



WWF

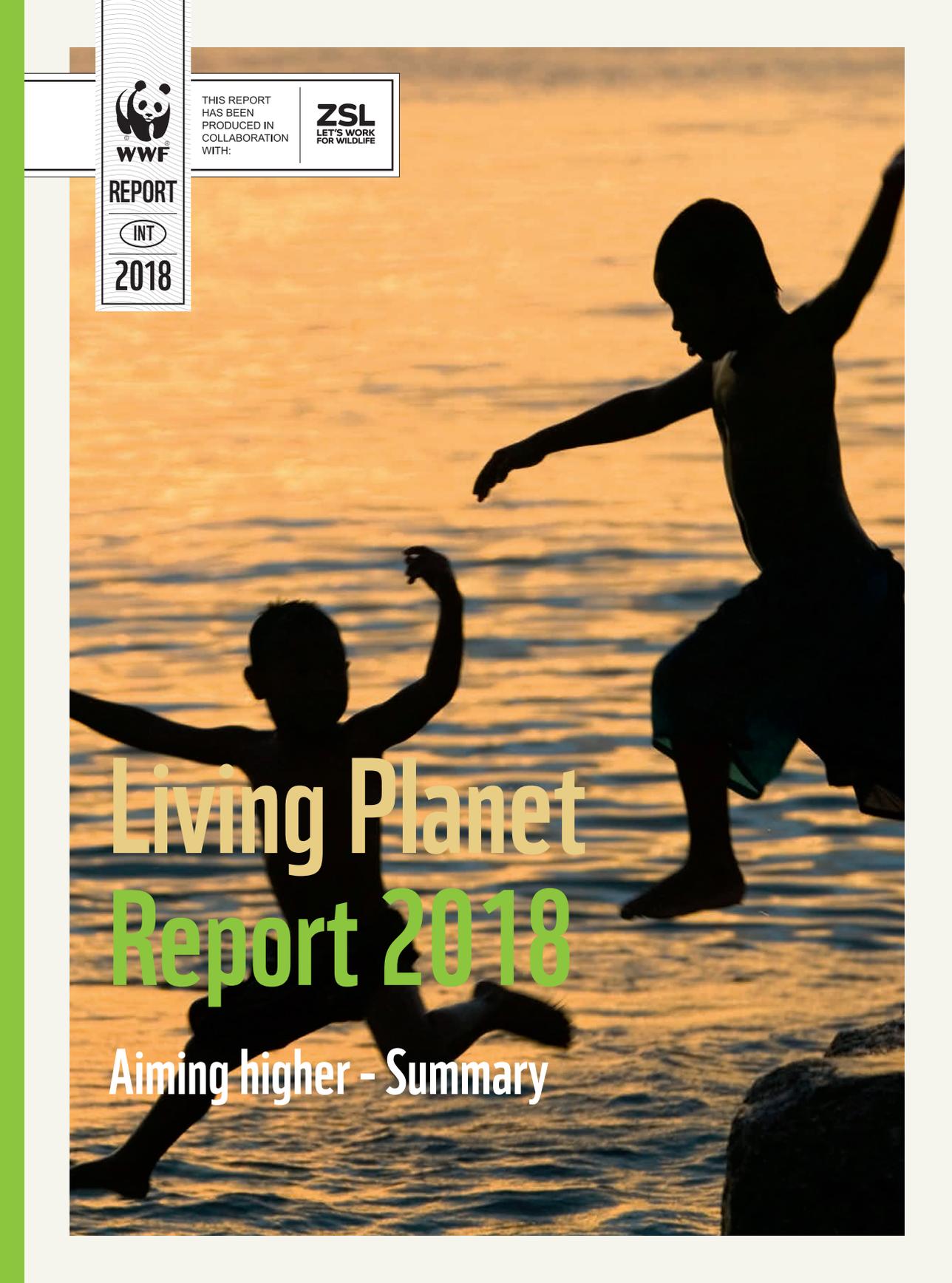
REPORT

INT

2018

THIS REPORT
HAS BEEN
PRODUCED IN
COLLABORATION
WITH:

ZSL
LET'S WORK
FOR WILDLIFE

A photograph of two children jumping over water at sunset. The children are silhouetted against the bright orange and yellow light of the setting sun. The child on the right is in mid-air, with one arm raised and the other extended forward. The child on the left is also in mid-air, with arms outstretched. The water is rippled and reflects the sunset light. The overall mood is joyful and active.

Living Planet Report 2018

Aiming higher - Summary

Institute of Zoology (Zoological Society of London)

Founded in 1826, the Zoological Society of London (ZSL) is an international scientific, conservation and educational organization. Its mission is to achieve and promote the worldwide conservation of animals and their habitats. ZSL runs ZSL London Zoo and ZSL Whipsnade Zoo; carries out scientific research in the Institute of Zoology; and is actively involved in field conservation worldwide. ZSL manages the Living Planet Index® in a collaborative partnership with WWF.

WWF

WWF is one of the world's largest and most experienced independent conservation organizations, with over 5 million supporters and a global network active in more than 100 countries. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

Citation

WWF. 2018. *Living Planet Report - 2018: Aiming Higher*.
Grooten, M. and Almond, R.E.A.(Eds). WWF, Gland, Switzerland.

Design and infographics by: peer&dedigitalesupermarkt

Cover photograph: © Global Warming Images / WWF
Children dive into the sea at sunset, Funafuti, Tuvalu

Living Planet Report®
and *Living Planet Index*®
are registered trademarks
of WWF International.

A NEW GLOBAL DEAL FOR NATURE AND PEOPLE URGENTLY NEEDED



© WWF

Marco Lambertini,
Director General
WWF International

Few people have the chance to find themselves on the cusp of a truly historic transformation. I passionately believe that this is where we stand today.

On one hand, we have known for many years that we are driving the planet to the brink. The astonishing decline in wildlife populations shown by the latest Living Planet Index – a 60% fall in just over 40 years – is a grim reminder and perhaps the ultimate indicator of the pressure we exert on the planet.

On the other hand, science has never been clearer about the consequences of our impact.

The nature conservation agenda is not only about securing the future of tigers, pandas, whales and all the amazing diversity of life we love and cherish on Earth. It's bigger than that. There cannot be a healthy, happy and prosperous future for people on a planet with a destabilized climate, depleted oceans and rivers, degraded land and empty forests, all stripped of biodiversity, the web of life that sustains us all.

In the next years, we need to urgently transition to a net carbon-neutral society and halt and reverse nature loss – through green finance, clean energy and environmentally friendly food production. We must also preserve and restore enough land and ocean in a natural state.

Few people have the chance to be a part of truly historic transformations. This is ours.

We have before us an unparalleled yet rapidly closing opportunity as we head into the year 2020, when the world will review its progress on sustainable development by means of the Sustainable Development Goals, the Paris Agreement and the Convention on Biological Diversity. And this is when the world should embrace a new global deal for nature and people and truly demonstrate the path we are choosing for people and the planet.

The choice is ours.

SETTING THE SCENE

We live in an age of rapid and unprecedented planetary change. Indeed, many scientists believe our ever-increasing consumption, and the resulting increased demand for energy, land and water, is driving a new geological epoch: the Anthropocene. It's the first time in the Earth's history that a single species – *Homo sapiens* – has had such a powerful impact on the planet.

This rapid planetary change, referred to as the 'Great Acceleration', has brought many benefits to human society. Yet we now also understand that there are multiple connections between the overall rise in our health, wealth, food and security, the unequal distribution of these benefits and the declining state of the Earth's natural systems. Nature, underpinned by biodiversity, provides a wealth of services, which form the building blocks of modern society; but both nature and biodiversity are disappearing at an alarming rate. Despite well-meaning attempts to stop this loss through global agreements such as the Convention on Biological Diversity, we are failing; current targets and consequent actions amount, at best, to a managed decline. To achieve climate and sustainable development commitments, reversing the loss of nature and biodiversity is critical.

Since 1998 the *Living Planet Report*, a science-based assessment of the health of our planet, has been tracking the state of global biodiversity. In this landmark anniversary edition, 20 years after its original publication, the *Living Planet Report 2018* provides a platform for the best science, cutting-edge research and diverse voices on the impact of humans on the health of our Earth. More than 50 experts from academia, policy, international development and conservation organizations have contributed to this edition.

This growing collective voice is crucial if we are to reverse the trend of biodiversity loss. The extinction of a multitude of species on Earth seems not to have captured the imagination, or attention, of the world's leaders enough to catalyse the change necessary. Together, we are advocating the need for a new global deal for nature and people that addresses the crucial questions of how to feed a growing global population, limit warming to 1.5°C, and restore nature.

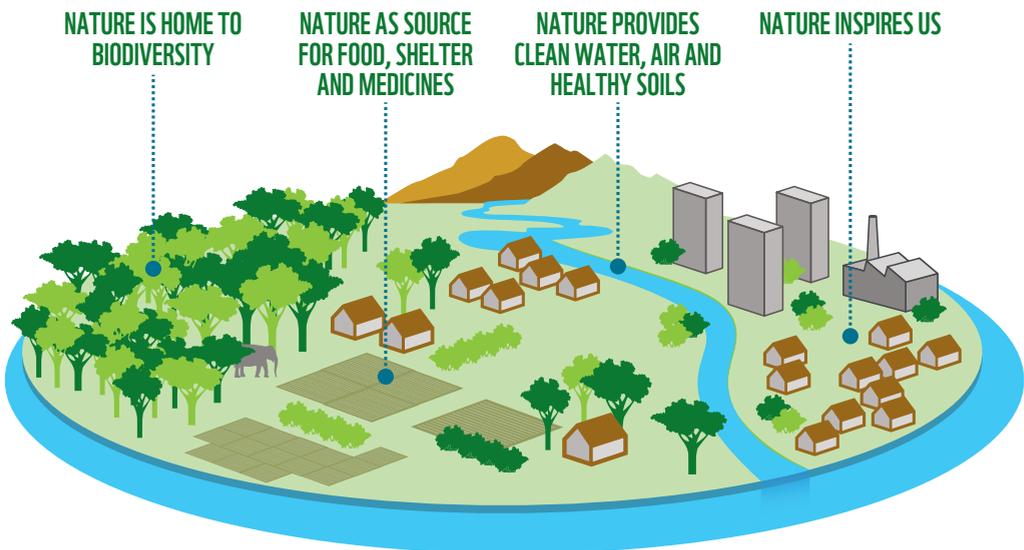
NATURE, UNDERPINNED BY BIODIVERSITY, PROVIDES A WEALTH OF SERVICES, WHICH FORM THE BUILDING BLOCKS OF MODERN SOCIETY; BUT BOTH NATURE AND BIODIVERSITY ARE DISAPPEARING AT AN ALARMING RATE

Everything that has built modern human society, with its benefits and luxuries, is provided by nature and we will continue to need these natural resources to survive and thrive. Increasingly, research demonstrates nature's incalculable importance to our health, wealth, food and security¹⁻³. What future benefits might we discover in the millions of species yet to be described, let alone studied? As we better understand our reliance on natural systems it's clear that nature is not just a 'nice to have'.

All economic activity ultimately depends on services provided by nature, making it an immensely valuable component of a nation's wealth. It's estimated that, globally, nature provides services worth around US\$125 trillion a year⁴. Governments, business and the finance sector are starting to question how global environmental risks – such as increasing pressure on agricultural land, soil degradation, water stress and extreme weather events – will affect the macroeconomic performance of countries, sectors and financial markets.

