



PART 2: The “when”, “where”, “what”, “why”, and “who” of African protected areas

What is the current state of African protected areas?

Declaring an area as formally protected is not an endpoint for conservation, but the start of a longer journey towards the continued persistence of biodiversity. The subsequent chapters lay out:

- How the geographical footprint of African protected areas has changed over recent decades;
- Which ecological features are secure within the current protected area network, and which still lack formal protection;
- The varying management motives and conservation objectives of contemporary protected areas;
- Who is responsible for, and who stands to benefit from, African protected areas.

Southern Bald Ibis, South Africa.
Source: Wayne S. Grazio on Flickr under CC BY-NC-ND 2.0 DEED.

2.1 “When” and “where” – the expansion of protected areas

2.1.1 The expansion of protected areas through time

Africa has more than 8800 protected areas covering nearly 19% of land and 16.7 % of seas. This has not always been the case. The last two and a half decades have seen a three-fold increase in terrestrial protection and a fifty-fold increase in marine protection. As the coverage of protected area expands, it is essential that resources, research, and policies also match this rate of growth.

Back in March 2000, the journal Science published a paper titled “Can Protected Areas Be Expanded in Africa?”¹ At the time, different sources estimated that protected areas covered roughly 4–6 % of the continent. The authors extrapolated future land-use based on expected population growth and estimated that, without increasing agricultural production considerably, Africa would simply not have enough space for additional protected areas. They estimated that protecting 5 % of Africa’s territory would lead to a nearly 20 % shortfall in land needed to feed the continent by 2050¹.

Looking back with hindsight, we now know that these concerns were mostly unfounded. Today, the World Database on Protected Areas² reports that the more than 8800 protected areas in Africa cover nearly 19 % of land and 16.7 % of seas (excluding Other Effective Area-based Conservation Measures changed these values to 14.5 % and 16.7 %, respectively).

The purpose of looking back at predictions from the turn of the century is to remind us of the significant progress in expanding protected areas, which seemed unthinkable just two and a half decades ago.

This feature map shows the approximate ages of Africa’s protected areas. It is not perfect because science still lacks unambiguous information on when protected areas were first established. Instead, we rely on reported information on the year of each protected area’s most recent designation status. For example, should a protected area that has existed for decades as a locally managed nature reserve be upgraded to a national park, the date of its designation will refer to the year the area became a national park, not the year it was originally established. Nevertheless, even after considering this caveat, it is clear that several large protected areas have recently been added to the continent’s protected area estate. This dramatic expansion is most notable in the marine realm. In 1998, less than 0.1 % of Africa’s oceans were protected, meaning that there has been a fifty-fold increase to current protection levels in just 25 years. On land, protected area coverage grew from roughly 6 % in 1998 to nearly 19 % today; a less remarkable increase perhaps, but impressive nonetheless.

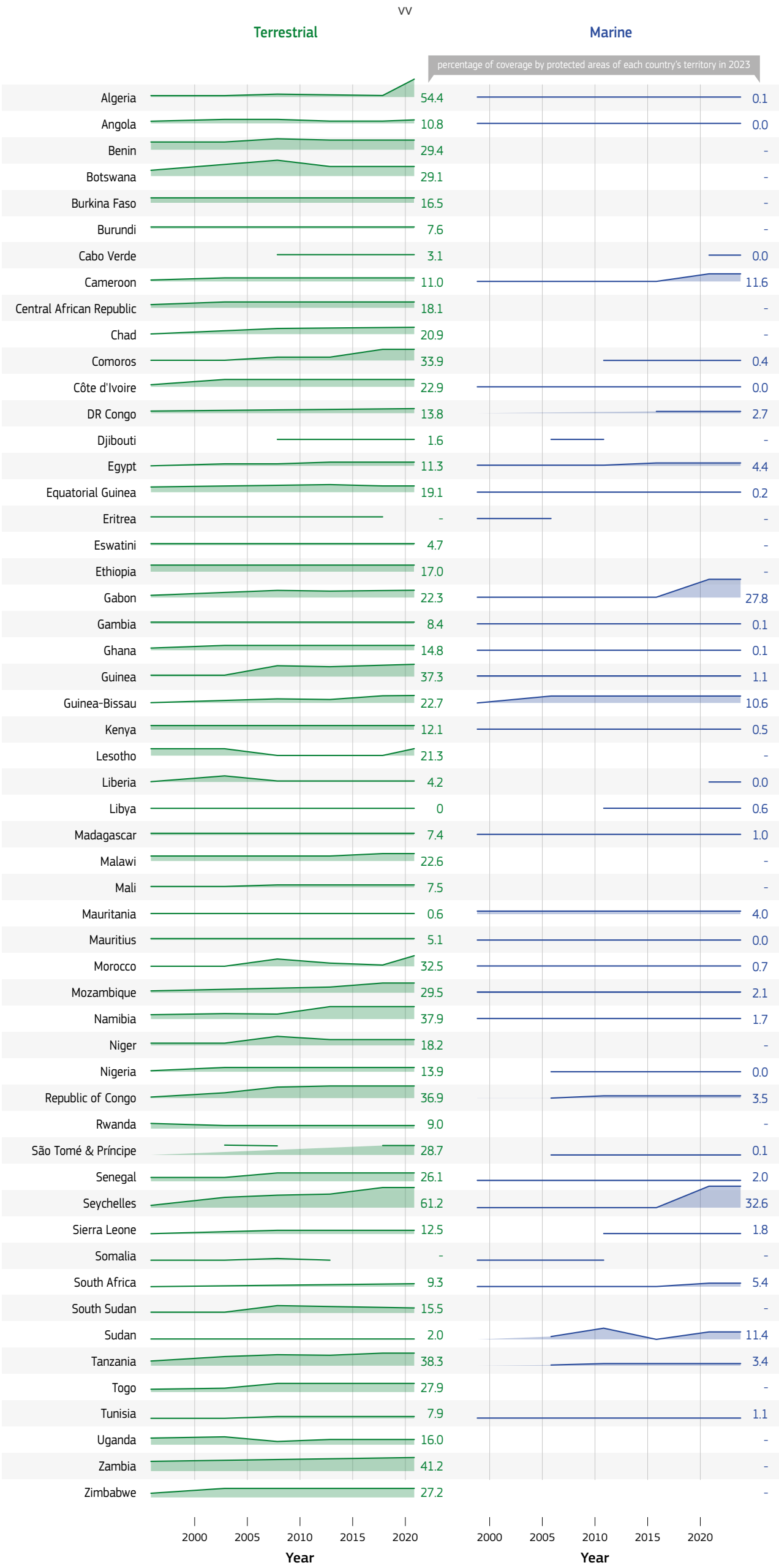
African countries are on their own protected area expansion journeys. This graphic shows the stylised trajectories of each African country’s terrestrial and marine protection. Protected area expansion in some countries is relatively recent. For instance, Guinea, Gabon and the Seychelles have grown their terrestrial and marine protected areas considerably since 2000. In other countries – like Benin, Ethiopia, or Zambia – protected area coverage has remained relatively unchanged from starting baselines. Most countries, however, have witnessed some change in their national protected area estates during this century.

