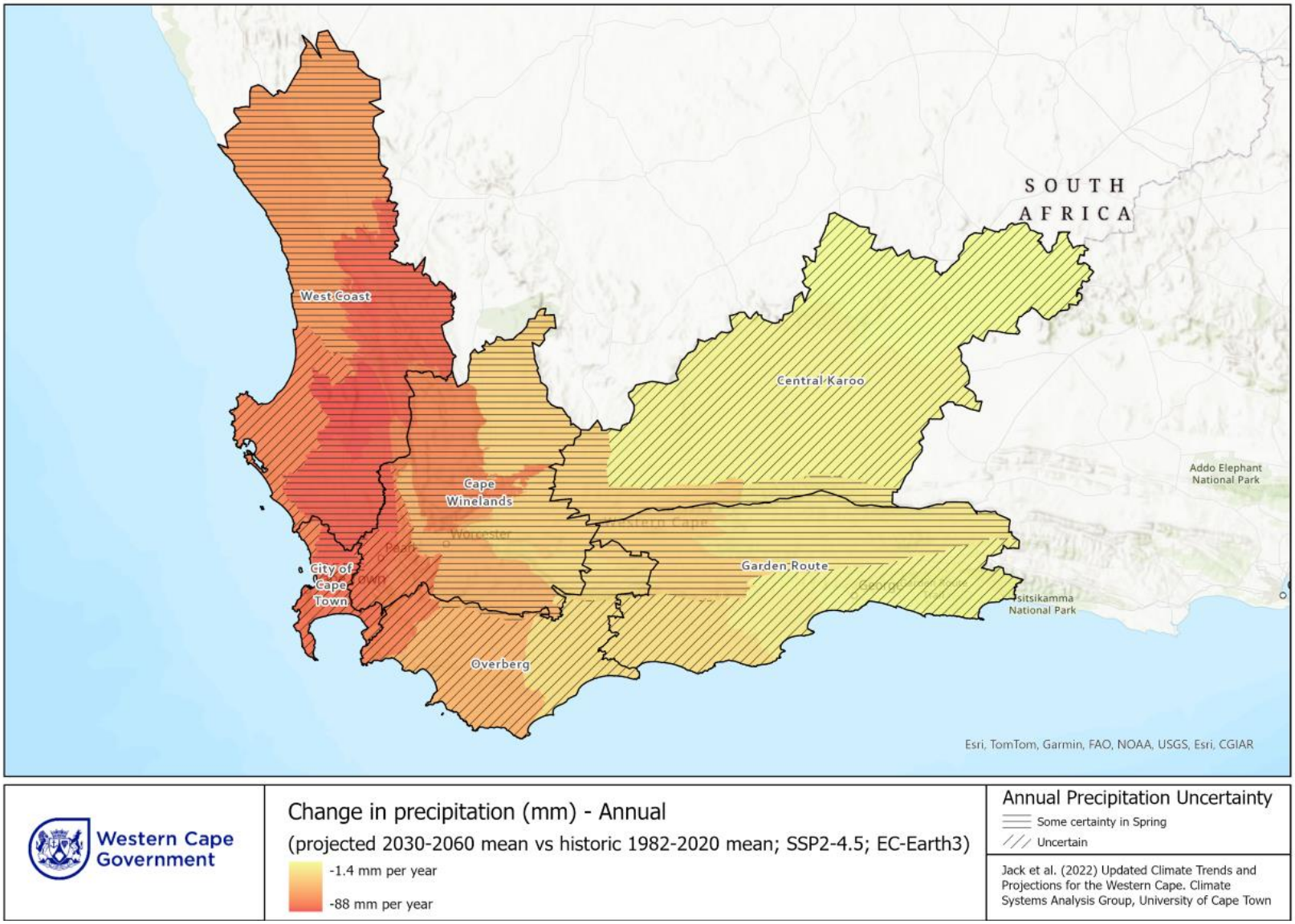

Figure 21: Projected change in average annual precipitation in the Western Cape for the period 2030-2060, as compared to 1982 to 2020 (Jack *et al.*, 2022).