Figure 1: The importance of nature to people

Nature provides us with vital goods and services. Adapted from Van Oorschot et al., 2016⁵.



THE GREAT ACCELERATION

We are living through the Great Acceleration – a unique event in the 4.5 billion-year history of our planet – with exploding human population and economic growth driving unprecedented planetary change through the increased demand for energy, land and water (figure 2)^{6,7}. This is so great that many scientists believe we are entering a new geological epoch, the Anthropocene^{8,9}. Some of these changes have been positive, some negative, and all of them are interconnected. What is increasingly clear is that human development and wellbeing are reliant on healthy natural systems, and we cannot continue to enjoy the former without the latter.

SOCIO-ECONOMIC TRENDS

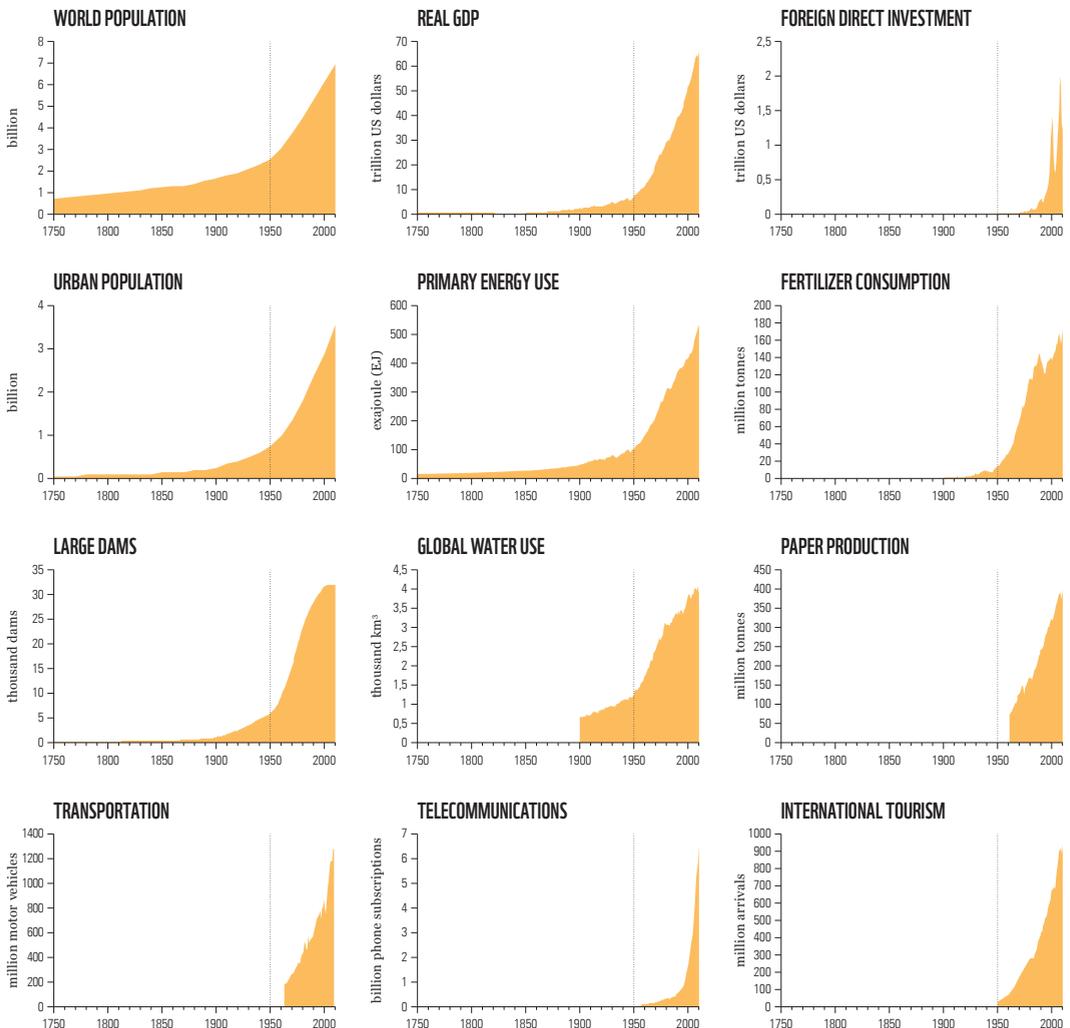
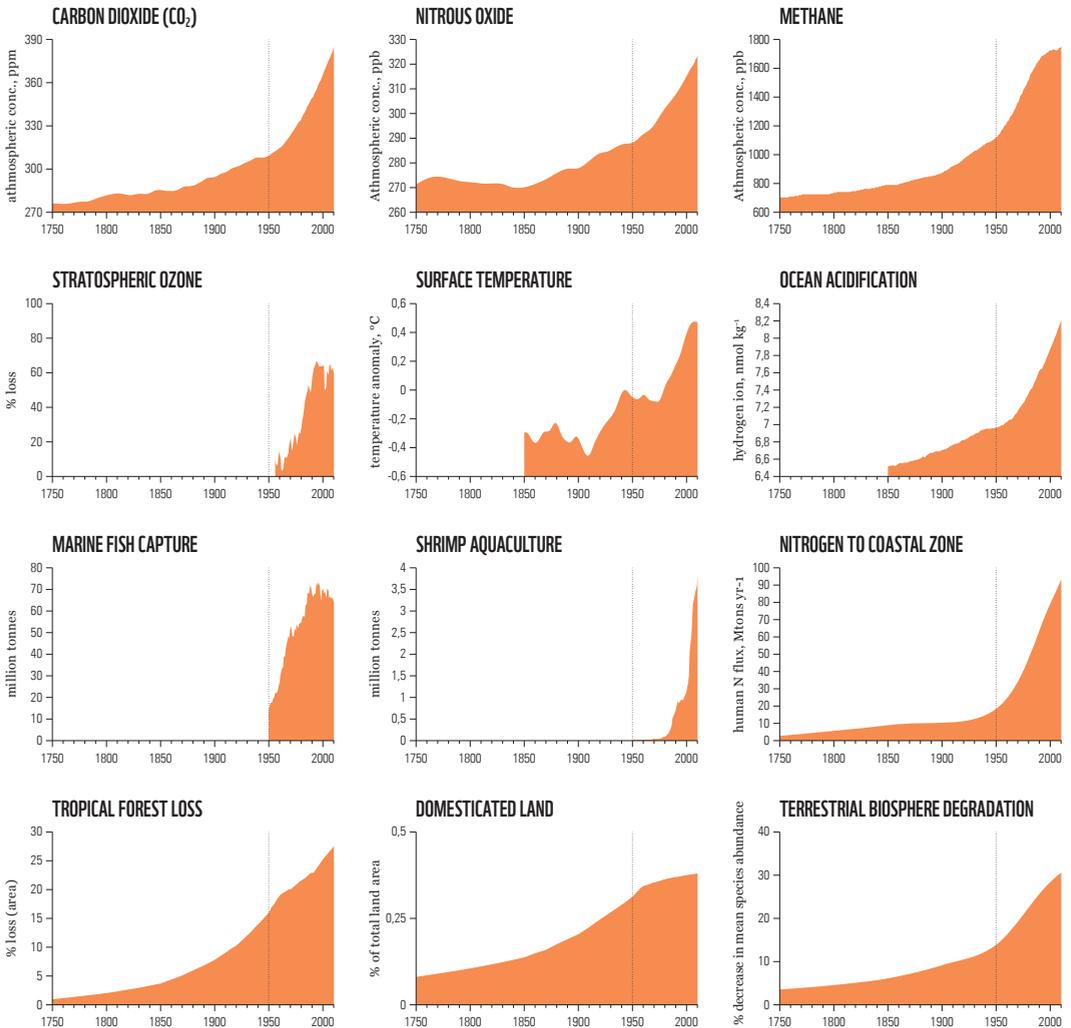


Figure 2: The Great Acceleration

The increasing rates of change in human activity since the beginning of the Industrial Revolution. The 1950s marks an explosion in growth. After this time, human activities (left panels) begin to interfere significantly with Earth's life support system (right panels) (these graphs are from Steffen et al., 2015⁷ and all the references to the datasets behind them are in the original paper).

EARTH SYSTEM TRENDS



THREATS OLD AND NEW

In a recent paper, researchers writing in the journal *Nature* analysed the most prevalent threats facing more than 8,500 threatened or near-threatened species on the IUCN Red List¹⁰. They found that the key drivers of biodiversity decline remain overexploitation and agriculture. Indeed, of all the plant, amphibian, reptile, bird and mammal species that have gone extinct since AD 1500, 75% were harmed by overexploitation or agricultural activity or both.

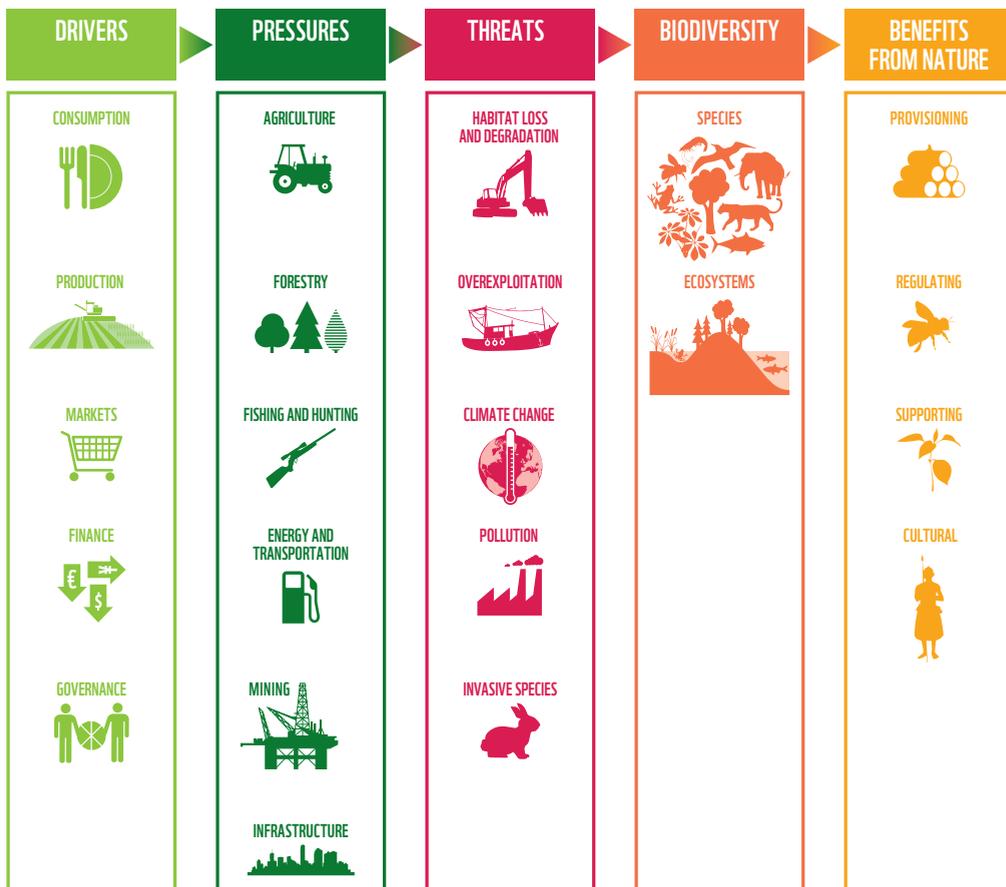
Beyond overexploitation and agriculture, invasive species are another frequent threat, their spread relying heavily on trade-related activities such as shipping. Pollution and disturbance, for example through agricultural pollution, dams, fires and mining, are additional sources of pressure. Climate change is playing a growing role and is already beginning to have an effect at an ecosystem, species and even genetic level¹¹.

