

National Biodiversity Assessment 2018

The status of
South Africa's ecosystems
and biodiversity

FACTS, FINDINGS & MESSAGES



environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

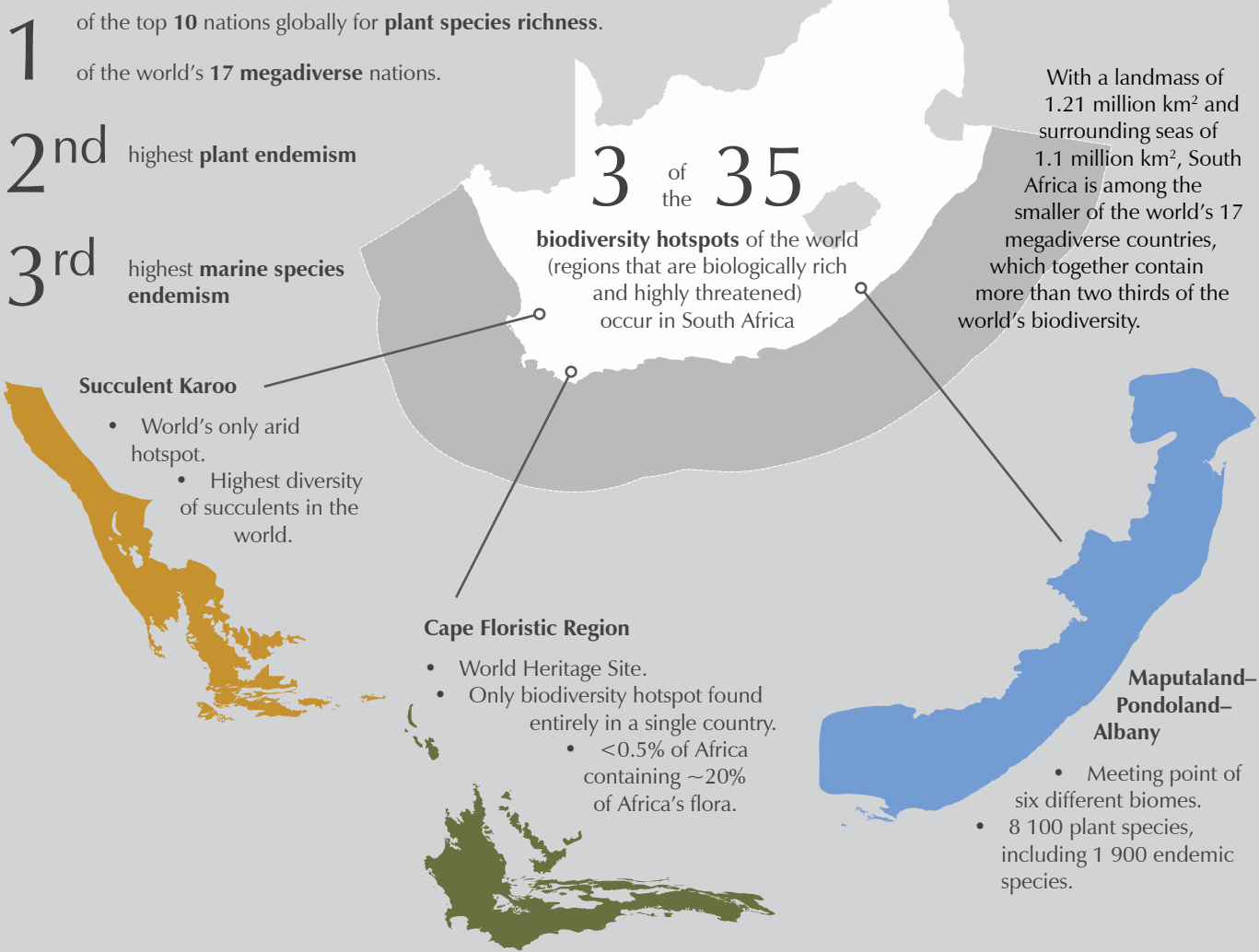


NELSON MANDELA
UNIVERSITY



South Africa's biodiversity profile

South Africa is a megadiverse country with exceptional species richness and endemism. Our endemic plant species richness (plants found nowhere else on Earth) is among the highest on the planet.



The Red Roman (*Chrysoblephus laticeps*) is found only on South Africa's near-shore reefs. © Steve Benjamin.



The unique Fynbos biome hosts the national flower, the King Protea (*Protea cynaroides*). © Melanie Cornelius.

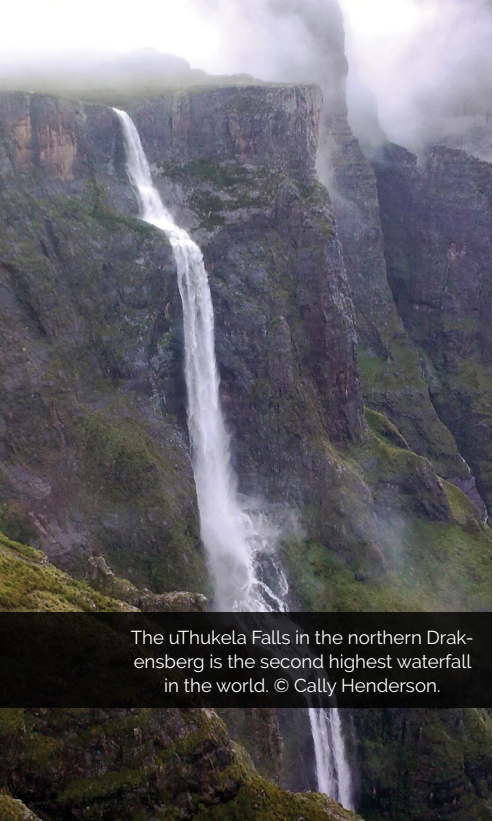
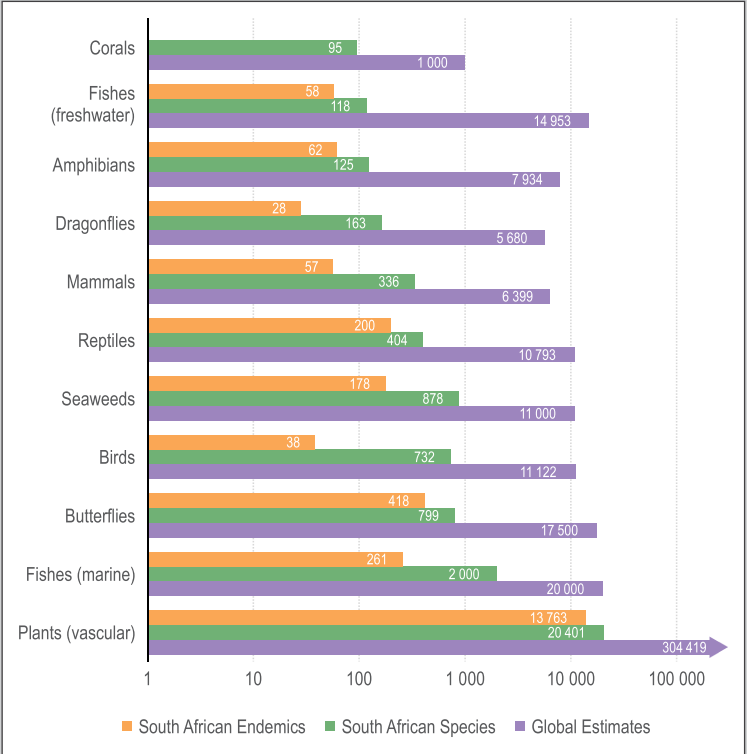
South Africa's rich species diversity

