Wildlife guidelines for NDCs

Integrating wildlife conservation into national climate action plans

Vision:
Animals and people thriving together

Mission:
Fresh thinking and bold action for animals, people and the place we call home

Content

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Executive summary

In 2025, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are required to submit their updated Nationally Determined Contributions, or NDCs, outlining their revised plans for tackling the growing crisis of climate change. This provides countries with a timely opportunity to align their climate action plans with their plans to tackle other critical challenges, such as biodiversity loss and the degradation of ecosystem services, by establishing synergies between their NDCs and other policy instruments, such as their National Biodiversity Strategies and Action Plans (NBSAPs). By aligning these plans, countries have an opportunity to supercharge their ability to address the most critical crises of our time, while also accelerating sustainable economic development that benefits people, nature, and the climate.

Recent scientific evidence demonstrates that wild animals play an important role in climate mitigation, annually facilitating the sequestration of billions of tons of CO_2 across land and sea—a contribution unaccounted for in the climate negotiations. The protection and restoration of key wildlife areas play a critical role in meeting two of IPCC's top options to cut net emissions by 2030 (reducing conversion of natural ecosystems: 4.0 GtCO2-eq/y and restoring ecosystems: 2.8 GtCO2-eq/y) as well as making a significant contribution toward enhancing the likelihood of the meeting the global target of removing 440-500 billion tons of excess CO_2 from the atmosphere by 2100—both urgently needed to prevent a global mean temperature rise of 1.5°C increase compared to pre-industrial levels.

From the tropical forests and savanna grasslands of Africa to the Carpathian Mountains of Romania, the boreal forests of Canada, the kelp forests of British Colombia, and across the open oceans, animals as diverse as elephants, wildebeest, bison, moose, wolves, and reindeer, as well as sea otters, beavers, whales, sharks, and mesopelagic fish, are the unsung heroes of climate change mitigation.

Similarly, wildlife conservation and rewilding programmes are a major contributor of revenues to the local and national economies of many countries that are rich in biodiversity, especially among the least developed countries (LDCs), and have the potential to support the resilience and adaptation of vulnerable people, while also supporting climate resilient development, when designed and managed in a holistic and sensitive manner.

▲ A mother moose and her calf together in a river.

► School of Caribbean reef sharks swim over the coral reef, Gardens of the Queens, Cuba.

However, research shows that the potential offered by wild animals and wildlife conservation and rewilding as natural climate solutions is not being factored into the climate action plans of most countries—especially LDCs and other climate-vulnerable African countries that have some of the highest levels of biodiversity in the world. In particular, most countries have not yet acknowledged the role of wild animal populations and wildlife conservation and restoration in their greenhouse gas inventories and have not integrated them into their climate action plans, despite their immense potential to both help countries meet their obligations under the Paris Agreement and Kunming-Montreal Global Biodiversity Framework and generate significant volumes of carbon and biodiversity finance.

The 2025 NDC update process therefore offers countries an excellent opportunity to integrate wild animals and the conservation or restoration of key wild animal populations and their habitats into their climate action plans. This paper presents governments, conservation agencies, and climate actors with a set of step-by-step guidelines on how they can approach this task. It first provides a précis of the most recent science on the role of wild animals and wildlife conservation as natural climate solutions, and explains why it is useful for countries to include them in their new NDCs. It then presents 10 guidelines that can assist countries in this process and provides examples and case studies that countries can refer to.

10 guidelines for integrating wildlife into 2025 NDCs

1. Establish the contribution that key wildlife species and wildlife habitats can make to climate change mitigation and adaptation in your country.
2. Identify the major risks that threaten the wildlife populations and ecosystems that contribute to climate mitigation and adaptation in your country.
3. Specify the wildlife species and ecosystems that the country seeks to protect and restore as part of its NDC commitments.
4. Describe plans to include wildlife-nature interactions within the national greenhouse gas inventory.
5. Set high-level targets for delivery of climate change mitigation and adaptation through conservation and restoration of wildlife populations and biodiverse ecosystems.
6. List the actions the country will take to deliver wildlife and climate targets.
7. Specify the financial support required to implement NDC actions that link climate action and wildlife conservation.
8. Outline the capacity support and technology transfer required to implement NDC actions that link climate change and wildlife conservation.
9. Explain how your country will align institutional arrangements for managing the country's response to climate change and biodiversity loss.
10. Identify linkages between the NDC and other domestic and international policy frameworks that seek to protect wildlife and biodiversity.

Section 1

Introduction


Photo: Jen Prelack / © IFAW

Introduction

The world faces two critical and interlinked environmental crises: the global extinction of biodiversity and the accelerating impacts of climate change. Scientists predict that without rapid action to limit greenhouse gas, or GHG, emissions, humanity could face a rise in global mean temperatures of 4°C or more, compared to pre-industrial levels, by the end of the century.[1] In parallel, one million species are at risk of extinction[2] as human-led actions—including from both the drivers (e.g., land-use conversion and air pollution) and impacts of climate change (e.g., temperature rise, more variable rainfall, and extreme weather)—are pushing the world toward what some scientists warn could be a 'sixth mass extinction'.[3]

Actions to address these crises are often delivered in silos. But just as these crises are interlinked, so too must be their solutions. Actions to address climate change, such as limiting global temperature increase, can reduce the environmental strain on populations of wild animals, which will be at much greater risk of extinction if global mean temperatures exceed 2°C.[4] Similarly, natural climate solutions that sequester carbon dioxide by protecting, restoring, and effectively managing wild animal habitats, such as forests, peatlands, mangroves, grasslands, and oceans, can also enable the protection and restoration of wildlife and other forms of biodiversity if implemented effectively.[5] On the other hand, actions to address biodiversity loss can deliver tremendous benefits for climate change mitigation and adaptation. For example, there is growing evidence that actions that promote wildlife conservation and the restoration of wildlife populations to natural levels within their ecosystems (also known as rewilding) can significantly increase rates of natural carbon capture and storage.[6] Similarly, biodiversity conservation programmes that aim to protect and/or restore wildlife or ecosystems can also contribute substantially to climate mitigation and adaptation of the communities and local economies where they are implemented.[7]

Given the interlinked nature of these crises and their solutions, it is important that national governments align their policy responses to the climate and biodiversity crises. In 2025, countries will submit their revised Nationally Determined Contributions (NDCs) to the United Nations Framework Convention on Climate Change (UNFCCC), outlining their ambitions to respond to the climate crisis and how they will contribute to limiting global temperature increase to 1.5°C above pre-industrial levels, as agreed to in the Paris Agreement. This process provides countries with an important opportunity to align their climate action plans with their plans to deliver the targets of the Kunming-Montreal Global Biodiversity Framework (GBF), which was agreed to under the auspices of the Convention on Biological Diversity (CBD) in 2022.

In the GBF, countries agreed to deliver a range of measures that directly relate to meeting the Paris Agreement's climate targets; however, there is little synergy between these conventions—neither globally nor at the level of national implementation. For instance, NDCs which set out government strategies to address climate change are generally developed with limited reference to the NBSAPs that countries use to lay out their plans to deliver on the CBD, and vice versa.[8] The current NDC update process offers a unique opportunity to ensure that climate and biodiversity action plans are better aligned at the national level.

As recent research by IFAW (2023) and others[9] has shown, the last round of NDCs, which countries submitted in 2020, made important progress by increasing the integration of nature-based solutions into national climate action plans, including references to ecosystem conservation and restoration as natural climate solutions. However, there has been a conspicuous lack of acknowledgement of the importance of wild animals in NDCs and a lack of reference to wildlife conservation and restoration as a climate solution. For instance, in the LDCs and the rest of Africa[10] the immense value of wild animals for climate mitigation, and of wildlife conservation for mitigation and adaptation, has largely been ignored.

This is a critical gap and a missed opportunity for developing nations with high levels of biodiversity that could be leveraged for climate action and to raise carbon finance. The 2025 NDC revision process offers countries a valuable opportunity to deliver a joint response to the climate and biodiversity crises by integrating wildlife conservation and restoration into their climate action plans, and by aligning their NDCs with their NBSAPs. Such alignment has the potential to create a win-win scenario for people, nature, and the climate.

These *Wildlife Guidelines for NDCs*, which have been developed by IFAW in collaboration with researchers from the Global Rewilding Alliance (GRA), Yale University, and re:wild, and in consultation with national government partners globally, provide strategic guidance on how countries can integrate wild animals, wildlife conservation, and rewilding into their updated NDCs in 2025. It aims to help countries harmonise their climate action plans with their wildlife and biodiversity conservation efforts (e.g., NBSAPs and efforts to meet the targets of the GBF). Specifically, the Guidelines describe 10 steps that countries can take to integrate wild animals and wildlife conservation or rewilding into their NDCs, thereby linking climate mitigation, ecosystem resilience, economic opportunities, and biodiversity conservation in mutually reinforcing ways.

The Guidelines begin by explaining the rationale for integrating wild animals and wildlife conservation into NDCs by providing an overview of the growing body of scientific evidence on the important role that wild animals play in supporting carbon sequestration and carbon storage in natural ecosystems, sometimes referred to as 'animating the carbon cycle' or ACC. They also explain the importance of wild animals for ecosystem functionality, which directly supports ecosystem resilience to climate impacts, thereby securing the ecosystem services that provide physical and economic resilience to people and communities, and which are the essential foundation for climate resilient economic development.

The main section of the Guidelines details the steps that countries can take to integrate wild animals and wildlife conservation into their new NDCs. These provide suggestions for where countries can include wildlife in their NDCs, what baseline information could be provided, and how countries can increase their ambition over time to jointly address the climate crisis and biodiversity loss.

The Guidelines are not policy prescriptive—they do not advocate specific approaches to wildlife conservation that countries should include, as any policy action or measure would need to be tailored to the specific circumstances and context of each country. Rather, they highlight how and where this can be done in the process of NDC revision. However, to illustrate what resulting measures could look like, we also showcase examples, where available, of how countries included wildlife-related measures in their 2020 NDC submissions.

Overall, these guidelines seek to provide all countries with tangible guidance on how to integrate wild animals and wildlife conservation into their NDCs. It is our hope that this alignment can spur greater action by policymakers to address the climate and biodiversity crises in a more joined-up manner, as well as help them deliver concrete results against the targets of both the Paris Agreement and the CBD.

Actions to address climate change... can reduce the environmental strain on populations of wild animals

◀ Zebras, elephants and wildebeests in Amboseli, Kenya. Healthy populations of herbivores are key to maintaining the savanna ecosystem.

Box 1

Why should countries include wild animals in NDCs?

1. Healthy wildlife populations help ecosystems store more carbon, delivering more—and more cost effective—greenhouse gas mitigation in the forestry and land-use sector.
2. Balanced ecosystems with healthy populations of wild animals provide critical ecosystem services for people and nature, which are critical for climate adaptation, disaster risk reduction, and climate resilient development.
3. Wild animals face significant risks from climate change. Drought conditions, for instance, can lead to the death and population decline of wild animal species. This, in turn, can erode ecosystem resilience and reduce their carbon sequestration potential.
4. The wildlife economy delivers significant economic benefits to communities and national economies, supporting climate resilient development and climate adaptation at local and national levels.

By protecting and expanding wild animal populations to their historic levels, countries can increase economic benefits for their citizens. Increased economic security can, in turn, support broader resilience of households and communities.

Photo: Madhumay Mallik / © IFAW-WTI

Why should countries include wildlife in their NDCs?

Climate change mitigation

A growing body of scientific evidence shows that wild animal species exert a profound and positive impact on the climate through the role they play in the global carbon cycle, and that they must be included in any plans to sequester carbon dioxide using nature-based solutions.

Typically, nature-based climate solutions focus on the sequestration and storage of carbon in above ground biomass, primarily in trees, and the role of biodiversity is not fully taken into account. This can result in a narrow approach to designing and implementing nature-based solutions that does not consider the importance of animals for maintaining the health of forests and other ecosystems. In particular, the role that mammals, birds, reptiles, fish, and invertebrates play in enabling ecosystems to capture and store carbon in landscapes and oceans is not factored into carbon accounting methodologies.

A robust and growing body of scientific evidence shows that animals are not simply a marginal element in the carbon cycle—in fact they control the global carbon cycle through their behaviours and the way they interact with the ecosystems they inhabit.[11] Mammals and birds, fish and invertebrates are integral to the web of life. They play a functional role in the evolution and maintenance of natural ecosystems. They consume vegetation, fruits, nuts, and other animals, metabolise the carbon and other nutrients from the food they eat into forms that are readily absorbed by soil and water, and then disperse carbon and nutrients in their faeces across the landscapes, waterways, and oceans they inhabit, sometimes across very wide areas, nourishing soils, feeding other plants, insects and animals, and depositing seeds ready for germination.

These processes are vital for ensuring that ecosystems flourish healthily. But they are also critical to the process of carbon sequestration, dramatically increasing the capacity of forests, grasslands, wetlands, and oceans to capture and store carbon from the atmosphere—referred to by some as 'animating the carbon cycle' or ACC.[12]

This important function has now been demonstrated in a number of academic papers by researchers from Yale University and the Universities of Oxford and Zurich.[13] These papers provide empirical evidence and robust models that reveal the immense scale and critical importance of animals' role in the global carbon cycle. They also provide estimates of the extent to which climate mitigation could be accelerated, either by protecting existing wild animal populations through traditional programmes of biodiversity conservation, or by helping increase their numbers through approaches like habitat restoration and rewilding.

◄ Humpback whale breaching.

Box 2

Animating the carbon cycle

Animating the carbon cycle, also known as ACC, refers to the role that wild animals play in providing natural climate solutions by enabling ecosystems to capture and store carbon, which supports climate change mitigation.

Wild animals help support carbon sequestration by:

1. Protecting existing carbon stores in ecosystems to avoid emissions;
2. Enhancing the capacity of ecosystems to capture and store additional carbon.