“GUNS, NETS AND BULLDOZERS: THE THREATS OF OLD ARE STILL THE DOMINANT DRIVERS OF CURRENT SPECIES LOSS.”

MAXWELL ET AL. 2016¹⁰

Figure 3: Threats to nature and the drivers and pressures behind them

Habitat loss due to agriculture and overexploitation remain the biggest threats to biodiversity and ecosystems.





© Stefan Widstrand - WWF

Melting iceberg on coast Qaanaaq, Greenland, Arctic.

A SNAPSHOT OF CONSUMPTION WORLDWIDE

Overexploitation and ever-expanding agriculture are driven by spiralling human consumption. Over the past 50 years our Ecological Footprint – one measure of our consumption of natural resources – has increased by about 190%¹². Creating a more sustainable system will require major changes to production, supply and consumption activities. For this we need a detailed understanding of how these complex components link together, and the actors involved, from source to shelf, wherever they may be on the planet¹³⁻¹⁵.

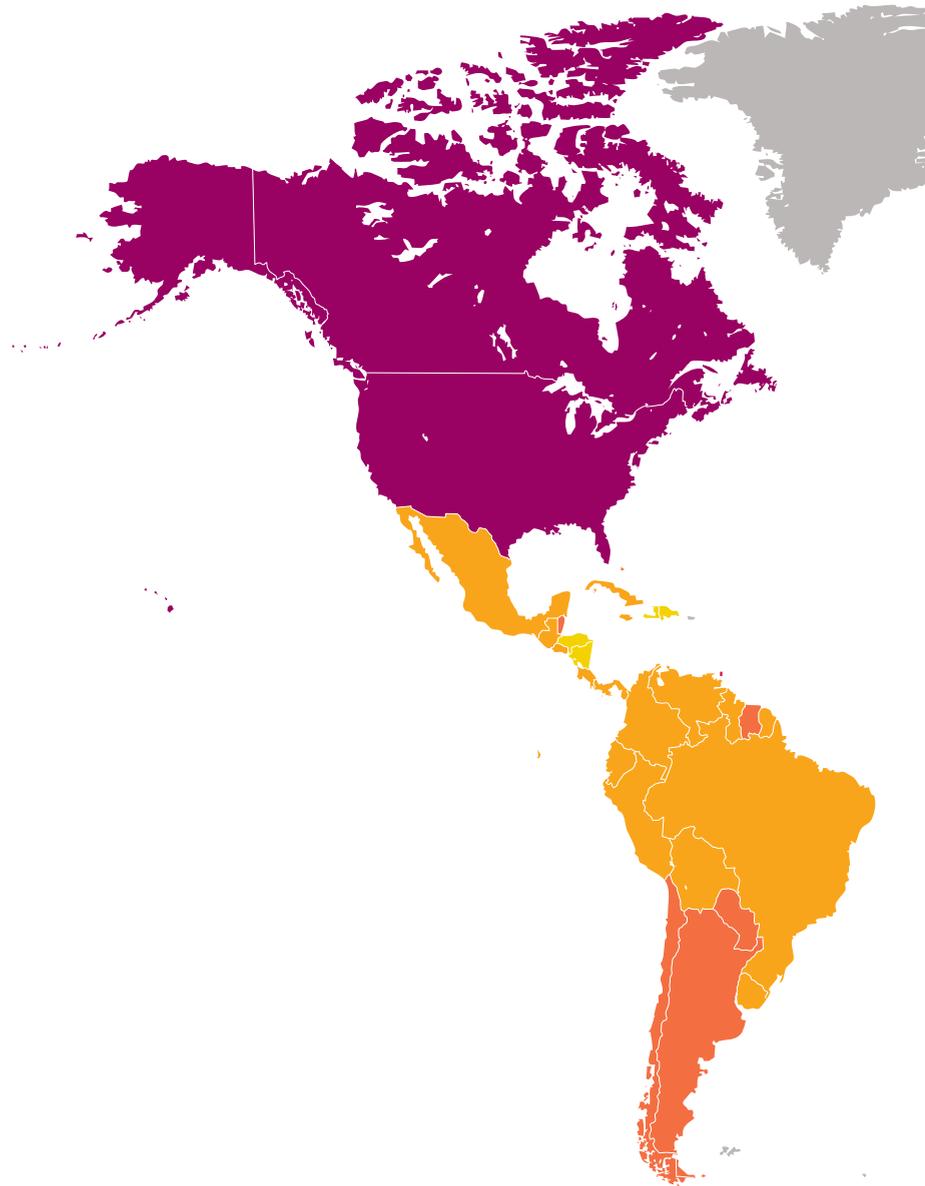


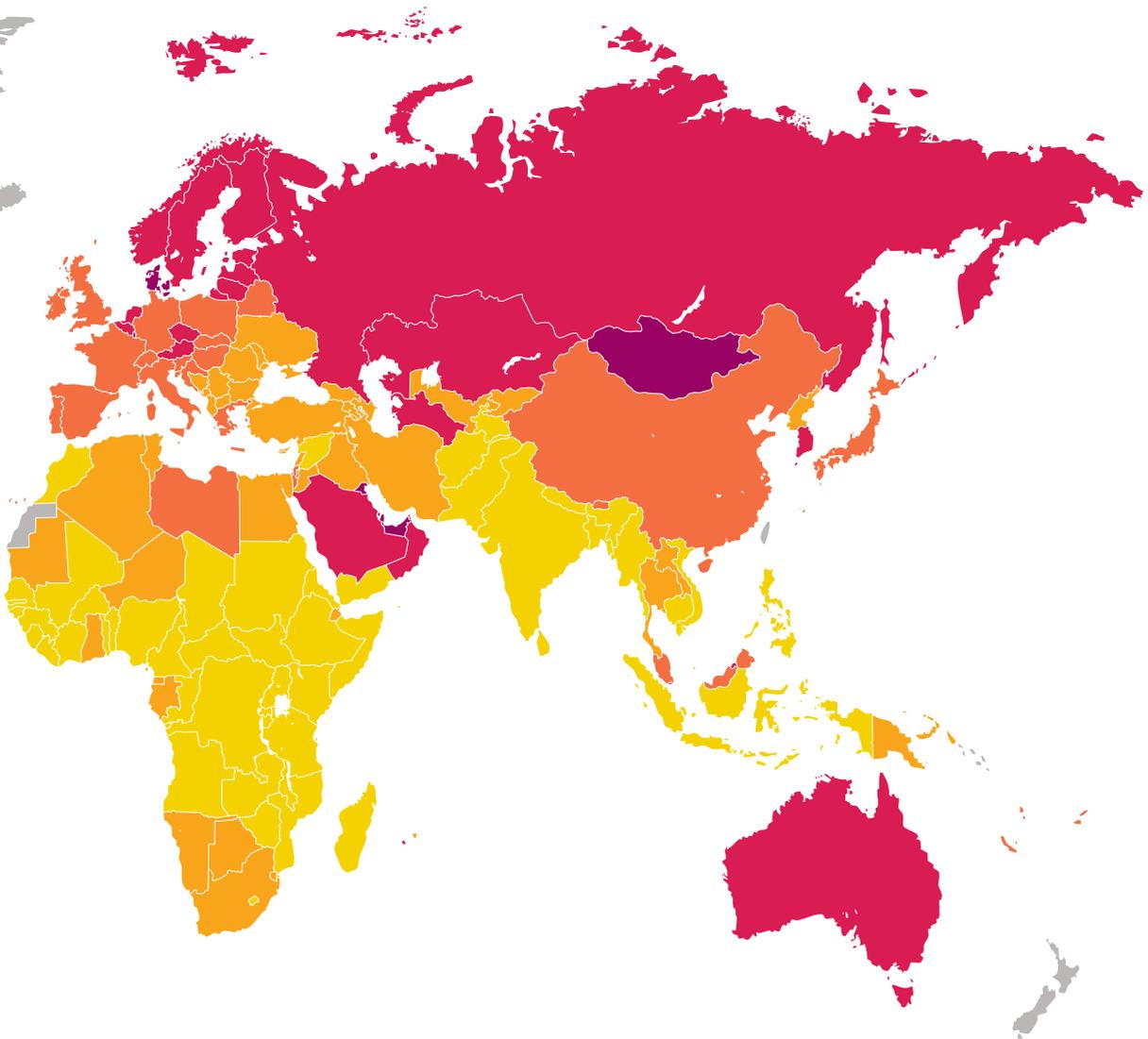
Figure 4: Global map of Ecological Footprint of consumption, 2014

Total Ecological Footprint is a function of both total population and rates of consumption. A country's consumption includes the Ecological Footprint it produces, plus imports from other countries, minus exports¹².

Key

- < 1.75 gha
- 1.75 - 3.5 gha
- 3.5 - 5.25 gha
- 5.25 - 7 gha
- > 7 gha
- Insufficient data

Looking at the Ecological Footprint of each person at the national level provides an additional insight into where the world's resources are being consumed (figure 4)¹⁶. Varying levels of Ecological Footprint are due to different lifestyles and consumption patterns, including the quantity of food, goods and services residents consume, the natural resources they use, and the carbon dioxide emitted to provide these goods and services¹⁷.



THREATS AND PRESSURES ON LAND

In March 2018, the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) released its latest Land Degradation and Restoration Assessment (LDRA), finding that only a quarter of land on Earth is substantively free of the impacts of human activities¹⁸. By 2050 this fraction is projected to decline to just a tenth. Wetlands are the most impacted category, having lost 87% of their extent in the modern era.

WETLANDS ARE THE MOST IMPACTED CATEGORY, HAVING LOST 87% OF THEIR EXTENT IN THE MODERN ERA

The immediate causes of land degradation are typically local – the inappropriate management of the land resource – but the underlying drivers are often regional or global, including the growing demand for ecosystem-derived products, beyond the declining capacity of ecosystems to supply them.

Land degradation includes forest loss; while globally this has slowed due to reforestation and plantations it has accelerated in tropical forests that contain some of the highest levels of biodiversity on Earth¹⁹. In one study carried out in 46 countries in the tropics and subtropics, large-scale commercial agriculture and local subsistence agriculture were responsible for about 40% and 33% of forest conversion between 2000 and 2010²⁰. The remaining 27% of deforestation was due to urban growth, infrastructure expansion and mining (this is further explored in FAO FRA 2016²¹).

This ongoing degradation has many impacts on species, the quality of habitats and the functioning of ecosystems. Negative impacts can be direct, such as direct biodiversity loss (for example through deforestation) and the disruption of habitats and of biodiversity-mediated functions (such as soil formation); or they can be indirect, through their effect on the broader environment that ultimately affects habitats, functions and species richness and abundance (figure 5).