The upward trajectories of protected area coverage fail to capture the true magnitude of the change that has happened since the turn of the century. Approximately 3.7 million km² of land and 0.6 million km² of seas have been declared as protected areas during the last 25 years. The positive effects on biodiversity of such large expanses depend on essential supportive factors such as rangers presence, infrastructure, wildlife surveys, and community engagement. However, allocating new resources in proportion with protected area expansion places a heavy financial burden on those tasked with managing and maintaining these conservation areas.

Protected area expansion in African countries.
The expansion of terrestrial (green) and marine (blue) protected areas between 1998 and 2023. Numbers represent the percentage of coverage by protected areas and OECMs (not shown on map) of each country’s territory in 2023. Missing values (-) can reflect either the absence of geospatial information or the absence of protected areas (e.g. landlocked countries without any marine protected areas).

These statistics might differ from those reported officially by countries due to difference in methodologies and datasets used to assess protected area coverage and differences in the base maps used to measure terrestrial and marine area of a country or territory.

Source: Own calculations based on World Database on Protected Areas.

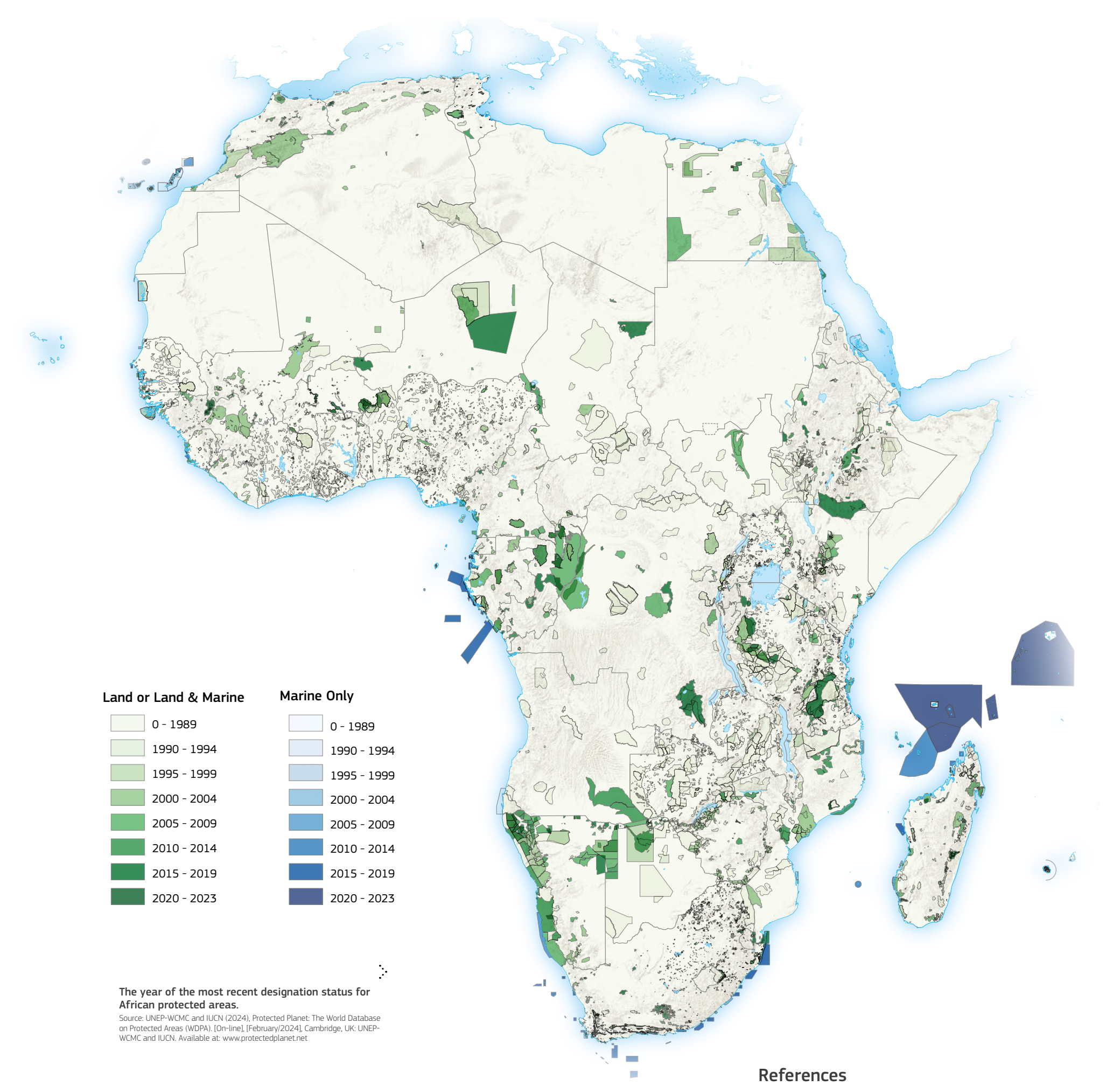


Assessing the return-on-investment of protected areas would help justify their continued expansion³. A useful case-study on protected areas in the Eastern Arc Mountains of Tanzania used economic modelling to estimate establishment costs, capital expenditure (e.g. investing in infrastructure), and recurrent costs (e.g. staff salaries and operational expenditure) of maintaining a protected area⁴. The study found that the annual management costs in the region, while not insignificant, equated to just 13 %

of the revenue generated by tourism in Tanzanian National Parks. In reality, however, comparing the costs of protected area expansion with the potential revenue is rarely this straightforward. Nevertheless, this case-study demonstrated the considerable expenses associated with protected area expansion, while also providing context on the potential value added.

Looking forward, while protected area expansion since 2000 has been remarkable, the next 25 years will pose new challenges

in ensuring that protected areas are climate-smart⁵. One way to do this would be to consider protected area expansion, not by increasing coverage of geographic area, but by enhancing the representation of current climate conditions within future protected areas⁶. This new way of thinking could embed climate change adaptation within protected area expansion, and may involve a shift in perspective on how progress toward future protected area targets is defined and measured.



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2.1.2 The growth of data available through the World Database for Protected Areas

The World Database on Protected Areas (WDPA) is used to monitor the continually evolving global network of protected areas. As a dynamic dataset integrating information from over 500 sources, it has also evolved over time. Compared to 25 years ago, the quality of protected area information in the database has improved significantly. 70% of African protected area records in the WDPA have been updated in the last four years, with the majority represented by spatial information on their geographical boundaries. Despite its known limitations, the WDPA provides the most comprehensive depiction of the continent's protected area network, and the quality of its information is improving continuously.