By performing their natural behaviours in their natural habitats, wild animal species can exert a profound, positive impact on the climate by controlling the carbon cycle, and have the potential to supercharge carbon capture by a factor of between 1.5 and 12 times,

The multiple pathways by which key functional groups of wild animals species can control the carbon cycle by mediating (bowties) exchanges (arrows) of energy (solar radiation) and carbon (CO_2) between the atmosphere and different ecosystem types on land and in the ocean is illustrated in the figure above.[19]

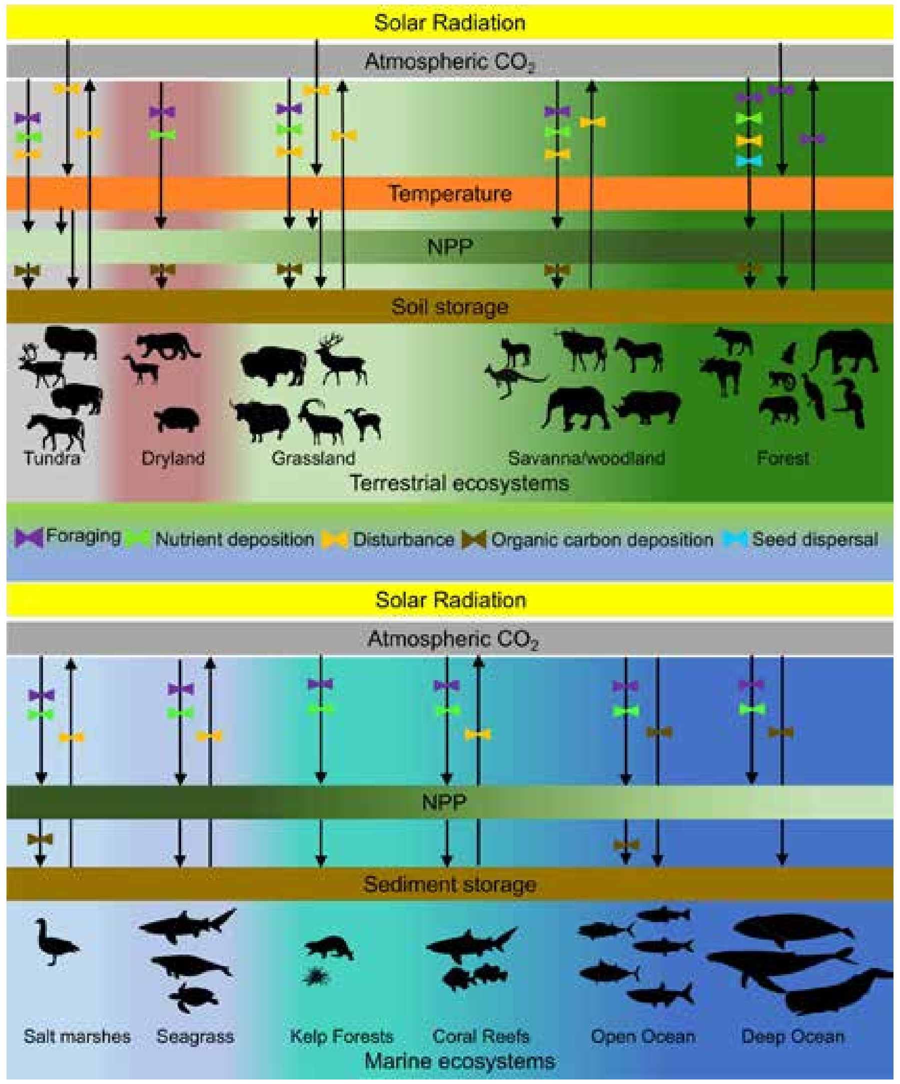


Photo: US Fish and Wildlife Service

The potential for ACC to support climate change mitigation is enormous. It has been estimated that protecting and restoring the populations of just nine species and species groups could facilitate the capture of an extra 6.4 billion tons of carbon dioxide per year, which is more than 95% of the amount required per year to keep global warming below a 1.5°C increase compared to pre-industrial levels.[14]

Two of the IPCC's priority recommendations for reaching net zero greenhouse gas emissions by 2030 are:

1. Reducing the conversion of natural ecosystems to save 4.0 Gigatonnes of CO_2 equivalent per year (GtCO2-eq/y);
2. Restoring, afforesting, and reforesting ecosystems, to sequester 2.8 GtCO2-eq/y.

   Protecting and restoring wildlife populations are critical mechanisms that countries can use to meet those two targets.

- The **protection** of marine fish, wildebeest, sea otter, sharks, muskox, and grey wolf secure annually 5.8 GtCO2 in carbon sequestration resulting in 440 GtCO2 captured by end of century.
- The **restoration** of three other species—American Bison, baleen whales, and African Forest Elephants—would add another 0.6 GtCO2 per year, or 40 GtCO2, by 2100. The magnitude of additional carbon sequestration that can be generated by wildlife is thus highly relevant, locally, nationally and internationally.[15]

If we consider an expanded group of high potential species, trophic rewilding can catalyse other ACC mechanisms (foraging, disturbance, seed dispersal, deposition of nutrition & organic carbon, etc.) to make a significant contribution toward enhancing the likelihood of meeting the global target of removing 500 GtCO2 from the atmosphere by 2100.

▲ Wildebeest during the great migration in Serengeti National Park, Tanzania.

◀ Grey wolf, Canada.

Box 3

Magnitude of additional carbon sequestration

Magnitude of additional carbon sequestration generated by six individual species and one multi-species group - marine fish – compared to human-generated CO_2 emissions in selected provinces, countries & continents/sub-continents.

Protecting

- **Wildebeest in the Serengeti**
  4.4 MtCO2/yr, or 28% of the total fossil fuel emissions by Tanzania in 2021 (13 MtCO2/y).
- **Sea otters in coastal kelp forests between southern British Columbia and the Aleutian Islands**
  5.2 MtCO2/y, or 8% of the total greenhouse gas emissions of British Colombia in 2021 (62 MtCO2e).
- **Grey wolf in Boreal Canada**
  260 MtCO2/y - or 47% of the total fossil fuel emissions by Canada in 2022 (548 MtCO2/y).
- **Muskox circumpolar, high Arctic mire ecosystems**
  30MtCO2/y, or 75% of the fossil fuel emissions by Norway in 2022 (40.9 MtCO2/y).
- **Marine fish, about 90% mesopelagic**
  5.50 GtCO2/y, or twice the total fuel emissions of the EU-27 in 2022 (2.76 GtCO2/y) or 3.9 x total for Africa in 2022 (1.42 GtCO2/y).

Restoring

- **African forest elephant in Congo Basin Forest**
  13 MtCO2/y, or 4 x the total fossil fuel emissions of the DRC in 2022 (3.6 MtCO2/y), almost double that of the Republic of Congo (7.4 MtCO2/y) and 1.4 x that of Cameroon in 2022 (9.6 MtCO2/y).
- **American bison in prairie grasslands**
  595 MtCO2/y, or 1.08 x that of the total fossil fuel CO2 emissions by Canada in 2022 (548 MtCO2/y) or 12% of the USA (5,057 MtCO2/y).

(From Schmitz et al. 2023)

So, from the tropical forests and savanna grasslands of Africa to the Carpathian Mountains of Romania, the tundra and boreal forests of Canada, the kelp forests of British Colombia, and across the open oceans, wild animals are the unsung heroes of climate change mitigation.

But the potential offered by wild animal populations is being overlooked by national governments and other agencies who do not include wild animals and wildlife conservation in their climate action plans.[16]

In part, this is because the carbon sequestration potential of animals, birds, fish, and invertebrates is simply not being acknowledged and measured. Current greenhouse gas inventories and emissions modelling does not account for the role wildlife plays in the carbon cycle and in ecosystem carbon storage. This means that GHG modelling of the mitigation potential of the land use, land-use change and forestry (LULUCF) sector in national inventories does not factor in the role that wild animals are playing, and could potentially play, in boosting carbon sequestration.

As a result, countries do not include wild animal species in their NDCs, and international donors rarely fund programmes that explicitly link wildlife conservation to climate change mitigation. Countries are therefore missing a significant opportunity to expand natural carbon capture and storage through interventions such as trophic rewilding (*see Box 5*).

This opportunity is particularly relevant to countries that have relatively high levels of biodiversity and large wild animal populations but relatively low levels of economic development, such as many LDCs. Such countries could leverage their natural capital more effectively to raise funds to support climate resilient development by putting wild animals and wildlife conservation at the heart of their climate action plans.[17]

But there is also significant potential for more developed countries to benefit from the opportunity presented by wild animals for climate mitigation. As exemplified by recent modelling of the contribution made by European bison to carbon sequestration in Romania,[18] countries across North America and Europe could reap significant rewards from efforts to protect and restore wild animal populations that have been denuded by land-use change and hunting over the past centuries.

▲ Sea otter wrapped in kelp.

▶ Forest elephants (Loxodonta cyclotis) in the swamp Mbeli Bai, Nouabalé-Ndoki National Park, Congo.

Photo: © Thomas Breuer, CC BY 2.5

Box 4

Forest elephants increase carbon sequestration in the Congo Basin

The Congo Basin in Central Africa contains the world's second-largest tropical rainforest, playing a crucial role in global carbon sequestration. Within this ecosystem, the African forest elephant (*Loxodonta cyclotis*) has emerged as a key player in enhancing carbon storage capacity.[20] They perform this function through several important mechanisms:

1. Seed dispersal
Forest elephants consume fruits from high wood density trees, such as the Mukulungu (*Autranella congolensis*), which are significant carbon sinks due to their large size and dense wood. Elephants disperse the seeds of these trees over large distances through their dung, which is rich in nutrients and provides an ideal environment for seed germination. This process promotes the growth of large, carbon-rich trees, thereby increasing the overall carbon storage of the forest.

2. Soil fertilisation
Elephant dung is rich in nutrients, including nitrogen and phosphorus, which are essential for plant growth. When elephants defecate, they return these nutrients to the soil, enhancing soil fertility, which can lead to increased plant productivity and growth rates, particularly for high wood density trees that store more carbon. Elephant dung thus supports the growth of vegetation that contributes to higher carbon sequestration.

3. Feeding habits
Forest elephants preferentially browse on trees with low wood density, reducing competition for larger, high-density trees. Their foraging behaviour also thins the forest creating space for larger trees to thrive and allowing sunlight to penetrate though the dense canopy, which stimulates plant growth and increases carbon sequestration.

In 2014, a comprehensive elephant protection programme was initiated in Nouabalé-Ndoki National Park, Republic of Congo.[21] The programme included enhanced anti-poaching measures, community engagement initiatives, and habitat preservation efforts. After five years of intensified protection, the project succeeded in stabilising the elephant population, which began to recover and increase in numbers, primarily due to a significant decrease in poaching activities.

Importantly, the recovery of the elephant population also stimulated an increase in carbon sequestration in the forest. Researchers have estimated that the elephant conservation project resulted a 6–9% boost in above-ground carbon storage in areas with healthy elephant populations.[22] Areas with higher elephant densities also showed positive changes in forest composition and a 7% increase in the prevalence of high wood density tree species.

Based on these findings, it is now estimated that each forest elephant can stimulate a net increase in carbon capture of about 9,500 metric tonnes of CO_2 per km² of forest.[23] It has also been suggested that if forest elephant populations were restored to their former size and range, this could increase carbon capture by 13 metric tonnes per hectare across their 2.2 million km² historical range, which equates to capturing over 6,000 metric tonnes of CO_2 per km², comparable to the carbon captured by over a quarter of a million trees.[24]

This therefore demonstrates that protecting forest elephants is not only crucial for biodiversity conservation but also represents a powerful nature-based solution to climate change.

Resilience and adaptation

Actions that protect, restore, and effectively manage wild animal populations can also deliver significant benefits for climate adaptation and the resilience of animals, ecosystems, and people if implemented effectively.

These co-benefits can be delivered directly, such as through the use of climate smart wildlife conservation practices[25] that support wildlife to adapt to changing climatic conditions by building connectivity between habitats[26] or by providing them with access to water and fodder during droughts. They may also be delivered indirectly, by adopting climate smart conservation management practices that ensure conservation areas and agencies are resilient to the effects of climate change, and by supporting climate resilience and adaptation within local communities, ensuring that wildlife conservation contributes actively to climate-resilient development for local and national economies.

Healthy diverse ecosystems and landscapes deliver immense benefits for the climate resilience of both human and animal populations. Diverse flourishing ecosystems conserve water more effectively, are more resilient to extreme weather events such as droughts, and provide better protection from hazards such as floods and storms.[27] They bounce back better than degraded landscapes and deliver better quality ecosystem services for humans and animals alike.

But over the past 50 years, the levels of land and ecosystem degradation have accelerated globally, leaving many landscapes and seascapes in urgent need of restoration.[28] An overall population decline globally of over 50% in less than 50 years for 4,000 vertebrate species has been reported, including 90% of fish stocks used up – fully exploited, overexploited, or depleted.[29] It illustrates the urgent need to rebuild ecosystem functioning across our lands, freshwater ecosystems, and seas. Science has shown that less than 3% of the terrestrial part of our planet is still fully functional. Our oceans are not faring much better: 97%[30] of the marine environment is exposed to fishing of some kind by humans.[31]

Fortunately, recent evidence demonstrates that wild animals play a valuable role in landscape restoration through a process known as trophic rewilding (*see Box 5*).

One aspect of trophic rewilding aims to restore the balance between trophic levels in ecosystems by restoring the number of apex predators (e.g., wolves, lynx, sea otters, and cheetahs) to their traditional levels. As shown by the famous example of wolf reintroduction in Yellowstone National Park in the USA,[32] trophic rewilding can deliver important benefits to ecosystems that improve their ecological health and make them more resilient to climate impacts, while also enhancing carbon sequestration.

▲ An adult cheetah in the bush.

◀ Wolf on the shore of Yellowstone Lake.

