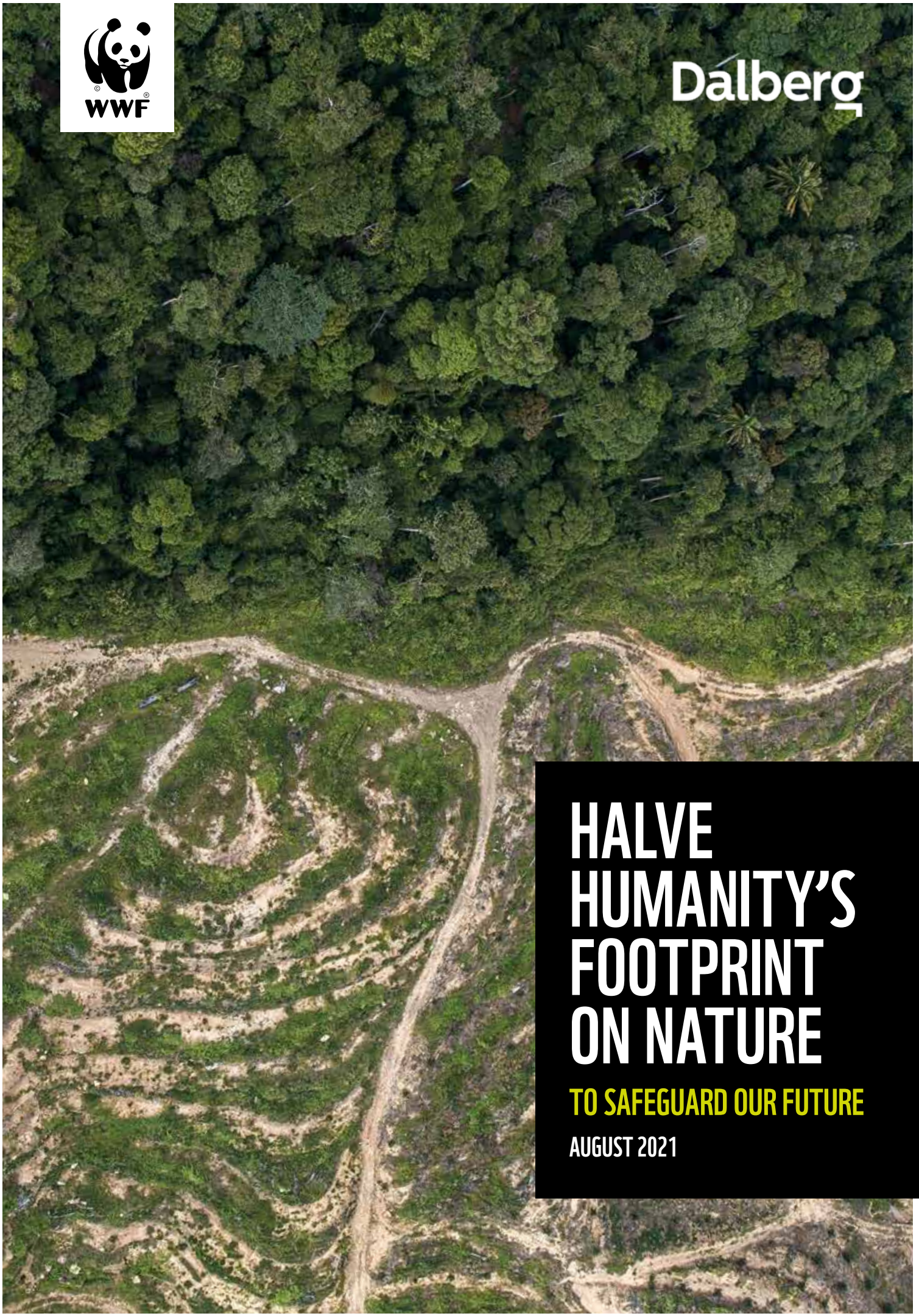

HALVE HUMANITY'S FOOTPRINT ON NATURE

TO SAFEGUARD OUR FUTURE

AUGUST 2021

CALLING ON THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY TO ADOPT A MILESTONE TO HALVE THE FOOTPRINT OF PRODUCTION AND CONSUMPTION BY 2030 AS PART OF THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK

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CALL TO ACTION

WWF CALLS ON STATES THAT ARE PARTY TO THE CONVENTION ON BIOLOGICAL DIVERSITY (CBD) TO ADOPT A 2030 MILESTONE TO HALVE THE FOOTPRINT OF PRODUCTION AND CONSUMPTION IN THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK (GBF).

Biodiversity loss comes at a price.

Biodiversity is declining at alarming rates. This is already having serious negative impacts on food security, human health and economic output, which disproportionately fall onto the world's poorest.

A just transformation of the production and consumption systems that drive biodiversity loss is urgently required.

To reverse nature loss, the world must protect and restore natural land, freshwater and marine habitats through a rights-based approach. But conservation measures alone are insufficient without action to address the drivers of biodiversity loss. This means moving to just and sustainable agriculture and food systems and practices and sustainable forestry, fisheries, energy and mining, infrastructure, construction and manufacturing. This will be beneficial to our economy through job creation and better incomes for farmers as well to our health and wellbeing. It will also contribute significantly to combating climate change and to reducing the risks of pandemics.

The post-2020 GBF: an opportunity to agree on global collective action.

The post-2020 GBF is a unique opportunity to agree on the global, collective action required to reduce the footprint of our production and consumption and to address the direct and indirect drivers of biodiversity loss. A 2030 milestone that explicitly focuses on sustainable use of biodiversity will emphasize to all decision-makers, public and private, the importance of assessing the footprint of production and consumption and determining what actions are needed to globally reduce the footprint and share it more equally. Countries with a bigger footprint will need to do more, so as to ensure a just transition. Civil society must ensure their national representatives use this opportunity, for the sake of nature and humanity.

WWF calls on states that are party to the CBD to adopt a post-2020 global biodiversity framework that includes:

A. A milestone to halve the footprint of production and consumption by 2030; and

B. Action oriented targets for 2030 that identify key productive sectors and the financial sector, and the actions needed for their nature-positive transition

In response to draft 1 of the post-2020 GBF, WWF has developed specific proposals to ensure that the framework addresses, at the target level, the following key sectors and transformative and just actions that support the milestone of halving the footprint and that are critical to reverse biodiversity loss by 2030:

1. Food and agriculture

The post-2020 GBF should ensure that by 2030 food systems are transformed and contribute to biodiversity, human and planetary health and provide enough nutritious and culturally appropriate food for all people today and in the future, and that all areas under agriculture, aquaculture, fisheries and forestry are managed sustainably. This would require commitment and actions to:

i. Apply agroecology and the ecosystem approach to fisheries, dramatically increasing agriculture and food production contributions to a nature-positive world

ii. Halve the global footprint of diets and align human and planetary health, dramatically shifting food systems mpacts on nature and people

iii. Protect and support pollinators and organisms critical for soil fertility

1v. Increase the efficiency of food systems and food availability by halving food waste and loss and by investing in the restoration of agricultural soils, thereby reducing the land needed for agriculture

2. Infrastructure, urban, marine and coastal development

The post-2020 GBF should ensure that infrastructure and urban, marine and coastal development are sustainable and minimize impact on areas of particular importance for biodiversity and ecosystem services. Critical elements to achieve these objectives include: ensuring all land and sea areas are under biodiversity-driven spatial planning; land and sea-scape approaches; equitable management addressing land- and sea-use change; retaining existing intact and wilderness areas and the lands and territories of indigenous peoples and local communities. In addition, the need to apply strategic environmental assessments should be clearly underlined.

3. Legal and sustainable use and management

The post-2020 GBF should ensure that the direct and indirect harvesting, trade and use of wild species is sustainable, legal, and safe for human health. This should include application of the ecosystem approach to fisheries and should urgently address both demand and supply of illegal wildlife products. It is essential that bycatch and other causes of indirect mortality are addressed given their significance for many species. In addition, it is critical that the post-2020 GBF ensures that all ecosystems are sustainably managed. This should be underlined also at the milestone level.

4. Aligning financial flows

The post-2020 GBF should ensure that all activities, and public and private financial flows, are aligned with biodiversity values, requiring financial institutions to measure, assess, disclose, and account for risks, dependencies and impacts associated with biodiversity loss. It should address these impacts on biodiversity by reflecting assessed risks and opportunities in investment decisions.

5. Sustainable consumption and circular economy

The post-2020 GBF should ensure that Parties take action to support the transition toward a nature-positive economy, sustainable consumption, and the adoption of circular economy business models. These actions should aim to deliver by 2030 a 50% reduction of the footprint of diets, a 40% reduction in the net consumption of all materials (minerals, metals & non-metals), and a 50% reduction in the use of primary biomass sources (wood and crops) for energy production, bringing the overall biomass demand down by 15.5%.

6. Sector and business engagement and action and nature-positive transitions of economic sectors

A 2030 milestone should clarify that all decisions, public and private, should contribute to a nature-positive world with immediate effect.

The post-2020 GBF should commit Parties to adopt regulatory measures to ensure all businesses avoid negative impact on biodiversity, halve their footprint and become nature-positive by 2030. This would also require businesses, as an initial step, to assess and disclose their dependencies and impacts on biodiversity. The framework should clarify that businesses should move towards the full sustainability of their practices, including by immediately implementing deforestation and conversion free supply chains, which has already been committed by many companies across the world.