The number of South African animal species is estimated at 67 000 and over 20 400 plant species have been described. Approximately 7% of the world's vascular plant species, 5% of mammal, 7% of bird, 4% of reptile, 2% of amphibian, 1% of freshwater fish and 16% of shark, skate and ray species are found in the country.

South Africa has nearly 10% of the world coral species and almost a quarter of the global cephalopod species (octopus, squid, cuttlefish). Some terrestrial invertebrate groups have high richness relative to global statistics, e.g. 13% of the world's sunspiders (Solifugae) and nearly 5% of butterflies occur in South Africa.

Around half of the South African species of reptiles, amphibians, butterflies and freshwater fish are endemic. Almost two thirds of South Africa's plant species are endemic – mostly linked to the unique Cape Floristic Region.

Approximately 40% of South Africa's estimated 10 000 marine animal species are endemic, the vast majority of which are invertebrates.



The uThukela Falls in the northern Drakensberg is the second highest waterfall in the world. © Cally Henderson.

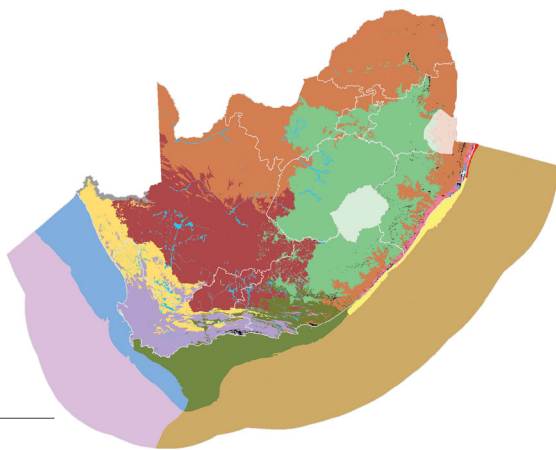
South Africa's rich ecosystem diversity

South Africa has a wide range of bioclimatic, oceanographic, geological and topographical settings. Together, these create high ecosystem diversity and endemism across all realms.

TERRESTRIAL realm: nine biomes and 458 ecosystem types, approximately 80% of which are endemic.

MARINE realm: exceptional marine biodiversity and a wide array of ecoregions with 150 distinct ecosystem types.

FRESHWATER realm: high variability of rainfall leads to diverse freshwater ecosystems. **Inland wetlands** are classified into 135 distinct types; **rivers** are classified into 222 distinct types.



Terrestrial biomes and marine ecoregions of South Africa.

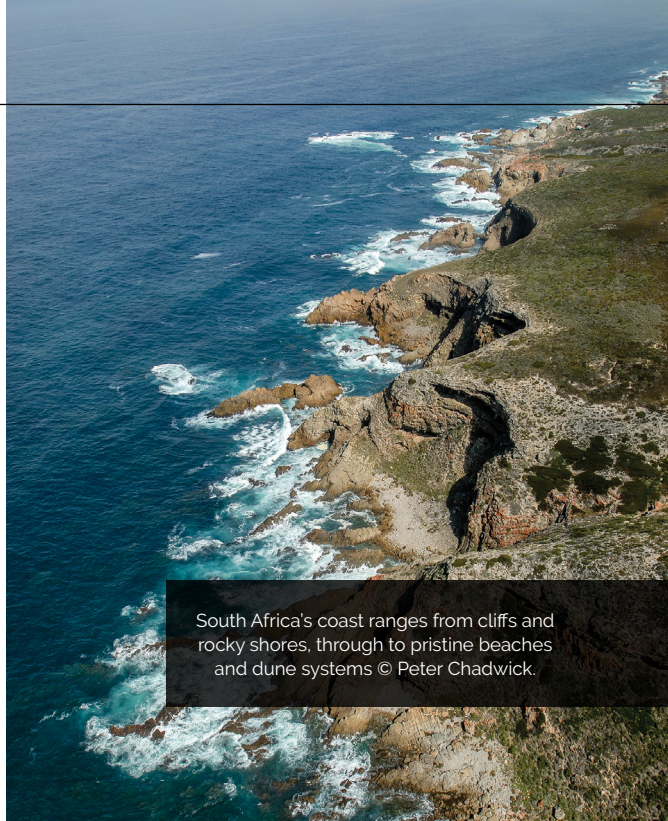
ESTUARINE realm: South Africa's 290 estuaries and 42 micro-estuaries are classified into 22 estuarine ecosystem types.

An ecological definition of the **COAST** draws from the terrestrial, marine and estuarine ecosystem maps and includes 186 ecosystem types.

South Africa's **SUB-ANTARCTIC TERRITORY** (situated 1 700 km south-east of the mainland) consists of Prince Edward Island, Marion Island and surrounding seas. There are five terrestrial and 29 marine ecosystem types.



Several threatened bird species breed on South Africa's sub-Antarctic islands, including the Wandering Albatross (*Diomedea exulans*), listed as Vulnerable. © Otto Whitehead.