4.4. Increase in disease vectors and transmission

A growing body of scientific literature now shows that the loss of biodiversity increases disease risks to humans and livestock (Keesing *et al.*, 2010, Johnson *et al*., 2013). As biodiversity is lost and decreases, encounters among infected individuals and between infected and susceptible hosts increase, leading to an increased spread of diseases. Greater species diversity provides a greater proportion of incompatible hosts thereby interrupting the cycle of infection (Center for Health and the Global Environment, 2017; McCallum, 2015; Keesing *et al*. 2010). Habitat loss and degradation have consequently been shown to exacerbate disease transmission. For example, the outbreak of the highly pathogenic avian influenza virus among wild seabirds in Western Cape in 2021 resulted in at least 21 172 dead birds, of which 20 558 were Endangered Cape Cormorants. The area most affected was Dyer Island, where 13 195 dead birds were reported between October and November 2021 (CapeNature, 2021). Although the infection and loss of entire wild bird populations to avian influenza is considered rare, such a disease could be most damaging to species that are already threatened, and/or found in only a few localities (BirdLife International, 2007), such as many of the endemic species of the Western Cape. In another example, an avian flu outbreak among poultry which started in April 2023 resulted in the culling of approximately 1.3 million birds by June of that year (25% of birds in production) (WCG, 2023a).

Moreover, the recent COVID-19 global pandemic, which affected billions of people, is linked to biodiversity and ecosystem health. A variety of human-made factors contribute to the spread of zoonotic pathogens and the emergence of disease, which include land use changes, intensive livestock production, and wildlife trade (Lawler *et al.*, 2021). In addition, climate change also drives the spread of diseases by altering the distribution of disease vectors, such as mosquitoes, and impacting water and food security, exacerbating vulnerabilities to diseases like malaria and diarrheal illnesses. Climate-induced displacement and social disruptions can further compound health risks, emphasising the urgent need for adaptation measures to mitigate the health impacts of climate change in the province.

It is critically important that major threats to biodiversity, such as habitat loss, degradation and fragmentation, are abated to minimise the spread of infection and potential for human transmission. To address both COVID-19 pandemic recovery globally and future zoonotic spillover risk, One Health collaborative approaches, decision science and sustainable pandemic recovery strategies can provide valuable tools (Lawler *et al.*, 2021).

4.5. Reduction in ecosystem goods and services as a result of ailing ecological infrastructure

The sustained provision of ecosystem goods and services is dependent on the long-term persistence and ecological integrity of biodiversity. Ecosystems provide vitally important contributions to people, for example water purification, pollination of economically important crops, flood attenuation, grazing land and clean air. These contributions rely on the healthy interactions of biotic and abiotic component that constitute ecosystems. The ongoing decline in ecosystem health outlined herein has meant that the ability of our natural systems to contribute to the wellbeing of people is continually being eroded. If the pressures on biodiversity are not reduced, many of the ecosystem goods and services that society is dependent on may reach a level where costly human intervention is required to maintain or replace them, with severe economic implications.

5. RESPONSES

A broad suite of responses to the challenges of biodiversity loss and a reduction in ecosystem health are being implemented at the international, national, provincial and local levels. These include the signing of international treaties; development and implementation of national and provincial legislation, policies, strategies and assessments; the development of local policies, strategies, plans and municipal by-laws; as well as work done by non-government and civil society organisations. Some responses to the challenges of biodiversity loss and a reduction in ecosystem health are described below.

5.1. Implementation

A vast number of biodiversity conservation initiatives are being implemented in the province. These include projects across the economic and tourism sectors, with private landowners and various organs of state.

The 2023 WC BSP is a spatial planning tool that comprises the BSP Spatial Informant Map of Biodiversity Priority Areas, accompanied by contextual information and land use guidelines of the 2023 WC BSP Plan that make the most recent and best quality biodiversity information available for land use and development planning, environmental assessment and regulation, and natural resource management. The first WC BSP, released in 2017, was developed using systematic conservation planning principles. During 2023 the 2017 WC BSP has been updated to reflect changes in landcover, protected area expansion and relevant elements of the National Biodiversity Assessment. The development and implementation of the WC BSP is a core output for the Provincial Biodiversity Strategy and Action Plan (PBSAP 2015-2025), which is also currently under review.

Various business and biodiversity initiatives are being implemented, including collaborative projects in the bioprospecting and natural products sector, such as honeybush.