Box 5

Trophic rewilding

Trophic rewilding is a process that aims to restore natural ecosystems by reintroducing key animal species that have become locally extinct, or whose populations have significantly declined due to human activity, resulting in unbalanced ecosystems.

At its core, trophic rewilding seeks to restore wildlife species to their natural levels so that they can fulfil their functional roles in ecosystems.

For instance, by reintroducing apex predators such as wolves, big cats, and other large carnivores, trophic rewilding aims to regulate prey populations, prevent habitat degradation caused by overgrazing, and enhance biodiversity.

This approach acknowledges the profound influence that apex predators exert on ecosystems, shaping vegetation patterns, controlling herbivore populations, and ultimately fostering greater ecosystem resilience. This approach often involves careful planning and consideration of ecological dynamics to ensure successful reintroductions, appropriate balance of species at different trophic levels, and long-term ecosystem resilience.[45]

For animating the carbon cycle, the following mechanisms are particularly important: foraging, disturbance, seed dispersal, deposition of nutrition & organic carbon.

In other cases, trophic rewilding has been associated with the reduction of wildfire risks in African savannas,[33] improved drought resilience in temperate forests and wetlands,[34] and reduced levels of permafrost melting in the Arctic.[35]

Rewilding through the restoration and increase of wild animals who act as ecosystem engineers has a positive impact on the resilience of degraded ecosystems. One iconic example is that of beavers, who modify and shape their ecosystems in ways that greatly reduce the risk of wildfires.

For instance, by building dams and canals and by restoring streams, beavers create extensive wetlands that slow down water flow across the landscape, improving water infiltration, recharging aquifers and increasing aquatic biodiversity.[36] These effects wet the landscape, making it more resistant to climate change-related wildfires and providing safe havens for animals during fires. By felling and dragging trees and clearing deadwood, beavers also open up the forest canopy and create clearings which can act as fire breaks, retarding or stopping the passage of fire across the landscape.

Large herbivores and small animals such as rodents have been shown to perform similar functions in other types of ecosystems, making a major contribution to ecosystem adaptation to climate change.[37] For example, elephants, wildebeests, and other large herbivores help prevent wildfires by removing vegetation that could fuel them, which in turn reduces the release of carbon into the atmosphere. In Arctic regions, large herbivores like muskoxen and reindeer help control woody plant growth, maintaining tundra ecosystems that reflect more sunlight and protect permafrost.[38] This helps mitigate warming and prevents the release of stored carbon. Large herbivores also disperse seeds across the landscape, thereby propagating plants and stimulating biodiversity, while also clearing vegetation to open up space for new growth, scuffing

the ground to improve water infiltration, and spreading their dung which acts as a fertiliser for plants and trees.[39] Rodents also act as seed dispersal mechanisms but also create new ecological niches by creating burrows in ways that support biodiversity and soil health).[40]

The conservation of wild animals and the ecosystems they inhabit can actively support animals to promote ecological resilience in a variety of ways. For instance, protected areas contribute to adaptation both by maintaining and increasing wild animal populations, and by protecting ecosystem resilience, buffering local climate, and reducing risks and impacts from extreme events such as storms, floods, droughts, and sea level rise, as well as by providing and maintaining essential ecosystem services such as water supplies, fish stocks and other wild foods, and agricultural productivity.[41]

Wildlife conservation and protected area management also make significant contributions to the climate resilience and adaptation of people, both in the local community living in proximity to conservation areas and at national and regional levels. In many climate-vulnerable developing countries, wildlife conservation is a major economic driver, providing employment and incomes to local women and men and contributing significant levels of revenue to national finances. In Africa alone, the wildlife economy is estimated to generate US$ 250 billion per year from a combination of ecotourism, carbon trading, hunting (including fishing), wildlife ranching, and forest products.[42]

▲ American beaver.

◀ Muskox in northwest Greenland.

Box 6

Beavers improve ecosystem resilience in Washington, US

The Tulalip Tribes in the state of Washington in the USA have implemented an innovative beaver reintroduction programme that demonstrates how these ecosystem engineers can enhance landscape resilience in the face of climate change.

The upper Snohomish Watershed in western Washington has experienced degradation of stream habitats and hydrological impairment, exacerbated by climate change impacts like more frequent droughts and floods. In response, the Tulalip Tribes initiated the Tulalip Beaver Project in 2014 to relocate 'nuisance' beavers from urban areas to impaired tributaries in the watershed.[46]

This involves capturing beavers considered problematic in developed areas then assessing and preparing suitable release sites in the upper watershed. Beaver families are then relocated into the prepared sites and the impacts of their reintroduction on the stream hydrology and habitat are rigorously monitored.

Since its inception, the Tulalip Beaver Project has demonstrated several positive outcomes, including improved water retention, enhanced fish habitat, increased biodiversity, and improved water quality.

The reintroduction of beavers has also significantly improved the watershed's resilience to climate change impacts:

1. Drought mitigation
By storing water and slowly releasing it, beaver dams help maintain stream flows during dry periods).[47]

2. Flood control
The ponds and wetlands created by beavers absorb and slow floodwaters, reducing peak flows during extreme precipitation events.[48]

3. Temperature regulation
Increased water storage and expanded riparian vegetation help moderate stream temperatures, crucial for cold-water species like salmon.[49]

4. Carbon sequestration
Beaver-created wetlands can act as carbon sinks, potentially contributing to climate change mitigation.[50]

5. Reduced wildfire risks
The wet, saturated soils around beaver complexes act as natural firebreaks, potentially slowing the spread of wildfires.

For low-income countries, this can be a significant source of low-carbon and environmentally sustainable economic development, which can also be climate resilient if managed effectively. Given the increasing global financial interest for investing in carbon projects, nature-based climate solutions, and biodiversity credits, the sector has immense potential to grow in the coming years.

As such, wildlife and biodiversity conservation should be a central pillar in the climate-resilient development plans of all countries—but is an especially attractive proposition for low-income countries with high levels of biodiversity. The revenues that are generated by the wildlife economy can contribute to climate adaptation and climate-resilient development in numerous ways.

Most immediately, local community members can benefit by accessing employment opportunities in protected area management, ecotourism, and associated services. The incomes provided by these kinds of jobs offer local communities the opportunity to diversify their income streams and to increase their assets and savings, all of which contributes to household climate resilience. And if employment in conservation is complemented by the provision of training, education, and health care, those benefits can be increased significantly. The growing development of community-owned conservation schemes also means that local households and community members—especially women—can control and benefit directly from revenues generated by wildlife-compatible enterprises, which increases adaptation benefits even further.

There is also significant opportunity to link wildlife conservation activities directly to activities that improve resilience and support adaptation of local households and communities—for instance, by integrating activities that improve agricultural production, support livelihoods development, and improve the provision of public services (water, health, and education), as well as by supporting access to clean, renewable energy. Improving the provision of these kinds of services to local households and communities has multiple beneficial effects for wildlife conservation.

For instance, reducing poverty, food insecurity, water scarcity, and dependence on fuel wood can reduce the need for local people to encroach on conservation areas with positive effects on wildlife poaching, deforestation, and land degradation, while also supporting households and communities to have higher levels of resilience to climatic shocks and more capacity to adapt to climate change.

The promise of carbon and biodiversity credits offers a significant opportunity for local communities to deliver wildlife and biodiversity conservation while also improving their climate resilience and adaptive capacity. As the work of Carbon Tanzania and BioCarbon Partners have shown in Tanzania and Zambia, projects that support both carbon sequestration and biodiversity conservation can deliver positive benefits both for the climate and for wild animal populations, while also delivering significant revenues to communities and local and national governments.[43]

Thus, wildlife conservation can provide economic benefits to communities which help strengthen their livelihoods and make them resilient to climate change. Growing evidence shows how wildlife conservation initiatives can transform the livelihoods of people and communities when implemented effectively and sensitively. These programmes can provide direct employment for community members, support Indigenous peoples and local communities to secure land tenure and legal rights over natural resources, provide wildlife-friendly alternative businesses that do not rely on resource extraction or degradation of landscapes, promote climate-resilient agriculture practices such as agroforestry and agroecology, and reduce deforestation by promoting access to renewable energy sources. Secure employment and livelihood opportunities, in tandem with efforts to limit human activity on the landscapes that wild animals depend on, lead to increased resilience of local economies and local landscapes, creating climate change and biodiversity win-win solutions.[44]

Wildlife conservation can provide economic benefits to communities which help strengthen their livelihoods and make them resilient to climate change

▲ Christopher, a local farmer between Tsavo West and Tsavo East national parks who is part of IFAW's climate-smart agriculture project, with some of his crops.

◄ Community rangers in Mgeno Wildlife Conservancy survey elephants they spotted during patrol.

Photo: © Donal Boyd

Why use Nationally Determined Contributions?

NDCs are an important entry point for developing an integrated response to the climate and biodiversity crises.

NDCs are self-determined commitments which outline how countries will implement their climate goals under the auspices of the Paris Agreement.[51] NDCs are short-to-medium-term plans which set out commitments to implement mitigation, adaptation, and loss and damage activities. They also outline the institutional arrangements that countries will set in place to deliver climate action, as well as their technology and financing needs to deliver on their commitments under the Paris Agreement. Countries are required to update their NDCs every five years with an increased level of ambition to ensure they move closer to achieving the goal to limit global temperature rise to at least 2°C—though ideally 1.5°C—above pre-industrial levels.

Countries are also free to include details on their climate change adaptation plans in their NDCs, as well as their plans for finance, technology development and transfer, capacity building, and transparency.[52] Of the 148 countries that updated their NDCs by the end of 2021, over 100 included adaptation components.[53] The upcoming 2025 update offers a valuable opportunity to develop balanced and holistic NDCs that show how mitigation and adaptation can be delivered in complementary ways. Wildlife conservation, rewilding, habitat protection, and restoration can be central components for delivering that ambition.

Countries have already made significant progress on integrating commitments on landscape conservation and landscape restoration into their NDCs. IFAW's analysis of 67 NDCs from every LDC and all other countries in Africa in 2023 showed that these countries have made significant efforts to promote some level of biodiversity conservation in their NDCs.[54] In total, 93% of these countries have made commitments to ecosystem protection, and 87% have made commitments for ecosystem restoration[55]. These include commitments to conserve, protect, manage, and restore a variety of ecosystems, such as forests, wetlands, mangroves, rangelands, and marine and coastal areas. A number of important guidelines were developed alongside the 2020 NDC submissions to support countries in integrating nature into the second round of NDC submissions (*see Box 7*).

However, countries have not yet adequately integrated the contribution that wildlife populations and wildlife conservation make to climate mitigation and adaptation and/or the actions that they can take to protect and restore wildlife and species biodiversity as a form of climate action into their NDCs. The same IFAW analysis of African and LDC NDCs showed that 60% of African countries and LDCs have not included wildlife conservation in their climate action plans at all.

More strikingly, efforts to promote landscape conservation and landscape restoration vastly outnumber efforts to promote wildlife conservation. Of all 580 biodiversity-related NDC commitments identified in African and LDC NDCs, less than 10% of these commitments relate to wildlife conservation. Some 65% of the commitments focus on ecosystem protection, while 45% focus on ecosystem restoration.[56]

Similarly, of the USD$44.2 billion in finance budgeted to implement biodiversity solutions in the NDCs, USD$27.4 billion (61.9%) was earmarked for ecosystem restoration and USD$15.2 billion (34.3%) was earmarked for ecosystem conservation. Only USD$1.66 billion (3.8%) was earmarked for wildlife conservation.[57]

This trend suggests that efforts to integrate biodiversity into NDCs have so far turned a blind eye to the critical role played by wild animals in ecosystems and in carbon sequestration, and illustrates the worrying possibility of having 'empty forests'[58] devoid of the fauna that are critical to maintain the trophic interactions that sustain healthy, resilient, high-carbon ecosystems. The 2025 update of NDCs serves as an important opportunity to integrate wildlife conservation and the restoration of wild animal populations as integral components of climate action. In their new NDCs, countries can begin to integrate wildlife conservation and restoration to address the twin challenges of climate change and biodiversity loss. They can also commit to increasing their ambition in the future, as the science of wildlife's contribution to carbon sequestration and ecosystem resilience continues to evolve.

◄ Elephants in the swamp at the border of Amboseli National Park, Kenya.

Box 7

Other guidelines for including nature in NDCs

A number of existing guidelines are available to help countries integrate nature into their NDCs. Countries interested in learning from these approaches can read more below.

While these are vital resources that can help countries to jointly combat biodiversity loss and climate change, IFAW believes that a more holistic approach is required to deliver an integrated response to the climate and biodiversity crises, one which includes an explicit focus on wildlife conservation and rewilding alongside the conservation and restoration of ecosystems.