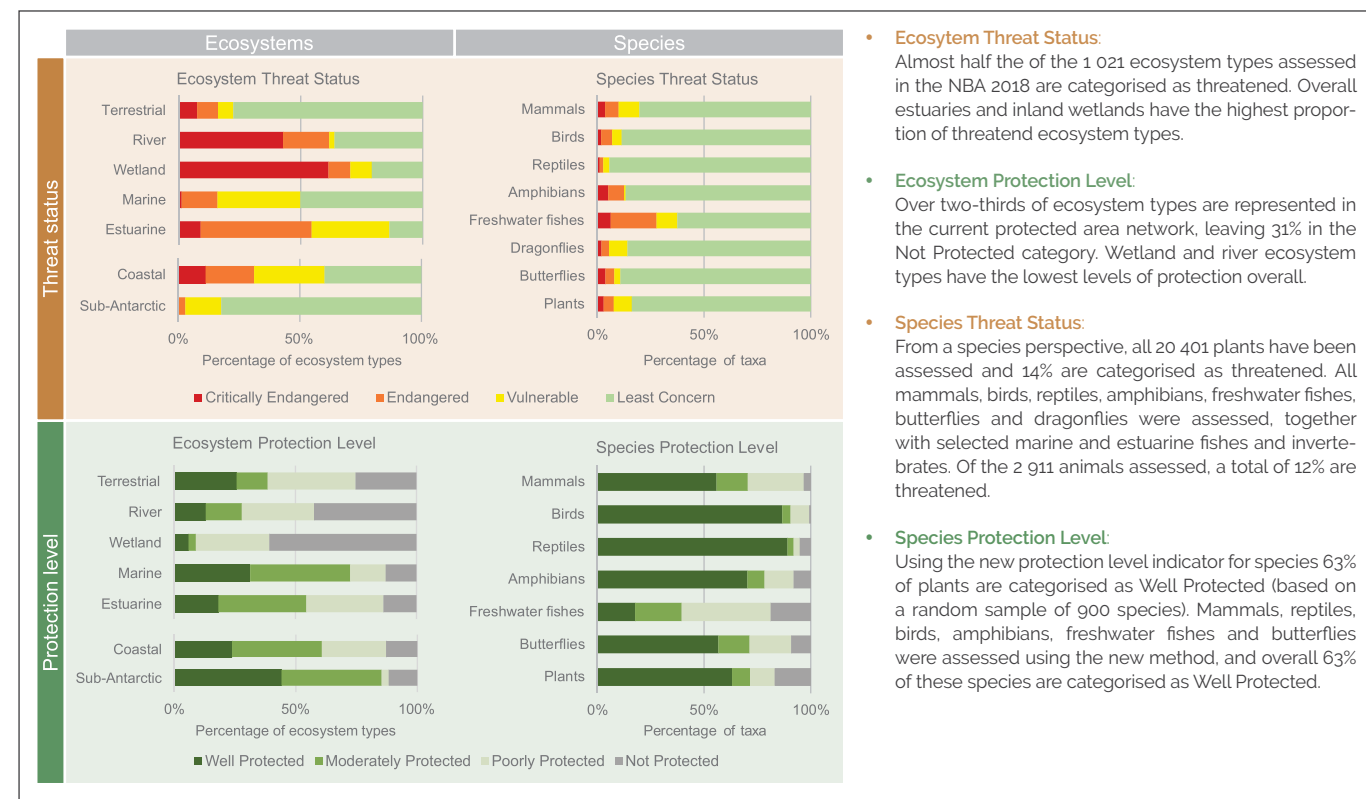


South Africa's coast ranges from cliffs and rocky shores, through to pristine beaches and dune systems © Peter Chadwick.

The status of South Africa's biodiversity an overview of the NBA 2018 findings

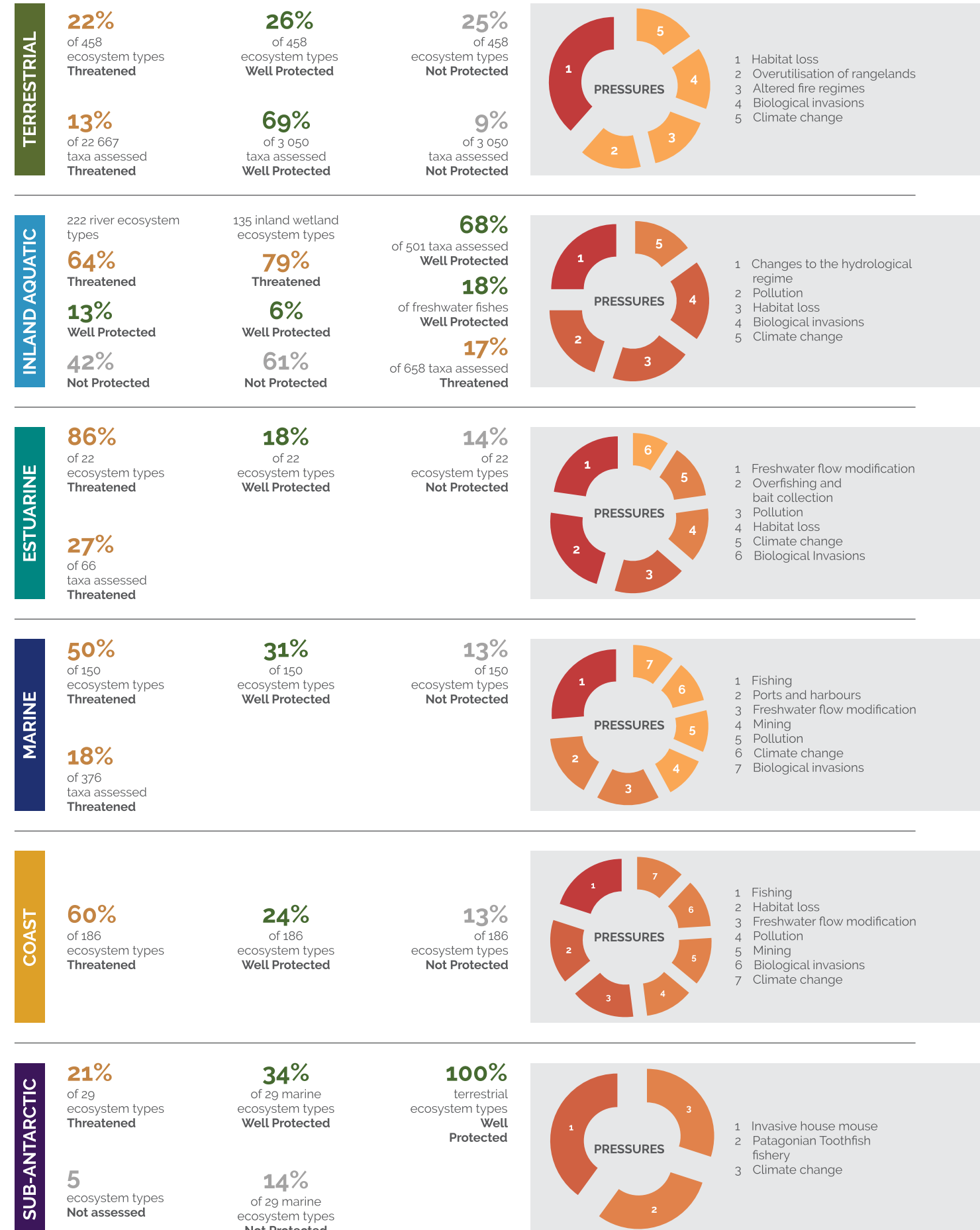
The NBA has four headline indicators, providing information on the threat status and protection level of ecosystems and species. The threat status indicators use established IUCN Red List of Species and Red List of Ecosystems assessment frameworks. The risk of extinction (species) or collapse (ecosystems) is evaluated

across all realms and for taxonomic groups for which sufficient data exists. The protection level indicators reflect how well species and ecosystem types are represented in the protected area network. The results of the four headline indicators for NBA 2018 are summarised as follows:

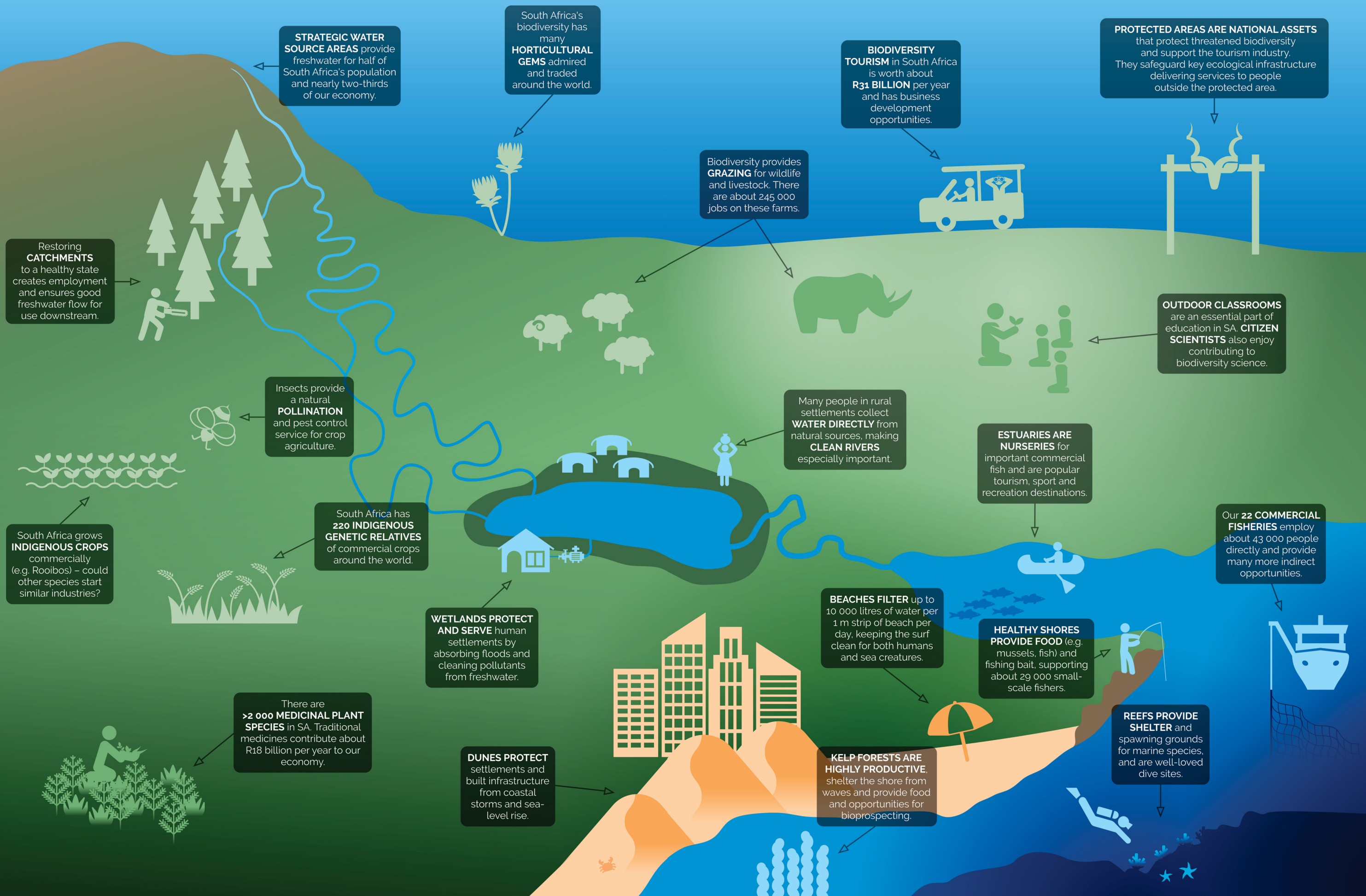


The NBA findings of threat status and protection level are summarised by realm along with each realm's main pressures on the opposite page. The main pressures across the country are habitat loss, freshwater flow modification and overfishing, with pollution, climate change and biological invasions also being key.

(A) The main pressure in the terrestrial realm is habitat loss (© Geoff Spiby). (B) Freshwater flow modification is the main pressure in the inland aquatic and estuarine realms (© Piet Huizinga). (C) Fishing is the main pressure in the marine realm, the coast and sub-Antarctic (© Kerry Sink).

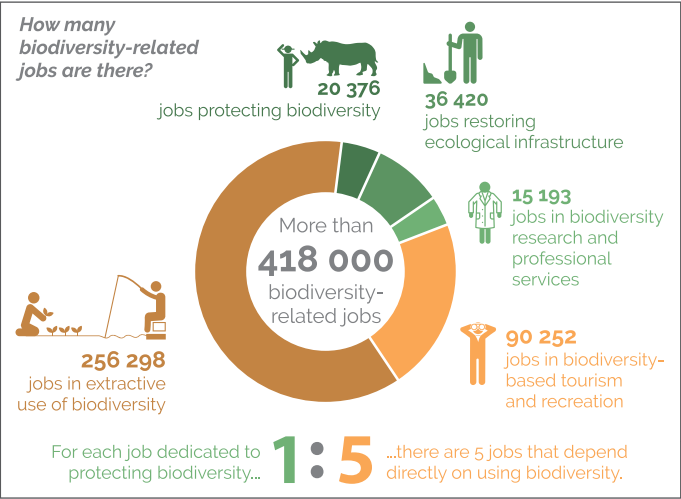


Our unique ecosystems and biodiversity providing benefits to people



Key messages from the NBA 2018

Biodiversity provides jobs



South Africa's biodiversity provides substantial employment in a range of sectors. Continued investment in managing and conserving biodiversity is essential so that jobs that depend on biodiversity can continue to increase. Jobs directly related to biodiversity are often outside urban centres and labour intensive, contributing to rural development, poverty alleviation and inclusive growth.

For more info: Part 3 of the synthesis report; the technical reports; compendium of benefits of biodiversity.

Biodiversity-related employment is based on a renewable resource that, if appropriately managed, can provide the foundation for long-term economic activity and sustainable growth.

Small, high-value ecosystem types provide disproportionate benefits to people

Certain small ecosystem types function as crucial ecological infrastructure and provide multiple benefits to society. Managing, protecting and restoring these small, high-value ecosystems gives a large return on investment. Indigenous forests, inland wetlands, lakes, estuaries, mangroves, dunes, beaches, rocky shores, kelp forests, reefs, seamounts, pinnacles and islands together take up less than 5% of South Africa's territory, but contribute disproportionately to a large number of benefits such as water purification, nutrient cycling, carbon storage, storm protection, recreation and food.