Support of and oversight over biosphere reserves is listed as a key performance area of the DEA&DP. To this end, the DEA&DP funds individual Biosphere Reserves in the province within a limited budget, mainly for logistical support such as operational expenses, through a Transfer Payment Agreement in terms of the Public Finance Management Act and the Treasury Regulations. Five biosphere reserves have been established in the province: Garden Route Biosphere Reserve, Cape West Coast Biosphere Reserve, Cape Winelands Biosphere Reserve, Gouritz Cluster Biosphere Reserve and Kogelberg Biosphere Reserve. Biosphere reserves are 'living laboratories' for testing and demonstrating integrated management of land, water and biodiversity. The objectives of biosphere reserves are to conserve, maintain and rehabilitate biodiversity, promote sustainable development and conduct research and education. The five Western Cape Biosphere Reserves cover 4 689 915 ha; Kogelberg Biosphere Reserve is the smallest at 103 629 ha, and Gouritz Cluster Biosphere Reserve is the largest at 3 187 893 ha.

The Western Cape Protected Areas Expansion Strategy 2020-2025 (PAES) drafted by CapeNature, focusses on three goals:

- To expand the Western Cape Protected Area network to increase biodiversity representivity and resilience;
- To regularise the protected area network to ensure NEM:PAA compliance and environmental security; and
- To maintain gains through post-declaration support to private protected areas.

Land acquisition for the expansion of protected areas is primarily through partnerships between conservation agencies and private or communal landowners through biodiversity stewardship agreements, with a focus on improving management effectiveness in protected areas.

In compliance with the NEM:PAA, CapeNature is required to develop management plans for each of its nature reserves, to ensure protection, conservation and management of the protected area in a manner that is consistent with the objectives of NEM:PAA.

Regular re-evaluations of taxonomic groups are necessary to evaluate the condition of provincial, national, and global biodiversity as well as to monitor advancement towards the aims of the Global Biodiversity Framework. Re-evaluating the state of South African mammals is underway and will conclude in 2024; this evaluation will include genetic indicators for the first time. Where practicable, the new red list assessments will include Green Status Assessments, which monitor population recovery and consequently conservation success (CapeNature, 2023c).

In addition, a number of Biodiversity Management Plans have or are being developed and implemented, focusing on the management of species endemic or near endemic to the Western Cape including the Cape mountain zebra, Bontebok, African penguin, Barrydale redfin, Clanwilliam sandfish, Geometric tortoise, Honeybush species and *Aloe ferox*. These plans are aimed not only at species specific outcomes but also at facilitating inter-agency collaboration and stakeholder engagement.

Finally, partnerships and collaborations are sought and maintained to effectively implement these initiatives where financial or human resources are lacking.

5.2. Ecological infrastructure

Ecological infrastructure can be described as the components of our social and ecological systems that are responsible for a single or group of ecosystem goods and services. The term, ecological infrastructure, places the contributions we received from our natural systems (such as water generated by a mountain catchment) alongside engineered goods and services that are derived from built infrastructure (such as potable water to the home). The need to elevate nature's contributions to people to the same level as built infrastructure is mostly due to rapid urbanisation, and an increasing disconnect between people and the natural systems that underpin their wellbeing. Juxtaposing ecological infrastructure with built infrastructure is often also helpful when relaying the economic contributions of ecological infrastructure, or when motivating for investment into improved ecological functioning for human wellbeing. While ecological infrastructure has the potential to replace the need for built infrastructure in certain instances (such as the augmentation of available water) it also serves as a suite of additional tools that can assist built infrastructure in providing cost-effective, reliable world-class services to the people of the Western Cape. Figure 22 represents ecological infrastructure, and how it can articulate with built infrastructure.