The global network of protected areas is continually evolving and its dynamics are monitored using the World Database on Protected Areas (WDPA). As such, the database has a pivotal role in global efforts to track progress toward international agreements related to protected areas, like Target 3 of the Kunming-Montreal Global Biodiversity Framework or the Sustainable Development Goals 14 and 15. Because global indicators must be derived from data that are comparable across countries, they depend on a single standardised data source. Reliable data is key for monitoring conservation commitments and supporting decision-making processes¹.

The WDPA is a dynamic dataset that integrates information coming from over 500 different data providers^{1,2}. Known limitations and challenges linked to this database stem from the complexity in maintaining such a large global dataset and liaising with so many data providers (see Topic 1.2.1). However, the quality of the WDPA has increased significantly in recent years¹.

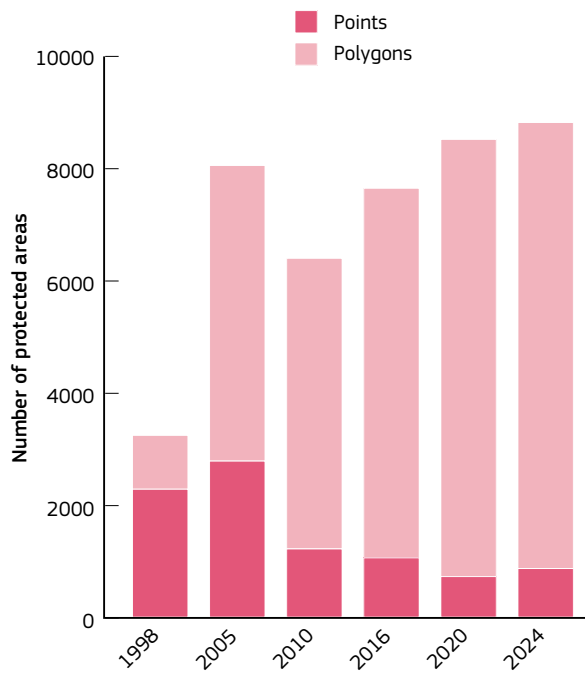
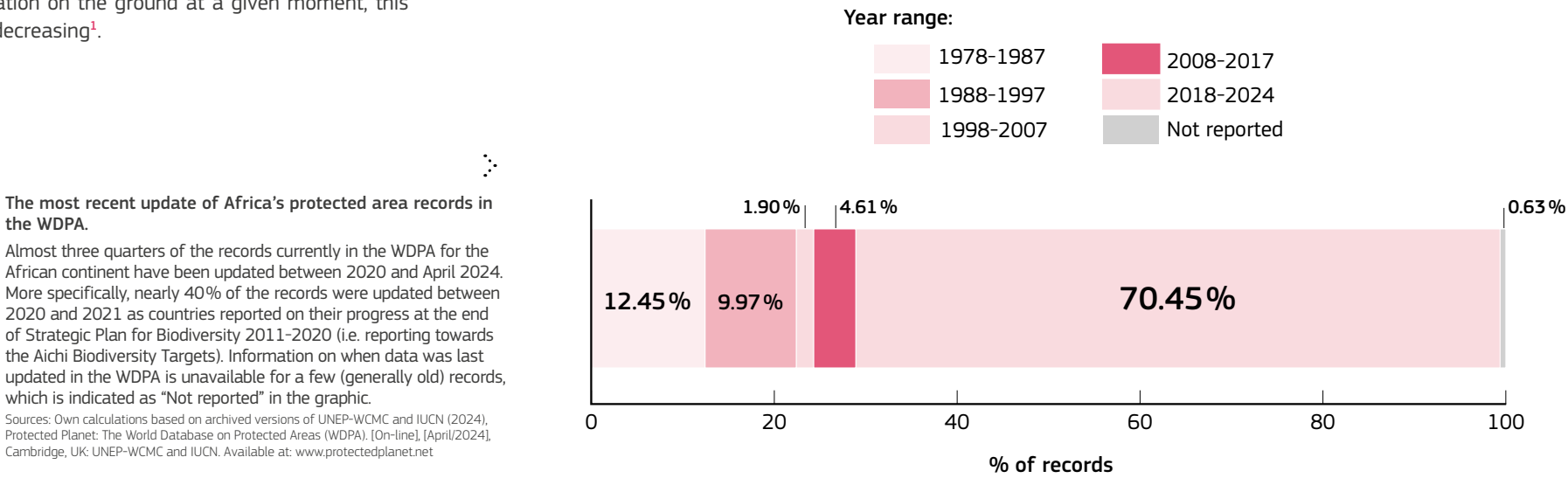
Since 2004, Parties to the CBD have been mandated to report data on protected areas to the WDPA³. The database continues improving year to year. In Africa, 70% of protected area records have been updated since 2020. However, updating certain subsets of the data remains challenging¹. As an example, the 28 polygon records for protected areas in Benin have not been updated since their original inclusion in 1984, and all additions since then are only represented by point coordinates. Moreover, there is typically a time delay between the establishment of a new protected area and its inclusion in the WDPA. Although this means that in some cases the information in the database does not reflect the situation on the ground at a given moment, this time-lag has been decreasing¹.

The WDPA consists of polygons (protected areas' boundaries) and points (single latitude/longitude locations). This spatial data is accompanied by 29 descriptive attributes (i.e. tabular information). The ratio of polygons to points is a relevant indicator of the WDPA's quality since the amount of points can constrain its utility for analyses. Over time, there has been an increase in the number of polygons and a decrease in the number of points^{1,2}. As of April 2024, more than 90% of the African protected area records in the database are represented by polygons.

The quality of tabular data in the database has also improved with time. Earlier versions of the database had fewer descriptive attributes linked to each protected area record. As database standards developed in 2010, and the database structure and protocols updated in 2015, more descriptors were added to enrich the information available for each site. For example, information on governance type (see Topic 2.4.1) has been compiled since 2010².

One of the limitations of the WDPA is that it cannot be used to explore how areas outside formal protected areas contribute to conservation. To tackle this, the World Database on Other Effective Area-based Conservation Measures (WD-OECM) was published in 2019 (see Topic 5.3.2 for more information on OECMs). The WD-OECM is a joint product of the UN Environment Programme and the International Union for Conservation of Nature (IUCN), compiled and managed by United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). Parties to the CBD have been mandated since 2018 to provide data on OECMs⁴. Both the WDPA and WD-OECM are fully interoperable and together provide a more comprehensive picture of the global conservation network. In fact, the WD-OECM is currently used alongside the WDPA for reporting progress towards international conservation targets². As with the WD-OECM, the WDPA is linked to other databases and initiatives, which provide further qualitative information, allowing for a more comprehensive status of the protected areas¹. This includes links to the Global Database on Protected Area Management Effectiveness; initiatives assessing governance and equity in protected areas; and the IUCN Green List (see Chapter 5.1.).