IFAW's *Wildlife Guidelines for NDCs* provide specific step-by-step guidance and recommendations to ensure that the conservation of wild animals is included in the 2025 NDC update process. These Guidelines can and should be used alongside other guidance, such as:

World Federation for Animals (2024). *Animals for Climate Action: Synergistic Solutions to Biodiversity Loss & Climate Change* https://animals4climate.wfa.org/

The Blue Carbon Initiative. (2023). *Blue Carbon and Nationally Determined Contributions: Guidelines on Enhanced Action.* https://www.thebluecarboninitiative.org/policy-guidance

UNDP. (2022). *Aligning NDCs with Green Recovery: Guidance Framework.* https://climatepromise.undp.org/research-and-reports/aligning-ndcs-green-recovery-guidance-framework

WWF. (2020). *Enhancing NDCs through Nature-Based Solutions. 8 Simple Recommendations for Integrating Nature into NDCs.* https://www.worldwildlife.org/publications/enhancing-ndcs-through-nature-based-solutions

Wetlands International. (2020). *Locking Carbon in Wetlands: Enhancing Climate Action by Including Wetlands in NDCs.* https://www.wetlands.org/publication/locking-carbon-in-wetlands/

WWF. (2020). *Enhancing forest targets and measures in Nationally Determined Contributions (NDCs).* https://wwfint.awsassets.panda.org/downloads/forests_and_ndcs_v4.pdf

WWF-UK. (2021). *NDCs: A force for nature? Nature in enhanced NDCs.* https://climatefocus.com/wp-content/uploads/2021/11/NDCs-for-Nature-4th-Edition.pdf

IUCN. (2019). *Nature-based Solutions in Nationally Determined Contributions: Synthesis and recommendations for enhancing climate ambition and action by 2020.* https://portals.iucn.org/library/sites/library/files/documents/2019-030-En.pdf

WRI. (2019). *Enhancing NDCs: Opportunities in the Forest and Land-use Sector.* https://www.wri.org/ndcs/resources/forest-land-use-sector

Nature4Climate, Conservation International, The Nature Conservancy, Environmental Defense Fund, National Wildlife Federation, Land Use & Climate Knowledge Initiative, Climate Advisers, WCS. (2019). *Guide to Including Nature in Nationally Determined Contributions.* https://international.nwf.org/wp-content/uploads/2019/09/Guide-to-Including-Nature-in-NDCs_2019-09-27-2.pdf

UNDP. (2019). *Pathway for Increasing Nature-based Solutions in NDCs: A Seven-Step Approach for Enhancing Nationally Determined Contributions through Nature-based Solutions.* https://climatepromise.undp.org/sites/default/files/research_report_document/undp-ndcsp-NBS-in-NDCs-Pathway-Report-english2.pdf


Photo: B. Hollweg / © IFAW

Section 3

Wildlife guidelines for NDCs

The guidelines

This section provides guidance on how countries can integrate wild animals and wildlife conservation into their updated NDCs in 2025. It lists 10 concrete steps that countries can follow to demonstrate their commitment to tackling both the climate and biodiversity crises in a joined-up manner.

The following section provides a detailed breakdown of each of the 10 steps of the *Wildlife Guidelines for NDCs*. It begins by providing an overall rationale for each guideline, which explains why it is important for countries to include this information in their NDC.

For each guideline, it then outlines which section of the NDC the guideline corresponds to so that countries know where to include the relevant information in their NDC. It then provides a suggestion of the information that countries should include in their 2025 NDC.

This serves as a starting point for including wildlife into NDCs. It signals commitment to jointly tackling the climate and biodiversity crises but does not require countries to develop new plans and strategies, new governance arrangements, new actions, and new financial commitments before their NDC is submitted in 2025. In this respect, the suggested information for the 2025 NDC serves as a baseline from which countries can increase ambition on wildlife and climate action in the future.

Each guideline then includes information on how countries can increase ambition to protect and restore biodiversity and address climate change in current or future NDCs. It offers tangible ways that countries can scale-up their approach to protecting and restoring wildlife and tackling the climate crisis.

Importantly, the *Wildlife Guidelines for NDCs* recognise that countries will have different institutional, financial, and human resource capacity to integrate wildlife and biodiversity into their NDCs and to translate these plans into action on the ground. Since countries will be starting from different places, the guidelines offer different levels of ambition and detail that can be tailored to the context of each country.

Over time, countries can increase their ambition and the level of detail in subsequent NDC submissions. Depending on national circumstances, some countries can begin to add these types of actions and commitments in their 2025 NDCs.

In some cases, countries may already have the policy objectives, action plans, data, and/or commitments for implementing specific wildlife and climate actions already agreed to and ready to incorporate into their NDCs.

Others may wish to explore ways to increase ambition by aligning wildlife and biodiversity actions with climate action in their NDC revision process for their 2025 submissions. This section for each guideline can help countries understand how to increase their ambition and develop more concrete linkages between biodiversity and climate change in their NDCs.

Where possible, examples from the previous round of NDC submissions are included to serve as inspiration and guidance on how countries can action the guideline in their 2025 NDC.

▲ Elephants in Hwange National Park, Zimbabwe.

10 guidelines for integrating wildlife into 2025 NDCs

Guideline 1
Establish the contribution that key wildlife species and wildlife habitats can make to climate change mitigation and adaptation in your country.

Guideline 2
Identify the major risks that threaten the wildlife populations and ecosystems that contribute to climate mitigation and adaptation in your country.

Guideline 3
Specify the wildlife species and ecosystems that the country seeks to protect and restore as part of its NDC commitments.

Guideline 4
Describe plans to include wildlife-nature interactions within the national greenhouse gas inventory.

Guideline 5
Set high-level targets for delivery of climate change mitigation and adaptation through conservation and restoration of wildlife populations and biodiverse ecosystems.

Guideline 6
List the actions the country will take to deliver wildlife and climate targets.

Guideline 7
Specify the financial support required to implement NDC actions that link climate action and wildlife conservation.

Guideline 8
Outline the capacity support and technology transfer required to implement NDC actions that link climate change and wildlife conservation.

Guideline 9
Explain how your country will align institutional arrangements for managing the country's response to climate change and biodiversity loss.

Guideline 10
Identify linkages between the NDC and other domestic and international policy frameworks that seek to protect wildlife and biodiversity.

▲ Wilson Kosianka, Olgulului Community Wildlife Ranger, explaining his patrol routes at their ranger base in Amboseli, Kenya.

Guideline 1

Establish the contribution that key wildlife species and wildlife habitats can make to climate change mitigation and adaptation in your country.


Photo: Christian Kaiser / © IFAW

◂ A young mountain gorilla living in the rainforest of Virunga National Park in the Democratic Republic of the Congo.

The first step in integrating wildlife into NDCs is to identify the key wild animal species and wildlife habitats that have the potential to contribute to climate mitigation and adaptation in your country.

As a preliminary step, countries should seek to identify animal species that might support climate mitigation through their role in the carbon cycle (e.g., by animating the carbon cycle or trophic rewilding). Likewise, they should seek to identify species that contribute positively to ecosystem functionality that supports ecosystem-based adaptation, as well as community livelihoods and a vibrant, sustainable national economy.

Work conducted by the Schmitz Lab at Yale University, in collaboration with the GRA, re:wild, the International Union for the Conservation of Nature (IUCN), and World Wildlife Fund (WWF), has identified a number of key species that can support carbon sequestration in biomes around the world—and the list of key species is expanding rapidly. Figure 1. illustrates a list of high potential species and habitats that could be candidates for inclusion in NDCs.

In time, countries should aim to develop quantitative models of the role that key wildlife species play in sequestering carbon in the landscape, i.e., the role wild animals play in animating the carbon cycle. Ideally, an initial baseline should be developed to assess the current contribution that key wildlife species are making to climate mitigation. As a starting point, this should include a baseline assessment of current wildlife population numbers and existing conservation initiatives.

Models can then be developed to estimate the levels of carbon sequestration that are likely to be achieved under different wildlife and habitat management regimes (e.g., conservation, rewilding, and population restoration) and wildlife population scenarios (*see Annex 1* for guidance on modelling). These models can be integrated with a country's GHG inventory (*see Guideline #4*).

Note that at the time of writing, few countries—whether high- or low-income—have the existing capacity to undertake ACC modelling approaches. As this is a relatively new scientific approach, such capacity mostly lies within universities in North America and Europe. For developing countries, this could be a valuable area to seek capacity building support and technology transfer to develop and embed the relevant skills within government under the auspices of the UNFCCC (*see Guideline #8*).

Countries should also develop a similar approach for adaptation. They should assess the current contribution that wildlife conservation and the wildlife economy make to climate resilience and adaptation in local communities and to climate-resilient development nationally.

This should include an assessment of the contribution that key wildlife species and wildlife conservation initiatives currently make toward maintaining ecosystem health and resilience, and toward supporting the delivery of ecosystem services that support resilience and adaptation of human communities by supporting local livelihoods and economies (e.g., through a valuation of the wildlife economy).

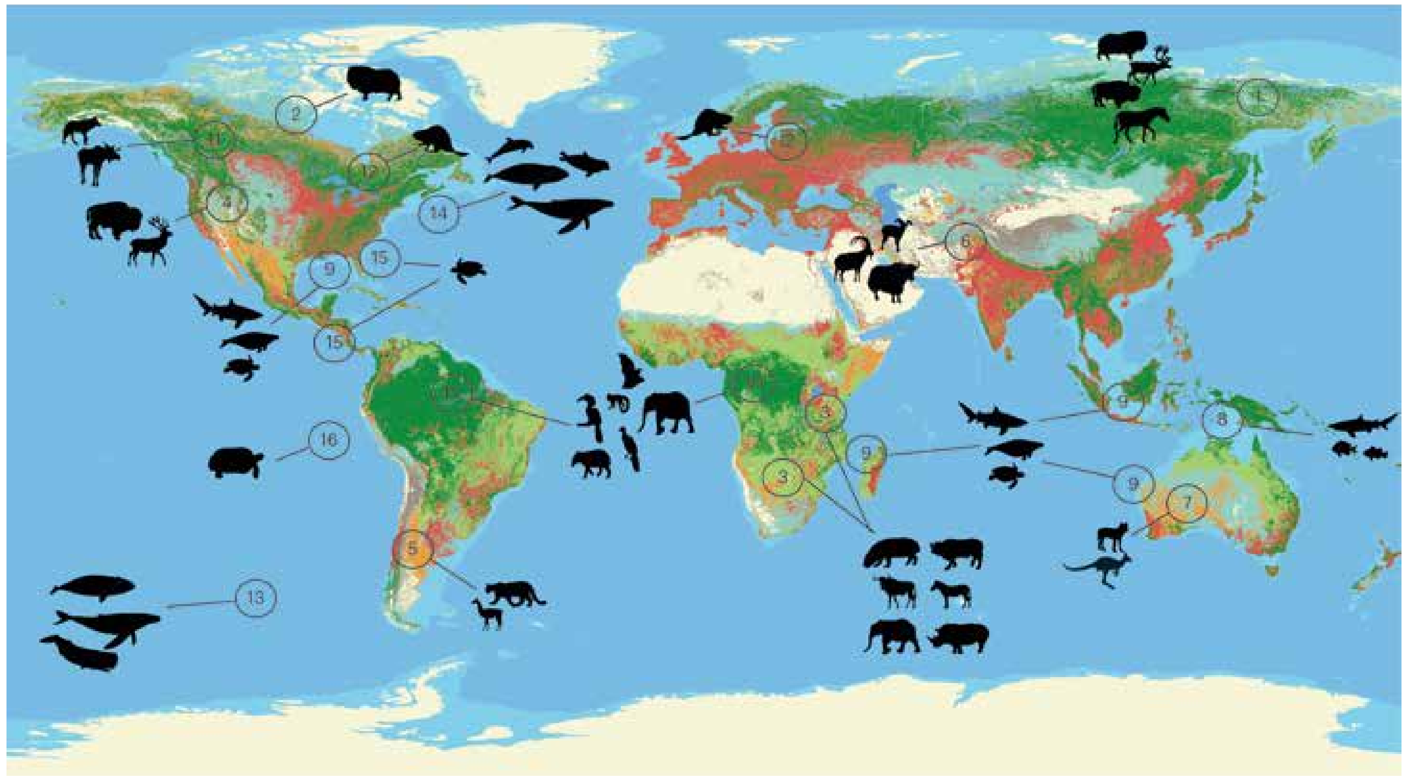
Over time, countries can then model the contribution that wildlife are likely to make to ecosystem-based adaptation and community resilience based on different wildlife population and conservation scenarios.

Starting point on what to include in 2025 NDC submission

- Identify and list the key wildlife species that contribute to climate mitigation in your country by supporting carbon sequestration (animating the carbon cycle and trophic rewilding) and, if possible, estimate the value of that contribution in tons of CO_2 per annum.
- Identify and list the key wildlife species that can contribute to climate adaptation/climate-resilient development in your country, and estimate that value in appropriate socioeconomic terms, in line with indicators from the Global Goal on Adaptation (GGA).
- Identify and list the most important wildlife conservation and restoration activities that contribute to climate mitigation and adaptation in your country and estimate the value of that contribution.

How to increase ambition over time

- Model the current contribution of key wildlife species to climate mitigation via carbon sequestration in your country.
- Model the future contribution of key wildlife species to climate mitigation via carbon sequestration under different conservation and rewilding scenarios.
- Increase the number or percentage of wildlife species in both current and future models of carbon sequestration in your country.
- Model the current contribution of key wildlife species to ecosystem-based adaptation and community resilience in your country.
- Model the future contribution of key wildlife species to ecosystem-based adaptation and community resilience under different conservation and rewilding scenarios.
- Increase the number or percentage of wildlife species in both current and future models of adaptation in your country.



1 Yedoma: muskox, caribou, bison, horse. 2 Tundra: muskox. 3 Savannah: hippo, buffalo, wildebeest, zebra, elephant, white rhino.
4 Grassland: bison, elk. 5 Arid alpine: puma, vicuna. 6 Mountain grassland: bharal, ibex, yak. 7 Shrubland: dingo, kangaroos.
8 Coral reef: tiger, reef and lemon sharks, coral reef herbivorous fish. 9 Seagrass: tiger shark, dugongs, sea turtles.
10 Old and New World tropical forests: elephants, Old- and New-world primates, tapirs, black-fronted piping guan, hornbills, fruit bats.
11 Boreal forest: wolf, moose. 12 Boreal and temperate wetlands: beaver. 13 Southern Ocean: blue, fin, humpback, right, minke and sperm whales. 14 Gulf of Maine: right, humpback, fin, sei and pilot whales, white-sided, common and harbour porpoises, harbour and grey seals.
15 Beaches: logger head and green sea turtles. 16 Semi-arid shrubland: tortoise.