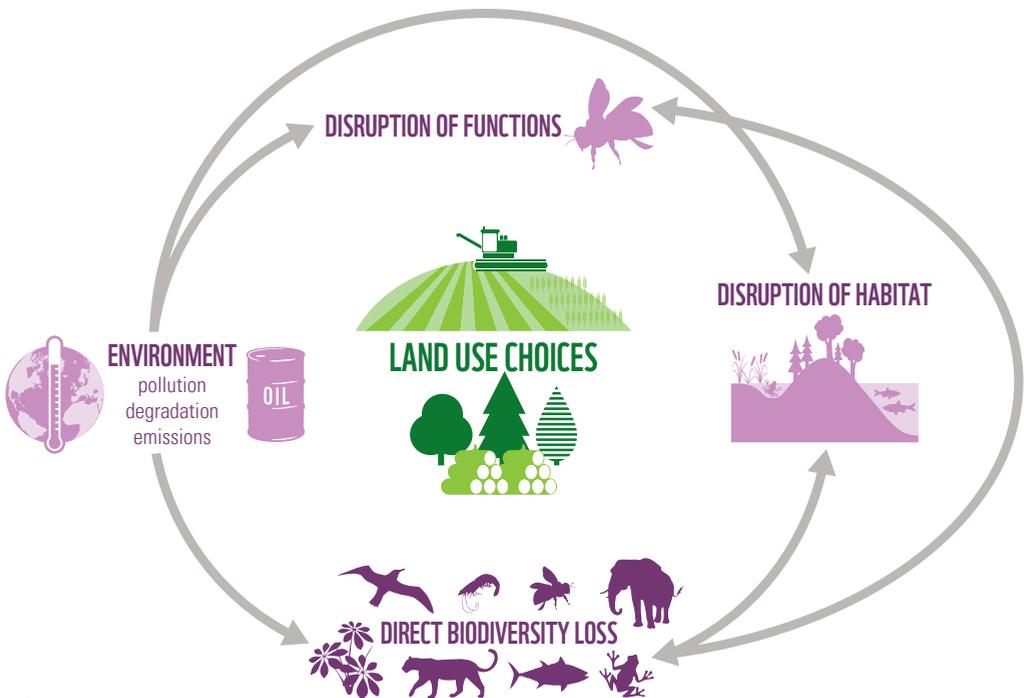


Figure 5:
 Direct and indirect
 negative impacts of land
 use choices on biodiversity

“REHABILITATING DAMAGED LANDS IS COST-EFFECTIVE DESPITE THE HIGH INITIAL PRICE, IF THE FULL LONG-TERM COSTS AND BENEFITS TO SOCIETY ARE CONSIDERED. COORDINATED, URGENT ACTION IS NEEDED TO SLOW AND REVERSE THE PERVASIVE UNDERMINING OF THE BASIS OF LIFE ON EARTH.”

ROBERT SCHOLES, CO-CHAIR OF THE IPBES LAND DEGRADATION AND RESTORATION ASSESSMENT

WHAT'S SO SPECIAL IN THE SOIL?

A quarter of all the life on Earth can be found beneath our feet ²². Soil biodiversity encompasses microorganisms (those only visible under microscopes, such as fungi and bacteria), microfauna (with a body size less than 0.1mm, such as nematodes and tardigrades), mesofauna (invertebrates ranging from 0.1 to 2mm in width, including mites and springtails), macrofauna (with a body size from 2 to 20mm in width, including ants, termites and earthworms) and megafauna (that are more than 20mm wide, including soil-living mammals such as moles).

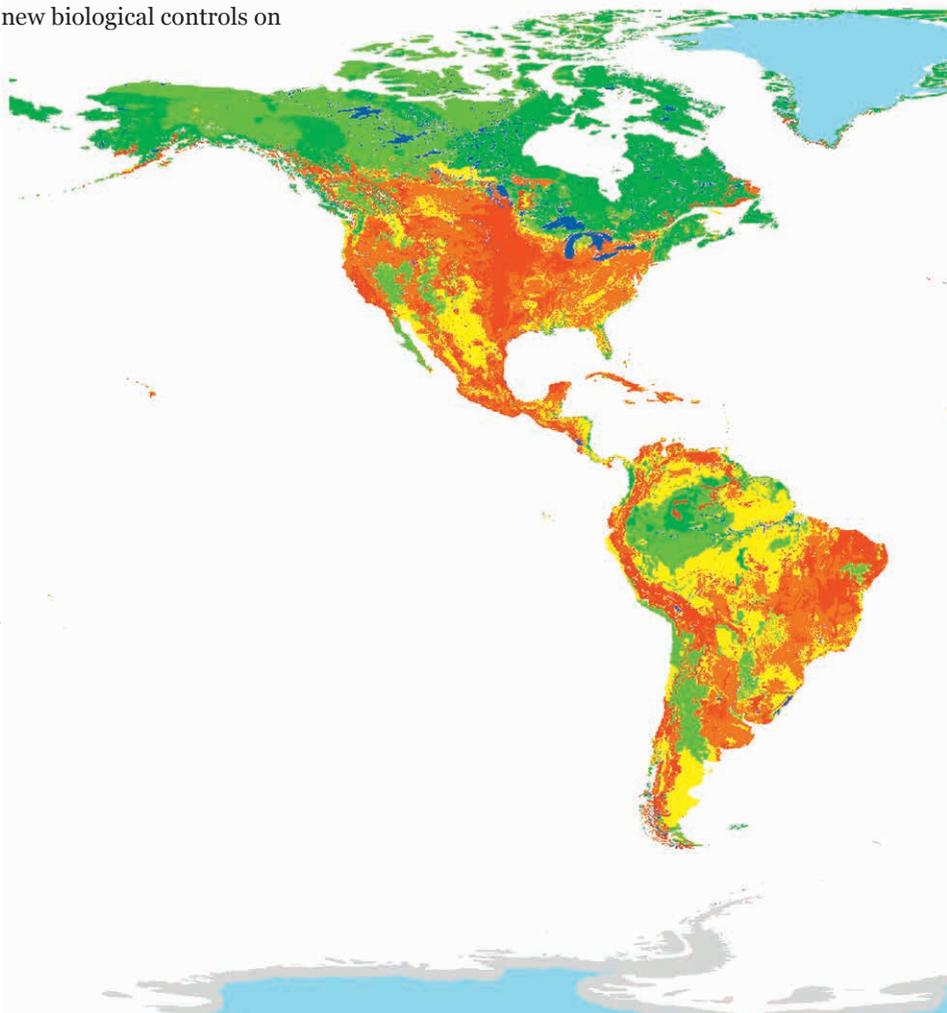
These underground organisms influence the physical structure and chemical composition of soils. They are essential for enabling and regulating critical ecosystem processes such as carbon sequestration, greenhouse gas emissions, and the uptake of nutrients by plants. They represent a storehouse for potential medical applications as well as new biological controls on pathogens and pests.

Figure 6: Global map showing the distribution of potential threats to soil biodiversity

All datasets were harmonized on a 0-1 scale and summed, with total scores categorized into five risk classes (from very low to very high) ²².

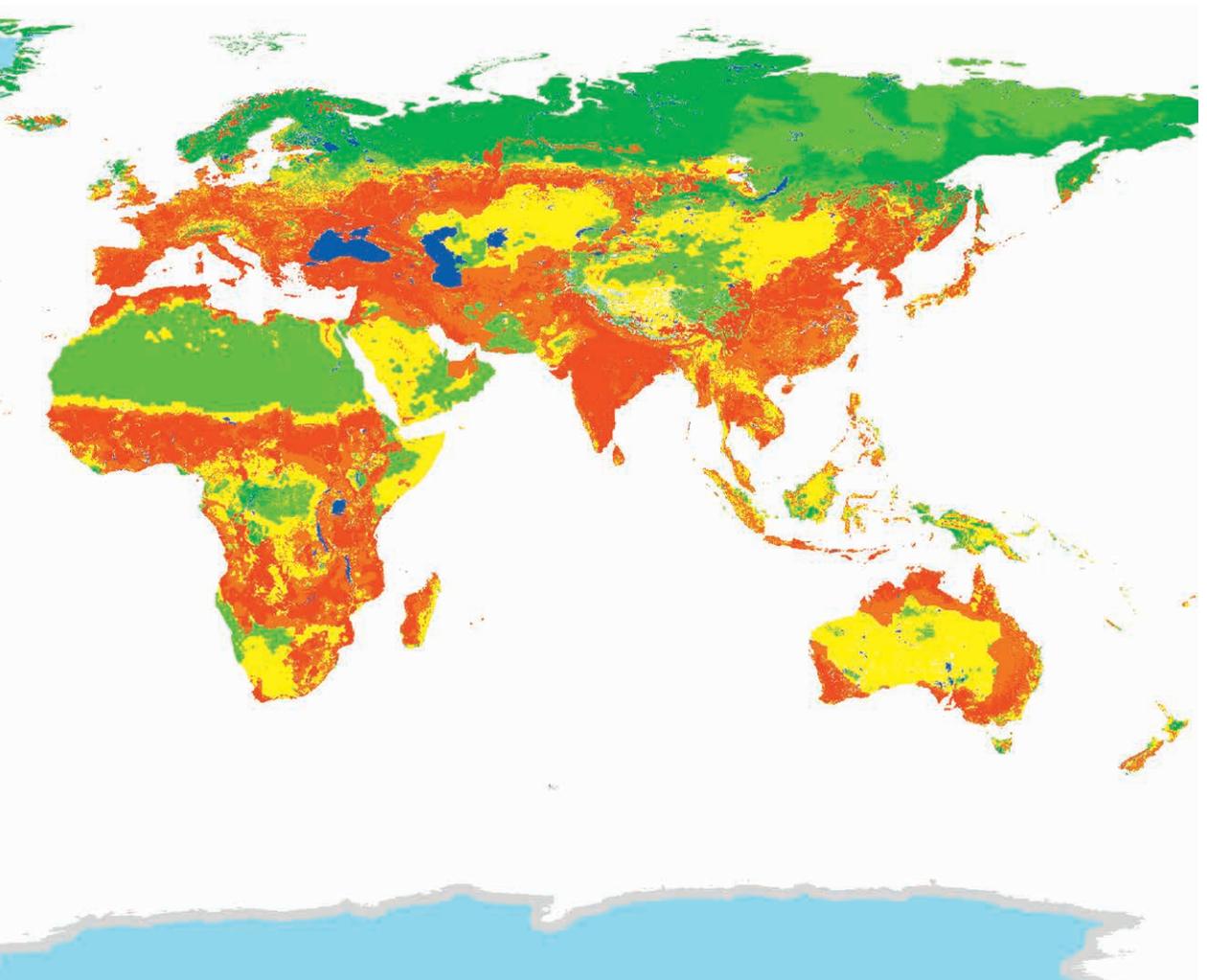
Key

	Very low
	Low
	Moderate
	High
	Very high
	Not available
	Water
	Ice



The recently published Global Soil Biodiversity Atlas mapped for the first time potential threats to soil biodiversity across the globe²². A risk index was generated by combining eight potential stressors to soil organisms: loss of above-ground diversity, pollution and nutrient overloading, overgrazing, intensive agriculture, fire, soil erosion, desertification and climate change. Proxies were chosen to represent the spatial distribution of each threat. Figure 6 shows the distribution of index scores and represents a first attempt to assess the distribution of threats to soil organisms at global scale.

The areas with the lowest level of risk are mainly concentrated in the northern part of the northern hemisphere. These regions are generally less subjected to direct anthropogenic effects (e.g. agriculture) although indirect effects (such as climate change) may become more significant in the future. Not surprisingly, the areas with highest risk are those that reflect the greatest exposure to human activities (e.g. intensive agriculture, increased urbanization, pollution).



Pollinators: what's all the buzz about?

Michael Garratt, Tom Breeze, Deepa Senapathi, University of Reading

The majority of flowering plants are pollinated by insects and other animals. It has been estimated that the proportion of animal-pollinated wild plant species rises from an average of 78% in temperate-zone communities to 94% in tropical communities²³. Taxonomically speaking, pollinators are a diverse group, including more than 20,000 species of bees, many other types of insects (e.g. flies, butterflies, moths, wasps and beetles) and even vertebrates such as some birds and bats. Most pollinators are wild but a few species of bees can be managed, such as honeybees (*Apis mellifera*, *Apis cerana*), some bumblebees and a few solitary bees²⁴.