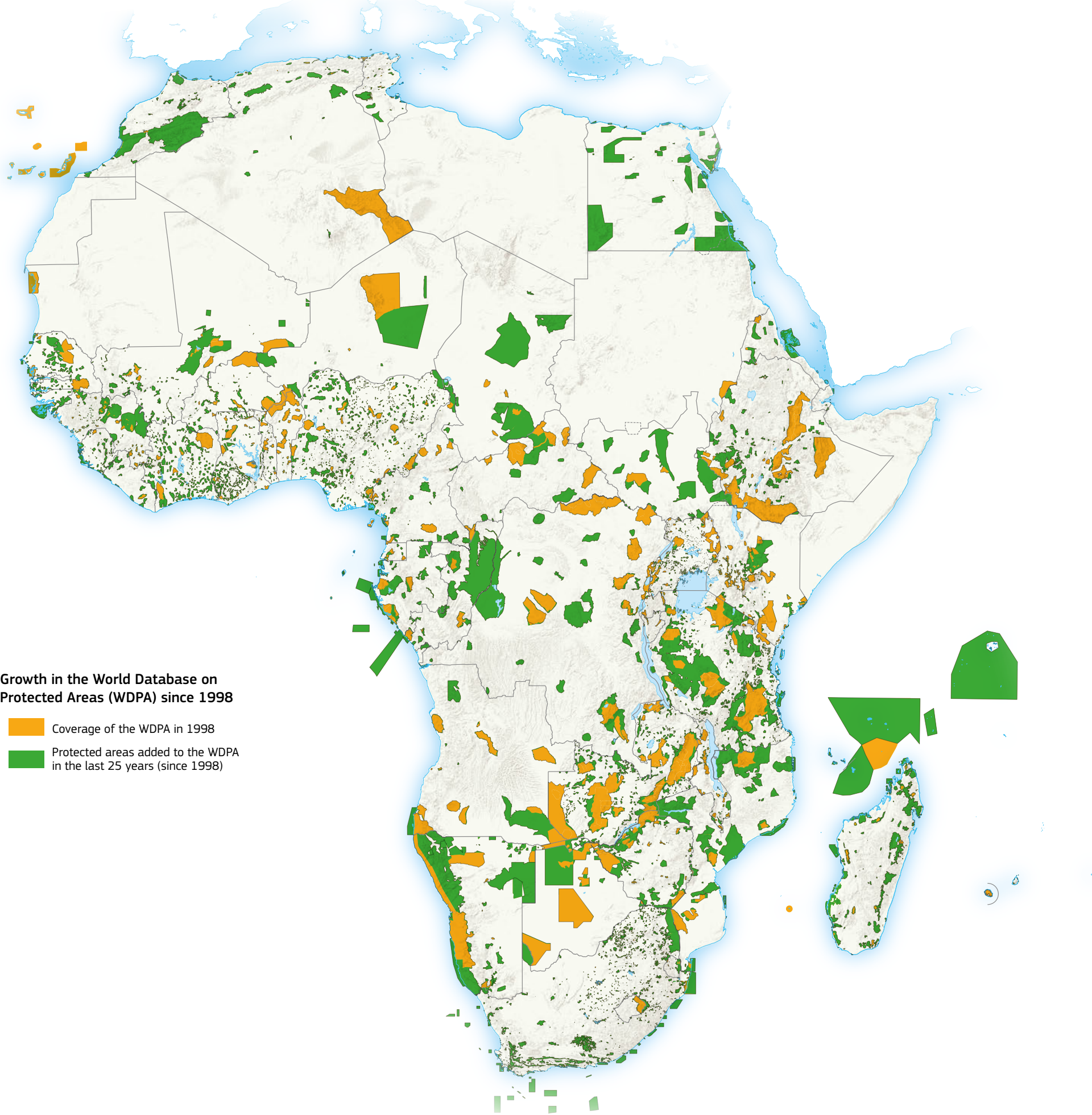
The WDPA embodies the growth in our global understanding of protected areas. Although researchers and policy officers should stay prudent by considering the scientific limitations of large global datasets of this kind, the WDPA provides remarkable scientific insights that would have been unthinkable just one generation ago.



The proportion of polygon data relative to points representing protected areas in Africa.

Over the years, the amount of protected areas represented by polygons has increased, replacing those represented by points. Back in 1998, 70% of records in the WDPA were represented by points, but this figure is currently less than 10%. Over one-third of African countries have the majority of their protected areas (more than 80% of their records) represented by polygons in the WDPA. Protected area records for only three countries, Libya, Somalia and Sudan, are completely or almost completely represented by points. In some instances, point data is submitted to the WDPA when the data provider lacks the capacity to digitise the boundaries of protected areas, or when precise boundaries are deemed politically sensitive.

Sources: Own calculations based on archived versions of UNEP-WCMC and IUCN (2024), Protected Planet: The World Database on Protected Areas (WDPA), [On-line], [April 2024], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net



Growth in the World Database on Protected Areas (WDPA) since 1998.

The WDPA is a dynamic database that has evolved and improved over the years. The number of protected area records represented by spatial information has increased in the last 25 years. This growth reflects countries' efforts to report a more accurate and complete picture of their area-based conservation actions, as well as the expansion of national protected area networks over time. This map compares geospatial information that has been added to the WDPA in the 25 years since 1998.

Source: Own calculations based on UNEP-WCMC and IUCN (2024), Protected Planet: The World Database on Protected Areas (WDPA), [On-line], [December 1998 and April 2024], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net

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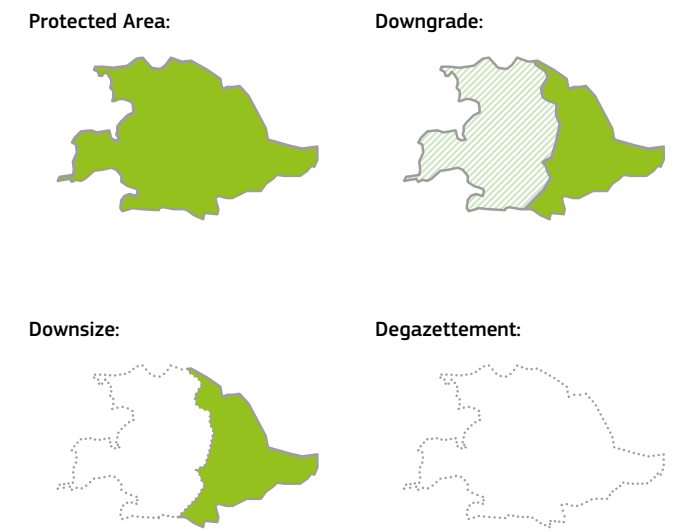
2.1.3 Protected Area Downgrading, Downsizing, and Degazettement

There is evidence for widespread legal changes that reduce restrictions on the use of protected areas, shrink the extent of boundaries, or eliminate legal protection altogether. Such events are known as downgrading, downsizing, or degazettement (PADDD). 505 PADDD events have been documented across Africa (10.18 % of global events), often as a result of the expansion of industrial-scale resource extraction and development. PADDD could potentially undermine the conservation goals of protected area systems.