Finally, it is critical that the post-2020 GBF provide clear pathways and mechanisms for stakeholders and sectors to engage and deliver coordinated action supporting the implementation of the framework. The post-2020 GBF should commit Parties, as an enabling condition, to:

i. Set up or strengthen representative and inclusive multi-stakeholder and multi-sectoral processes on biodiversity, and other such mechanisms that bring together the public and private sectors and civil society and Indigenous Peoples and local communities, including women and youth, at all levels to ensure a) coordination, transparency and effectiveness for the implementation of the post-2020 global biodiversity framework; and b) the full and effective participation of all right holders in biodiversity-related decision-making and implementation that affects their livelihoods and resources;

ii. Develop and then implement sector-specific and inclusive national, regional and global plans of action for food and agriculture, forestry, fisheries, infrastructure, tourism, energy and mining, manufacturing and processing, the finance sector, health and other relevant sectors and their national and trans-national supply chains to transition to a sustainable, just and nature-positive circular economy that incorporates the value of biodiversity.

UNSUSTAINABLE CONSUMPTION

EACH OECD CONSUMER INDIRECTLY DEFORESTS THE EQUIVALENT OF 27KG / DAY

OPPORTUNITY

AGROECOLOGICAL APPROACHES CAN INCREASE FARMERS' INCOME BY UP TO 30%, ESPECIALLY AMONG THE WORLD'S POOREST.

Figure 1*

A Nature-positive opportunity:

Reallocating just one year's worth of subsidies that harm biodiversity to nature-positive activities could result in 39 million jobs (rounded to 100k).

39 MILLION NATURE POSITIVE JOBS COULD BE CREATED THROUGH A US$ 500 BILLION STIMULUS

* See Chapter 2 for a complete discussion including sources

EXECUTIVE SUMMARY

EARTH'S BIODIVERSITY IS DISAPPEARING AT AN UNPRECEDENTED RATE, ENDANGERING HUMAN LIVES AND LIVELIHOODS.

Wild animal population sizes have declined by 68% on average since 1970, and considerably more in some key biodiversity hotspots.[1] Life on Earth is increasingly uniform: e.g., 98% of mammal biomass on Earth now consists of humans and their livestock.[2] We have cut down half of all tropical forests since the 1960s, and mostly replaced them with monoculture farms and pastures.[3] The crises of habitat loss, overexploitation and pollution have driven countless species to or near extinction, while climate change is accelerated by, and in turn amplifies, these crises. All this harms food security, human health and economic output, which affects the world's poorest most.[4]

Unsustainable production and consumption are what drives this biodiversity loss, much of it attributable to consumers in high-income countries (HICs), but increasingly also in middle-income countries (MICs).

For example, the average OECD[5] citizen's consumption causes around 27kg of deforestation every day[6] Consumers in middle-income countries (MICs) are adopting these consumption patterns. For instance, many countries in Latin America and Southeast Asia grew their per capita meat consumption (a strong predictor of biodiversity footprint) fourfold or more over the past 50-years, thus nearing the per capita meat consumption of HICs.[7] And with another billion consumers expected to join the global middle class by 2030,[8] the current model of production and consumption looks ever more unsustainable.

The biggest drivers of biodiversity loss are closely linked to a few key industries.[9]

Habitat loss is mostly caused by agricultural expansion and new infrastructure. Overexploitation is in large part caused by unsustainable forestry and overfishing. Pollution has many causes, but is ultimately driven by manufacturing and extractive industries, as well as agricultural run-off. Overall, producers and consumers are rarely held accountable for negative impacts they have on nature. Often, they are also unaware of their biodiversity footprints due to the lack of transparency in global supply chains. At a systems level, the true social and ecological costs of production and consumption are generally not being factored into the cost of consumer products.

Populations in the Global North and South increasingly acknowledge nature's value.

Social media mentions and media coverage of nature loss have drastically increased in recent years, in both the Global North and South.[10] Consumers increasingly demand sustainable products, and producers recognize that they have to change the way they do business.[11] Governments are articulating this groundswell of support for nature: 89 heads of state or of government have recently signed the Leaders' Pledge for Nature, calling for a more sustainable global society.[12]

Three macro-approaches can channel this demand for change into key productive sector transformations:

- Natural capital accounting correctly values the contribution of ecosystem services to national output. Nature's vital contribution to production does not show up in GDP figures. Governments need methodologies for optimizing the natural capital that forms the basis of economic value creation, particularly in key productive sectors like agriculture, fisheries and forestry, and infrastructure. Financiers of projects in these sectors need equivalent methodologies to assess biodiversity risks and opportunities. Importantly, these public and private sector methodologies should also incorporate nature's intrinsic value to Indigenous Peoples and local communities, and, increasingly, all of society.[13]
- Sustainable food systems will produce more food, while enabling more nutritious diets for all. On the producer side, agroecology optimizes long-term agricultural output and land value by harnessing nature as an input, for example by investing in pollinator and soil biodiversity. On the consumer side, 'planetary diets'[14] supply more nutritious food to all by shifting demand to less resource-intensive foods in culturally appropriate ways. Alongside these approaches, the food value chain needs to become more efficient all the way from farms to plates, to avoid the third of all food production that is currently going to waste.[15]
- The circular economy maximizes value by minimizing waste that could turn into pollution. It does so by increasing products' lifespans, while recycling more resources. This lowers humanity's demand for resources, which in turn reduces the need to convert natural habitats to production facilities and creates more supply for everyone. The reduction in pollution, particularly from the manufacturing, mining and agriculture sectors, in turn protects ecosystems and human health.

39 million nature-positive jobs could be created if governments reallocated just one year's worth of subsidies that harm biodiversity to a nature-positive stimulus instead.[16, 17]

Governments currently spend US$500 billion a year on subsidies that are harmful to biodiversity.[18] Reallocating even one year's worth of this spending could provide a catalytic boost towards the three macro-approaches outlined above by creating a global labour force that can drive innovation in nature-positive business models. This could set off a virtuous circle towards creating the ~US$10 trillion in economic value and ~400 million jobs forecast by the World Economic Forum for the nature-positive economy.[19] Distributing this stimulus between countries equitably – that is, according to population, not economic strength – would create almost twice as many jobs as vice versa (39 million vs. 20 million). An equitable stimulus would thus also protect more biodiversity and help create green growth trajectories for less developed producer countries.

Nature-positive job investments can also pay dividends in health, security and economic value creation for all.

Recognizing the value of natural capital and stopping overexploitation could restore coastal habitats that provide flood protection to 100-300 million people.[20] By enabling more planet-friendly diets in culturally appropriate ways, a sustainable food systems transformation can help to lower red meat overconsumption. This can have health benefits such as helping to halve global diabetes rates, which alone could save health systems ~US$500 billion and prevent around two million premature deaths per year.[21, 22] Finally, mainstreaming circular economy models to avoid pollution could add US$4.5 trillion to global GDP and create millions more jobs.[23, 24]

The Convention on Biological Diversity (CBD) should adopt a milestone to halve the footprint of production and consumption by 2030, and link this to concrete sectoral targets, notably on agriculture, fisheries, forestry, infrastructure and finance.

Importantly, such targets on production and consumption footprints are not substitutes for increased ambition in traditional conservation approaches, but a necessary addition. As such, footprint targets will have to address both supply and demand sides in each major productive sector, in ways that ensure a globally just transition.[25] Policymakers need to ensure that harmful production practices are phased out, as well as supporting nature-positive productive systems and encouraging demand to shift to more nature-positive consumption (e.g., planetary diets). Only ambitious action has a chance at safeguarding the biodiversity that global equity, cultural heritage and local and national economies depend on.

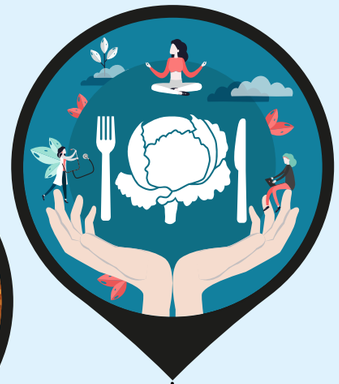
HALVING THE FOOTPRINT OF PRODUCTION AND CONSUMPTION WILL PROVIDE MANY OPPORTUNITIES

A NEW GOAL: NATURE POSITIVE BY 2030

It is essential we reverse biodiversity loss, to ensure fresh water, clean air and a healthy environment to sustain generations to come and allow nature to thrive. This requires governments to increase conservation action as well as address unsustainable production and consumption. A milestone on halving the footprint of production and consumption by 2030 is a main building block to put the world on a path toward living in harmony with nature by 2050.