For more info: Part 3 of the synthesis report; all technical reports.

Mangrove habitats are found in only a few estuaries on the east coast. They are crucial ecological infrastructure as they protect coastal settlements from storms, provide nursery habitat for fish, and also store carbon and stabilise sediments. © Janine Adams.



Healthy ecosystems are essential for water security

Rivers, wetlands and their catchment areas are crucial ecological infrastructure for water security, often complementing built infrastructure, but the benefits of some of these ecosystems are currently compromised by their poor ecological condition. Water security can be improved through integrated management of natural resources in Strategic Water Source Areas (SWSAs) and other key catchments. SWSAs make up only 10% of South Africa's land area but deliver 50% of all surface water, supporting half of South Africa's population and nearly two-thirds of its economy. Only 12% of the extent of SWSAs falls within protected areas.

For more info: Part 3.2 of the synthesis report; inland aquatic technical report.



Poor ecological condition in rivers and wetlands makes expensive water treatment necessary before human use. The eutrophication of this water flowing from the Hartebeestpoort Dam is caused by excessive nutrients in the water from pollution. © Eric Nathan / Alamy Stock Photo.

Benefits from fishing are at risk, including food and job security



Estuarine and marine ecosystems provide South Africans with food and livelihoods by providing a basis for fishing (commercial, subsistence or recreational). Yet many fish stocks are overexploited and many fish species are threatened. Better practices to rebuild stocks of priority species are needed, as well as reliable data and sufficient capacity for undertaking regular stock assessments. Of the 10% of harvested marine species that have had their stock status assessed, more than a third are overexploited or collapsed.

For more info: Parts 3.3, 3.4 of the synthesis report; marine and estuarine technical reports.

Iconic inshore marine resources such as South African Abalone (*Haliotis midae*) and West Coast Rock Lobster (*Jasus lalandii*) are in crisis due to being overexploited and from escalating poaching. © Geoff Spiby.

Water flowing into the sea provides many benefits to people



Freshwater flowing from rivers through estuaries into the sea is not wasted, and is essential for coastal and marine food production, livelihoods, tourism and future climate change resilience. Through appropriate management, South Africa can maintain the vital freshwater flows that reach the coast and ocean. Estuaries link land and rivers to the sea. Over 30% of South Africa's estuaries are impacted by freshwater flow reduction.

For more info: Parts 3.2, 3.3 of the synthesis report; inland aquatic and estuarine technical reports.

Sediment-rich water flowing from rivers into the sea, like this Mzimvubu River plume, provides benefits such as nutrients for fish and sand for beaches. © Darren Hanner.

Climate change is impacting on people and ecosystems; healthy ecosystems can help us adapt to climate change

Impacts of climate change are evident across all realms and within most species groups. Biodiversity provides resilience against the worst effects. Restoring ecosystems and maintaining them in good ecological condition means they are better able to support natural adaptation and mitigation processes, offering increased protection to human communities and reducing the economic burden of climate disasters. Temperature increases of more than 1°C have been observed in the past 50 years, accompanied by the intensification of extreme events such as droughts, heavy rainfall, coastal storm surges, strong winds and wildfires.

For more info: Parts 2, 3.1.3, 3.2.3, 3.3.3, 3.4.3 of the synthesis report; all technical reports.

Healthy wetlands act like sponges in the landscape and are able to slow the flow of water from floods, which are likely to become more frequent as the climate changes. © Georg Wandrag.



Key messages from the NBA 2018 (continued)

Estuaries and wetlands are the most threatened and least protected ecosystems in South Africa



Estuarine and inland wetland ecosystems face many pressures and are highly threatened. The restoration and protection of estuaries and inland wetlands will secure essential benefits and deliver large return on investment. Approximately 99% of estuarine area and 88% of wetland area is threatened. Less than 2% of their extent is in the Well Protected category.

For more info: Part 2 of the synthesis report.

The groundwater-fed Langebaan Estuarine Lagoon is partly in the West Coast National Park. Fishing pressure needs to be managed to bring its ecosystem protection level to Well Protected and safeguard fish nurseries. © Peter Chadwick.

Protected areas: providing effective protection for many species

South Africa's protected areas are generally providing good protection for species. The proportion of threatened species represented in protected areas has increased over 30 years for most taxonomic groups assessed. However, when considering threatened species only, more than 85% of threatened birds, plants, freshwater fishes, amphibians, mammals and butterflies are under-protected. The results of this first-time assessment of protection levels for species provide important information for managers of protected areas, to enable further improvements in the protection of species.

For more info: Part 2.6 of the synthesis report.

The Table Mountain Ghost Frog (*Heleophryne rosei*) occurs mostly within the Table Mountain National Park. Nevertheless, it is under-protected because it is threatened by poor water quality and water abstraction from the few streams where it occurs. © Joshua Weeber.



Coastal biodiversity assets, including beaches, are at risk

Sixty per cent of coastal ecosystem types are threatened – a result of the many pressures concentrated along the coast, including habitat loss through coastal development. Some beaches are being eroded as natural movements of sand are disrupted, putting one of South Africa's most popular recreational activities at risk. Judicious coastal development that avoids sensitive areas can minimise further damage, maintain coastal ecological infrastructure and reduce climate risks.

For more info: Part 3.5 of the synthesis report.



Inappropriate coastal development undermines the resilience of coastal ecosystems and increases the risk of built infrastructure failing due to natural hazards. © Linda Harris.

Freshwater fishes are the most threatened species group assessed in South Africa



Freshwater fishes are the most threatened of all species groups that have been fully assessed. Half of South Africa's freshwater fish species are found nowhere else in the world. Effective management and conservation strategies to halt the decline and promote recovery of threatened fish species are needed. One-third of South Africa's native freshwater fish species and two-thirds of endemic species are threatened. Predation by invasive alien fishes (e.g. bass) and habitat degradation are the key pressures on native freshwater fishes.

For more info: Parts 2.5, 3.2 of the synthesis report.

The small Fiery Redfin (*Pseudobarbus phlegethon*) is Endangered. However, its range has been extended following the successful eradication of the invasive alien Smallmouth Bass (*Micropterus dolomieu*) by CapeNature. © Riaan van der Walt.

Protected areas: investment success in the ocean and on land



Protected areas have expanded in the ocean and on land, and are a source of pride for South Africans. Continued expansion will help to ensure biodiversity conservation, ecological sustainability and even more social and economic benefits from biodiversity. The 20 new Marine Protected Areas declared in 2019 ensure that 5% of the country's mainland marine territory and 87% of marine ecosystem types have some protection. The protected area estate of South Africa's terrestrial mainland now covers nearly 9% of land area and 75% of terrestrial ecosystem types have some form of protection.