Conservation policy and practice presume that protected areas are permanent features in land- and seascapes that safeguard biodiversity in perpetuity. Yet evidence indicates widespread protected area downgrading, downsizing, and degazettement (PADDD)¹⁻³. PADDD refers to:

- **Downgrading:** a reduction in legal constraints on the number, magnitude, or extent of human activities within a protected area.
- **Downsizing:** a reduction in the size of a protected area due to the removal of land or sea area through a legal boundary change.
- **Degazettement:** the elimination of legal protection for an entire protected area.

Although research on PADDD has focused mainly on terrestrial protected areas, downgrading is the predominant form of PADDD in both terrestrial and marine sites. Downgrades in marine protected areas tend to affect a substantially larger area compared to terrestrial downgrades, owing to the greater spatial coverage of marine sites relative to terrestrial protected areas⁴. In Africa, 54.85% of PADDD events were downsizes, followed by degazettements (32.87%) and downgrades (12.28%).



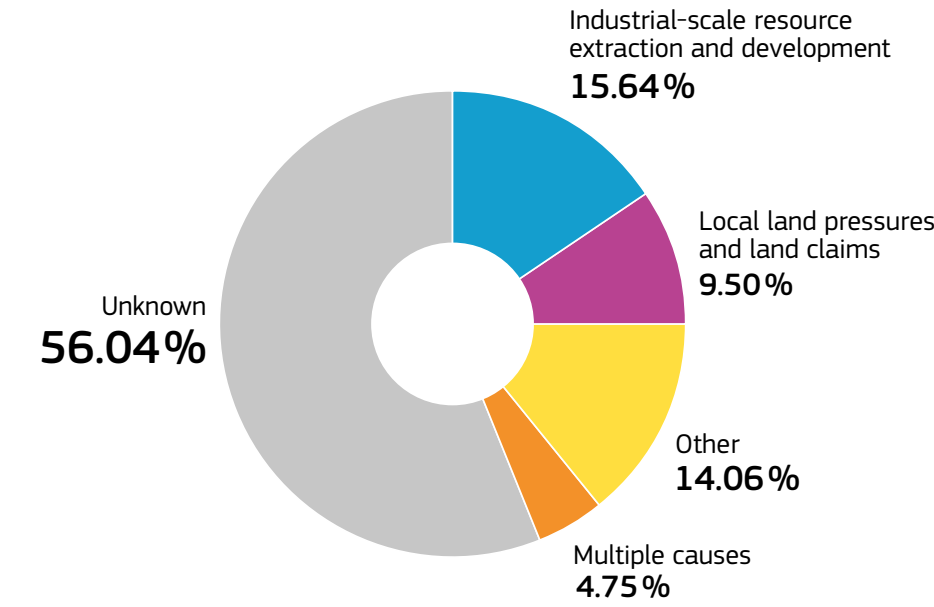
Conceptual illustration of PADDD.
Some governments have enacted or proposed extensive reductions in legal protections for protected areas. These events, known as Protected Area Downgrading, Downsizing, and Degazettement (PADDD), involve tempering legal protection (downgrading), reducing spatial extent (downsizing), or removing (degazetting) protected areas.
Source: Golden Kroner, R. E., et al. (2019). The uncertain future of protected lands and waters. *Science*, 364, 881-886.



Tsitsikamma National Park Marine Protected Area, South Africa.
Tsitsikamma National Park Marine Protected Area is Africa's oldest marine protected area and an example of a site where a PADDD has been enacted. The entire marine area was designated as 'no-take' in 2000, which prohibited extractive harvesting. In 2016, the government rezoned the site from 'no-take' to a partially open area, allowing limited fishing by local communities, hence downgrading the marine protected area.)
Source: Ben Haeringer on flickr CC BY-ND 2.0 DEED.

PADDD can hinder national progress towards protected area targets, which is why PADDD is included as a complementary indicator for Target 3 of the Kunming-Montreal Global Biodiversity Framework. Although PADDD may speed up tropical deforestation⁵ or intensify habitat fragmentation⁶, it may not always affect biodiversity negatively. PADDD can lead to positive conservation outcomes when it is linked to reinstating rights to displaced populations, optimising the conservation landscape through conservation planning, or addressing climate change^{3,7}. PADDD events may be dynamic when events are reversed or counterbalanced by compensatory protection elsewhere. A non-negligible minority (7.52%) of PADDD events in Africa have been reversed. Even though reversing PADDD may offer advantages, if habitat loss has already occurred it may not restore ecological values⁷.