REDUCED LAND-USE

SHIFTING TO HEALTHY AND SUSTAINABLE DIETS ALONE CAN REDUCE AGRICULTURAL LAND-USE BY AT LEAST 41% WHILE PROVIDING NUTRITIOUS FOOD FOR ALL



IMPROVED HEALTH

PREVENT 2 MILLION PREMATURE DEATHS PER YEAR THANKS TO MORE HEALTHY, SUSTAINABLE DIETS, AND A REDUCED RISK OF PANDEMICS CAUSED BY ZOONOTIC DISEASES

JOB OPPORTUNITIES

AT LEAST 39 MILLION NATURE-POSTIVE JOBS CREATED IF GOVERNMENTS REALLOCATED JUST ONE YEAR'S WORTH OF SUBSIDIES THAT HARM BIODIVERSITY TO A NATURE-POSITIVE STIMULUS INSTEAD

NATURE-POSITIVE ECONOMY

A CIRCULAR ECONOMY CAN ADD US$ 4.5 TRILLION TO GLOBAL GDP BY 2030, AND A NATURE-POSITIVE ECONOMY CAN ADD US$ 10 TRILLION IN ECONOMIC VALUE

MORE RESOURCES FOR GOVERNMENTS

US$ 500 BILLION IN HEALTHCARE COSTS ARISING FROM DIABETES ALONE AVOIDED, AND MONEY SPENT ON HARMFUL SUBSIDIES AVAILABLE TO BE REALLOCATED

HUMANITY'S UNSUSTAINABLE FOOTPRINT OF PRODUCTION AND CONSUMPTION

The unsustainable footprint of production and consumption is one of the main drivers of the catastrophic loss of biodiversity we are seeing worldwide. Deforestation in some areas is at an all-time high, mostly making space for monoculture farms and pasture. Humanity's growing unsustainable footprint is driving countless species to extinction and accelerating climate change. These interconnected crises impact food security, human health and economic output, affecting the world's poorest most. The trajectory if we continue in this manner is dismal.

THE DRIVERS OF BIODIVERSITY LOSS ARE PRIMARILY CAUSED BY:

DEFORESTATION

THE AVERAGE OECD CONSUMER INDIRECTLY DEFORESTS THE EQUIVALENT OF 27KG A DAY

OVERFISHING

TWO THIRDS OF MARINE ENVIRONMENTS ARE NEGATIVELY IMPACTED BY HUMAN ACTIVITY

UNSUSTAINABLE RESOURCE USE

MANUFACTURING AND EXTRACTIVE INDUSTRIES ARE ONE OF THE BIGGEST POLLUTERS

INDUSTRIAL FARMING

HUMANS AND LIVESTOCK NOW OVERWHELMINGLY OUTWEIGH WILD MAMMALS

POLLUTION

MARINE PLASTIC POLLUTION HAS INCREASED TENFOLD SINCE 1980

THE PROBLEM

EARTH'S BIODIVERSITY IS IN CRISIS, IMPACTING HUMAN LIVES AND LIVELIHOODS

EARTH'S BIODIVERSITY IS DISAPPEARING AT AN UNPRECEDENTED RATE

Since 1970, animal populations tracked by the WWF/ZSL Living Planet Index have declined by 68% on average. In the Latin America and Caribbean region, the average decline has been as much as 94%[26] and more broadly, biodiversity loss is highly concentrated in a few tropical regions (see Figure 1). A larger share of species is at risk of extinction than ever before.[27]

Humans and their livestock have displaced the world's biodiversity.

Humans and their livestock now overwhelmingly outweigh wild mammals in biomass terms. As an illustration, for every 100kg of wild mammal biomass (for example, about one adult panda[29]) on the planet, there is ~1,700kg of human biomass (~27 humans[30]) and ~3,100kg of mammal livestock (for example, up to 50 sheep[31])[32] – see Figure 2 for an illustration. And while the biomass of humans and mammal livestock has more than tripled since 1900, wild mammal biomass has declined by 70%.[33] A similar trend holds for the world's birds and fish. A handful of fish species grown in aquaculture now outnumber the wild-caught fish that are used for human consumption, as wild fish stocks in many places are increasingly under pressure. Similarly, the chicken is now by far the most common bird on Earth, outnumbering the biomass of all wild birds by about threefold.[34]

Habitat loss, overexploitation and pollution are driving this mass extinction of biodiversity.[35]

- **Habitat loss is the leading cause of declining biodiversity.**[36,37] Humans have felled about half of all trees over the course of history.[38] In some regions, this happened within a human lifetime: since the 1960s, we have cleared about half the original extent of the world's tropical rainforests.[39] In the last 20 years, that has meant losing tropical rainforest of an area the size of Rwanda or Belgium each year, or the area of a soccer field every six seconds.[40] Tropical rainforests matter because they are home to two-thirds of the planet's terrestrial biodiversity.[41] However, similar losses of habitat have also occurred across non-tropical forests, grasslands, and most other ecosystems.[42]
- **Overexploitation is driving many species to extinction.** It occurs when species are exploited for human use beyond their capacity to regenerate. For example, oceans used to be treasure troves of biodiversity, but overfishing is increasingly driving aquatic species and ecosystems to the brink, with two-thirds of marine environments impacted by human activity.[43] Many well-known fish species, like southern bluefin tuna, are critically endangered.[44] On land, overexploitation of species mainly takes the form of unsustainable logging and of poaching.[45] Poorly managed logging is in fact one of the largest threats to biodiversity, endangering about half the IUCN red-listed species analysed in one comprehensive study.[46] Both on land and under water, overexploitation has negative knock-on effects on other species (e.g., by threatening the abundance of fish caught as 'bycatch' to targeted species).
- **Pollution increasingly fills Earth's ecosystems.** Marine plastic pollution has increased tenfold since 1980, affecting most marine turtles and many seabirds and marine mammals.[47] This is compounded by fertilizer run-off from farmland, which produces algal blooms that deprive 400 aquatic ecosystems globally of oxygen, with a total area about the size of Ecuador or the UK.[48] The excessive use of nitrogen fertilizer is making landscapes more monotonous and threatening insect biodiversity.[49,50] Pollution, including contamination from settlements and industry, is a known contributor to endangering 1,900 species on the IUCN Red List.[51] However, pollution is likely to contribute to endangering many more understudied species, particularly impacting insects, 130,000 species of which may have already died out because of pollution.[52]

While the biodiversity impact of climate change has historically been relatively minor, it presents a large potential risk.

This report will focus on the most immediate causes of biodiversity loss listed above. However, it is essential also to note the additional and enormously exacerbating effects of climate change. Climate change directly contributes to around 5% of animal and plant population declines, though these are highly concentrated. Changes in marine ecosystems, in particular, are already having profound impacts on the communities who depend on them.[53,54] While current impacts are attributed to shifting/altered habitats and weather extremes like floods or droughts,[55] the impacts of a changing climate on biodiversity are multifaceted and will strongly intensify in the future. More research is needed in this area.

This destruction of nature is putting human health and food security at risk, pushing vulnerable groups towards poverty.

The ongoing COVID-19 pandemic provides proof that encroaching on nature can result in zoonotic diseases that can shut down national economies and overwhelm health systems.[56] Natural disasters like wildfires and floods are becoming more dangerous without natural ecosystems to protect human infrastructure.[57] Global food security is under threat. Up to 75% of the genetic diversity of food crops is already lost.[58] This crisis is made worse by the loss of pollinator and soil biodiversity, threatening agricultural productivity further. For example, excessive fertilizer use can reduce earthworm populations by as much as 85%.[59] Animals also pollinate 75% of crop types, an ecosystem service worth ~US$300-600 billion a year, which is also threatened by the excessive use of fertilizer and pesticide.[60] The destruction of nature tends to harm vulnerable groups in rural areas the most, such as Indigenous Peoples and local communities, many of whom depend on intact forest ecosystems.[61]

Economic output is dependent on nature, yet governments spend US$500 billion each year on subsidies that are harmful to biodiversity.

Globally, nature's services are worth an estimated US$125-140 trillion per year, which is more than 1.5 times the size of global GDP.[62] More than half the world's GDP – US$44 trillion – is highly or moderately dependent on nature.[63] Global environmental change puts nearly US$10 trillion of economic value at risk by 2050 and could result in large-scale price rises in some major commodities.[64] Much of this is accounted for by climate change, but the risks of nature loss are far more wide-reaching. For example, deforestation of tropical rainforests risks creating unstable weather patterns that could drastically increase water scarcity in affected regions.[65] Similarly the destruction of coral reefs (e.g., via trawler fishing) displaces vital breeding grounds for the regeneration of global fish stocks.[66] Yet despite all this, governments globally continue to spend US$500 billion each year on subsidies harmful to biodiversity, according to the OECD.[67]