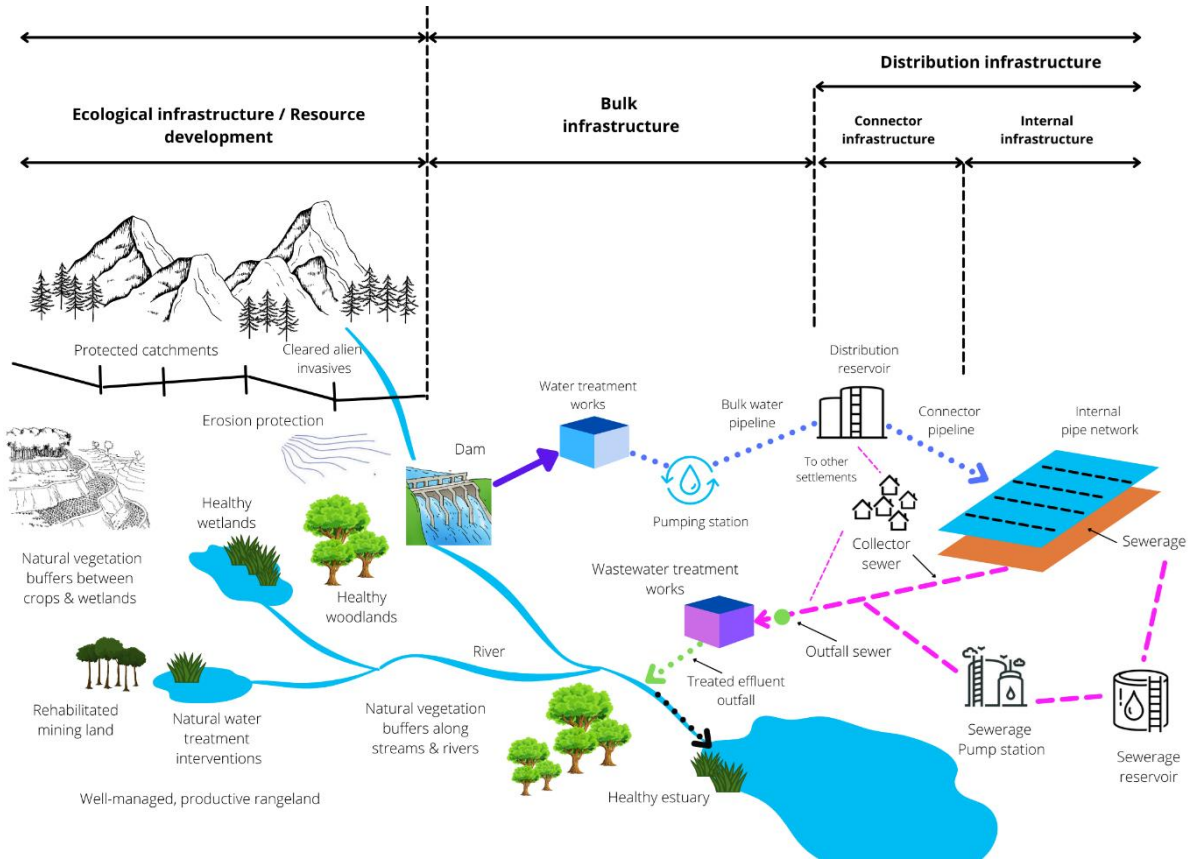

Figure 22: Ecological Infrastructure and built infrastructure specifically in terms of water and wastewater (WWF-SA, 2022)

The Western Cape Government showcases its commitment to investing in ecological infrastructure through the Western Cape Ecological Infrastructure Investment Framework, 2021 (EIIF)[6]. This framework was co-created with leading implementors of ecological infrastructure investment and the associated and beneficiaries of the resulting ecosystem goods and services.

To eradicate IAPs from surface water Strategic Water Source Areas within the province would require R10 billion over 30 years (David Le Maitre, pers. comm., 2022). Applying the same thought process, a total spend of R16.5 billion over 30 years was calculated as the total cost of IAP eradication in the province. Unfortunately, due to fiscal constraints, the EIIF has not received any additional human resource allocations, and the Western Cape has allocated approximately R40 million for the 2023/24 financial year as opposed to the approximately R1.5 billion that would be required in the abovementioned 30-year eradication plan. Fiscal constraints remain the most significant limitation to the realisation of the vision of the EIIF.

Despite the fiscal constraints, the EIIF continues to be implemented through the Implementation and Monitoring Plan, which outlines actions associated with each of the four investment objectives. A three-pronged approach to implementation has been adopted as follows:

[6] For more information on the Ecological Infrastructure Investment Framework, please visit the DEA&DP Biodiversity Management website, and navigate to the document repository at the bottom of the page.

1. to continually explore funding options (both public and private) and to make the case of largescale investment in ecological infrastructure

2. unlocking funding streams for ecological infrastructure, such as elevating ecological infrastructure as an equivalent to built infrastructure in conventional infrastructure funding streams

3. partnering with other government, non-government and corporate partners to explore shared objectives and the facilitation of efforts that progress the EIIF.