Our food production depends heavily upon these pollinators – more than 75% of the leading global food crops benefit from pollination²⁵. Some of these crops – especially fruits and vegetables – are key sources of human nutrition. High yields in large-scale intensive production of crops such as apples, almonds and oilseeds depend on insect pollination²⁶⁻²⁸ but so do the crops of smallholder farmers in the developing world, where healthy populations of wild pollinators increase yields significantly²⁹. Economically, pollination increases the global value of crop production by US\$235-577 billion per year to growers alone and keeps prices down for consumers by ensuring stable supplies³⁰.

Changing land use due to agricultural intensification and urban expansion is one of a number of key drivers of pollinator loss, especially when natural areas, that provide foraging and nesting resources, are degraded or disappear. Improving habitat diversity within the landscape, and the inclusion of non-agricultural habitats within land management plans, have been shown to ameliorate pollinator loss, boost pollinator numbers and improve ecosystem services³¹. Landscape-scale initiatives to improve habitat heterogeneity and connectivity have been incorporated in several national and international initiatives which focus on protecting pollinators³². The abundance, diversity and health of pollinators is also threatened by a number of other drivers including a changing climate, invasive species and emerging diseases and pathogens; appropriate local, national and global actions are needed to mitigate these threats as well²⁴.

The red-tailed bumblebee (*Bombus lapidarius*) is a widespread and generalist species of bumblebee and so it is a really important pollinator of many different crops across Europe.





POPULATION INDICATOR: THE LIVING PLANET INDEX

The Living Planet Index (LPI) is an indicator of the state of global biodiversity and the health of our planet. First published in 1998, for two decades it has tracked the population abundance of thousands of mammals, birds, fish, reptiles and amphibians from around the world. It uses the trends that emerge as a measure for changes in biodiversity³³. The species population data that is collected goes into a global index, as well as indices for more specific biogeographic areas, referred to as realms, based upon distinct groupings of species.

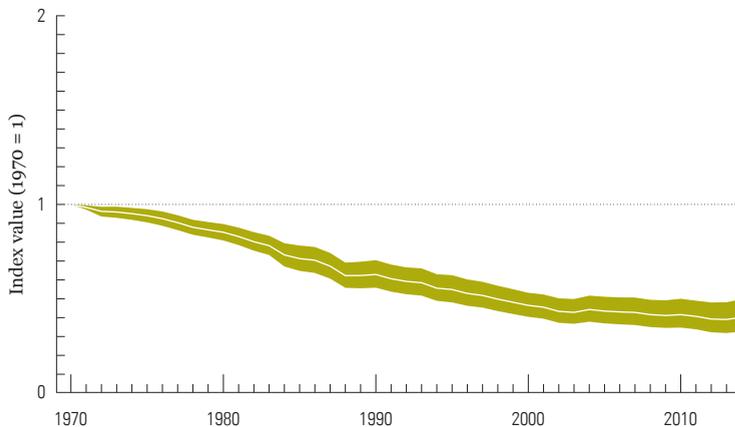


Figure 7: The Global Living Planet Index, 1970 to 2014
Average abundance of 16,704 populations representing 4,005 species monitored across the globe declined by 60%. The white line shows the index values and the shaded areas represent the statistical certainty surrounding the trend (range: -50% to -67%)³⁴.

Key

- Global Living Planet Index
- Confidence limits

This year's indices include data from 1970 – set as a common starting year for many indicators – to 2014, because not enough information is available before 1970 or after 2014 to produce a robust and meaningful index. This is because it takes time to collect, process and publish monitoring data, so there can be a time lag before these can be added to the LPI.

The global index, calculated using available data for all species and regions, shows an overall decline of 60% in the population sizes of vertebrates between 1970 and 2014 (figure 7) – in other words, an average drop of well over half in less than 50 years.

How to interpret the Living Planet Index

Living Planet Indices – whether the Global Index or those for a specific realm or species group – show the average rate of change over time across a set of species populations. These populations are taken from the Living Planet Database, which now contains information on more than 22,000 populations of mammals, birds, fish, reptiles and amphibians. The global LPI is based on just over 16,700 of these populations. This is because some populations overlap in both space and time, so to avoid double-counting, certain populations are not included when calculating a global trend.

Figure 8: Interpreting the LPI

Explanations of the most important terms needed to understand the LPI¹.

Baseline

The index starts at a value of 1. If the LPI and confidence limits move away from this baseline, we can say there has been an increase (above 1) or decline (below 1) compared to 1970.

Index values

These values represent the average change in population abundance – based on the relative change and not the absolute change – in population sizes. The shaded areas show 95% confidence limits. These illustrate how certain we are about the trend in any given year relative to 1970. The confidence limits always widen throughout the time-series as the uncertainty from each of the previous years is added to the current year.



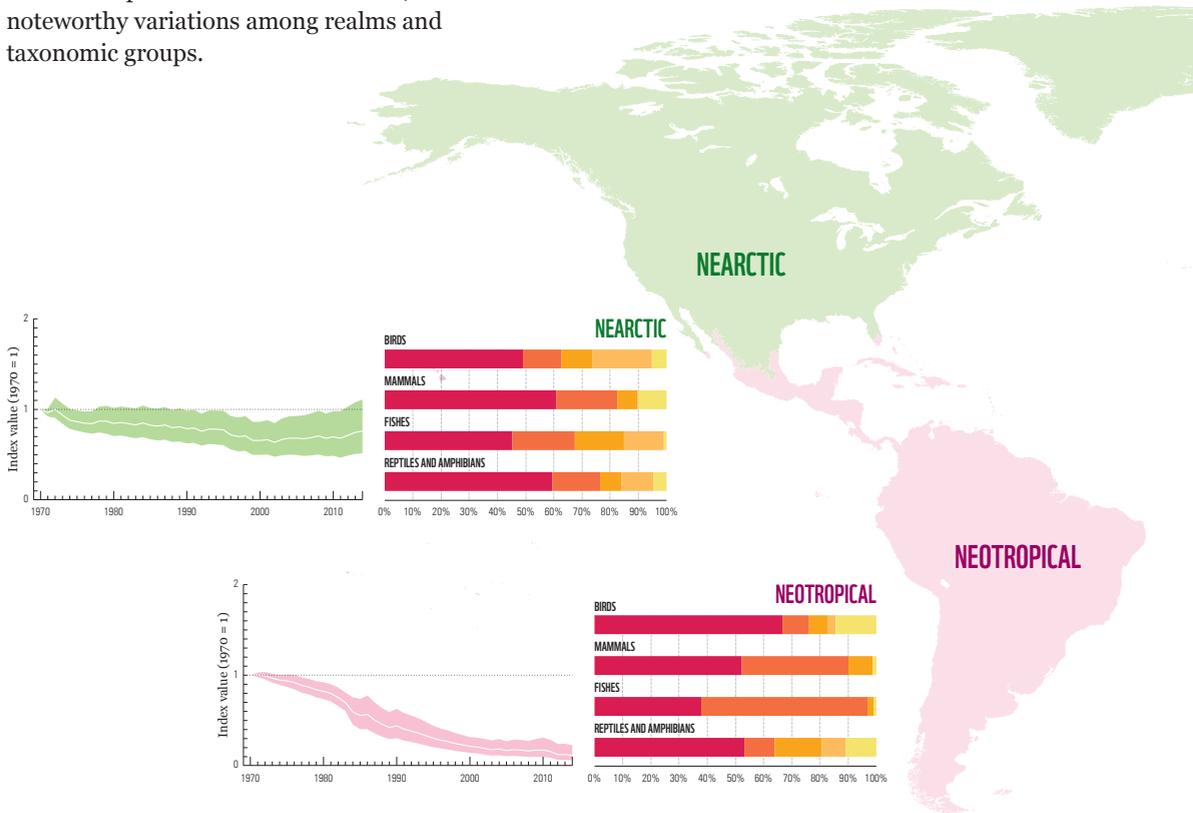
Cut-off

The final year of the index depends on data availability and is the latest year for which we have a good amount of data. For the final year, this is because it takes time to collect, process and publish monitoring data, so there can be a time lag before these can be added to the LPI.

Threats to LPI populations around the world

All freshwater and terrestrial populations in the global LPI are assigned to one of five major biogeographic realms, regions characterized by distinct assemblages of species (defined in Olson *et al.* 2001³⁵). The Index is then recalculated for just the species populations in that region and, where possible, threats for each realm are catalogued. This gives us a better understanding of how biodiversity is changing in different parts of the world and helps us to identify whether different local threat processes are driving these changes.

Species population declines are especially pronounced in the tropics, with the Neotropical realm, covering South and Central America, and the Caribbean, suffering the most dramatic decline with an 89% loss compared to 1970. Nearctic and Palearctic populations are faring slightly better with declines of 23% and 31%. Habitat degradation and loss is consistently the most reported threat in all realms; but there are some noteworthy variations among realms and taxonomic groups.

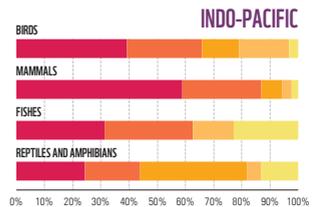
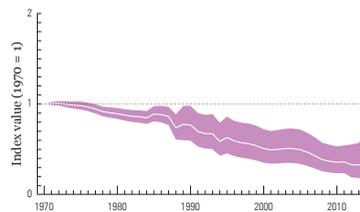
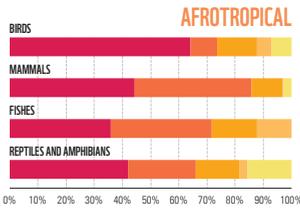
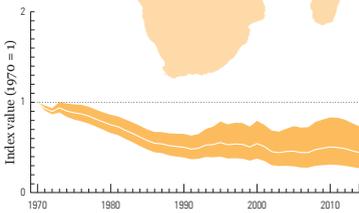
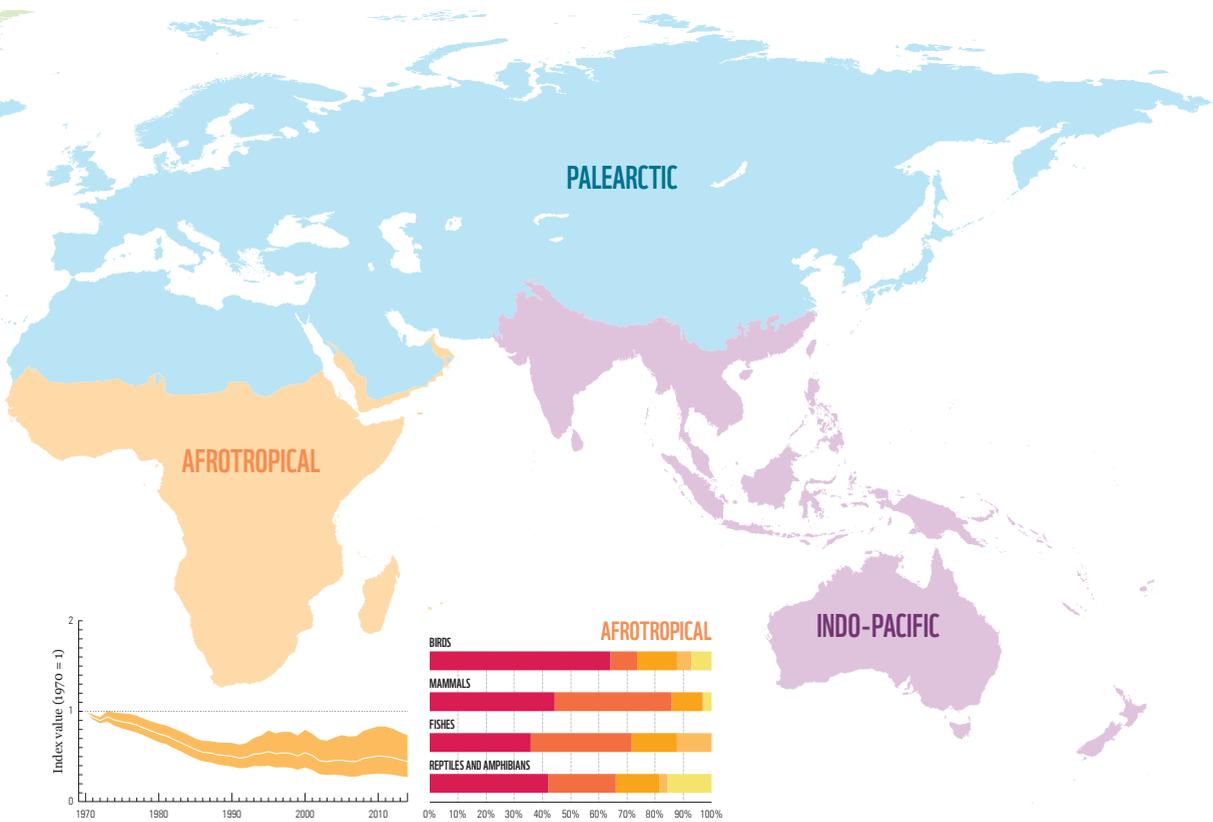
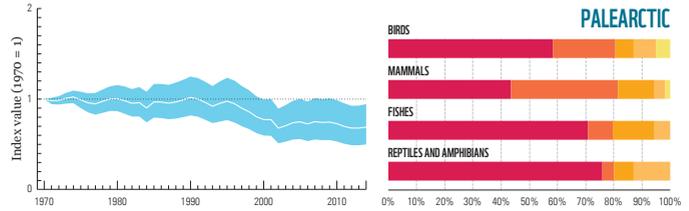