For more info: Part 2.2 of the synthesis report.

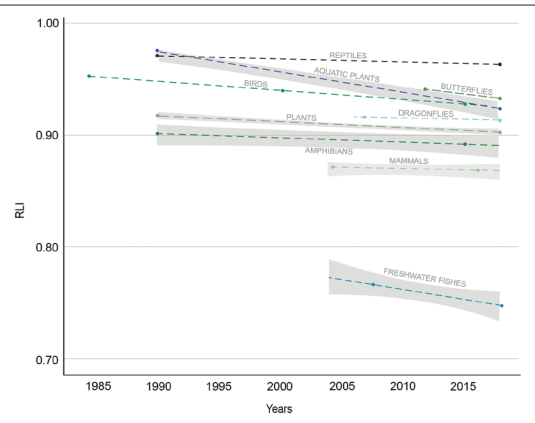
South Africa's new Marine Protected Areas will ensure benefits for ecosystems, people and the economy, including contributing to sustainability of fisheries, adaptation to climate change and tourism. © Peter Chadwick.

Trends in threat status show rapid declines in some of South Africa's species

Changes in species threat status over time were tracked for eight taxonomic groups using the IUCN Red List Index (RLI). Increased extinction risk is evident for most groups, and freshwater species and butterflies show a steep decline. For the RLI to be more comprehensive, repeat assessments are required for invertebrates and species in the marine and estuarine realms. The RLI uses national Red List assessments and currently allows the tracking of trends in extinction risk for plants, reptiles, birds, mammals, amphibians, freshwater fishes, dragonflies and butterflies.

For more info: Part 2.5 of the synthesis report.

The Red List Index shows that freshwater plants and fishes have steep declines, reflecting the poor status of rivers and wetlands. Butterflies also show a decline that is of concern, suggesting that there is a need to assess and monitor other invertebrate groups.



Key messages from the NBA 2018 (continued)

Areas where pressures are concentrated should be priorities for spatial planning



The spatial distribution of pressures on biodiversity across the landscape and seascape is uneven. Pressure hotspots, where many different pressures converge, require strategic spatial planning and focussed management. Human activities are often concentrated in areas rich in natural resources, of high productivity and high accessibility. However, careful planning can often allow for a sustainable configuration of natural areas within a matrix of more intensive land and resource uses.

For more info: Part 2.4 of the synthesis report.

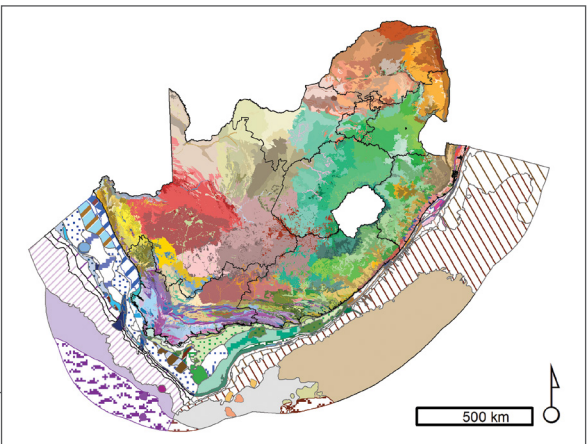
Intensive agriculture is one of the main pressures on biodiversity. It impacts terrestrial ecosystems through outright loss of natural habitat, and also affects rivers and wetlands through abstraction of water or polluting return flows with chemicals. Careful planning of intensive agriculture can avoid or reduce some of these impacts. © Oswald Kurten.

South Africa's new seamless map of ecosystem types will improve assessment, planning and monitoring

Progress made in classifying and mapping ecosystem types seamlessly across all realms has unlocked comprehensive and systematic assessment and planning for all of South Africa's territory, providing improved information to inform policy and decision making. A new, comprehensive and integrated map of ecosystem types has been developed as part of the NBA 2018 and seamlessly aligns the terrestrial, marine and estuarine realms through a detailed delineation of seashore ecosystem types.

For more info: Part 2.1 of the synthesis report.

The National Ecosystem Classification System recognises a total of 1 021 distinct ecosystem types covering South Africa and its sub-Antarctic territory, which have been mapped in detail in a new integrated map of ecosystem types.

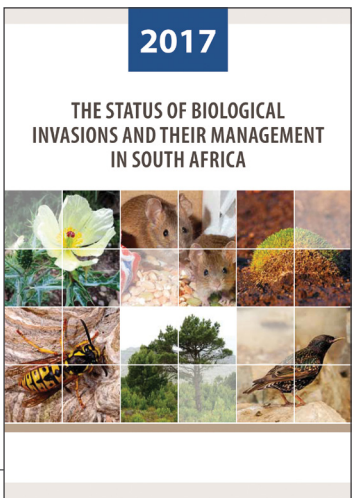


Biological invasions threaten biodiversity and human wellbeing

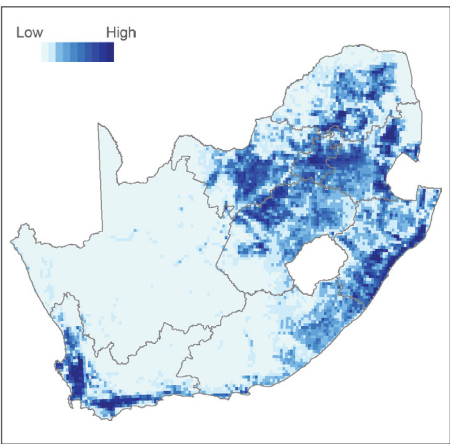
Over 100 alien species have a severe impact on South Africa's biodiversity and, in some cases, on human wellbeing. Although some successes in the management of biological invasions have been achieved, the adoption of a national strategy for managing biological invasions, improved project-level planning for prevention and management, and enhanced spatially explicit data will greatly increase effectiveness of current efforts. Over 2 000 alien species have become established in South Africa and a third of these have become invasive. Biological invasions are major pressures on biodiversity and ecological infrastructure in all realms.

For more info: Part 2.3 of the synthesis report.

The first national report on invasive species has created an excellent foundation on which to build a comprehensive monitoring and reporting programme that can guide research and implementation efforts.