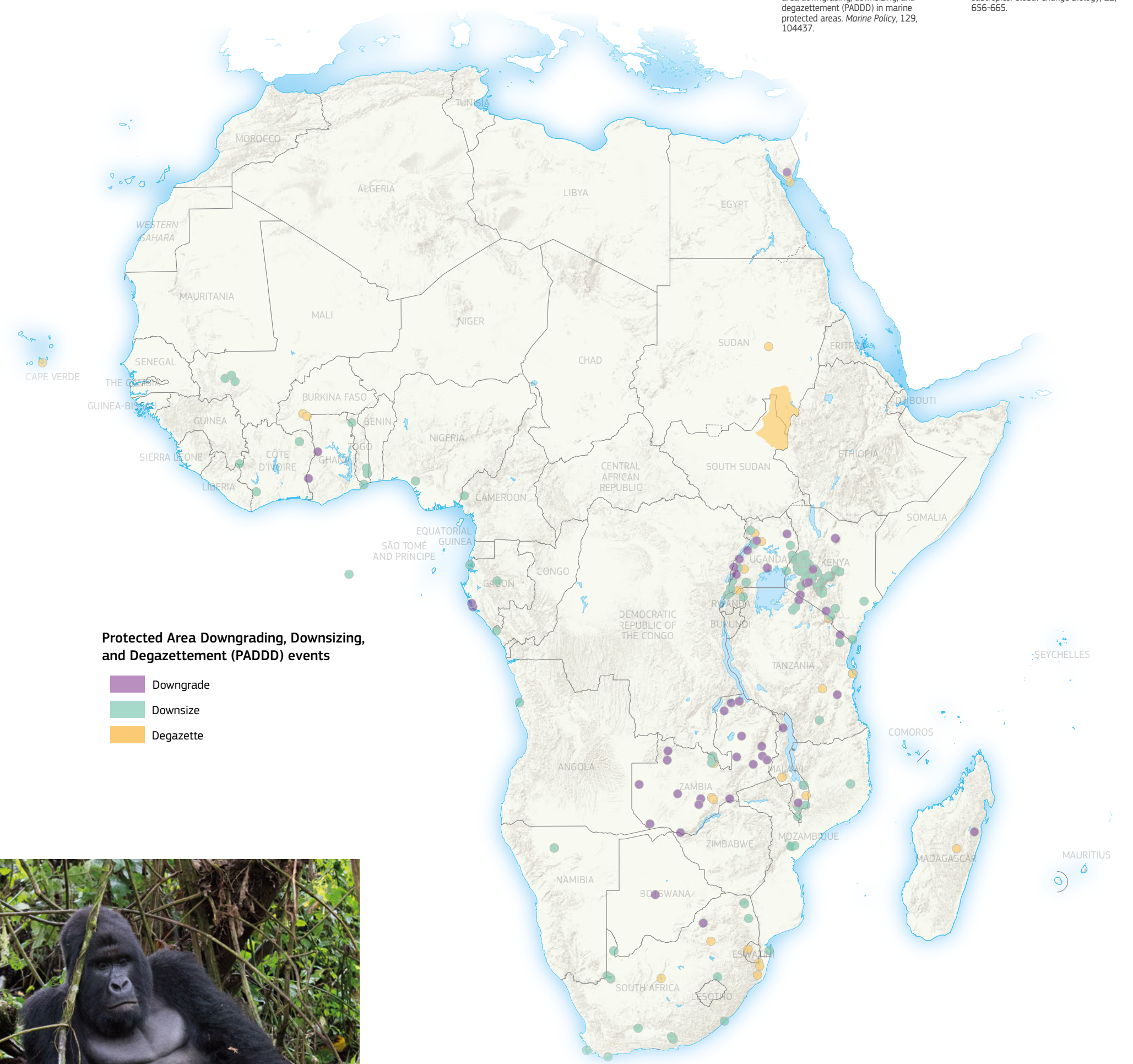
Whilst recent research covers the patterns, trends, causes, risks and ecological consequences of PADDD, knowledge gaps remain. Understanding land-use history, enabling conditions, patterns of spread, social and ecological impacts, and the relationships between causes and consequences of PADDD can provide valuable insights to guide conservation policy and implementation. Despite efforts to monitor PADDD (e.g. <https://www.paddtracker.org/>), many events remain undetected. Therefore, enhanced transparency on the status of protected areas in Africa will guide the long-term protection and conservation of ecosystems and species.



Proximate (most closely associated) causes of enacted or proposed PADDD events in Africa.
As is the case elsewhere, the majority of PADDD events (56.04%) in Africa lack information on the cause of the event. When events are attributed to specific causes, "Industrial-scale resource extraction and development", which includes fisheries, forestry, industrial agriculture, industrialisation, infrastructure, mining, and oil and gas, was the most frequently cited reason (15.64%). "Local land pressures and land claims", which include land claims, rural settlements, and subsistence, were the reason for 9.5% of PADDD events, while "Other" causes – including degradation, conservation planning, refugee accommodations, shifting sovereignty, and other proximate causes – accounted for 14.06% of African PADDD events.
Source: Conservation International, & World Wildlife Fund. (2021). PADDDtracker Data Release Version 2.1 (2.1) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.4974336>

Protected Area Downgrading, Downsizing, and Degazettement in Africa.

The continent has documented 505 Protected Area Downgrading, Downsizing, and Degazettement (PADDD) events. These events have been enacted in 27 countries between 1902 and 2020 (approximately 10% of all events globally). Shown here are the spatial locations of PADDD events by type (excluding 41 events from the Democratic Republic of the Congo and two events from Kenya, which lack spatial information). Almost all PADDD events recorded in Africa have already been enacted, while the remaining 2.18% are still only proposed.
Source: Conservation International, & World Wildlife Fund. (2021). PADDDtracker Data Release Version 2.1 (2.1) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.4974336>



Virunga National Park, Democratic Republic of the Congo.
Virunga National Park (Democratic Republic of the Congo), established in 1925, covers 8000 km² and is the oldest national park in Africa. This site, well known for its megafauna, was inscribed in the World Heritage List in 1979 and designated as a Wetland Site of International Importance under the Ramsar Convention in 1996. In 2010, a portion of the national park was subject to a partial downgrade for oil exploration in an area overlapping 3897 km² of the site. This downgrade was overturned in 2014 when the oil company announced it was discontinuing its activities. However, Virunga experienced another downgrade in 2015 with the enactment of the new Hydrocarbon Law, which legalised oil exploration within all protected areas and allowed for downsizing and degazettement for oil exploitation. In 2018, the government proposed to downsize 21% (1720.75 km²) of the national park to allow oil development.
Source: Fanny Schertzer under Creative Commons CC BY 3.0 DEED.

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2.1.4 Protected area connectivity

Protected areas conserve biodiversity more effectively when they are part of well-connected ecological networks. As such, Target 3 of the Kunming-Montreal Global Biodiversity Framework prioritises well-connected systems of protected areas and other effective area-based conservation measures (OECMs). There are several different metrics available for assessing ecological connectivity, which differ in their complexity, and ease of calculation. Understanding the differences between these metrics is essential for monitoring the connectivity of the African protected area system.

Ecological connectivity refers to "the unimpeded movement of species and the flow of natural processes that sustain life on Earth"¹. Connectivity is crucial for ecosystem functioning, and poorly-connected ecosystems put essential aspects of life at risk. A well-connected conservation network links natural processes between different sites². However, human-induced changes to the unprotected habitat matrix can erode ecological connectivity, jeopardise biodiversity, and hinders climate change adaptation^{3,4}.

Although protected areas and other effective area-based conservation measures (OECMs) are key for conservation, they may not always be sufficient on their own. The persistence of species relies on processes at broader spatial scales⁵. Protection cannot focus exclusively on individual protected areas and should recognise that these areas form parts of the larger conservation networks needed for long-term positive outcomes for biodiversity⁴. However, protected areas are increasingly nestled within fragmented landscapes dominated by human activities⁶.

The International Union for Conservation of Nature World Commission on Protected Areas (IUCN-WCPA) Connectivity Conservation Specialist Group developed technical guidelines for conserving connectivity through ecological networks and corridors⁷. These guidelines describe ways of establishing ecological networks for conservation, which are systems of protected areas, OECMs, and intact natural areas, all connected by ecological corridors. These ecological networks are designed, implemented and managed to improve ecological connectivity.



There are several different metrics that can be used as indicators of ecological connectivity. Choosing between these indicators depends on the specific conservation objectives and the extent of the area of interest⁸. Simpler indicators are easier to calculate and may be more appropriate for a wider range of global contexts. By contrast, more informative indicators contain more ecological realism, but are harder to quantify. These trade-offs are important when monitoring the connectivity of the protected area network.