Key

- Habitat degradation/loss
- Exploitation
- Invasive species and disease
- Pollution
- Climate change

Figure 9: The Living Planet Indices and the distribution of threats for each taxonomic group for each realm

In each realm, the white line in the LPI graphs on the left shows the index values and the shaded areas represent the statistical certainty surrounding the trend (95%). The bar chart on the right shows the distribution of threats for each taxonomic group for each realm. The LPI database also records information on threats facing just under a quarter – 3,789 – of the populations in the global LPI. Populations may face more than one threat³⁴.



DIFFERENT BIODIVERSITY INDICATORS, SAME STORY

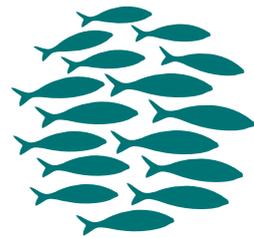
Biodiversity: A multifaceted concept requires multiple indicators

Biodiversity is often referred to as the ‘web of life’. It is the variety of all living things – plants, animals and micro-organisms – and the ecosystems of which they are a part. It includes diversity within species and between species and can refer to any geographic scale – from a small study plot to the entire planet⁴⁶.

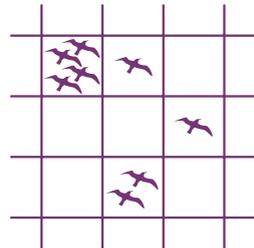
Species, and the natural systems around us, respond to human pressures and conservation interventions in a variety of ways and there is no single measure to capture all these changes. That’s why different metrics and indicators are needed to understand biodiversity change as well as to track progress towards biodiversity targets and to devise effective conservation programmes.

In addition, the direction of abundance trends is only available for a minority of species. For example, the IUCN Red List uses information about species-level increases and decreases as one of the criteria for assessing extinction risk. The Database currently contains this information for 60% of mammals, 64% of amphibians, 92% of birds and 52% of the world’s reptiles⁴⁷. The magnitude of these trends is known for far fewer species. Other taxonomic groups are even less well-monitored⁴⁷. To compensate for this scarcity of observational data, other biodiversity measures and ecological models can be used to track biodiversity change and inform conservation strategies.

Population trend data is just one way to track changes in biodiversity. Three other biodiversity indicators can complement the Living Planet Index and put its trends in a broader context: the Species Habitat Index, measuring changes in species distribution; the IUCN Red List Index, which tracks extinction risk; and the Biodiversity Intactness Index, which looks at changes in community composition. All these paint the same picture – that of continued biodiversity loss.



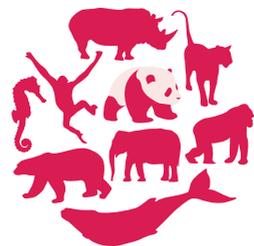
ABUNDANCE



DISTRIBUTION



COMPOSITION



EXTINCTION RISK



© National Geographic Stock - Steve Winter - WWF

A camera trap captures an endangered snow leopard (*Panthera uncia*) in Hemis National Park, a high altitude national park in the eastern Ladakh region of the state of Jammu and Kashmir in India.

AIMING HIGHER – BENDING THE CURVE OF BIODIVERSITY LOSS

Biodiversity has been described as the ‘infrastructure’ that supports all life on Earth. The natural systems and biochemical cycles that biological diversity generates allow the stable functioning of our atmosphere, oceans, forests, landscapes and waterways. They are, simply, a prerequisite for our modern, prosperous human society to exist, and to continue to thrive^{1, 48}.

Without a dramatic move beyond ‘business as usual’ the current severe decline of the natural systems that support modern societies will continue – with serious consequences for nature and people. Between now and the end of 2020, there is a unique window of opportunity to shape a positive vision for nature and people. The Convention on Biological Diversity is in the process of setting new goals and targets for the future. These, together with the Sustainable Development Goals, will become the key international frameworks for protecting nature and enhancing biodiversity.

Despite numerous international scientific studies and policy agreements confirming that the conservation and sustainable use of biological diversity is a global priority, worldwide trends in biodiversity continue to decline. Figure 10 shows starkly how poorly natural systems have fared since internationally agreed policy commitments such as CBD targets came into force. However, it also offers a vision for the future: if we aim higher and move away from business as usual, implementing approaches designed to restore nature rather than simply tracking a managed decline, then we can achieve a healthier, more sustainable world that is good for people as well as our natural systems.

The Strategic Plan for the Convention on Biological Diversity (2010–2020) includes the 20 Aichi Targets to be achieved by 2020. Recent projections suggest that this is unlikely for most of the targets⁴⁹. Yet the 2050 vision requires a much more ambitious goal, which will necessitate recovery of biodiversity and bending the curve by 2030. The black line indicates currently observed trends (to 2015), dotted lines show extrapolations from current trends (black) and projections for biodiversity after 2030 that are declining (red), stabilizing (orange) or recovering (green).

“Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity; Integrate [...] the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies”

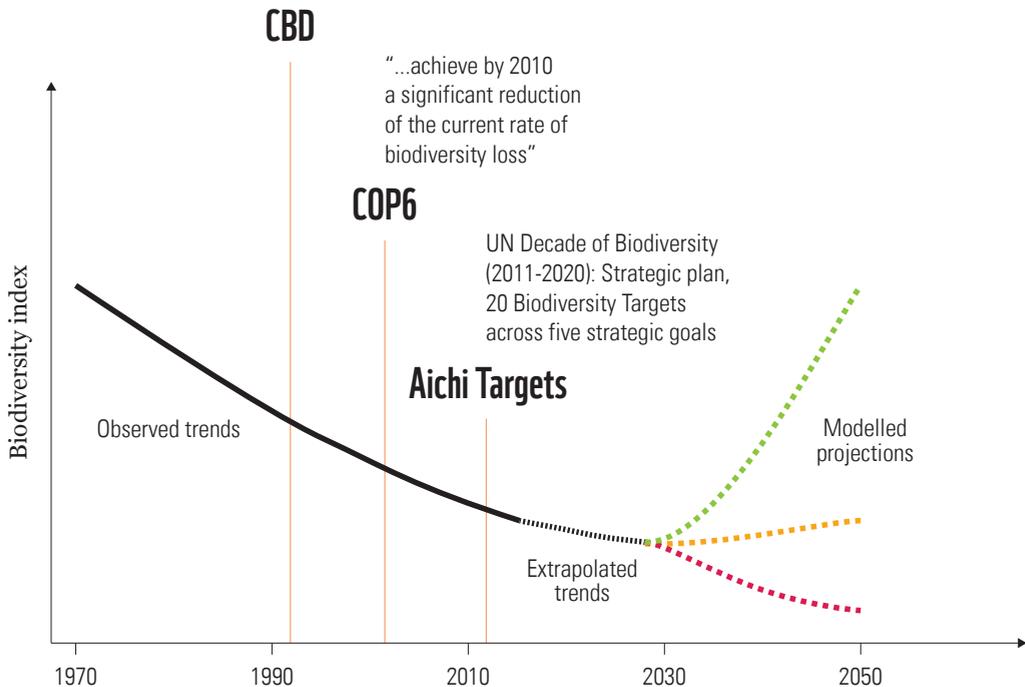


Figure 10: Biodiversity declines have continued despite repeated policy commitments aimed at slowing or halting the rate of loss
(redrawn from Mace et al. 2018³).

Box 1: Global biodiversity commitments to 2020, 2030 and 2050 enshrined in the CBD and SDG frameworks

CBD vision: By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.



CBD Aichi target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

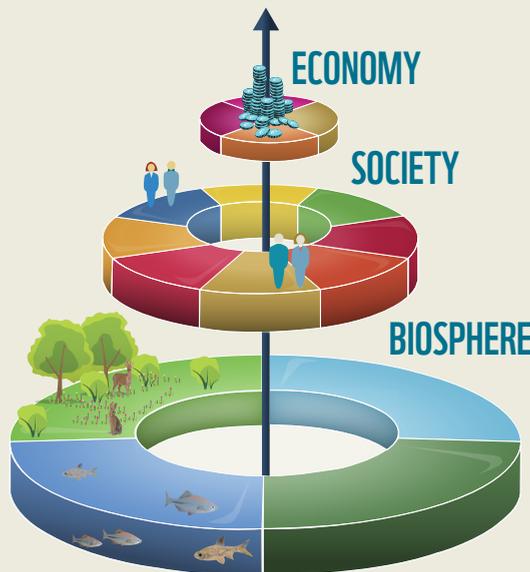


CBD Aichi target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.



Sustainable Development Goals

SDG 14 and 15: By 2030 “Conserve and sustainably use the oceans, seas and marine resources.” (SDG 14) and “Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.” (SDG 15). Target 15.5: “Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and protect and prevent the extinction of threatened species.”



A roadmap for 2020 to 2050

This degradation of nature is among the most serious issues that the world faces, but current targets and consequent actions amount, at best, to a managed decline. Chapter 4 of the report is inspired by a paper that was conceived during the brainstorming for this anniversary edition of the *Living Planet Report* and published on 14 September 2018 in *Nature Sustainability*. ‘Aiming Higher – bending the curve of biodiversity loss’⁵⁰ argues that what the world requires is bold and well-defined goals and a credible set of actions to restore the abundance of nature to levels that enable both people and nature to thrive.