The EIIF has been positioned in the Western Cape Growth for Jobs Strategy (WCG, 2023b), the Western Cape Water Resilience Plan (under development), as well as the Western Cape Infrastructure Framework (currently being revised), and it is hoped that associated resourcing systems will begin to recognise and invest in the role of ecological infrastructure in the provisioning of goods and services to inhabitants of the province.

Considerable inroads have been made through the EIIF, such as the DEA&DP acting as secretariat with WWF-SA of the Boland-Groot Winterhoek Strategic Water Source Area Collective. The objective is to get improved cohesion and planning of the different platforms in the landscape that are contributing towards the maintenance and monitoring of the ecological infrastructure. The DEA&DP is also represented on the Greater Cape Town Water Fund (GCTWF) Steering Committee which drives the establishment of the Water Fund as a separate entity. This funding mechanism and vehicle is highly complementary to the partnerships being driven at provincial and local levels.

South Africa is collaborating with the United States (through the US National Aeronautics and Space Administration) on the BioSCape research project which gathers remote sensing and field data to understand the distribution, function and importance of biodiversity in the Greater Cape Floristic Region. There are few formal monitoring or research projects measuring the impact of IAPs, especially over the longer term. One of the ways to address this is the establishment of long-term monitoring approaches that can measure the presence and density of IAPs and indigenous species, as well as record the effects of fire and IAP management practices over time. This type of monitoring is being rolled out in seven priority sub-catchments within the Boland area as part of the GCTWF.

5.3. Ecosystem-based adaptation

Ecosystem-based adaptation (EbA) involves a wide range of ecosystem management activities to increase resilience and reduce the vulnerability of people and the environment to climate change (IUCN, 2017). Typical approaches include sustainable agriculture, integrated water resource management, and sustainable natural resource management interventions such as restoring ecosystems, wetland and floodplain management, conservation of forests to stabilise slopes, and the establishment of healthy and diverse agroforestry systems to cope with increasingly variable climatic conditions (Reid *et al.*, 2017). The role of ecosystems in adaptation is recognised at the international level under the United Nations Framework Convention on Climate Change, the CBD and the United Nations Convention to Combat Desertification (IUCN, 2017).

Within the South African context, DFFE has proactively identified ecosystem-based adaptation measures through its National EbA five-year Strategy and Implementation Plan. This strategy is currently undergoing a review process, with plans to extend its scope to a 10-year

Implementation Plan. The revised plan will prioritise the integration of localised response mechanisms and acknowledge the efficacy of nature-based solutions. This strategic refinement aims not only to bolster resilience but also to strategically position South Africa to secure funding for sustainable adaptation initiatives.

People's ability to adapt to climate change is inextricably linked to their access to basic human rights and to the health of the ecosystems they depend on for their livelihoods and well-being. If adaptation policies and programmes are to be effective, they must integrate efforts to sustain and restore ecosystem functions and promote human rights under changing climate conditions (IUCN, 2017). EbA is gaining increasing prominence and is likely to become a mainstream approach to ecosystem management activities in the future.

Investing in ecological infrastructure promotes resilience to climate change by enhancing EbA strategies. For example, investing in the restoration and conservation of coastal ecosystems such as dunes and estuaries not only enhances their resilience to climate change but also provides multiple benefits for coastal communities, including improved coastal protection, enhanced biodiversity, and sustainable fisheries. Additionally, these ecosystems contribute to tourism, recreation, and other economic activities, further underscoring the importance of investing in their conservation and restoration. Another example is investing in the restoration and protection of catchment forests and grasslands. These areas are crucial for regulating water flow, replenishing aquifers, and maintaining water quality in rivers and reservoirs. With climate change leading to altered precipitation patterns and increased water stress in many regions of the country, ensuring the resilience of strategic water source areas is essential for safeguarding water security for both rural and urban communities.

5.4. Climate Change Response

Climate change is one of the most important direct drivers of biodiversity loss and ecosystem service changes worldwide, and it may become the dominant direct driver of these changes by the end of the 21st century. The Western Cape biomes are expected to be impacted by climate change, as the climate projections for the province not only indicates a general warming trend, but also drying in many areas, with increased variability of rainfall (CapeNature, 2023c).