	Animal function and ecosystem effects	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Protecting C stores	Foraging: herbivory																
	Shrub cover	–	–														
	Albedo	+	+														
	Wildfire extent			–													
	Foraging: predation																
	Stability of soil and/or sediment C storage						+		+			+					
	Trampling and/or disturbance																
	Albedo	+	+		+												
	Soil compaction	+	+	+	+												
	Soil CO_2 release	–	–	–	–		–										
	Soil CH_4 release	–	–														
	Stability of soil and/or sediment C storage			+	+		+										
Enhancing C capture and storage	Foraging: herbivory																
	Net primary production		+		+						+						
	Above-ground plant biomass C				+												
	Foraging: predation																
	Net primary production								+	+		+					
	Plant abundance				+				+	+							
	Above-ground plant biomass C							+				+					
	Soil and/or sediment organic C inputs																
	C storage pool size				+	+		+	+	+		+	+	+	+		
	Nutrient inputs																
	Net primary production													+	+	+	+
	Seed dispersal																
	Tree germination and abundance										+						+
	Above-ground plant biomass C										+						

Figure 1

Global distribution of candidate animal species and ecosystems for which there is a high potential to expand natural climate solutions through trophic rewilding. (From Schmitz et al. 2023: 328)

▶ An eastern grey kangaroo standing in the brush of a forest in Cooroibah.

Guideline 2

Identify the major risks that threaten the wildlife populations and ecosystems that contribute to climate mitigation and adaptation in your country.

Photo: © Donal Boyd

Wildlife populations and critical ecosystems that support climate change mitigation and adaptation are under threat globally, both from climate change and other risks, such as deforestation, land-use change, ecosystem degradation, overexploitation, and pollution.

These risks have the potential to cause the decline of important animal species and their habitats, thereby undermining the potential of ecosystems either to support carbon sequestration or to deliver ecosystem services and support climate adaptation and resilience. It is therefore necessary to identify the most important risks to the priority animal species and ecosystems that have been identified in *Guideline #1*.

This risk assessment can draw upon existing analyses that may have been developed to inform the NBSAPs in your country. The assessment should include analysis of the risks to wild animals and their habitats from climate change and extreme weather events under different climate scenarios. It should also include analysis of the risks posed by other threats to wildlife and ecosystems, such as poaching and illegal hunting and fishing, the illegal wildlife trade, deforestation, and land degradation arising from land-use change, encroachment on protected areas, and pollution. The impact of these processes on wild animal populations and their habitats will result in a loss of carbon sequestration potential and adaptation benefits.

It is also important to acknowledge that many of the factors that create risks to wild animals and their habitats, which threaten the ability of ecosystems to act as carbon stocks and sinks, are closely related to chronic poverty and inequality in communities that live near wild animal populations, and that these conditions of poverty and inequality are being significantly aggravated by climate change.

Poaching and illegal hunting, deforestation and encroachment of protected areas, and land-use change very often result from the short-term economic needs of poor and climate change-affected populations as they seek to overcome food and livelihoods insecurity, cope with disasters and health shocks, or pay for basic services.

Addressing chronic poverty and inequality, food and water insecurity, and a lack of climate-resilient livelihoods options that also support wildlife conservation and habitat protection can simultaneously support carbon sequestration and access to carbon finance, while also delivering climate resilience and adaptation for local communities.

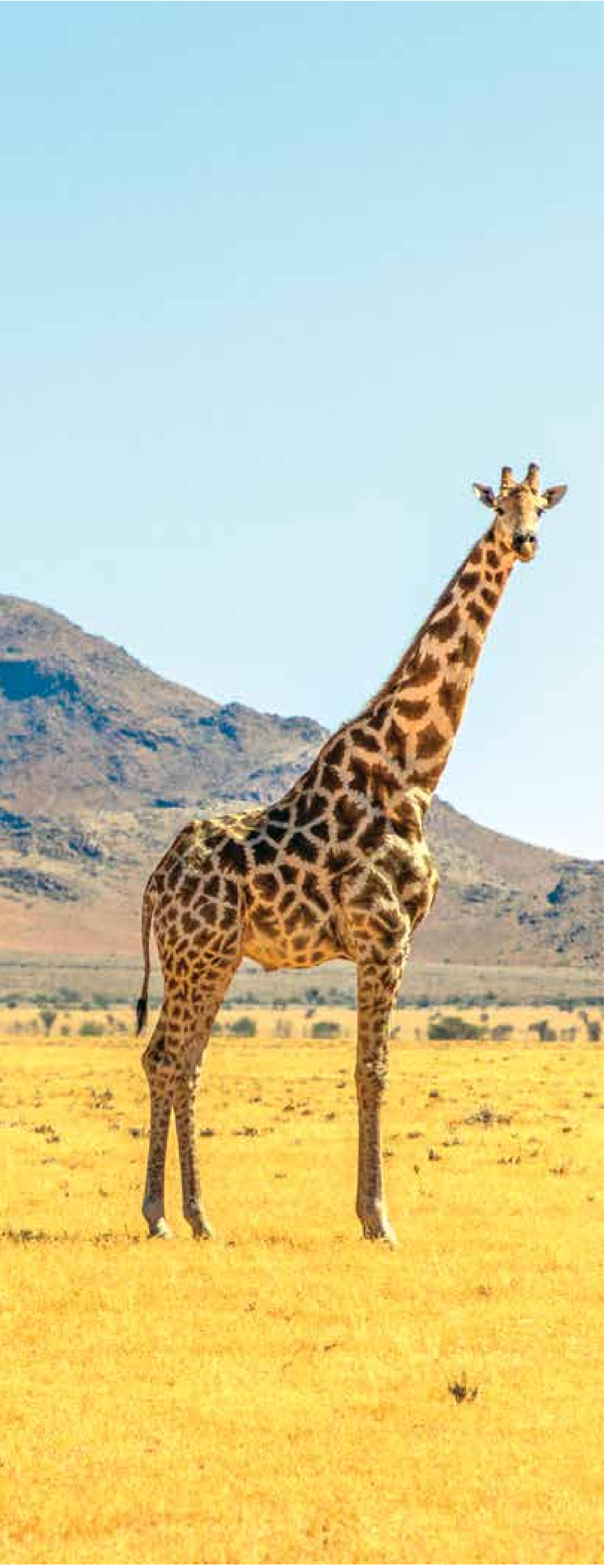
◀ KWS Ranger Samuel Atambo with a wildebeest carcass during a drought in Amboseli National Park, Kenya.

Starting point on what to include in 2025 NDC submission

- List climate hazards and other risks (e.g., poaching, deforestation, land degradation, land-use change, encroachment on protected areas, pollution, etc.) in your country that currently threaten wild animals and their habitats (identified in *Guideline #1).*
- List climate hazards and other threats (e.g., poaching, deforestation, land degradation, land-use change, encroachment on protected areas, pollution, etc.) that are likely to impact wildlife in the future.
- Identify and list key wildlife species and habitat ecosystems that will be affected by climate impacts and other threats listed above.
- Explain the interaction between a specific climate hazard(s) and wildlife (either wildlife in general or for a specific species).
- If feasible, estimate the likely impact of these risks on key animal species and habitats under different scenarios, and then estimate the impact these will have on carbon stocks and sinks and their ability to sequester carbon and support adaptation.

How to increase ambition over time

- Add a description of the current and future climate impacts on a greater number of wildlife species.
- Add information on current and future climate impacts on wildlife species for an increased number of climate hazards.
- Add more scientific data that models the relationship between future climate projections and specific wildlife populations as more data becomes available.



Box 8

Examples from previous NDC submissions on the impact of climate change on wildlife

'The impacts of the indirect effects of climate change such as floods, severe droughts and soil erosion will have implications for the increase in displacement and loss of species and also for the increased risk of fire in forests. Stress to flora and fauna caused by variations in climate will condition the life of species, which can cause extinctions. The increase in soil erosion and flooding may affect the distribution and resilience of Angolan biodiversity.' (Angola 2021, p. 54).

'In the Continental Region, as in the Bioko Island, there is a great diversity of mammals such as elephants (*Loxondonta africana*), gorillas (*Gorilla gorilla*), chimpanzees (*Pan troglodytes*), baboons (*Mandrillus sphinx*), panthers (*Panthera pardus*) and numerous species of antelopes, amphibians, reptiles and birds. The hunting of these species is a very serious threat. Additionally, the evidence of the significant increase in temperature and the change in precipitation in the locations under study, would lead to this diversity being increasingly in danger of extinction.' (Equatorial Guinea 2022, p.10).

'Namibia's tourism industry has undergone rapid growth in the past three decades, with an average increase in international arrivals of 16% per year on average. This growth rate has made tourism the fastest-growing sector of the Namibian economy. Tourism in Namibia relies largely on the wildlife sector. Changes in the quality of wildlife viewing, wildlife numbers and vegetation because of climate change are expected to affect the demand for wildlife tourism, which is estimated to be as much as a 15% reduction in tourism demand.' (Namibia 2021, p.22).

'Water shortages, lack of grazing and heat stress threaten the survival of wildlife species, especially those sensitive to heat, such as elephants. Droughts have continued to have similar impacts on ecological systems and biodiversity in recent years, most notably in 2018. A recent study in Hwange National Park projected a reduction of 40% of elephant habitat by 2050 and a change in elephant population distribution because of climate change. Other factors that will increase elephants' vulnerability to climate change include the increased spread of diseases, moderate genetic diversity, and slow reproductive rates.' (Zimbabwe 2021, p.10).

Source: All NDCs can be found in the UNFCCC's NDC registry https://unfccc.int/NDCREG

◄ Lone giraffe standing in typcial namibian landscape in Namib Naukluft park.

► A family of African elephants walk together in Hwange National Park, Matabeleland North Province, Zimbabwe.

Guideline 3

Specify the wildlife species and ecosystems that the country seeks to protect and restore as part of its NDC commitments.

Countries should specify the specific wildlife species and the specific ecosystems that they seek to protect and restore to deliver climate mitigation and adaptation outcomes. This is an important contribution to the NDC because it allows a country to set out its intention to deliberately link its climate response with its efforts to conserve, protect, and restore biodiversity.

Traditionally, these two policy responses have been siloed via separate policies, strategies, institutions, agencies, programmes, and financing streams. However, the science is increasingly clear that climate change drives wildlife and biodiversity loss, and that healthy populations of wild animals can contribute significantly to climate mitigation, ecosystem resilience, and the economic resilience of people who share landscapes with wild animals.

In their 2025 NDC submissions, governments can begin to align their climate and biodiversity strategies by specifying the wild animal species and wildlife habitats, protected areas, and Other Effective Area-based Conservation Measures (OECMs) that they will conserve and restore as a means of improving climate mitigation and adaptation outcomes. Such efforts should make clear the role wild animals play in supporting carbon sequestration, ecosystem-based adaptation, and community resilience.

Over time, these interactions should be modelled for current wildlife populations and future wildlife population scenarios where wildlife numbers are progressively restored to historic levels (*see Guideline #1*). Ultimately, this will serve as a step toward developing specific wildlife-related mitigation and adaptation targets (see *Guideline #5*) and actions (*see Guideline #6*).

To increase ambition over time, countries should expand their focus to include a greater number of species and species types, modelling the way these species interact with their ecosystems to promote carbon sequestration, ecosystem-based adaptation, and community resilience.

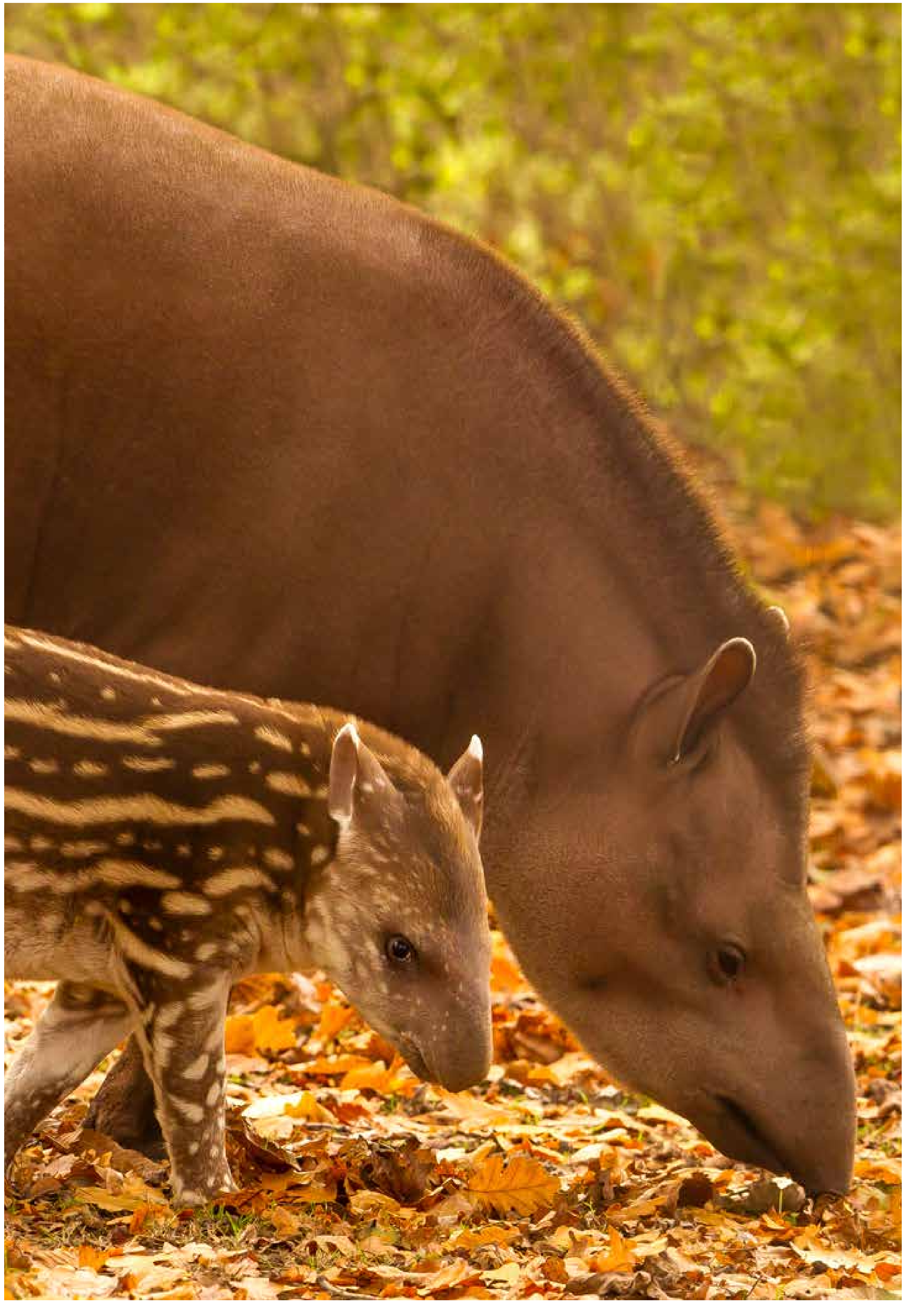
◄ A southern yellow-billed hornbill perched on a rock in Hwange National Park, Zimbabwe.