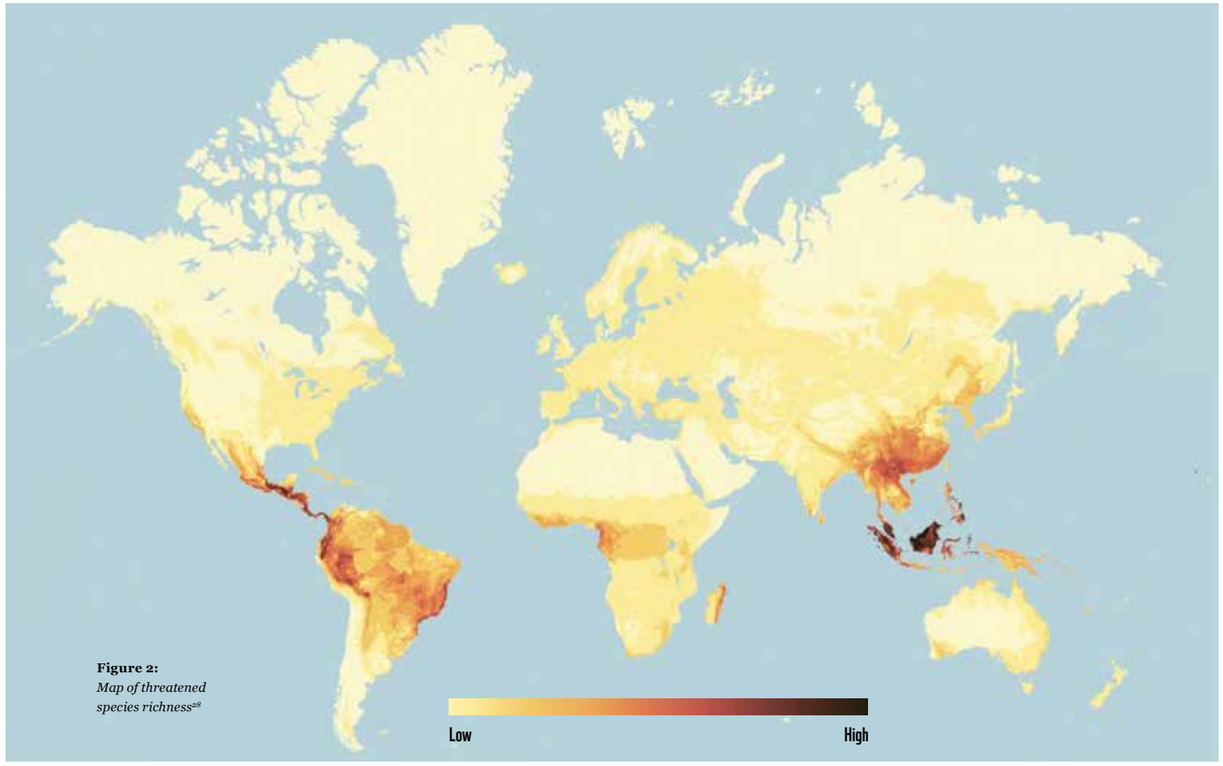


Figure 2:
Map of threatened species richness[28]

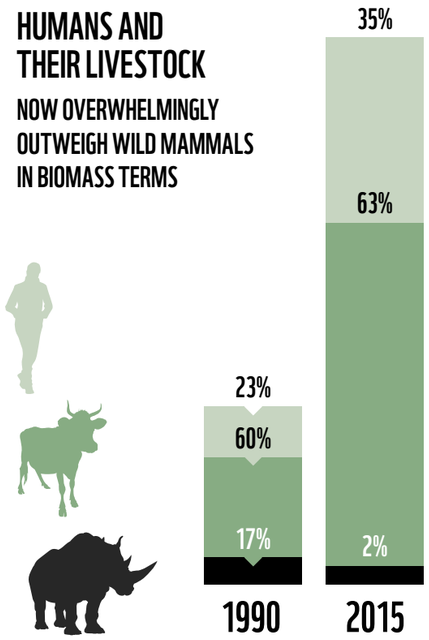


Figure 3:
Illustration of the relative distribution of mammal biomass on Earth

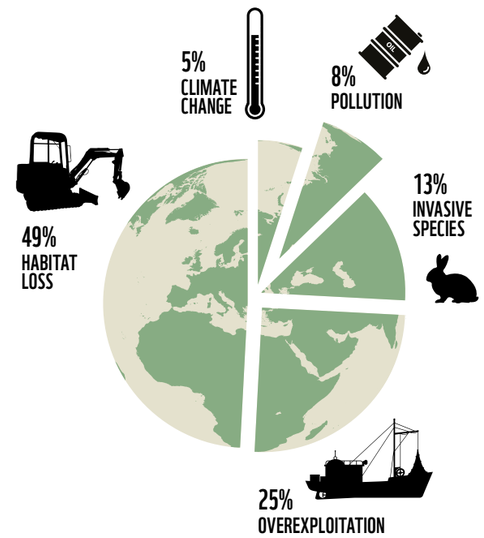


Figure 4:
Contributions of different threats to global biodiversity loss

THE CAUSE

BIODIVERSITY IS LOST BECAUSE OF UNSUSTAINABLE CONSUMPTION AND PRODUCTION

Humanity's demand for natural resources is outpacing Earth's supply

Humanity's footprint is beyond planetary limits, putting unprecedented strain on the systems that sustain life as we know it. In fact, we may be using the natural resources of up to 1.6 'Earths' in a given year – meaning we quickly run-down nature's capacity to regenerate.[68] That is driven most by the consumption patterns of those in high income countries (HICs). For example, the average OECD consumer is responsible for the deforestation of around four trees every year, most of which are in tropical areas.[69] To put this in context, four mature trees likely weigh at least 10 tonnes,[70, 71] so each OECD consumer indirectly deforests the equivalent of ~27kg per day. Moreover, middle income country (MIC) consumption patterns are increasingly emulating those in HICs, for example via increased plastic use.[72]

Most consumption has a footprint on nature, as shown by the staggering range of products that use palm oil.

In the absence of a global system that includes biodiversity as part of our economic model, unsustainable products appear into almost everything we consume. Palm oil is a good example. Nearly 50% of all products in supermarkets will have some form of palm oil in them: detergents, cosmetics and even pizza dough.[73] But palm oil is also found in animal feeds, as grease for machinery, and in pharmaceutical products.[74] We can barely avoid using palm oil. And yet while it is entirely possible to produce palm oil sustainably, unsustainable palm oil is common in many value chains. The plantations on which this unsustainable palm oil is grown are a major driver of deforestation in many of the world's biodiversity hotspots, such as the rainforests of Sumatra and Borneo.

Income is the best predictor of how much biodiversity loss countries and households cause by their consumption.

For example, both the per capita GDP and the per capita footprint on nature of the Netherlands are about 2.5 higher than that of Slovakia.[75] Similarly, the richest 20% of households in an average European country are responsible for ~50% higher footprints than the poorest 20%.[76] The most important driver of these differences is land use.[77] The more individuals consume, the more they drive international land-use change. In fact, richer countries often 'export' their true footprint on nature. This happens when these rich countries source goods from regions where production is cheaper, partly due to weak regulations that do not reflect the true long-term cost of biodiversity loss. This in effect subsidizes the consumption of rich countries at the cost of producing countries, which suffer from biodiversity loss as a result. Figure 5 illustrates how the UK in effect exports its footprint by demonstrating how much land is used globally to provide the UK with some top commodities.

Consumption causes biodiversity loss because the 'linear' way we produce is unsustainable.

Current production models are based on a linear 'take-make-dispose' economic model (Figure 6). The global economy relies on extracting ever more resources and producing ever more waste in the process. For example, the global consumer electronics industry is now responsible for generating more than 50 million tonnes of waste every year, more than the weight of all commercial aircraft ever built.[79] Much of this is the result of planned obsolescence, where products are designed for a short lifespan and minimal repairability, to encourage the consumption of new products[80]. Yet even though all electronics contain valuable raw materials like copper, iron and gold, only 20% of that waste is formally recycled.[81] Much of the rest ends up in landfill – often in the Global South – where it leaks toxic compounds into local water streams or, when burnt, fills the air with toxic fumes, endangering biodiversity as well as human health.

Figure 5: *Land-use requirements for supplying the UK with some leading commodities*[78]

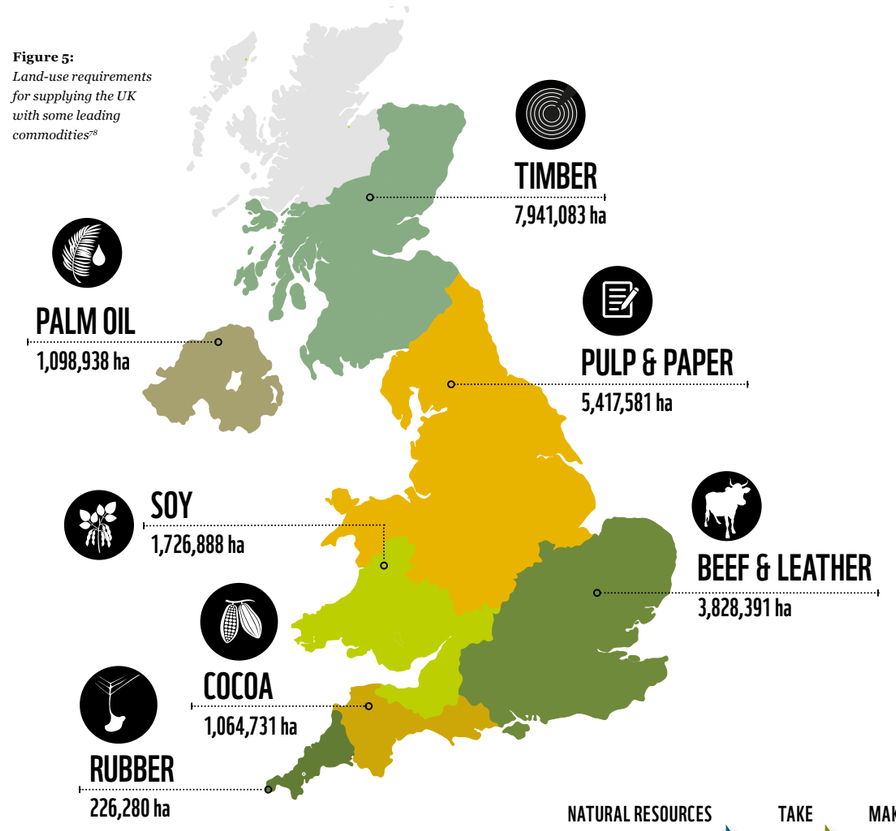


Figure 6: *The dominant linear economy model of production*

Case study: Ramin timber

A walk to a local hardware store can illustrate the link between consumption and biodiversity loss. Ramin timber, a tropical hardwood from Southeast Asia, is frequently be sold as high-quality hardwood, appealing for its durability and creamy colour. This fetches high prices. Yet these high prices are what drives the widespread illegal harvesting of Ramin trees from the peat forests of Southeast Asia, where they house orangutans alongside other unique wildlife, and lock up carbon. Ramin timber can of course be produced sustainably, but in the absence of holistic supply chain monitoring, some unsustainable timber creeps into value chains where profits are to be made.