Ecological connectivity is made up of both structural and functional connectivity⁹. Some indicators quantify structural connectivity, which refers to the geographical configuration of habitat within the surrounding non-habitat matrix. Other indicators also quantify functional connectivity, which is the extent to which a landscape or seascape, including the matrix between habitat patches, facilitates or hinders the movement of organisms⁸. As indicators incorporate more complexity, they become more informative, but they also need higher quality input data and more intricate computation. Indicators of structural connectivity are generally more straightforward and globally applicable than functional indicators, which rely on species-specific movement data. In some contexts structural and functional connectivity are positively correlated^{6,7}, which allows the former to infer the latter².

Studies assessing how connectivity can facilitate species to shift their ranges in response to climate change often incorporate human impact as a measure of both structural and functional connectivity. This is because species may move more easily through natural areas compared to those with heavy human pressure (i.e. roads, or built-up areas)⁹. There are still many data gaps and unanswered questions before this approach transfers to the marine realm, however.

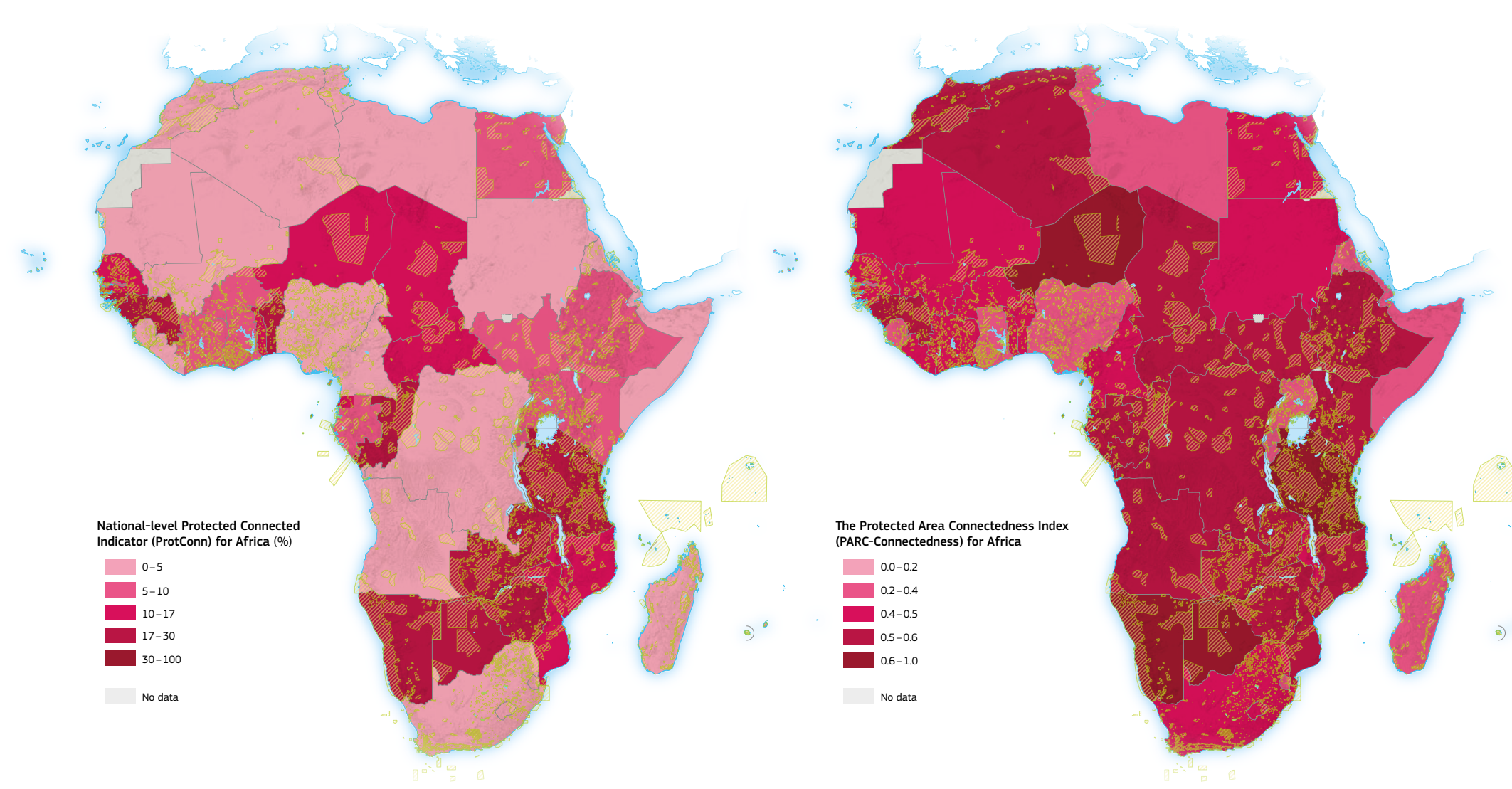
Connectivity Indicators	Connectivity components	Protected land coverage	Spatial arrangement of protected habitat	Inter-protected area structural connectivity	Inter-protected area matrix permeability	Contribution of multiple movement pathways	Functional connectivity of protected areas
	Proportion of protected areas						
	ProtConn						
	ConnIntact						
	PARC						
	PAI						

The features of different protected area connectivity indicators.

There are several different metrics available for quantifying ecological connectivity. The proportional coverage of protected areas is the headline indicator for Target 3, but additional metrics can assess different aspects of structural and functional connectivity. Improving the informational content of indicators also increases their methodological complexity. ProtConn, the easiest indicator to calculate, is based on the spatial configuration of protected areas. Its updated successor, ConnIntact, adds information on the intactness of the unprotected matrix. PARC-Connectedness goes further by considering the resistance of the matrix to movement, as well as the availability of multiple movement pathways. PAI includes all these elements, but also considers functional connectivity of the landscape by incorporating animal movement data.

ConnIntact indicator: updating the Protected Connected indicator (ProtConn) to account for human impact in the landscape between protected areas

ConnIntact³ calculates the percentage of a protected area network that is connected by lands with a low human footprint. It is an updated version of the ProtConn indicator, but unlike its predecessor, ConnIntact presumes that the unprotected matrix is only permeable when the human footprint is below a pre-defined threshold. Whereas ProtConn sets connectivity thresholds based on median dispersal distances of terrestrial vertebrates, ConnIntact assumes two protected areas are connected if there is a contiguous pathway of natural land linking them, regardless of the distance separating them. ConnIntact suggests that less than 10% of the global terrestrial protected area network is structurally connected through intact landscapes. Africa shows very low (0.5%) protected area connectivity, which may reflect its rapidly changing landscape. At the national level, the majority of countries have low proportions of intact land and low proportions of connected protected areas. For example, according to this indicator, the Democratic Republic of the Congo only has 23.3% intact land remaining and no connected protected areas. This may, however, be due to the human footprint indicator being particularly sensitive to the presence of roads, cultivated lands, and sites of extractive industries.