Starting point on what to include in 2025 NDC submission

- List main wildlife species that a country seeks to protect as part of its joined-up strategy to address climate change and biodiversity loss, based on the assessment of a species' contribution to mitigation and adaptation.
- List specific ecosystems or ecosystem types that a country seeks to protect to promote mitigation, adaptation, and wildlife conservation (e.g., savanna, wetlands, peatlands, coastal areas, forests, mangroves, rangelands, marine areas, etc.).
- List specific protected areas, parks, wildlife reserves, conservancies, habitats, etc., that a country seeks to protect to promote mitigation, adaptation, and wildlife conservation.

How to increase ambition over time

- Include a greater number of wildlife species as part of the country's strategy to combat climate change and the biodiversity crisis.
- Include a wider range of ecosystems or ecosystem types that a country seeks to protect to promote mitigation, adaptation, and wildlife conservation.
- Include a greater number of protected areas, parks, wildlife reserves, conservancies, habitats, etc., that a country seeks to protect and/or sustainably manage to promote mitigation, adaptation, and wildlife conservation (e.g., overall number of parks, percentage of territory, or number of ha^2/km^2).



Guideline 4

Describe plans to include wildlife-nature interactions within the national greenhouse gas inventory.

Countries should aim to integrate the contribution of wild animal species to carbon sequestration into their national greenhouse gas inventories and life cycle assessments (LCAs). The science on the contribution of wild animals to carbon sequestration is very new and is rapidly evolving. For many wildlife species, ecosystems, and countries, this data does not yet exist. As a result, it is likely too early for all but a few countries to integrate wildlife-related interactions in the carbon cycle to their GHG inventories and LCAs.

For their 2025 NDC submission, countries cannot be expected to update their GHG inventories and carbon sequestration projections based on this emerging science, but they can commit to exploring how to integrate wildlife contributions to carbon capture as part of their GHG inventories and LCAs in the future. They can also commit to collecting baseline data on wildlife populations and the contributions specific species make to carbon sequestration in ecosystems of national importance. For developing countries, this is an area that they should seek finance, capacity, and technological support for from international partners.

◄ Tapir mother and calf, Brazil.

Starting point on what to include in 2025 NDC submission

- Commit to exploring how to integrate the wildlife contribution to carbon capture within GHG inventories and LCAs in the future.
- Make plans to collect baseline data collection that will support modelling of wildlife contributions to carbon sequestration for specific species and ecosystems of national importance.
- Connect with scientific/technical experts who can support with modelling of wildlife-carbon linkages in key ecosystems.
- Invest in wildlife population baseline studies and/or scientific monitoring for specific wildlife species to better understand the drivers of population growth/loss and have robust data for inclusion in GHG inventories , LCAs and resilience assessments.

How to increase ambition over time

- Estimate the future carbon sequestration potential that may be possible due to the presence of one or two flagship species, as relevant to national context, to serve as proof of concept for this GHG modelling approach.
- Continue to add GHG modelling for more species, as relevant to national circumstances, and as further scientific data becomes available.
- Model the contribution of specific species to carbon capture potential based on different scenarios where wildlife population numbers are increased to different levels in line with a trophic rewilding approach.

Box 9

Mesopelagic fish

Fish—especially those dwelling in the mesopelagic zone—play a crucial role in animating the carbon cycle by participating in what scientists call the 'biological pump'. During their daily vertical migration, they move from deeper waters to the surface at night and back down during the day. Along this journey, they consume plankton and other organic matter.

By breathing and defecating across different ocean depths, they transport organic matter, including carbon, into deeper waters. This process efficiently shuttles carbon from the ocean surface to the deep sea, which sequesters carbon, preventing it from re-entering the atmosphere. An estimated 1.5 billion tonnes of carbon dioxide ($GtCO^2$) are sequestered to the ocean floor each year due to fish respiration and excretion. This is equivalent to twice the annual CO^2 emissions of the European Union.[59]

Scientists estimate that if trophic rewilding to rebuild fish stocks is used as a natural climate solution, mesopelagic fish can potentially sequester up to 5.5 gigatons of additional CO^2 annually. Securing mesopelagic fish communities could contribute up to 84.6% of the 6.5 $GtCO^2$ needed every year to meet the global target of removing 500 $GtCO^2$ by 2100.[60]

▲ Close-up of a Krill.

▶ Viperfish, Samoa Islands.

Photo: NOAA

Guideline 5

Set high-level targets for delivery of climate change mitigation and adaptation through conservation and restoration of wildlife populations and biodiverse ecosystems

Countries should set high-level targets for the delivery of climate change mitigation and adaptation through the conservation and restoration of wildlife populations and their habitats in their NDCs.

Mitigation targets could include metrics such as the amount (in millions of tonnes) of greenhouse gas emissions avoided or sequestered by wild animals and their habitats as a result of interventions.

Such targets could be based on modelling of the carbon sequestration potential of different species (*see Guideline #1 and Guideline #4*). These targets should be set using robust baselines for the carbon and biodiversity in priority landscapes, and based on good quality modelling of likely outcomes that will result from different types of intervention. They could also be based on the use of good quality proxies derived from existing scientific models, such as an increase in the population of particular species who make known contributions to carbon sequestration or the area of land under protection/conservation.

Adaptation targets could include metrics that model: 1) the impacts on household and community resilience and adaptive capacity through their involvement in, and proximity to, wildlife conservation and restoration initiatives and related interventions, measured by indicators such as income, assets, livelihoods diversity, access to social protection, food security, etc.; 2) the benefits that households and communities derive from improvements in availability of and access to ecosystem services that result from wildlife conservation, rewilding, and habitat restoration initiatives, such as water resources for people, agriculture, and livestock, soil quality, agrobiodiversity, vulnerability to natural hazards, etc.; 3) the levels of climate-resilient economic development that accrue to local and national economies as a result of investment in the wildlife sector as a whole (tourism, carbon, and biodiversity markets, sustainable use, ecosystem services, etc.).

These metrics can serve a dual purpose as they can also feed into monitoring and reporting against other instruments such as the National Adaptation Plan (NAP) and NBSAPs.

◄ A humpback whale calf swims near the surface of the ocean.

Starting point on what to include in 2025 NDC submission

- Develop an overall target for the amount or percentage of increase in the population of specific wild animal species that the country seeks to conserve/restore by 2030 and/or 2050.
- Develop a target for the amount of carbon dioxide and other greenhouse gas emissions that will be avoided or sequestered through wildlife conservation and rewilding activities, taking into account the contribution that wild animal species can make to carbon sequestration, as well as the carbon that can be sequestered as above ground biomass in trees and other vegetation.
- Develop an overall target for the amount or percentage of the country's territory or of specific ecosystems that the country will conserve and restore to deliver climate and wildlife-positive outcomes in its NDC.
- Develop a target for the climate resilience and adaptation benefits that the country aims to deliver through investment into wildlife conservation and the wildlife economy as a whole.

How to increase ambition over time

- Increase the number or percentage of wild animals the country seeks to conserve as part of its climate and biodiversity strategy.
- Move from targets that relate to conserving wild animals at current levels to targets that aim to restore the populations of wild animals to their historic levels.
- Increase the number or percentage of the country's territory or of specific ecosystems the country seeks to conserve and restore to deliver climate and wildlife-positive outcomes in its NDC.
- Develop a specific high-level target for the Mitigation section of the country's NDC that outlines the amount of carbon/avoided GHG emissions that the country seeks to achieve by promoting wildlife conservation and restoration.
- Develop a specific high-level target for the Adaptation section of the country's NDC that outlines the resilience outcome the country seeks to achieve by promoting wildlife conservation and restoration.

Guideline 6

List the actions the country will take to deliver wildlife and climate targets

The most tangible way that countries can deliver joined-up action to combat climate change and species loss in their NDCs is by including specific commitments (in the form of programmes, projects, and investments) that they will implement to conserve and restore wildlife.

In their 2025 NDC submission, countries should therefore list the actions in their NDC that they plan to undertake to conserve and restore wildlife in order to deliver their high-level wildlife-climate targets (*see Guideline #5*). These can be listed in the adaptation and mitigation sections of their NDC, depending on the type of climate objective they aim to support.

◄ Chawia Hass avocado farmers tending to the seedlings.

Starting point on what to include in 2025 NDC submission

- Include specific actions in the mitigation section of the country's NDC that promote wildlife conservation and restoration to help deliver climate mitigation.
- These might include actions to protect, restore, and effectively manage wild animal populations in terrestrial and coastal ecosystems in ways that maximise their contribution to the avoidance and sequestration of greenhouse gas emissions, especially carbon dioxide.
- They could also include actions to protect, restore, and increase levels of above-ground and soil carbon as a by-product of wildlife and biodiversity conservation actions, e.g., avoidance of deforestation by establishing protected areas, re-establishing forested areas as part of a biodiversity conservation plan, restoring degraded grassland in protected areas, and rangeland management.
- They could also include actions taken indirectly with local communities which serve both to reduce negative impacts on wild animals while supporting carbon sequestration, avoidance of deforestation, and improving livelihoods. For instance, the introduction of agroforestry and regenerative agriculture in communities living in and around conservation areas can contribute to carbon sequestration and reduced deforestation while also benefitting wildlife conservation and increasing resilient livelihoods.
- Include specific actions in the adaptation section of the country's NDC that promote wildlife conservation and restoration to strengthen the resilience of wildlife, ecosystems, and communities. These could include a wide range of activities that support both the adaptation and resilience of wild animals and vulnerable ecosystems, as well as the adaptation and resilience of communities living in and around protected and conservation areas.

How to increase ambition over time

- Include a greater number of wildlife- and mitigation-focused actions in NDCs over time. These could outline how the country will work to deliver mitigation actions by conserving and restoring a greater number or percentage of wildlife species, ecosystems, and land and seascapes in the country.
- Include a greater number of wildlife- and adaptation-focused actions in NDCs over time. These could outline how the country will work to deliver adaptation and resilience outcomes by conserving and restoring a greater number or percentage of wildlife species, ecosystems, and land and seascapes in the country.

Box 10

Examples of wildlife-related actions included in previous NDC submissions

'At least 10% of Afghanistan land area and the habitat of selected species under a system of conservation.' (Afghanistan 2016, p.6).

'Develop, adopt and implement science- and ecosystems-based plans to rebuild depleted fisheries stocks, and ensure adaptive fisheries management to respond to climate change and uncertainties of shifting ocean ecosystems.' (Cabo Verde 2021, p.39).

'Identify the status of known flora and fauna species and implement conservation actions on 50% of threatened species.' (Congo-Brazzaville 2021, p.31).

'Promote scientific research and demographic studies to identify population groups that are most vulnerable to the impacts of climate change and effective means for support. Assess the impact of climate change on biodiversity in vulnerable and protected areas.' (Egypt 2022, p.27).

'Enhance climate resilient livelihoods of wildlife resource dependent communities in protected areas.' (Ethiopia 2021, p.34).

'Establishment of cross-border conservation areas to maintain ecosystem functions and allow wildlife migrations.' (Mozambique 2021, p.43).

'Establish water points for wildlife. The government will establish water holes for wildlife in protected areas to ensure that water is available during dry seasons, thus reducing negative impacts on animals.' (South Sudan 2021, p.93).

'Enhancing participatory sustainable forest and wildlife management and protection.' (Tanzania 2021, p.10).

'Establish and protect existing wildlife corridors to strengthen the resilience of wildlife against climate risks and hazards.' (Uganda 2022, p.26).

▲ Elephants walking through Amboseli National Park, Kenya.

▶ Mangrove trees by the water on the island of Zanzibar, Tanzania.