WHAT CAUSES THE THREATS TO BIODIVERSITY?

Habitat loss is mostly caused by agricultural expansion and new infrastructure.

Humans over the past decades conceived of land use mostly in narrow economic terms, with little consideration of the area needed for natural habitats so that the natural productivity of the wider ecosystem is not decreased. In many countries – particularly in tropical low-to-middle-income countries (LMICs) – forests are logged or burned to make way for new farmland. Over the past 60 years, humanity has deforested half the world's tropical forests, and has mostly replaced them with monoculture farmlands, with pastureland for cattle being the leading driver by far (Figure 7).[82, 83] Middle-income country and high-income country diets – specifically, demand for animal products – drive much of this trend.[84]

- **Global meat consumption has more than quadrupled since 1961.**[85, 86] Much of this increase is driven by growing consumption in industrializing economies. For example, many countries in Latin America and Southeast Asia grew their per capita meat consumption fourfold or more over the past 50 years in a trend parallel to growing incomes, thus nearing the per capita meat consumption of HICs.[87] There remains significant regional variation, though, with most HICs consuming 80-120kg per capita per year, whereas per capita meat consumption in India is barely 4kg/year.[88]
- **The food value chain is inefficient, with about one third of all food produced going to waste.**[89] This is partly because of a lack of investment in smallholder agricultural value chains in LMICs (e.g., cold storage, cereals handling, food processing, etc.).[90] Equally, food waste by retailers, restaurants and individuals remains a key issue, particularly in rich countries.[91] All this produce going to waste increases pressures to expand agricultural output even more, which in turn drives yet more habitat loss.
- **Infrastructure often fragments natural ecosystems, and so degrades habitats in addition to replacing them.** Besides requiring land clearing, roads and fences also fragment ecosystems and disturb the natural migration patterns of wildlife. Some 70% of global forests now lie within 1km of such an 'edge' of human-built infrastructure.[92] Yet infrastructure goes beyond roads: large-scale dams, urban expansion and coastline modification all put pressure on natural habitats.
- **Mining infrastructure often has a particularly destructive role in degrading habitats by opening up intact forest landscapes for a range of secondary exploitation methods.**[93] Beyond the impact that mines themselves have on key landscapes, their supply infrastructure is often also used by illegal loggers, driving the conversion of forests into low-productivity farmlands. For example, mining claims in the Amazon overlap with undisturbed forest area larger than Malaysia or Germany.[94] In Suriname, artisanal small-scale mining is a leading driver of deforestation.[95] Whether small or large-scale, mines are typically in frontier areas, where they accelerate the conversion of forests and other landscapes.[96] Deep sea mining is the latest example of this, and it has the potential to do irreversible damage to underwater habitats at an enormous scale.[97]

Overexploitation largely caused by unsustainable forestry and overfishing.

- Illegal logging is a key threat to plant biodiversity, and closely linked to the unsustainable agricultural expansion described above. Many species of trees and other plants are cleared for commercial use at levels that drive them to extinction, also threatening ancillary plant and animal species dependent on these plants.[98] The silky safika lemur (pictured), which is found in Madagascan World Heritage site forests, is an example of this. Illegal logging, for example of rosewoods or ebonies, threatens their habitats and makes them a target for bushmeat consumption by loggers.[99]
- Unsustainable fishing practices have driven many fish populations to the brink. An all-time high of 34% of fish stocks are now overfished, and the energy spent on catching each tonne of fish has increased drastically.[100] This trend is driven by direct human consumption, but also by the fact that most farmed fish require some portion of wild-caught fish as part of their feed, further endangering marine biodiversity.[101] Bycatch is a further issue, which has contributed to driving several species towards extinction. A notable case of this is whales and dolphins, at least 300,000 of which are killed as bycatch or from fishing net entanglement each year.[102]

Pollution has many causes, but is ultimately driven by manufacturing and extractive industries, as well as agricultural run-off.

Oil and gas companies produce more than 400 million tonnes of new plastic a year,[103] but in large part they do not bear the social and ecological cost that plastic pollution imposes. The problem is wider than plastics, though: over 80% of global wastewater flows into nature without treatment.[104] All the while, 300–400 million tonnes of heavy metals, toxic sludge and other wastes from industrial facilities are dumped into the world's waters each year.[105] Farming is yet another important cause: especially in HICs, it is the leading source of water pollution, while in LMICs this pollution often escalates to become a major health hazard to rural communities.[106]

So far, every country that industrialized underwent a phase of large-scale biodiversity loss.

The agricultural intensification that typically accompanies industrialization has historically competed for the natural habitat of wildlife. This is in large part driven by increased demand for beef, mutton and other ruminant meats, and the expansion of agricultural commodities (e.g., cotton). Only once countries have high average incomes, great sums are spent to regain natural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capital domestically, in the form of greener landscapes, cleaner air and water and sustainable infrastructure. However, even this 'recovery' of natural capital in HICs is typically offset with negative biodiversity impacts associated with commodity imports.[107]

The loss of biodiversity is fundamentally a tragedy of the commons that is in nobody's long-term interest.

The drivers of biodiversity loss are often such that individuals try to make a living in ways that undermine their long-term prospects. Fish stocks are fished beyond their sustainable reproductive capacity. High-value hardwood tree species are felled at rates driving their extinction. Factories and farms poison the soil, water and air with chemicals that cause harm to human, animal and plant health. In all these cases, small producers working to earn an income or large producers maximizing shareholder returns as best they can cause ecosystem collapses that undermine their own long-term prospects. All the while consumers the world over support this biodiversity loss by spending money on products where, often without their knowledge, destructive practices are present within the supply chain.[108]

The global economic system of the past was not set up to address the negative externalities of growth.

Policymakers typically design policy frameworks in ways that maximize GDP. Yet while being a fully legitimate planning tool, a focus on GDP can lead to institutional and market failures where governments and investors do not account for the value of natural capital. A focus on 'gross' rather than 'net' capital stock disregards nature's invaluable ecosystem services.[109] In the past, governments tended to give free rein to the exploitation of natural capital by the private sector. It took the environmental movement, largely started from around 1970, to provide a solid evidence base for policymakers to understand the true cost of unsustainable economic growth. Today, the science behind the value of ecosystem services is clearer, as are the options for policymakers to foster growth in ways that minimize impacts on ecosystems.

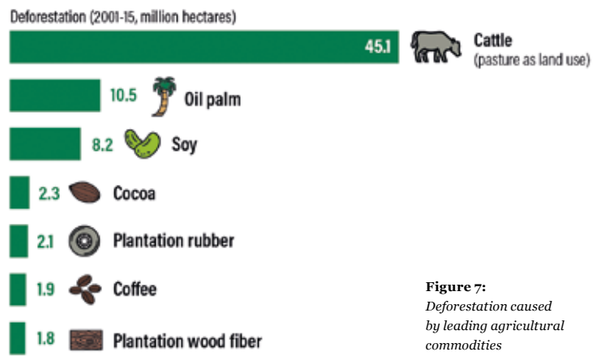

Figure 7: *Deforestation caused by leading agricultural commodities*

THE SOLUTION

HUMANITY CAN THRIVE WHILE CONSUMING AND PRODUCING MORE SUSTAINABLY

BIODIVERSITY LOSS IS NOT INEVITABLE, AS WE CAN PRODUCE AND CONSUME IN WAYS THAT BENEFIT BOTH NATURE AND HUMANS.[110, 111]

Besides nature having an intrinsic value, it is also eminently possible for human societies and the global economy to flourish in a way that protects biodiversity. In fact, Indigenous Peoples and local communities have done so for millennia, and in modern times have found ways to prosper that preserve the ecosystems they depend on.[112] Governments need to step in and create frameworks that meet their populations' strong demand for living in harmony with nature. Such forward-looking policy will have to involve and define new roles for all economic actors, from consumers, to businesses, financiers, NGOs, etc.[113]

Populations around the world increasingly acknowledge nature's intrinsic value.

Recent research has made it clear that people want to protect nature, with awareness growing particularly strongly in LMICs. For example, the number of nature-loss conversations online has grown starkly, as seen in a 65% increase in Twitter mentions since 2016.[114] News media coverage of nature loss has also grown strongly in countries as diverse as Brazil, India, Indonesia, China and the US, and beyond in a global trend.[115] This is clear evidence that populations around the world are expecting their representatives to do more to protect nature.

Consumers across the Global North and South demand more sustainability and are willing to pay for it.

Google searches for sustainable products more than tripled from 2016-20.[116] This research clearly informs spending decisions. For example, ethical consumer spending in the UK has risen almost fourfold within 20 years, reaching close to US$60 billion.[117] Sustainable brands consistently outperform conventional alternatives in markets around the world, from the US to China and India.[118]

Producers are responding to market signals and have started taking steps to reduce their footprints.