The Western Cape Climate Change Response Strategy (DEA&DP, 2022) and its Implementation Plan (DEA&DP, 2023), focusses on the following four objectives:

- Responding to the climate emergency;
- Transitioning in an equitable and inclusive manner to net zero emissions by 2050;
- Reducing climate risks and increasing resilience; and
- Enabling a just transition through public sector, private sector and civil society collaboration.

The Strategy acknowledges the critical importance of biodiversity in the face of climate change challenges, and that biodiversity plays a fundamental role in providing ecosystem services, supporting livelihoods, and enhancing resilience to climate impacts. To address challenges related to biodiversity, the strategy includes several key components:

- **Ecosystem-Based Adaptation**: The use of EbA approaches to build resilience to climate change impacts. This includes the restoration and conservation of natural

habitats such as forests, wetlands, and coastal ecosystems, which provide essential ecosystem services and support biodiversity.

- **Protected Area Management**: Effectively managing protected areas to conserve biodiversity and enhance ecosystem resilience. This involves implementing adaptive management practices, improving connectivity between protected areas, and addressing emerging threats such as invasive species and habitat fragmentation.
- **Biodiversity Monitoring and Research**: Increased monitoring and research efforts to better understand the impacts of climate change on biodiversity and ecosystems in the Western Cape. This includes assessing changes in species distributions, tracking habitat shifts, and identifying areas of ecological vulnerability.
- **Community Engagement and Participation**: Engaging local communities and stakeholders in biodiversity conservation and climate change adaptation efforts. This includes supporting community-based conservation initiatives, integrating indigenous knowledge and practices, and promoting sustainable land use and natural resource management practices.

There is also national recognition of the threats of climate change and considerable efforts have been made to consider how our country's biodiversity conservation obligations under climate change can be achieved, how vulnerable communities' resilience can be improved through strategic restoration and maintenance of ecosystem health, and how the restoration and maintenance of ecosystem health can contribute to the mitigation of greenhouse gas emissions.

To this end, DFFE developed a Biodiversity Sector Climate Change Response Strategy in 2014 and individual biome adaptation plans (DFFE, 2015) for dealing with climate change threats to biodiversity. Work to provide an updated Biodiversity and Ecosystems Sector Climate Change Adaptation Plan was initiated in 2021, along with the drafting of accompanying biome-level implementation plans.

5.5. Gender and vulnerable groups analysis and mainstreaming

The Gender and Human Rights Gap Analysis of the 2015-2025 PBSAP set out to identify whether the PBSAP adequately catered for the social-cultural sensitivities and dimensions surrounding priority groups within the Western Cape. It was found that, while the PBSAP would benefit priority groups most through its efforts to safeguard the ecosystems upon which many vulnerable individuals depend, the PBSAP itself was largely blind to the social-cultural dimensions that shape how benefits and burdens associated with biodiversity management are distributed within the Western Cape. As a result, high likelihood existed that the implementation of the PBSAP could unintentionally exacerbate existing inequalities in certain instances. The findings and recommendations of the Gap Analysis have been incorporated into the revision of the PBSAP to avoid approaches that might drive inequality in the biodiversity management space and to actively enable a human rights-based approach to the implementation of biodiversity management strategies. Further to this, a good practice note is being developed to enable effective stakeholder engagement with vulnerable groups.

The youth unemployment rate in the Western Cape was 32.1% in 2023 (WCG, 2023c). This not only poses socio-economic challenges but also impacts biodiversity resilience by limiting opportunities for young people to engage in conservation and sustainable development efforts, thereby affecting both environmental and socioeconomic well-being in the province.

Addressing youth unemployment can contribute to enhancing biodiversity resilience and socioeconomic well-being by fostering greater youth participation and stewardship in environmental initiatives, creating pathways to economic opportunities while safeguarding natural resources for future generations.

6. CONCLUSION

OUTLOOK: DECLINING

The province has experienced an overall worsening in the ecosystem threat status of vegetation types, primarily due to the loss of approximately 102 057 ha of habitat between 2017 and 2023. While the threat status of some species has improved, the threat status of others, particularly those in the endangered and critically endangered threat categories, has further deteriorated, demonstrating a continued negative trend during the reporting period. Some improvement was experienced in the ecosystem protection level of specific vegetation types due to the establishment of new protected areas or the expansion of existing ones. Furthermore, while active management of invasive alien plant species is taking place via invasive alien plant programmes being implemented in the province by various entities, the overall funding available to address this issue is inadequate and invasive alien plant species densities are increasing despite alien clearing programmes.