New indicators developed during the NBA 2018 advance South Africa's ability to report on biodiversity

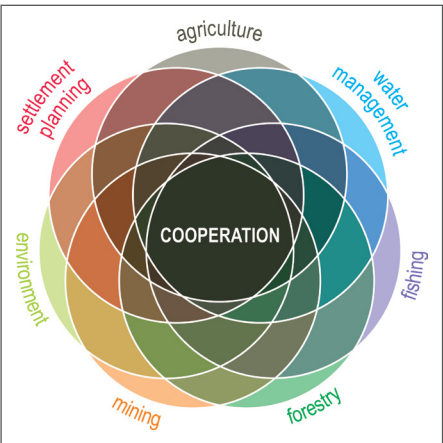


The collaborative process of undertaking the NBA builds on innovations in the biodiversity sector to produce new techniques and advances in knowledge. Several new indicators provide a more comprehensive picture of the state of ecosystems and species. The indicators are key elements of the National Biodiversity Monitoring Framework and support South Africa's international reporting requirements. New indicators in the NBA 2018, which join the existing indicators of ecosystem threat status, ecosystem protection level and species threat status, include: the species protection level indicator, the first application of the Red List Index, indicators of rates of terrestrial habitat loss, and potential indicators to monitor the status of genetic diversity.

For more info: Parts 2.6, 2.5, 3.1.4, 3.1.9 of the synthesis report; technical reports.

Land cover change was contrasted with areas of high phylogenetic richness (measured by phylogenetic diversity) for reptiles to create an integrated metric to track areas sensitive to genetic erosion.

Cooperative governance is essential for healthy landscapes and seascapes



Biodiversity features and ecological processes are connected in complex ways that cross realms and human-constructed boundaries. Human activities in a range of separately managed sectors can impact on the same biodiversity. To deal with this interconnectedness, cooperative governance and cross-sectoral planning and decision making are essential. Biodiversity is central to national objectives of inclusive economic growth, job creation and improved service delivery for all citizens. Just as all biodiversity is connected, management interventions, research, monitoring and data efforts should also be connected. All sectors should integrate this collective responsibility into their policies and practices.

For more info: Part 4.3 of the synthesis report.

Planning for people, planning for the economy and for sustainable environmental resources requires cooperation across sectors that often work in silos.

Investment in strategic and collaborative biodiversity monitoring programmes is crucial

Investment in existing and future strategic and cooperative biodiversity monitoring programmes is essential to strengthen our ability to detect and report on trends, plan accordingly and manage effectively. While South Africa has some robust biodiversity monitoring programmes, many involving citizen scientists, there has been a decline in resources allocated to monitoring programmes and some key monitoring datasets are very old or not secure. The NBA 2018 has highlighted gaps that should be filled and priorities for building on existing monitoring efforts.

For more info: Part 4.4 of the synthesis report.

Polhillia ignota, a species thought to be extinct that was rediscovered by volunteers of the CREW Programme in 2017 – demonstrating the value of continuous species monitoring for biodiversity science. © SANBI.

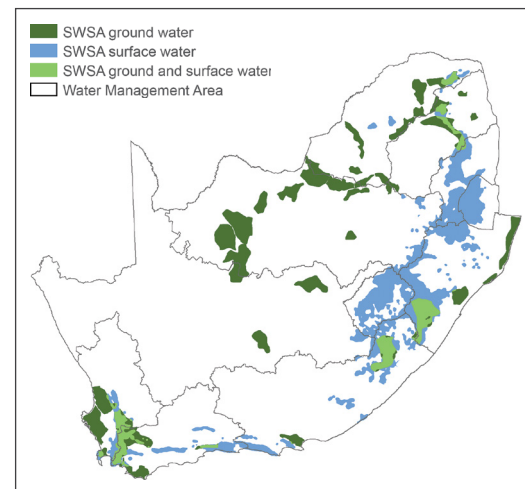
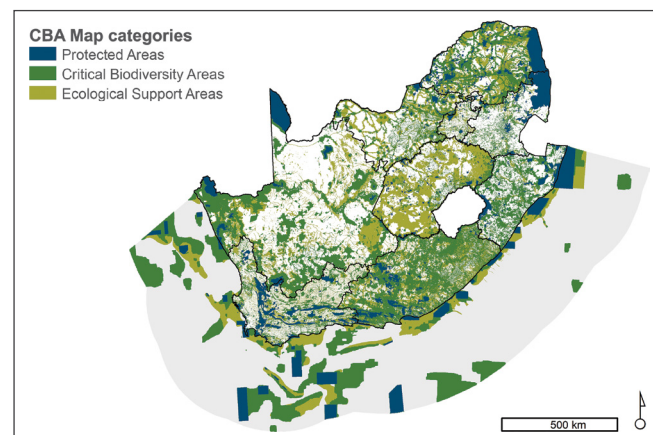


Priority actions revealed by NBA 2018 for managing and conserving SA's biodiversity

The NBA presents important information that can be used by government and civil society in various decision making processes to ensure effective management and conservation of South Africa's biodiversity in support of national development goals. The NBA informs and supports the implementation of the National Biodiversity Strategy and Action Plan (NBSAP) and the National Biodiversity Framework (NBF), which set national strategic objectives for managing and conserving biodiversity.

Spatial biodiversity priorities

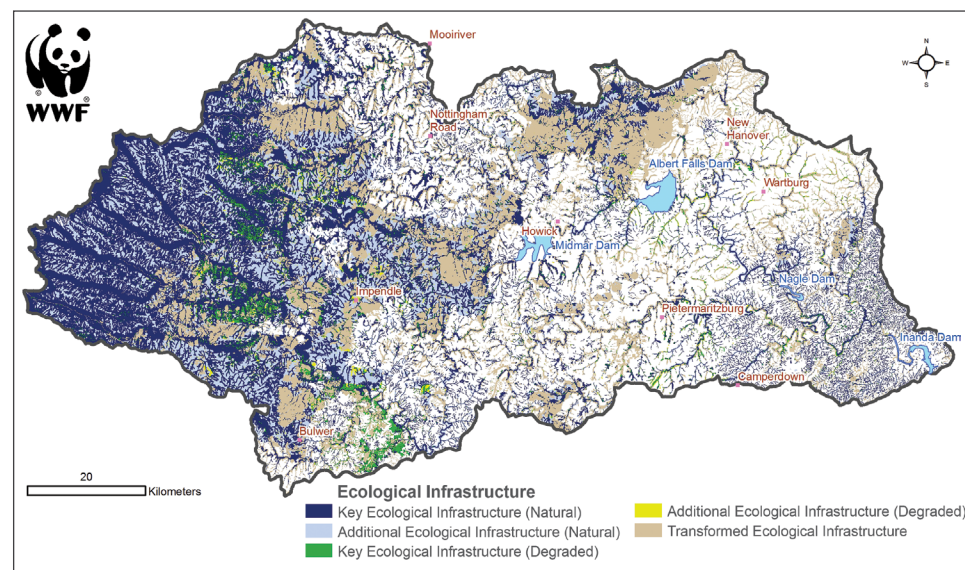
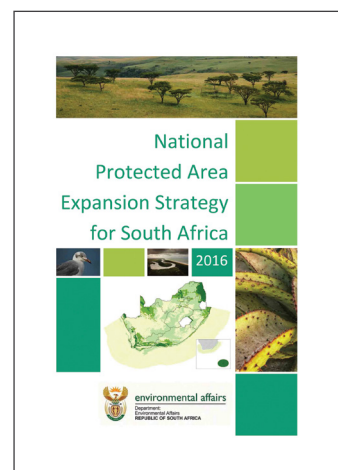
An important feature of South Africa's responses to the pressures on biodiversity has been spatial planning to prioritise interventions in the landscape and seascape. The spatial data layers and datasets of the NBA support the production of many spatial planning tools at the national and sub-national level. These include maps of Critical Biodiversity Areas (CBAs) and Ecological Support Areas, protected area expansion strategies, and the identification of Strategic Water Source Areas and Freshwater Ecosystem Priority Areas. Together, these tools provide a comprehensive set of biodiversity priority areas that collectively meet biodiversity targets for ecosystems, species and ecological processes. These spatial biodiversity plans support decision making about the desired future uses of the land or ocean (e.g. in the form of Spatial Development Frameworks produced by municipalities, and Marine Spatial Planning), as well as decision making in response to development applications (such as environmental authorisations).