More than 1,000 companies – among them some of the world's largest firms – have signed up to the Science-Based Targets initiative, with the rate of signups still increasing exponentially.[119] Increasingly, firms based in emerging markets like China and Brazil also take action in response to consumer demand.[120] Though focused more narrowly on reducing greenhouse gas emissions, this is indicative of broader momentum for protecting and restoring the world's biodiversity. For example, one survey of 150 European and US fashion executives showed 65% of surveyed businesses have committed to sourcing sustainably produced raw materials.[121] Membership of the Union for Ethical BioTrade – a non-profit association that promotes sourcing practices that conserve biodiversity – has also increased by 45% since 2016.[122]

Political leaders are starting to take steps to protect global biodiversity.

The Leaders' Pledge for Nature, for example, committed 89 heads of state or government from all around the world to reverse biodiversity loss by 2030.[123] The Paris Agreement – though again only focused on greenhouse gas emissions – showed that collective action by the world's governments is possible. Much like human welfare is impossible without a healthy atmosphere, the Earth's biodiversity is essential to the health and wealth of all nations. Yet many producer countries remain sceptical of such commitments, worrying that these will stifle their opportunities for economic growth. This is misconceived, as economic growth that depletes natural capital is not worth much in the long run.[124] However, HICs will have to enable a just global transition by supporting producers in biodiversity-rich countries, thereby enabling these countries to protect their natural heritage.

A few levers could put humanity's consumption patterns on a more sustainable track.

For example, shifting meat consumption from ruminants like cows and sheep to other meats and plant proteins could free up a large land area for wild habitats. Currently, these ruminants use two-thirds of all agricultural land while only providing at most ~3% of calories and ~12% of protein.[125, 126] Stricter regulation and monitoring of fisheries, combined with methods to minimize bycatch, can ease pressures on marine ecosystems and lead to better management of fish stocks, while increasing long-term profits.[127] Setting standards for imports of palm oil and soybeans, as – for example – the UK government has done, could further remove pressures for biodiversity loss.[128, 129] These levers have to be part of a comprehensive strategy to protect nature, but by themselves can show that halving our consumption footprint is entirely achievable.

Policymakers need to act decisively to deliver the biodiversity protection and restoration that their fellow citizens want to see.

Previous iterations of the Convention on Biological Diversity (CBD) saw most countries make progress towards biodiversity targets, but not at a fast enough rate to stem the tide of biodiversity loss.[130] Countries now need to adopt a milestone to halve the footprint of production and consumption by 2030 to commit to a future that does not just limit damage, but actively builds biodiversity for future generations (see Figure 8). Humanity's footprint can be measured by indicators such as land use, material consumption and natural boundaries of nitrogen and phosphorous use.[131] Halving humanity's footprint in these areas matters as it will allow us to reduce our demand for natural capital below the rate at which it naturally replenishes. This enables a global economy in which both humanity and nature flourish.[132]

A production and consumption related milestone needs to enforce policy mechanisms to show effects.

For net-consuming countries (that is, most HICs), targets should specify transition horizons for moving to 100% sustainable supply chains for all major commodities. This will involve working closely with private sector actors, such as retailers and the finance sector, to ensure regulations minimize trade friction and that benefits flow to populations in producing countries. Net-producer countries, meanwhile, should move to ban production practices that destroy biodiversity, while working proactively with indigenous peoples and local communities as custodians of biodiversity to monitor activities on the ground.

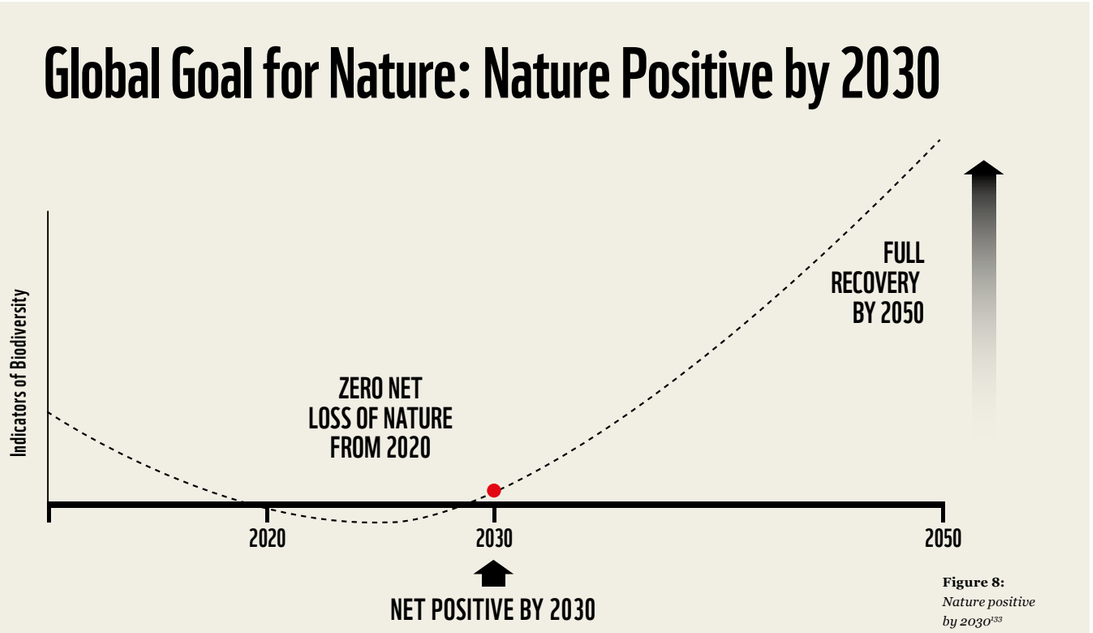

Figure 8: *Nature positive by 2030*[133]

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Three macro-approaches to production can help address biodiversity loss

These are natural capital accounting, a food systems transformation and the circular economy.

Natural capital accounting correctly values the invisible contribution of ecosystem services to national output.[134] While ecosystems are invaluable contributors to countries' growth and prosperity, their health does not show up in GDP figures. Governments need to think of growth more holistically with the target of maximizing natural capital alongside economic capital. This will also need to account for the intrinsic value nature has to Indigenous People and local communities and, increasingly, all of society.[135] Doing so will be good for the economy in the medium and l ong term. For example, if proposed infrastructure projects are assessed for their impact on natural watersheds and flood protection areas like mangroves, that can save money when natural disasters strike.[136]

A food systems transformation will enable humanity to produce more food, while enabling more nutritious diets. Most nations currently do not account for nature when planning for how land should be used. That needs to change. This has both producer components that are largely captured under a focus on agroecology and consumer aspects around dietary choices. Finally, food loss and waste considerations link the two.

- **Agroecology optimizes agricultural output and land value by harnessing nature as an input.** Life did not evolve as a series of monocultures. So while factory-style farming of single species can yield short-term efficiency gains, it actively runs down the value of land by depleting soil biodiversity and fertility.[137] Alternative farming approaches that preserve fertility exist, including those that have long been practised by Indigenous Peoples and local communities.[138] By growing a number of crops in combination, sometimes combined with rearing livestock, farmers can maximize the value of their land by maintaining healthy soils.[139] This can also help absorb a large amount of atmospheric carbon, and benefits soil and pollinator biodiversity, while decreasing pressure to open up new land for cultivation as monoculture soils become depleted.
- **Planetary diets increase healthy food options, while encouraging planet-friendly choices.** As shown in Chapter 2, meat and dairy consumption, particularly when linked to ruminants such as cows, sheep and goats, drives biodiversity loss. While acknowledging these as important sources of protein and as cultural heritage, a planetary diet seeks to widen choices for consumers and to use incentives to lower the demand for these resource-intensive foods. A crucial role in this lies with plant-based protein sources like legumes and nuts, whose planetary footprint is generally much lower, while still enabling a balanced macro-nutrient intake and being highly versatile in food preparation.[140] 'Blue foods', such as sustainable fish and aquatic plants, also have a key role to play as they can be produced with a minimal ecological footprint.[141]
- **Food value chain investment minimizes food loss and waste.** Given as much as a third of produced food goes to waste,[142] a more efficient food supply chain can itself make a large contribution to lowering food's footprint on nature. This will require significant investment by governments and businesses to improve forecasting of supply and demand, and to unlock nimble food processing capacity to absorb produce at risk of going to waste, especially in LMICs.[143]

The circular economy maximizes value by minimizing waste that could turn into pollution. As discussed above, our current model of production and consumption is based on a 'take-make-dispose' model. This relies on the large-scale input of natural resources, and creates a lot of waste as an output, the cost of which is often borne by marginalized communities. This model exists because in the past, the social and ecological cost of resource extraction and waste disposal was not priced into production. As this changes due to government regulations and voluntary initiatives, companies are increasingly turning to a more circular model. In this model, products are designed for shared and repeated use, ease of recycling and minimal use of fossil and mineral resources (see Figure 9). Notably, this has been the default production model in indigenous communities all around the world, who have long valued nature more highly than industrialized societies.[144]

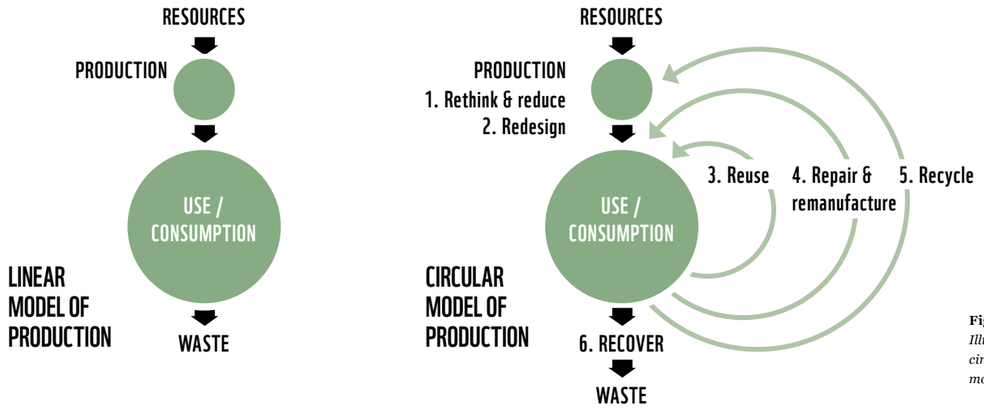

Figure 9: *Illustration of the circular economy model for plastics*[145]


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SECTOR HIGHLIGHTS

The sector highlights below illustrate how these macro-approaches can work in practice

Sustainable timber production optimizes natural capital.