In the paper, the authors suggest three necessary steps in a roadmap for the post-2020 agenda: (1) clearly specify the goal for biodiversity recovery, (2) develop a set of measurable and relevant indicators of progress, and (3) agree a suite of actions that can collectively achieve the goal in the required timeframe.

Step 1: Translate the aspirational vision to an ambitious goal

The first step in the development of a biodiversity roadmap is to specify the goal. The current CBD vision is that “By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.” When it was written, it was an aspirational vision for the future. The Aiming Higher paper argues that this vision is concrete and achievable enough to be the basis of the goal of a post-2020 agreement on biodiversity. Achieving this ambitious goal will require a new set of targets that aim higher and are effective beyond 2020.

Figure 11: Making connections

Johan Rockström and Pavan Sukhdev modified an infographic developed by the Science Director of the Stockholm Resilience Centre, Carl Folke, and others to present new way of viewing the Sustainable Development Goals and to show how they are all linked to food (credit: Azote Images for Stockholm Resilience Centre).

Step 2: Identify ways to measure progress towards the goal

Keeping track of the status of biodiversity, and progress towards targets, requires suitable indicators. Biodiversity assessment requires multiple measures at different spatial scales and across different ecological dimensions. The different metrics that are in common use capture different properties of biodiversity, and their responses to pressures vary⁵¹. Mace et al. has argued for indicators that can track three key dimensions of biodiversity necessary for the vision and the goals described here, and in the CBD and SDG targets (Figure 12):

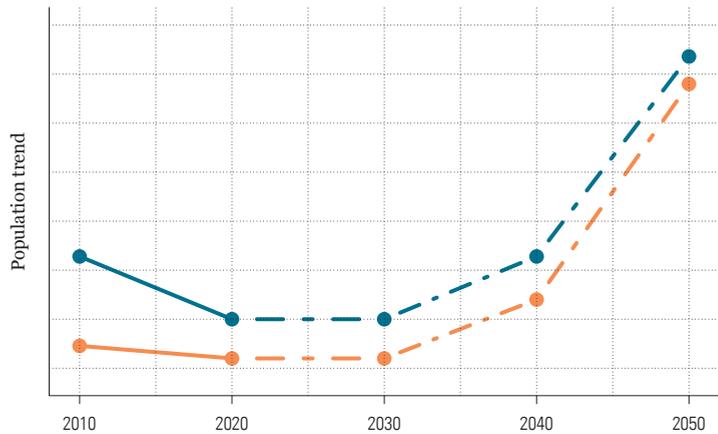
- 1) Changes in population abundance: Trends in the abundance of wild species are well captured by population-level indicators such as the Living Planet Index (LPI)⁵⁴
- 2) Extinction rate on a global scale: The extent to which species are threatened with the risk of extinction is estimated by the Red List Index (RLI)^{52, 53}
- 3) Changes to local biodiversity: Changes in the 'health' of ecosystems can be estimated by comparing what currently exists with what once existed in a given place using indicators such as the Biodiversity Intactness Index (BII)^{55, 56}

Step 3: Identify actions to deliver the required transformation in global biodiversity

Scenarios and models can help scientists to visualize and explore how alternative actions affect the dynamic interdependencies between nature, nature's benefits to people and quality of life. However, the challenge we face is that we not only need to identify potential pathways that will allow us to restore biodiversity, we also need to achieve the necessary transformation while feeding a still growing population under the accelerating effects of climate change in a rapidly changing world. Therefore, although traditional biodiversity conservation interventions such as protected areas and species conservation planning remain crucial, action must also address the major drivers of biodiversity loss and ecosystem change, such as agriculture and overexploitation.

Figure 12: Required trajectories for the three proposed biodiversity indicators

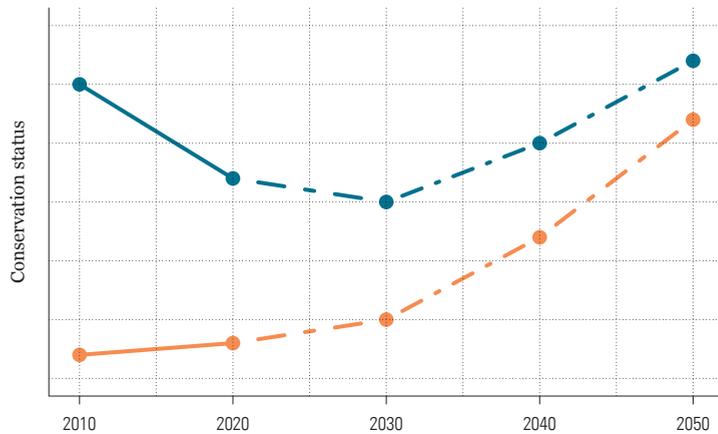
These reflect conservation status (that is global extinction risk), population trend (changes to average population abundance) and biotic integrity (changes to local, functional diversity) from the present to 2050, based on the commitments in Box 1. These curves would represent a successful recovery and restoration of nature. Note that while the curves are based on recent data and analyses they are necessarily approximate and so the indicator axes do not have figures attached to them (redrawn from Mace et al. 2018³⁹).



The two top graphs show lines for both threatened and all species because preventing extinction is the aim of the current Aichi Target 12 and is an absolute measure of conservation success or failure.

Key

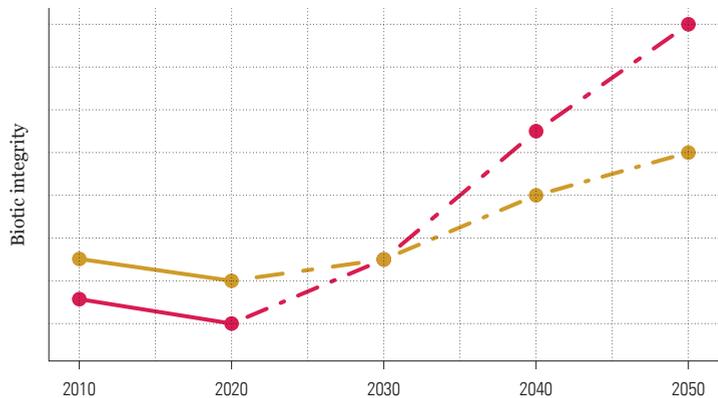
- All species
- Threatened species



In the bottom graph, we have included biomes as tracking changes to biomes is critical to Aichi Target 5. There is also a line for ecoregions, as these are used within Target 11 as part of the element on protected areas and to ensure that biodiversity in different areas of the world is equally represented (see box 1 for more information about all these targets).

Key

- Biomes
- Ecoregions



THE PATH AHEAD

The evidence becomes stronger every day that humanity's survival depends on our natural systems, yet we continue to destroy the health of nature at an alarming rate. It's clear that efforts to stem the loss of biodiversity have not worked and business as usual will amount to, at best, a continued, managed decline. That's why we, along with conservation and science colleagues around the world, are calling for the most ambitious international agreement yet – a new global deal for nature and people – to bend the curve of biodiversity loss. Decision-makers at every level from individuals to communities, countries and companies need to make the right political, financial and consumer choices to realize the vision that humanity and nature can thrive. This vision is possible with strong leadership from us all.

Reframing the debate: Nature is our only home

This *Living Planet Report* joins an ever-increasing number of research and policy papers building the case that our planet's natural systems are fundamental to our society.

This report's Living Planet Index also outlines how much nature we are losing. It shows an overall decline of 60% in species population sizes between 1970 and 2014, while current rates of species extinctions are 100 to 1,000 times higher than the background rate (the extinction before human pressure became a prominent factor). Other indicators measuring different changes in biodiversity all paint the same picture – that of dramatic, continued loss.

Yet, the future of millions of species on Earth seems not to have captured the imagination or attention of the world's leaders enough to catalyse the change necessary. We need to radically escalate the political relevance of nature and galvanize a cohesive movement across state and non-state actors to drive change, to ensure that public and private decision-makers understand that business as usual is not an option.

Between now and 2020, a year when global leaders will make key decisions on biodiversity, climate and sustainable development, we have a unique opportunity to build momentum towards the most ambitious deal yet – one that provides a blueprint for biodiversity and for people to 2050 and beyond. Bending the curve of biodiversity loss – with a new framework for biodiversity that can start to reverse the loss of nature by 2030 – needs to be at its core. Such a deal is essential not just for nature but for people too, because addressing the decline in natural systems is key to achieving the 2030 agenda for Sustainable Development and the Paris Agreement on Climate Change.



A new global deal for nature and people

In our contribution to this pathway, WWF is collaborating with a consortium of almost 40 universities, conservation organizations and intergovernmental organizations to launch the research initiative Bending the Curve of Biodiversity Loss.



Models and scenarios can assist in mapping the best path ahead. This critical work will explicitly include biodiversity in future systems modelling, helping us to identify potential win-win solutions for both nature and people. These new models will form the cornerstone of a future edition of the *Living Planet Report*.

We are proud to be a part of this collective initiative. We all need to embrace this ambition. Piecing together the biggest threats to nature means that we can better protect it. Not much time is left.

**WE ARE THE FIRST GENERATION THAT HAS
A CLEAR PICTURE OF THE VALUE OF NATURE
AND THE ENORMOUS IMPACT WE HAVE ON IT.
WE MAY ALSO BE THE LAST THAT CAN ACT TO
REVERSE THIS TREND. FROM NOW UNTIL 2020
WILL BE A DECISIVE MOMENT IN HISTORY.**

REFERENCES

- 1 Diaz, S. et al. Assessing nature's contributions to people. *Science* **359**: 270, doi:10.1126/science.aap8826 (2018).
- 2 Millennium Ecosystem Assessment. *Ecosystems and human well-being: Synthesis*. (World Resources Institute, Washington, DC, USA, 2005).
- 3 Whitmee, S. et al. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation-Lancet Commission on planetary health. *Lancet* **386**, 1973-2028, doi:10.1016/s0140-6736(15)60901-1 (2015).
- 4 Costanza, R. et al. Changes in the global value of ecosystem services. *Global Environmental Change* **26**: 152-158, doi:10.1016/j.gloenvcha.2014.04.002 (2014).
- 5 Van Oorschot, M. et al. *The contribution of sustainable trade to the conservation of natural capital: The effects of certifying tropical resource production on public and private benefits of ecosystem services*. (PBL Netherlands Environmental Assessment Agency, The Hague, Netherlands, 2016).
- 6 Steffen, W. et al. Trajectories of the Earth System in the Anthropocene. *Proceedings of the National Academy of Sciences*, doi:10.1073/pnas.1810141115 (2018).
- 7 Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O. & Ludwig, C. The trajectory of the Anthropocene: The Great Acceleration. *The Anthropocene Review* **2**: 81-98, doi:10.1177/2053019614564785 (2015).
- 8 Waters, C. N. et al. The Anthropocene is functionally and stratigraphically distinct from the Holocene. *Science* **351** (2016).
- 9 Gaffney, O. & Steffen, W. The Anthropocene equation. *The Anthropocene Review* **4**: 53-61, doi:10.1177/2053019616688022 (2017).
- 10 Maxwell, S. L., Fuller, R. A., Brooks, T. M. & Watson, J. E. M. Biodiversity: The ravages of guns, nets and bulldozers. *Nature* **536**: 143-145 (2016).
- 11 Scheffers, B. R. et al. The broad footprint of climate change from genes to biomes to people. *Science* **354** (2016).
- 12 Global Footprint Network. National Footprint Accounts 2018 edition. <data.footprintnetwork.org> (2018).
- 13 SEI and Global Canopy Trase Earth <www.trase.earth> (Stockholm Environment Institute (SEI) and Global Canopy, 2018).
- 14 Godar, J., Persson, U. M., Tizado, E. J. & Meyfroidt, P. Towards more accurate and policy relevant footprint analyses: Tracing fine-scale socio-environmental impacts of production to consumption. *Ecological Economics* **112**: 25-35, doi:10.1016/j.ecolecon.2015.02.003 (2015).
- 15 Croft, S. A., West, C. D. & Green, J. M. Capturing the heterogeneity of sub-national production in global trade flows. *Journal of Cleaner Production* (2018).
- 16 Galli, A., Wackernagel, M., Iha, K. & Lazarus, E. Ecological Footprint: Implications for biodiversity. *Biological Conservation* **173** doi:10.1016/j.biocon.2013.10.019 (2014).
- 17 Wackernagel, M. & Rees, W. E. Our Ecological Footprint – Reducing Human Impact on the Earth. *Environment and Urbanization* **8**: 216-216 (1996).
- 18 IPBES. *Summary for policymakers of the thematic assessment report on land degradation and restoration of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. (IPBES Secretariat, Bonn, Germany, 2018).
- 19 FAO. *Global Forest Resources Assessment 2015: How are the world's forests changing?* 2nd edition. (United Nations Food and Agriculture Organization (FAO), Rome, Italy, 2016).
- 20 Hosonuma, N. et al. An assessment of deforestation and forest degradation drivers in developing countries. *Environmental Research Letters* **7** (2012).
- 21 FAO. *State of the World's Forests*. (UN Food and Agriculture Organization, Rome, Italy, 2016).
- 22 Orgiazzi, A. et al. *Global Soil Biodiversity Atlas*. 176 (European Commission, Publications Office of the European Union, Luxembourg, 2016).