The impact on Western Cape biodiversity resources due to degradation continues, with safeguarding and restoration efforts not able to mitigate the overall decline. This continued loss of natural habitat, particularly in CBAs and ESAs, undermines not only the rich natural heritage of the Western Cape, but our very livelihoods and quality of life, our water security, and our resilience in the face of a changing climate. It is vital that unlawful habitat destruction in CBAs is stopped with effective action taken against transgressors.

Greater effort is consequently required to mainstream and safeguard biodiversity priorities in all sectors. Action must be taken to achieve the GBF 30x30 target; however, without adequate resource allocation, overextended biodiversity management entities within the province are unlikely to meet targets.

An overview of the key aspects identified in this chapter and the outlook for biodiversity and ecosystem health is reflected below in Table 10 and Table 11.

Table 10: Overview of key aspects.

Aspect	Summary of key points
Pressures	• Increased urban development • Agricultural expansion • Climate change • Invasive alien species • Over-exploitation of natural resources, including water abstraction, overgrazing and illegal harvesting of species amongst others • Altered fire regimes • Increased pollution • Mining • Lack of resources for effective management and monitoring
Impacts	• Habitat degradation and loss of habitats, species and ecological processes • Increased habitat fragmentation • Reduction in water resources • Increase in disease vectors and transmission • Reduction in ecosystem services / ecological infrastructure
Challenges	• Increased number of critically endangered ecosystem types and species • Lack of resources for effective management and monitoring
Progress	• Expansion of conservation areas • Increasing number of well-protected ecosystems • Regular review and updating of some conservation data and maps • Continued mainstreaming of biodiversity priorities • Incorporation of vulnerable groups

Critical areas for action	• Mainstreaming of biodiversity priorities • Ongoing expansion of the conservation estate • Management of alien invasive species • Need for increased focus on retaining the condition and extent of ecosystems, particularly through programmes that reduce the vulnerability of the poor to the impacts of such loss or degradation • Incorporation of vulnerable groups in planning and decision taking/making

Table 11: Summary of outlook for biodiversity and ecosystem health in the Western Cape.

Indicator	Quantification	Desired state	Trend
Ecosystem threat status	• Increase in threat status for some vegetation types due to habitat loss (109 CR, 54 EN, 28 VU)[7]	• Maintain or decrease the threat status for all ecosystems in the Western Cape	**Declining** 
Ecosystem protection level	• Current protected area network amounts to 16.5% of the Western Cape • Increase of 123 051 ha protected from 2 155 859 ha in 2017 to 2 278 910 ha in 2022	• Increase the protection category for all ecosystems in the Western Cape • Increase the total extent of areas formally protected	**Improving** 
Biodiversity priority areas	• Combined loss of 219 804 ha in CR (13% loss), EN (12% loss) and VU ecosystems (12% loss) between 2013/2014 and 2020	• Reduced loss of CBAs • Increased number of CBAs secured in new/expanded protected areas	**Declining** 
Habitat degradation	• Highest levels of change occur in areas with the most threatened ecosystems	• Reduction in the extent of degraded land • Increase in the extent of areas rehabilitated, or restored where possible	**Declining** 
Species threat status	• Between 2016 and 2023, 64 species have been uplisted to more threatened categories of the SA Red List	• Reduction in the SA Red List status of species across all categories, particularly within the Critically Endangered and Endangered categories	**Declining** 

[7] Based on the recognition of 349 ecosystem types in 2023, compared to 163 ecosystem types recognised in 2018.

Indicator	Quantification	Desired state	Trend
	due to real changes in threat levels; 23 of these uplistings have been into EN, CR or CR-PE status.		
Invasive alien species	• Large proportions of areas in CN protected areas with moderate increase in IAP densities between 2018/19 and 2022/23 • As of 2019, 344 invasive species were recorded in WC • Analysis based on recently-published 2023 National Invasive Alien Plan Survey not available yet	• Reduction in the number, population density and extent of distribution of invasive alien species across all biological groups	**Declining** 

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