Healthy forests provide many ecosystem services, from storing carbon, to supplying water, to protecting landscapes from erosion.[146] Timber is also the world's largest soft (i.e., nature-based) commodity, with a market value of ~US$250 billion.[147] Unfortunately, much of this timber harvesting is unsustainable, especially where it contributes to deforestation and forest degradation in tropical areas.[148] Yet if the natural capital value of forests is taken into account, their value rises to as much as ~US$18 trillion.[149] What is more, the UN Food and Agriculture Organization (FAO) considers as much as 20% of the world's population as 'forest-dependent', meaning that their livelihood and/or food supply is closely linked to forests.[150] If governments can create regulatory frameworks that acknowledge the natural capital tied to forests, trees can be acknowledged as the socio-ecological cornerstones they are.

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Case study

Emerging models of sustainable forestry in Brazil. More than twice the area of Malaysia or Germany has been cleared in the Brazilian Amazon since 1990.[151] About two-thirds of this cleared land is used for low-productivity cattle ranching, at less than one cow per hectare.[152] Economic activity enabled by deforestation contributes very little to the Brazilian economy: ~0.01% of GDP for each year's worth of deforestation.[153] This weighs against enormous carbon emissions from deforestation and hundreds of premature deaths caused in Brazil each year from pollution linked to fires caused by deforestation.[154] Yet Brazil has the tools to end deforestation while making its rural economy flourish. A previous round of policy action from 2005-12 cut deforestation rates by 70%.[155] Additionally, large-scale forestry companies like Suzano have come out in favor of forestry models that protect nature, mixing native and plantation forests to maximize production and ecosystem services.[156] Suzano has protected and restored close to one million hectares of conservation areas and issued US$1.25 billion of 'green bonds' in 2020, making it a promising example for the forestry industry.[157]

A large global infrastructure gap provides a key opportunity for sustainable development.

With the global infrastructure gap potentially as big as US$90 trillion,[158] building roads, ports, railways and other infrastructure is rightly seen as a global development priority. Excellent infrastructure is also needed to address some of the ecological challenges mentioned in this report, such as food loss and waste.[159] Yet whereas infrastructure is often seen as directly at odds with nature, there are certainly models to dramatically lower nature risks from infrastructure, or even to make infrastructure nature-positive. For example, 'natural infrastructure' such as cultivated mangrove marshes can be highly cost-effective flood protection.[160] With 'grey' infrastructure such as roads, on the other hand, nature-integrated planning can reduce costs from road maintenance, e.g., by lowering the potential for wildlife collisions.[161] Natural capital accounting can prevent costs to people and nature by acknowledging the ecosystem services affected by new infrastructure, and can prevent biodiversity loss via integrated and forward-looking planning.

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Case study

China's infrastructure planning, domestically and internationally.
With its strict 'ecological conservation red line' policy, China has recently emerged as a leader in ecosystem protection and restoration.[162] In line with this, the Chinese government has set a target to protect 25% of its land, with much of this in or next to key population centres.[163] In some instances, the scale of transformation has been astonishing. In the Qianyanzhou region, forest cover went from 0.5% to 70% in just three decades.[164] And in just the past decade, China has restored around 75 million hectares of ecosystems, which is about the size of Mexico.[165] With its landmark Belt and Road Initiative (BRI) to build up infrastructure across Eurasia and Africa, China now has a key opportunity to support similar protection and restoration drives globally. By one estimate, proposed BRI infrastructure corridors overlap with 46 biodiversity hotspots, so it will be key to account for the natural capital found in these spaces.[166]

The manufacturing sector is seeing large-scale cost savings from the circular economy.

As manufacturing is increasingly automated, material costs become a larger share of the total. In practice that means that avoiding waste, in addition to being a key principle of responsible management and environmental stewardship, becomes an important means of keeping costs under control. Circular economy principles can help address waste in manufacturing and so help cut its footprint. Circular design creates products with a maximized productive lifespan. This can come from products being more repairable, more recyclable or shared between more users. For factories this could mean sharing some high-value assets with other producers, building a reverse supply chain for refurbishing products or recycling end-of-life products to recapture high-value materials. The cost savings from employing these and other circular economy principles can easily save ~20% on input cost,[167] while halving carbon and other footprints.[168]

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Case study

The result of circular economy deployments in South Africa.
The Western Cape Industrial Symbiosis Programme (WISP) shows how circular economy principles can create new revenue streams and employment, while cutting resource footprints. WISP identifies how some factories' waste streams could become low-cost inputs for other factories. For example, a fishing company sold broken fishing nets to the City of Cape Town to repurpose the material into sports nets for schools and sporting facilities. In another project, a textile manager could avoid the costs of disposing textile waste by selling cloth scraps to a carpet manufacturer. Replicated over almost 1,000 participating companies in the region, the scheme has diverted >100,000 tonnes of waste from landfill. It also created ~US$7 million in new revenue and cost saving, while generating new private investment and >200 jobs.[169]

THE OPPORTUNITY

A NATURE-POSITIVE ECONOMY CAN CREATE JOBS AND SUSTAINABLE GROWTH

Nature-positive growth is an opportunity for inclusive growth, rather than a drag on development.[170]

By definition, decreasing the footprint of production and consumption means that there will be more potential for sustainable development. That is because Earth's supply of resources is limited, so any such 'decoupling' of economic activity and natural resource use means that humanity's capacity to prosper rises. In short, both the global economy and the biosphere can benefit from 'green' growth. What is more, reducing humanity's footprint is the only way to survive in the long run, so we should invest early, ideally as part of our plans to achieve the Sustainable Development Goals (SDGs) by 2030. Nations that do so will be the most competitive in the future in a global market that prizes sustainable supply chains.

A global investment of US$500 billion aimed at nature-positive employment can create 39 million jobs

(see Annex for full methodology)**.** While sizeable, US$500 billion would still be minor compared to the US$10 trillion spent as COVID-19 stimulus by June 2020 alone.[171] US$500 billion is also equivalent to the amount governments spend each year on subsidies that are harmful to biodiversity.[172] Such a stimulus can be a catalytic boost toward creating the ~400 million jobs the nature-positive economy can create by 2030,[173] and a key element of the global COVID response and post-COVID recovery. While our model only estimates new job creation and not how many jobs in the old economy will be lost, earlier work by the International Labour Organization suggests that the net impact of investing in green jobs is highly positive.[174] For example, for every job lost in the fossil energy sector, four new green energy jobs are likely to be created.[175]

An equitable global distribution of a nature-positive employment stimulus would create twice as many jobs as an allocation determined by national GDP.

Whereas HICs like the US and the EU have already announced stimulus packages centred on a green recovery, widening this stimulus to all countries around the world can create much more employment. This is because job creation is inherently cheaper in LMICs, where much of the world's remaining biodiversity is also located. Our model finds that if a global stimulus was allocated between HICs and LMICs based on population, rather than GDP, this would create ~39 million jobs, vs. 20 million. Besides benefiting nature, this would be a crucial contribution to LMICs' SDG targets, where COVID eliminated years of progress.[176]

Our model only estimates job creation potential, but the opportunities of the nature-positive economy go far beyond that.