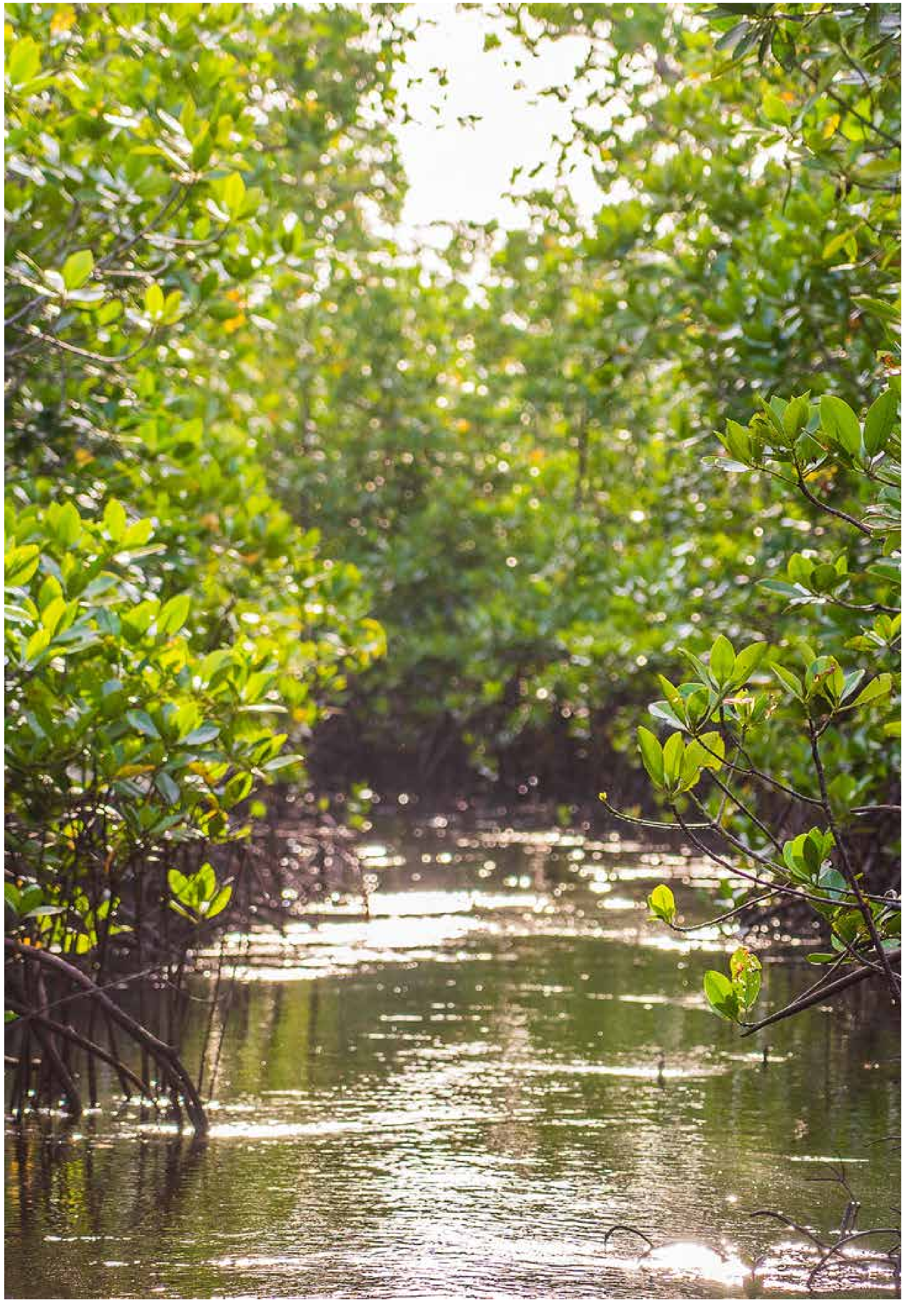


Photo: Jacqueline Nyagah / © IFAW

Guideline 7

Specify the financial support required to implement NDC actions that link climate action and wildlife conservation.

Many countries—in particular LDCs and small island developing states (SIDS)—will require financial assistance and support to develop and implement NDC commitments for wildlife conservation and restoration that deliver mitigation and adaptation outcomes.

For example, they may require financial assistance to collate and analyse baseline data and to conduct relevant modelling exercises. They are also likely to need financial support to protect and restore critical ecosystems, to initiate rewilding programmes that re-establish and restore wild animal populations, and to implement conservation programmes that protect wildlife populations and their habitats, while also promoting economic and ecosystem resilience for communities that live near and work in protected and conserved areas.

In their 2025 NDC submissions, LDCs, SIDS, and other developing countries that require external support should outline the financial support they will require to implement their wildlife-related NDC actions. High-income countries and others, where relevant, should outline the financial assistance and support that they provide to their counterparts in developing countries to facilitate their wildlife-related climate response.

◀ Dominic Mutua's farm in Kamungi Conservancy has a consistent water supply thanks to IFAW in partnership with TTWCA and supported by USAID Kenya as part of the sustainable management of the Amboseli and Tsavo landscapes project.

Starting point on what to include in 2025 NDC submission

- Provide an overall cost estimate for the amount of finance required to support wildlife conservation and restoration efforts to deliver climate mitigation and adaptation outcomes (developing countries).
- Provide an overall costing for the amount of finance available to help developing countries implement wildlife conservation and restoration efforts within their NDCs (high-income and middle-income countries).

How to increase ambition over time

- Provide a more detailed breakdown from the overall cost estimate that shows the amount of finance needed to for wildlife conservation and restoration efforts. This more granular breakdown of finance required could move from an estimate of overall financial support required ▶ mitigation/adaptation strategic objectives ▶ sectoral objectives ▶ specific action outlined in the mitigation and adaptation section of the NDC. This granularity can increase over time as the country's NDC becomes increasingly detailed in the types of actions it supports (*see Guideline #5*) (developing countries).
- Provide an individual costing for each NDC action outlined in the mitigation and adaptation section of the country's NDC, broken down by finance that will be committed through domestic resources and additional finance to scale-up action on the condition that finance is provided by international funders (developing countries).
- Provide a more detailed breakdown on the financial assistance provided to developing countries, especially LDCs and SIDS. This could include a breakdown of finance provided to individual countries, financial support provided to conserve and restore specific wildlife species, and/or financial support to conserve and restore specific landscapes and ecosystems (high-income countries and other countries).

Photo: Paolo Torchio / © IFAW

Guideline 8

Outline the capacity support and technology transfer required to implement NDC actions that link climate change and wildlife conservation.

Like financial assistance, many countries—in particular LDCs and SIDS—will also require capacity support and technology transfer to implement NDC commitments for wildlife conservation and restoration that deliver mitigation and adaptation outcomes.

Countries may need capacity building support and external expertise to undertake baseline studies and scientific modelling that estimates wildlife contributions to carbon storage, which can ultimately be included in GHG inventories. They may also require capacity support to develop and implement conservation programmes to protect critical ecosystems and rewilding programmes that support climate mitigation and adaptation. They may require technology transfer to support measuring, recording, and monitoring of wildlife populations, ecosystem health, and the carbon sequestration contribution of wild animal species. This could include surveillance equipment, such as cameras, drones, computer hardware, modelling software, etc. It could also include partnerships with research institutions, universities, and conservation organisations to implement priority actions to conserve and restore wildlife and ecosystems.

In their 2025 NDC submissions, LDCs, SIDS, and other developing countries that require external support should outline the capacity support and technology transfer they will require to implement their wildlife-related NDC actions. High-income countries and others, where relevant, should outline the capacity support and technology support that they provide to developing countries to facilitate climate response that delivers positive outcomes for wildlife and nature.

◀ Team Lioness on patrol. Team Lioness is one of Kenya's first all-female wildlife ranger units.

Starting point on what to include in 2025 NDC submission

- Provide a narrative overview of the technology transfer and capacity support requirements to implement wildlife conservation and restoration efforts for NDC actions (developing countries).
- Provide a narrative overview of the technology transfer and capacity support provided to support developing countries implement wildlife conservation and restoration efforts within their NDCs (high-income countries and other countries).

How to increase ambition over time

- Provide a more detailed breakdown on the capacity support and technology transfer requested from international partners. The granularity of this information could increase from overall support ▶ mitigation/adaptation strategic objectives ▶ sectoral objectives ▶ specific action, as the country's NDC becomes increasingly detailed over time. More detail could also be outlined in terms of capacity support and technology transfer required to implement actions to conserve and restore specific wildlife species, and/or to conserve and restore specific ecosystems and landscapes (developing countries).
- Provided a more detailed breakdown on the capacity support and technology transfer provided to developing countries, especially LDCs and SIDS. This could include a description of support provided to individual countries, support to conserve and restore specific wildlife species, and/or support to conserve and restore specific landscapes and ecosystems (high-income countries and other countries).

Guideline 9

Explain how your country will align institutional arrangements for managing the country's response to climate change and biodiversity loss.

Countries should develop institutional arrangements to align climate action and wildlife conservation. These responses to two of the most pressing environmental challenges of our lifetime are often siloed in different ministries, departments, and UN processes. As a result, countries are missing a significant opportunity to deliver a more integrated and effective response to climate change and biodiversity loss.

For their 2025 NDC submissions, countries can begin by outlining the institutional governance arrangements that governments will put in place to align policies and investments to address biodiversity loss and climate change. This alignment should be tailored to a country's unique biodiversity and climate change challenges and opportunities, and to their specific governance arrangements.

Options that could be considered include cross-ministry coordination arrangements and working groups, coordinated or joint policy development, coordinated planning, and budgeting, etc. Establishing a national interministerial platform for tackling the climate and biodiversity crises in a coordinated manner, bringing together not only the ministries responsible for climate change and wildlife but also ministries of finance, agriculture, economic development, planning and local government, will be highly productive.

Given the importance of finance and budgeting for addressing these crises, it is advisable that the Ministry of Finance and/or National Treasury is closely involved in,
or chairs, such structures. It will also be valuable to consider the establishment of subnational planning systems or structures, ideally at the level of the bioregion, to facilitate coordinated planning, investment, and action that can link biodiversity conservation, climate action, and economic development.

To increase ambition, countries can outline how they will align the institutional governance of climate and biodiversity, and how they will develop specific strategies or actions that deliver climate and wildlife win-wins.

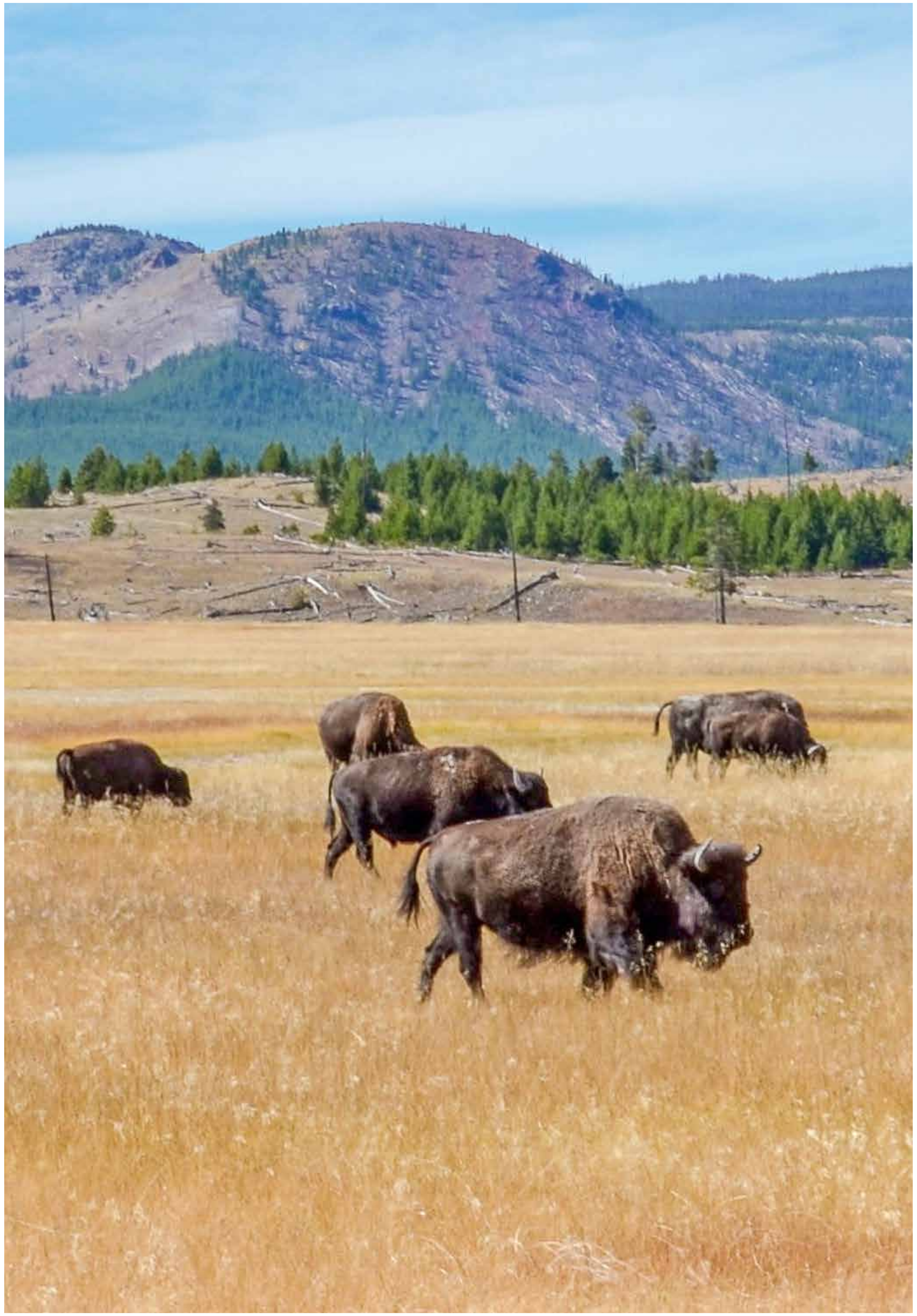
◀ IFAW's Bernard Tulito (second from left) with community leaders reviewing the lease for the Kitenden Conservancy, Kenya.

Starting point on what to include in 2025 NDC submission

- Outline the institutional governance for aligning wildlife, biodiversity, and climate change in your country—including consideration of other relevant ministries, especially finance, planning, and economic development.
- Commit to aligning the institutional governance for climate change and biodiversity so that the response is joined-up and not siloed at national and subnational levels.

How to increase ambition over time

- Outline the ways in which a country will align its institutional arrangements to deliver joined-up responses that address climate change and biodiversity loss.
- Describe new institutional arrangements put in place by a country to jointly tackle climate change and the biodiversity crisis.



Guideline 10

Identify linkages between the NDC and other domestic and international policy frameworks that seek to protect wildlife and biodiversity.

In light of both the impacts of climate change on wildlife and the contribution that wildlife conservation can make to GHG mitigation, climate resilience, and adaptation, countries should explain in their NDC how they will harmonise their climate policies with their domestic and international biodiversity policies and strategies, in particular their NBSAP.