Strategic Water Source Areas (SWSAs) are an important national ecological infrastructure feature, making up only 10% of South Africa's land area, yet delivering 50% of our water, often to towns and cities far away. SWSAs are highlighted in the National Spatial Development Framework as a strategic feature for water security.

Maps of Critical Biodiversity Areas, prepared at provincial or metropolitan scale, now cover the whole of South Africa's landmass. A preliminary coastal and marine CBA Map (developed in early 2019) now complements the land-based CBA Maps. Together, these maps provide key inputs into strategic planning and decision making processes.

The National Protected Area Expansion Strategy identifies priority areas for expansion of land-based and marine protected areas, with a focus on under-protected ecosystem types, as well as ensuring connectivity of the protected area network in support of climate change resilience.



Mapping ecological infrastructure is complex and requires fine-scale GIS work to delineate crucial features in the landscape. This was trialled in 2013 for the greater uMngeni catchment through a project funded by WWF-South Africa. The high resolution mapping of the coast for NBA 2018 enhances the prospect of more comprehensive maps of ecological infrastructure that reflect the high concentration of ecological infrastructure features along the coast.

Priority interventions

The NBSAP and NBF highlight a range of priority interventions for managing and conserving biodiversity, confirmed by the findings of the NBA 2018:

Strengthening compliance and enforcement. In some cases, there is limited technical capacity to utilise existing policy tools, in others there is limited capacity to enforce laws and regulations.

Strengthening cross-sectoral and cross-realm planning. Biodiversity features and ecological processes are connected in complex ways that cross realms and human-constructed boundaries. To deal with this interconnect-edness, cooperative governance and cross-sectoral planning and decision making are essential.

The Eastern Cape Department of Economic Development, Environmental Affairs and Tourism undertakes helicopter surveys to check for illegal land clearing of Albany Thicket vegetation near Alexandria. © DEDEAT.



Strengthening evaluation for adaptive management. Interventions to manage and conserve biodiversity are often not monitored for effectiveness. This needs to be improved to make adaptive management possible.

Improving conservation project implementation. Implementation challenges are often project-specific, and improving project financing and project management are key for implementation success.

Maintaining and further strengthening capacity. A common theme across the NBA 2018 is that of human capacity. Building an equitable and suitably skilled workforce to improve the management and conservation of biodiversity is an important part of building a capable state.

Rehabilitating and restoring biodiversity can be complex and labour intensive. Regularly monitoring rehabilitation efforts for effectiveness allows lessons to be learnt for further restoration initiatives. © Mike Powell.

Knowledge gaps

The NBA process reveals gaps in current knowledge, with the following priorities highlighted:

Research priorities. Improved foundational information (e.g. distributions, descriptions) for species and ecosystems, further work on pressures on biodiversity and ecological condition, and research for further improving the indicators used in the NBA are needed.

Monitoring needs. Investment in existing and future strategic biodiversity monitoring programmes is essential to strengthen our ability to detect trends, plan accordingly and manage effectively. While South Africa has some robust biodiversity monitoring programmes, many involving citizen scientists, there has been a decline in resources allocated to monitoring programmes and some key datasets are very old and no longer being updated.

Data management and sharing imperatives. Effective collaboration and data sharing between biodiversity data facilities, and between these facilities and the data users, provide a crucial foundation for ongoing research and monitoring. This ultimately improves the quality and accuracy of biodiversity assessments and planning, and underpins transparent science-based policy advice and decision making.

Biodiversity scientists use the data submitted by citizen scientists on platforms like iNaturalist to update information on species distribution and abundance patterns used in Red List assessments. © SANBI.





All the NBA 2018 products, including technical reports, synthesis report, datasets, maps and supplementary materials, are available on <http://nba.sanbi.org.za/>.

The **National Biodiversity Assessment (NBA)** is the primary tool for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategies and activities for managing and conserving biodiversity more effectively.

The NBA 2018 showcases findings for the headline indicators of threat status and protection level for both ecosystems and species, and presents these findings across the terrestrial, inland aquatic, estuarine and marine realms, as well as for the coast and South Africa's sub-Antarctic territory (Prince Edward and Marion Islands and associated waters). New analyses in the NBA 2018 include trend analyses for species threat status, an assessment of land cover change in the terrestrial environment, and an examination of potential ways to assess genetic diversity on a national scale.

The NBA is led by the South African National Biodiversity Institute (SANBI), but the breadth and scope of the NBA make collaboration between multiple institutions and individuals an essential part of the process. The collaboration ensures that the best available science underpins the NBA, promotes collective ownership of the NBA products by the biodiversity community in South Africa, and helps ensure a common vision for action following the assessment. The NBA 2018 was undertaken between 2015 and 2019, and involved over 470 individuals from approximately 90 institutions who collectively contributed approximately 75 person years of work. The CSIR led the inland aquatic and estuarine components, and Nelson Mandela University led the coastal component of the NBA 2018.

Citing this booklet: use recommended citation in Synthesis Report.



Front cover images, left to right: Coastal landscape of Maphelane and Lake St Lucia (© iSimangaliso Wetland Park); Women at the uThukela River (© Ariadne van Zandbergen/The Africa Image Library); Critically Endangered Waterberg Copper (*Eriksonia edgei*) (© Reinier F. Terblanche); Quiver Tree (*Aloidendron dichotomum*) (© Andrew Purnell).

Back cover images, left to right: Net fishing provides food and livelihoods (© Kerry Sink); West Coast Rock Lobster (*Jasus lalandii*) stock has collapsed from overfishing (© Geoff Spiby); King Penguin (*Aptenodytes patagonicus halli*) on Marion Island (© Stephni van der Merwe); Red Babiana (*Babiana villosa*) is endemic to Fynbos (© Ismail Ebrahim).