National-level Protected Connected Indicator (ProtConn) for Africa.

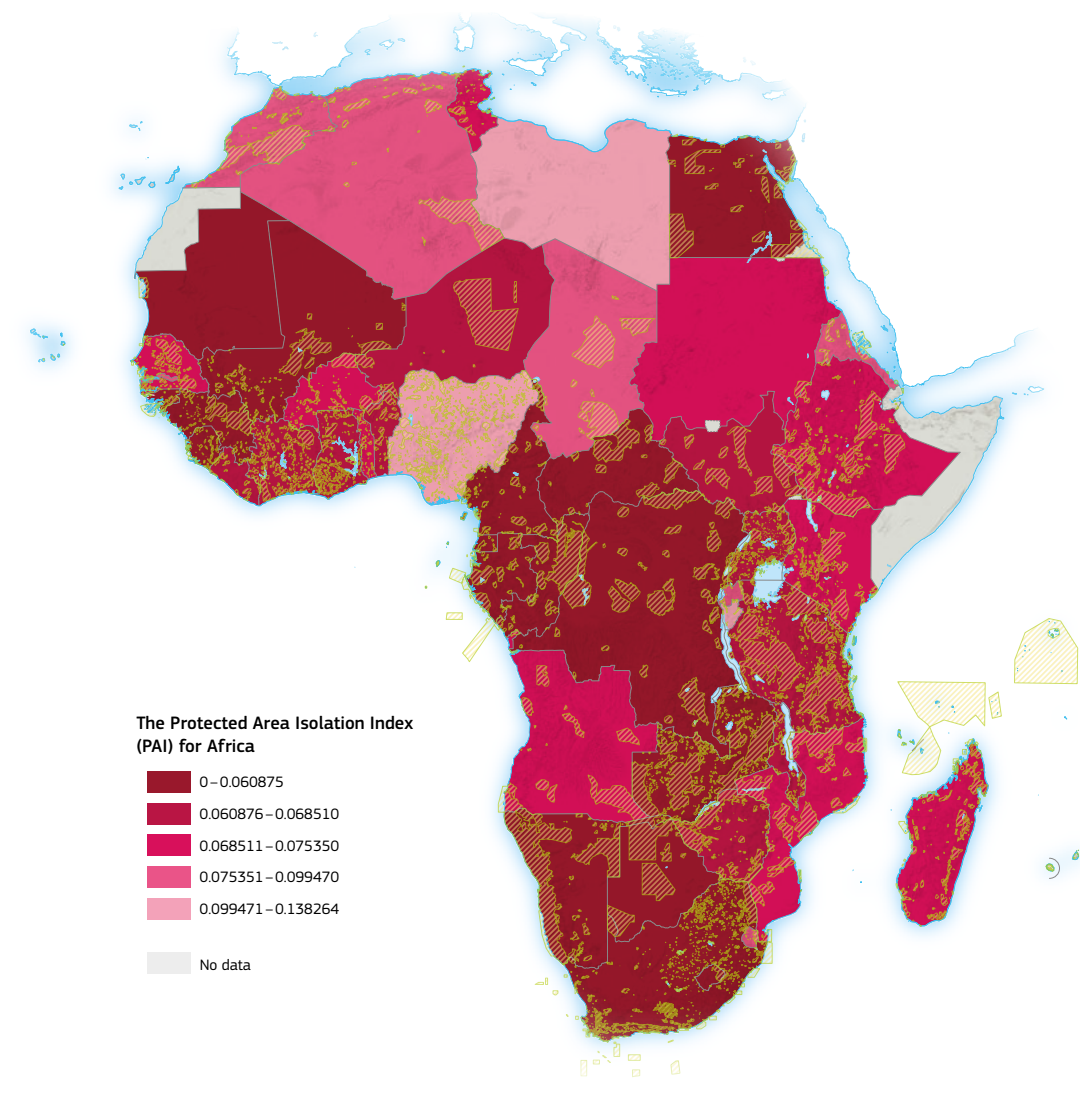
Protected Connected (ProtConn) is an indicator of terrestrial protected area connectivity. It measures the percentage of a country or region covered by protected and connected lands. The metric calculates the probability of connectivity of a protected area to all other protected areas within a maximum fixed distance. As such, it takes into account the spatial arrangement, size and coverage of protected areas, but does not account for the heterogeneity of the landscape matrix between protected areas. This structural connectivity metric is one of the component indicators of Target 3 of the Kunming-Montreal Global Biodiversity Framework. According to ProtConn, three quarters of the African countries did not reach 17% of protected connected land as of 2023. Only three countries, Seychelles, Comoros and São Tomé and Príncipe have protected and connect more than 30% of their national territories. Connectivity in these three countries increased by more than 8% since 2012. The maximum connectivity (~44%) was in Seychelles.

Source: Joint Research Centre of the European Commission (2024) *The Digital Observatory for Protected Areas (DOPA)*. Joint Research Centre, Ispra, Italy.

The protected Area Connectedness Index (PARC-Connectedness) for Africa.

The Protected Area Connectedness Index (PARC-Connectedness) calculates how well terrestrial protected areas are connected to each other as well as unprotected intact natural habitat in the surrounding landscape. PARC-Connectedness is one of the two component indicators to measure connectivity for Target 3 of the Global Biodiversity Framework. A value of 1 means that land is well-connected to other protected areas and intact habitat, whereas a value of 0 denotes poor connectivity. Approximately one third of the countries in the region show connectivity values above 0.5, with the highest connectivity in Namibia (0.68) and São Tomé and Príncipe (0.67).

Source: Commonwealth Scientific and Industrial Research Organization (CSIRO) (2024). *Protected Area Connectedness Index (PARC-Connectedness) [On-line]*. [2019]. Available at: <https://www.biodiversityindicators.net/indicators/protected-area-connectedness-index-parc-connectedness>



The Protected Area Isolation Index (PAI) for Africa.

The Protected Area Isolation Index (PAI) estimates how hard it is for mammals to move between terrestrial protected areas. High PAI values (i.e. effective resistance to movement) are associated with more isolation. This is the first metric that calculates functional connectivity at global level by considering how well mammal species are able to move through the unprotected landscape matrix. This metric is one of the two complementary indicators of Target 3 that measures connectivity. According to this indicator, Egypt, Gabon and Congo have the most connected national protected area networks in the region. Conversely, Burundi, Libya and Nigeria have the least connected protected areas.

Source: Brennan, A., et al. (2022). Functional connectivity of the world's protected areas. *Science*, 376, 1101-1104.

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