As a starting point, this could include providing a high-level overview on national biodiversity policies, strategies, and action plans in the 2025 NDC. It could also include a commitment to aligning NDC action with the new GBF and planned actions under commitments made in other biodiversity agreements to which the country is party (e.g., CITES, CMS, RAMSAR, IWC, and World Heritage Convention).

◄ A herd of bison grazing in Yellowstone National Park.

Starting point on what to include in 2025 NDC submission

- Provide an overview of national policies, strategies, action plans, etc., on biodiversity conservation and explain how the country can work to link the two.
- Commit to exploring how to align NDC actions with the new Kunming-Montreal Global Biodiversity Framework and relevant frameworks under other biodiversity conventions to which the country is party.

How to increase ambition over time

- Outline how the country will develop specific strategies or action plans to jointly address climate change and biodiversity loss.
- Outline how the country will develop and implement specific actions related to mitigation, adaptation, and biodiversity conservation to ensure a joined-up response that addresses climate change and the biodiversity crisis.
- Explain the link in NDCs between specific wildlife and climate targets/actions and high-level targets in national biodiversity policies, strategies, action plans, etc.
- Explain the link in NDCs between specific wildlife and climate targets/actions and high-level commitments made by the country under international biodiversity agreements, for example, under the Kunming-Montreal Global Biodiversity Framework and other relevant biodiversity conventions.

Box 11

Examples of linkages between climate and biodiversity policies from previous NDC submissions

'To mitigate the harmful effects of the impacts of climate change, the Government of Burundi has outlined policy guidelines, notably through the National Plan for the Development of Burundi 2018-2027… and various sectoral policies such as the National Water Policy, the National Water Strategy, the National Agricultural Strategy, [and] the National Strategy and Action Plan on Biodiversity 2013-2020.' (Burundi 2021, p.9).

'Most of the adaptation and mitigation measures of this NDC are in perfect synergy with Chad's commitments in the three Rio conventions on biodiversity, climate change and desertification, as well as with the Sustainable Development Goals and its commitments under the Bonn Challenge to restore 5 million hectares of degraded and deforested land by 2030. In this context, the priority adaptation measures identified as well as the mitigation actions promoted by this NDC will support the restoration of forests and lands, tackle the causes of biodiversity loss, land degradation and reduction of greenhouse gas emissions. Thus, and through nature-based solutions, these actions will contribute to the objectives of neutralising land degradation by 2030. At the same time they will promote the conservation, management and restoration of several ecosystems, as well as interventions which call for the protection and conservation of biodiversity and the restoration of ecosystems and their services, which are part of the objectives of the strategic plans of the Convention on Biological Diversity.' (Chad 2021, p.35).

'In 2020, Timor-Leste passed the Biodiversity Decree-Law (6/2020) to support national efforts to safeguard the environment, improve legal protections for the environment, and safeguard intergenerational interests. This legislation establishes a legal regime for protecting and conserving biodiversity and is aligned with the requirements of the National System of Protected Areas the existing Basic Law for the Environment. Timor-Leste continues to progress with a number of policies and activities dedicated to supporting the achievement of the Aichi Targets and the delivery of Timor-Leste's commitments under the Convention for Biological Diversity.' (Timor-Leste 2022, p.13).

▲ Natural rock formations and dry trees, Chad, Africa.

▶ A critically endangered Hawksbill sea turtle species feeding on a healthy coral reef ecosystem in Timor Leste.

Section 4

Resources

Annex: Modelling the climate role of wild animal species

Prof Oswald J. Schmitz, School of the Environment, Yale University, New Haven, CT, USA

Dr Fabio Berzhagi, Ocean Sustainability, Governance and Management, World Maritime University, Malmö, Sweden

Several different modeling approaches can be used to evaluate the climate role of wild animal species, which embody different assumptions and mathematical characterizations of animal impacts on ecosystem carbon dynamics. The rationale for using several competing models follows the logic of IPCC assessment reports that make projections based on the use of multiple models.

This approach enables one to assess whether modeling results give convergent insights despite differences in assumptions or mathematical formulation, and if not, what the degree of uncertainty is among modeling outputs. Suitable models include REMAP (REproduce MAmmal Populations) for terrestrial mammals, a series of ocean ecosystem models that simulate different groups and species of marine life, and the Yale/GRA Carbon Capture Framework Model.

The Yale/GRA Carbon Capture Framework Model

The Yale/GRA Carbon Capture Framework Model[61] is a general framework that uses the mathematics of dynamical systems theory (i.e., ordinary differential equations) to specify how carbon and essential limiting nutrients that support ecosystem productivity flow between (i.e., flux) and build-up (i.e., stock) in different ecosystems compartments—including soil/sediments, vegetation, herbivores animals, and predators of herbivores—and carbon exchange between the ecosystem compartments and the atmosphere.

The model framework also accounts for the feedback that different groups of animals exert on vegetation and soil/sediments through their consumptive and recycling (defecation, urination, death) effects. The modeling framework enables prediction of animal effects on standard, accepted components examined when modeling the carbon cycle and when conducting carbon budget estimates.

These include gross carbon uptake (gross primary production, GPP), net carbon uptake (net primary production, NPP) and net ecosystem storage potential, aka ecosystem carbon sink strength (Net Ecosystem Carbon Balance [NECB]. The framework can be adapted to accommodate interactions among different combinations of predator and herbivore species in different ecosystems. Predictions for different ecosystems can be made by parameterizing the model for a specific ecosystem using published data from the scientific literature.

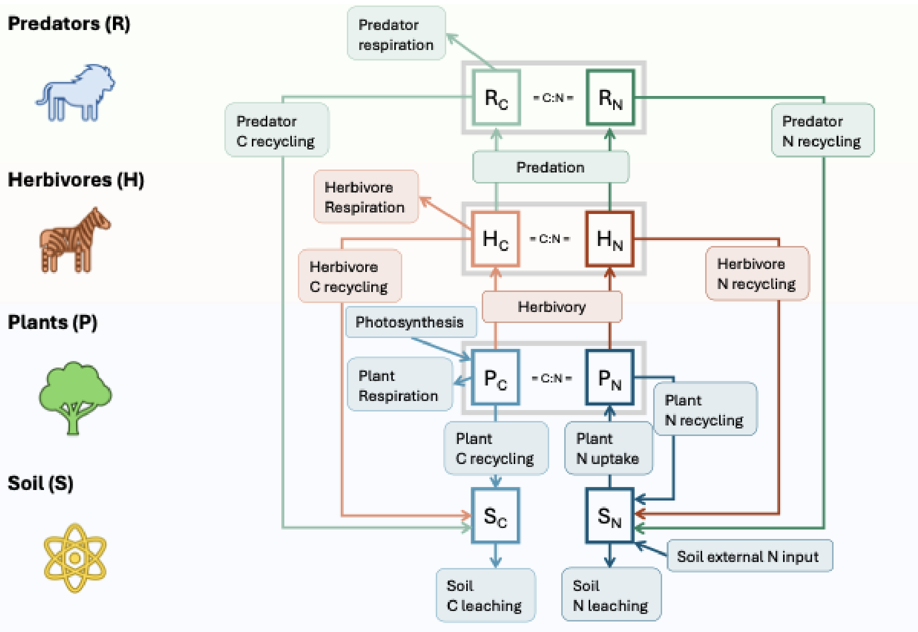
EMAP (REproduce MAmmal Populations)

REMAP[62] (Berzaghi et al. 2024) is an eco-physiological model that simulates the biomass of all terrestrial herbivores, grouped in functional types based on reproduction, metabolism, growth, mortality, and competition for food. REMAP has been developed with the capability of being coupled to global dynamic vegetation models that allows to study the effects of different mammal functional groups on vegetation and their contribution to carbon cycling in case of population decline or rewilding.

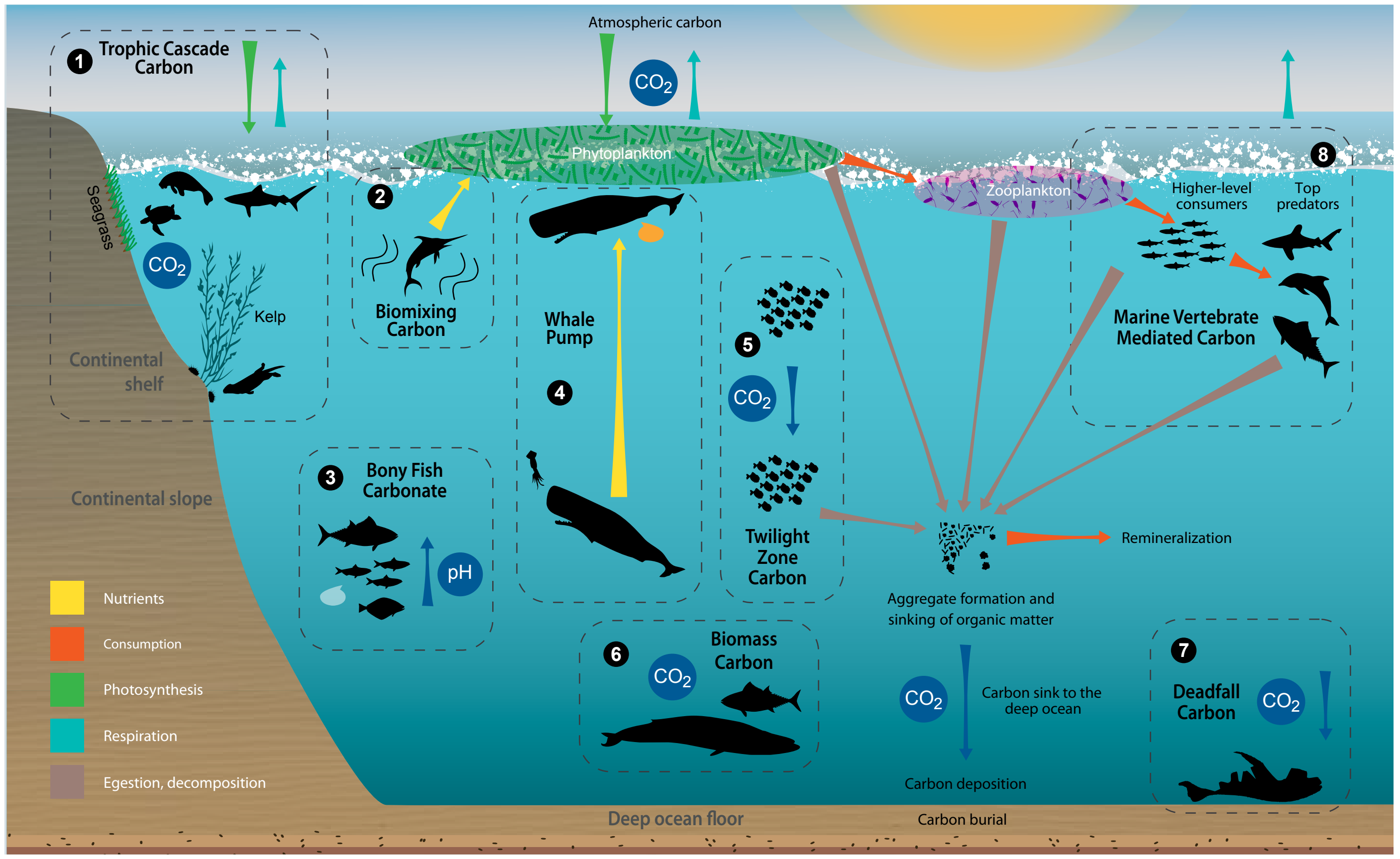
Ocean Ecosystem Models

Regarding the contribution of marine animals to carbon cycling, different models are available that can be divided into two main categories:

Models that represent animal species in functional groups. This includes the NEMO-PISCES-APECOSM, a widely used biogeochemical model that is part of the IPSL Earth System Models that contribute to the IPCC reports and the Inter-Sectoral Impact Model Intercomparison Project (https://www.isimip.org/impactmodels/).



Reproduced with permission of Matteo Rizzuto, Memorial University of Newfoundland, St. John's Canada)



From https://bluecsolutions.org/dev/wp-content/uploads/2015/07/Fish-Carbon-2014.pdf, with permission of Steven Lutz, GRID-Arendal, Norway

Lower trophic levels in this model include two phytoplankton groups (nano phytoplankton and diatoms) and two zooplankton size classes (micro and meso-zooplankton). Upper trophic levels include fish and filter feeders ranging from 1mm to 2m divided in 20 size classes. Upper trophic levels communities are of three types: epipelagic (first 200m), mesopelagic and bathypelagic (200-1000m), and migratory, which perform daily vertical migration. The latest development also includes jellyfish. Another global model is the Pinti et al. 2023 which includes meso-zooplankton, macro-zooplankton, jellyfish, and three groups of fish: forage, large pelagic, and mesopelagic.

Single species models include predictions of carbon sequestration attributable to tuna (Mouillot et al. 2023), cephalopods (Ottman et al. 2024), tuna, mackerels, sharks, billfishes (Mariani et al. 2020). Even if there are only few specific models dedicated to simulating the role of marine species, there is a large body of fish models that are now organized in the FishMIP (model inter-comparison project (Tittensor et al. 2018).

These fish models produce biomass of both single species of fish including anchovies, herrings, hake that with appropriate calculations can help estimate some of the contributions of fish and other organisms to carbon sequestration in the ocean.

For more information, please consult the following scientific papers:

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▲ Himalayan Yak in Kibber wildlife reserve, India.

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56 IMany commitments were classified by multiple types (e.g., both wildlife conservation and ecosystem conservation), which means the percentages do not add up to 100%.

57 Only 26% (153 of 581 commitments) of overall biodiversity commitments were costed, meaning the true financial need for all types of biodiversity commitments is not known. There was a higher costing for ecosystem restoration (39%) than for ecosystem conservation (19%) and wildlife conservation (22%), likely as a result of more readily available budgeting methodologies for large-scale reforestation projects.

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▲ Leopard in Panna National Park, India.

◀ Tiger shark swimming near the ocean floor.

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