- 23 Ollerton, J., Winfree, R. & Tarrant, S. How many flowering plants are pollinated by animals? *Oikos* **120**: 321-326, doi:10.1111/j.1600-0706.2010.18644.x (2011).
- 24 Potts, S. G. et al. Safeguarding pollinators and their values to human well-being. *Nature* **540**: 220-229 (2016).
- 25 Klein, A.-M. et al. Importance of pollinators in changing landscapes for world crops. *Proceedings of the Royal Society Biological Sciences* **274**: 303-313 (2007).
- 26 Klein, A.-M. et al. Wild pollination services to California almond rely on semi-natural habitat. *Journal of Applied Ecology* **49**: 723-732, doi:10.1111/j.1365-2664.2012.02144.x (2012).
- 27 Garratt, M. P. D. et al. Insect pollination as an agronomic input: Strategies for oilseed rape production. *Journal of Applied Ecology* **0**, doi:10.1111/1365-2664.13153 (2018).
- 28 Garratt, M. P. D. et al. Avoiding a bad apple: Insect pollination enhances fruit quality and economic value. *Agriculture, Ecosystems & Environment* **184**: 34-40, doi:10.1016/j.agee.2013.10.032 (2014).
- 29 Garibaldi, L. A. et al. Mutually beneficial pollinator diversity and crop yield outcomes in small and large farms. *Science* **351**: 388-391 (2016).
- 30 Breeze, T. D., Gallai, N., Garibaldi, L. A. & Li, X. S. Economic measures of pollination services: shortcomings and future directions. *Trends in Ecology & Evolution* **31**: 927-939, doi:10.1016/j.tree.2016.09.002 (2016).
- 31 Senapathi, D. et al. The impact of over 80 years of land cover changes on bee and wasp pollinator communities in England. *Proceedings of the Royal Society B* **282**: 20150294, doi:10.1098/rspb.2015.0294 (2015).
- 32 Senapathi, D., Goddard, M. A., Kunin, W. E. & Baldock, K. C. R. Landscape impacts on pollinator communities in temperate systems: evidence and knowledge gaps. *Functional Ecology* **31**: 26-37, doi:10.1111/1365-2435.12809 (2017).
- 33 Collen, B. et al. Monitoring Change in Vertebrate Abundance: the Living Planet Index. *Conservation Biology* **23**, 317-327, doi:10.1111/j.1523-1739.2008.01117.x (2009).
- 34 WWF/ZSL. The Living Planet Index database, <www.livingplanetindex.org> (2018).
- 35 Olson, D. M. et al. Terrestrial ecoregions of the worlds: A new map of life on Earth. *Bioscience* **51**: 933-938, doi:10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2 (2001).
- 36 Dunn, M. J. et al. Population size and decadal trends of three penguin species nesting at Signy Island, South Orkney Islands. *PLOS One* **11**: e0164025, doi:10.1371/journal.pone.0164025 (2016).
- 37 Forcada, J., Trathan, P. N., Reid, K., Murphy, E. J. & Croxall, J. P. Contrasting population changes in sympatric penguin species in association with climate warming. *Global Change Biology* **12**: 411-423, doi:10.1111/j.1365-2486.2006.01108.x (2006).
- 38 Lynch, H. et al. In stark contrast to widespread declines along the Scotia Arc, a survey of the South Sandwich Islands finds a robust seabird community. *Polar Biology* **39**: 1615-1625 (2016).
- 39 Kato, A., Ropert-Coudert, Y. & Naito, Y. Changes in Adélie penguin breeding populations in Lutzow-Holm Bay, Antarctica, in relation to sea-ice conditions. *Polar Biology* **25**: 934-938 (2002).
- 40 Ratcliffe, N. & Trathan, P. N. A review of the diet and at-sea distribution of penguins breeding within the CCAMLR Convention Area. *CCAMLR Science* **19**: 75-114 (2012).
- 41 Hogg, A. E. & Gudmundsson, G. H. Impacts of the Larsen-C Ice Shelf calving event. *Nature Climate Change* **7**: 540-542, doi:10.1038/nclimate3359 (2017).
- 42 IPCC. Climate Change 2007: Impacts, Adaptation and Vulnerability. 976 (Cambridge University Press, Cambridge, UK, 2007).
- 43 Lescoeur, A., Ballard, G., Gremillet, D., Authier, M. & Ainley, D. G. Antarctic climate change: extreme events disrupt plastic phenotypic response in Adélie penguins. *PLOS One* **9**: e85291, doi:10.1371/journal.pone.0085291 (2014).
- 44 Ropert-Coudert, Y. et al. A complete breeding failure in an Adélie penguin colony correlates with unusual and extreme environmental events. *Ecography* **38**: 111-113, doi:10.1111/ecog.01182 (2015).

- 45 Humphries, G. R. W. et al. Mapping Application for Penguin Populations and Projected Dynamics (MAPPPD): data and tools for dynamic management and decision support. *Polar Record* **53**: 160-166, doi:10.1017/S0032247417000055 (2017).
- 46 United Nations. Convention on Biological Diversity: Article 2. (Convention on Biological Diversity (CBD), United Nations, Montreal, Canada, 1992).
- 47 IUCN and BirdLife International. Red List Index of species survival, calculated from data in the IUCN Red List of Threatened Species <www.iucnredlist.org> (2018).
- 48 Griggs, D. et al. Sustainable development goals for people and planet. *Nature* **495**: 305, doi:http://dx.doi.org/10.1038/495305a (2013).
- 49 Tittensor, D. P. et al. A mid-term analysis of progress toward international biodiversity targets. *Science* **346**: 241-244, doi:10.1126/science.1257484 (2014).
- 50 Mace, G. M. et al. Aiming higher to bend the curve of biodiversity loss. *Nature Sustainability* **1**: 448-451, doi:10.1038/s41893-018-0130-0 (2018).
- 51 Hill, S. L. L. et al. Reconciling Biodiversity Indicators to Guide Understanding and Action. *Conservation Letters* **9**: 405-412, doi:10.1111/conl.12291 (2016).
- 52 Butchart, S. H. M. et al. Measuring global trends in the status of biodiversity: Red List Indices for birds. *PLOS Biology* **2**: 2294-2304, doi:10.1371/journal.pbio.0020383 (2004).
- 53 Butchart, S. H. M. et al. Improvements to the Red List Index. *PLOS One* **2**: e140, doi:10.1371/journal.pone.0000140 (2007).
- 54 McRae, L., Deinet, S. & Freeman, R. The diversity-weighted Living Planet Index: controlling for taxonomic bias in a global biodiversity indicator. *PLOS One* **12**: e0169156, doi:10.1371/journal.pone.0169156 (2017).
- 55 Newbold, T. et al. Has land use pushed terrestrial biodiversity beyond the planetary boundary? A global assessment. *Science* **353**: 288-291, doi:10.1126/science.aaf2201 (2016).
- 56 Scholes, R. J. & Biggs, R. A biodiversity intactness index. *Nature* **434**: 45, doi:10.1038/nature03289 (2005).

WWF WORLDWIDE NETWORK

WWF Offices

Armenia
Australia
Austria
Azerbaijan
Belgium
Belize
Bhutan
Bolivia
Brazil
Bulgaria
Cambodia
Cameroon
Canada
Central African Republic
Chile
China
Colombia
Croatia
Cuba
Democratic Republic of Congo
Denmark
Ecuador
Fiji
Finland
France
French Guyana
Gabon
Georgia
Germany
Greece
Guatemala
Guyana
Honduras
Hong Kong
Hungary
India
Indonesia
Italy
Japan
Kenya
Korea
Laos

Madagascar
Malaysia
Mexico
Mongolia
Morocco
Mozambique
Myanmar
Namibia
Nepal
Netherlands
New Zealand
Norway
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Romania
Russia
Singapore
Slovakia
Solomon Islands
South Africa
Spain
Suriname
Sweden
Switzerland
Tanzania
Thailand
Tunisia
Turkey
Uganda
Ukraine
United Arab Emirates
United Kingdom
United States of America
Vietnam
Zambia
Zimbabwe

WWF Associates

Fundación Vida Silvestre (Argentina)
Pasaules Dabas Fonds (Latvia)
Nigerian Conservation Foundation (Nigeria)

Publication details

Published in October 2018 by WWF – World Wide Fund for Nature (Formerly World Wildlife Fund), Gland, Switzerland (“WWF”). Any reproduction in full or in part of this publication must be in accordance with the rules below, and mention the title and credit the above-mentioned publisher as the copyright owner.

Recommended citation:

WWF. 2018. *Living Planet Report 2018. Aiming Higher*. Grooten, M. and Almond, R.E.A.(Eds). WWF, Gland, Switzerland.

Notice for text and graphics: ©2018 WWF
All rights reserved.

Reproduction of this publication (except the photos) for educational or other non-commercial purposes is authorized subject to advance written notification to WWF and appropriate acknowledgement as stated above. Reproduction of this publication for resale or other commercial purposes is prohibited without prior written permission. Reproduction of the photos for any purpose is subject to WWF’s prior written permission.

The designation of geographical entities in this book, and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of WWF concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

LIVING PLANET REPORT 2018

100%
RECYCLED



BIODIVERSITY

The Living Planet Index, which measures biodiversity abundance levels based on 16,704 populations of 4,005 vertebrate species across the globe, shows an overall decline of 60% since 1970.

NATURE MATTERS

Biodiversity is essential for our health, wellbeing, food and security as well as the stability of economic and political systems worldwide.



THREATS

The biggest drivers of current biodiversity loss are overexploitation and agriculture, both of which are the result of continually increasing human consumption.

AIMING HIGHER

A new global deal for nature and people, with clear, ambitious goals, targets and metrics, is needed to bend the curve of biodiversity loss.



Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

panda.org/lpr