The rest of this chapter explores some of the wider opportunities inherent in creating a nature-positive economy that halves the footprint of humanity's production and consumption. To capture these, governments need to accelerate the shift to a nature-positive economy with supportive policy. This needs governments to take bold action. As a first step, the Parties to the CBD should adopt a milestone to halve humanity's production and consumption footprint by 2030, supported by specific action targets and plans for key productive sectors (see Chapter 6 for examples). To achieve this milestone, governments should implement catalytic policies in three broad areas:

1. Recognizing the value of natural capital and stopping overexploitation
2. Transforming food production and diets, and creating a zero-waste food system
3. Mainstreaming circular and regenerative business models

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1. Recognizing the value of natural capital and stopping overexploitation

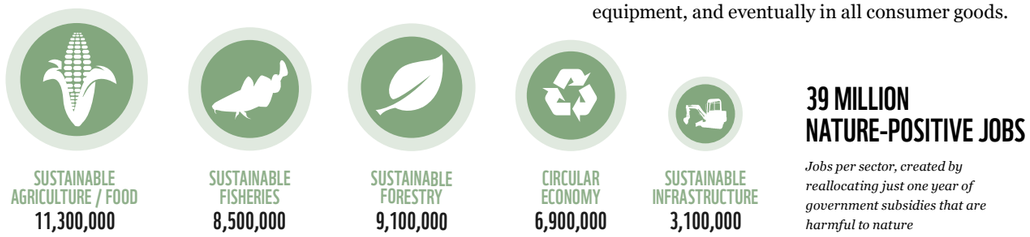
- **Opportunity: By protecting forests, we can safeguard natural capital worth almost twice the value of global stock markets, or US$150 trillion.**[177] Forests perform crucial ecosystem services, such as absorbing and permanently locking up carbon, protecting watersheds or creating favourable micro-climates.[178] Sustainable forestry can have many co-benefits and co-uses with other productive sectors, such as shading agricultural crops and helping avoid land erosion, providing pollinator habitat and creating income from eco-tourism[179].
- **Opportunity: Making fisheries more sustainable could deliver an additional US$50 billion – or 18% above current contributions – to global GDP.**[180] On top of that, protecting coral reefs will yield tens to hundreds of billions of dollars, while helping coastal communities to achieve the SDGs.[181] Creating the right incentives can be a win-win: if countries protect zones where fish can reproduce, fisheries can increase their long-term profits and national treasuries can reduce subsidies paid to the industry. As an immediate first step, governments should phase out the fisheries subsidies that are harmful to biodiversity by encouraging overexploitation, which the World Trade Organization currently values at ~US$20 billion per year.[182]
- **Enabler: National development agencies need to create methodologies and policies that acknowledge the value of natural capital.** Governments need to account for the value of natural capital – as partly measured in species abundance – when calculating national development figures and when setting targets. An important recent step was the adoption of the System of Environmental-Economic Accounting – Ecosystem Accounting, a UN initiative.[183] This and similar standards will need to become more established in government decision-making procedures, as well as the investment criteria of the global finance sector.

2. Transforming food production and diets, and creating a zero-waste food system

- **Opportunity: Agroecological approaches can increase farmers' incomes by up to 30%, especially among the world's poorest.**[184] Agroecological approaches can be more efficient, producing more output from fewer inputs, and recycling resources where possible. At the same time, these approaches create resilience in agriculture from harnessing synergies between different crop types and cultivation methods. Finally, agroecological approaches maximize the long-term value of farmland by enhancing soil biodiversity and hence fertility.
- **Opportunity: By contributing to halve obesity, a planetary diet could save health systems US$500 billion and prevent two million premature deaths each year.**[185, 186] Reducing HIC consumers' reliance on animal protein is not just good for the planet and reducing greenhouse gas emissions, it's also good for human health. By consuming less and better animal protein, consumers can again appreciate meats and cheeses for the rich cultural heritage they are, instead of treating them like commodities, while continuing to get nutritious food at prices affordable to all. As such, government policy should focus less on producing the highest short-term quantity of agricultural outputs, and more on ensuring everyone has access to sustainably produced nutritious food. As such, they should incentivize consumers to eat more plant-based proteins in ways that are culturally appropriate and healthy, and so can help improve human well-being, as well as biodiversity.[187]
- **Enabler: Public funding for food, agriculture, fisheries and forestry should be tied to maximizing long-term natural capital, on both the consumption and production side.** Governments should take steps to eliminate farm subsidies on the most resource-intensive foods (e.g., beef or mutton) and tax associated consumer products differently from alternatives (e.g., pork, poultry or meat alternatives). Harmful fisheries subsidies should be eliminated. Agricultural subsidies everywhere should be tied more closely to environmental standards, e.g., taking steps to avoid land erosion. Finally, governments must go further in requiring private companies to ensure supply chain sustainability and traceability.

3. Mainstreaming circular and regenerative business models to avoid and manage pollution and waste

- **Opportunity: The potential opportunity of adopting a circular economy model is worth US$4.5 trillion.**[188] This comes from developing asset-sharing models that reduce the need for producing physical assets like cars by extending product lifespans. This happens when products are designed for reuse and repairability and for recovering resources at the end of their life cycle. On top of that, the circular economy can create jobs on a large scale. For example, in the EU alone, the circular economy created close to one million jobs from 2000-2010.[189]
- **Enabler: To harness this opportunity, legislation will be needed to encourage circular economy principles.** Governments should ban and crack down on the most destructive practices (e.g., disposing of industrial waste in nature). State agencies should use their procurement and standard-setting powers to scale up circular and regenerative models where feasible. This could involve requiring certain repairability and recyclability features in publicly procured equipment, and eventually in all consumer goods.



CHAPTER 5

THE PATH FORWARD

SAFEGUARDING BIODIVERSITY NEEDS GLOBAL COOPERATION

THE CBD SHOULD ADOPT A 2030 MILESTONE TO HALVE THE FOOTPRINT OF CONSUMPTION AND PRODUCTION, SUPPORTED BY CONCRETE SECTOR TARGETS.

IMPORTANTLY, FOOTPRINT TARGETS NEED TO GO ALONGSIDE INCREASED AMBITION IN TRADITIONAL CONSERVATION APPROACHES, SUCH AS PROTECTING AND RESTORING HABITATS ON LAND, INLAND WATERS AND BELOW WATER THROUGH A RIGHTS-BASED APPROACH. HOWEVER, THE PAST DECADE OF THE CBD HAS SHOWN THAT INCREASING CONSERVATION AREAS WITHOUT TACKLING UNDERLYING ECONOMIC PRESSURES HAS LIMITED SUCCESS.

As such, the post-2020 global biodiversity framework needs targets identifying key sectors with high impacts on biodiversity, notably for food and agriculture, fisheries, infrastructure, forestry and the financial sector. We provide some examples of what these might look like in the sector overview in Chapter 6. Here we lay out a high-level roadmap of how this transition can be managed in the short and medium term, with a view to promoting equity, human rights and governance.

The cost of inaction is enormous, so policymakers should make ambitious commitments now.

As shown throughout this report, biodiversity is on the brink. Humanity needs to act now to halt unsustainable production and consumption and to harness the opportunities of a nature-positive economy. We cannot live without the services that nature provides, so it is inevitable that we make this transition. The costs of doing so will only rise the longer humanity waits, while the Earth's natural capital and opportunities associated with it will continue to decline.

Those nations transitioning to a nature-positive economy first will have a competitive advantage.

It is only a question of time until more legislatures realize that humanity cannot continue destroying biodiversity at the current rate. As we have shown in Chapter 4, there is already a critical mass on the demand side of the global economy for more sustainable goods and services. To continue benefitting from trade-led growth, production-focused economies should transition quickly to get a competitive edge over other producers, as well as doing so to protect human lives and nature's intrinsic worth.

Policymakers need to urgently develop frameworks that value nature's contribution correctly, and at a global scale.

By its nature GDP does not account for the depreciation of assets, including the natural environment.[190] As such, policymakers will have to create mechanisms that can account for natural capital and devise means by which they can optimize their country's natural capital. This will also require the realization that nature's contributions are not contained within national borders, meaning that biodiversity-poor nations, mostly in the Global North, will have to co-finance the conservation of biodiversity-rich regions. Furthermore, this will require North-South technology transfer and capacity building, for example in the use of geospatial technology to support conservation. Similarly, biodiverse regions outside national jurisdiction, like the high seas, need strictly enforced protocols to safeguard Earth's natural heritage.

Consumption and production practices harmful to biodiversity urgently need to be transitioned to nature-positive models.

Countries should use the CBD to agree on a phase-out of unsustainable economic activity by 2030 to have a chance at meeting the CBD's objectives and vision of living in harmony with nature by 2050. For example, they could introduce traceability requirements on imported timber, seafood and minerals. This will require investments and political commitments to supply chain transparency, where net consumer countries should again co-finance a transition. Here again, national economies that can move fast in creating highly transparent supply chains will have a competitive advantage over other countries.

HICs will need to invest in the nature-positive transition of LMICs, but the latter can also take action independently.

Some mechanisms, like supply chain traceability or building nature-positive infrastructure, will require large capital outlay. This will require a significant increase of national budgets and provision to LMICs of much more international support, including from overseas development assistance and technology transfer. However, much of the policy required is not directly tied to financial capability. For example, all countries will need to create tailored, sector-based plans for eliminating activity harmful to biodiversity from major productive industries. All governments must show commitment in these areas and LMICs must take on a fair share of co-investment in biodiversity proportional to their per-capita economic strength. Doing so not only acknowledges their citizens' recognition of nature's value:[191] it is also in their narrow economic interest, as an ability to produce sustainably will become a key consideration for supply chain involvement.

Civil society should hold their national representatives accountable and learn whether their country is using the opportunity provided by the CBD.

Negotiations must not happen out of the global spotlight. Civil society must ensure that national representatives are prepared to make bold global commitments and to translate these into realistic national action plans. As such, national and global media should report on the opportunities inherent in making this commitment, to generate public buy-in and pressure on national representatives. The future of nature – and humanity – depends on it.

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SECTOR OVERVIEW

EACH MAJOR PRODUCTIVE SECTOR NEEDS TO CUT ITS BIODIVERSITY FOOTPRINT

	Food & agriculture	Infrastructure	Forestry
Indicative links to biodiversity loss	Most of the >50% of tropical forests felled since 1960 is now monoculture farmland, especially pastureland for cattle[192, 193]	70% of global forests now lie within 1km of an 'edge' of human-built infrastructure, like roads, fences, dams, etc.[194]	Logging is one of the largest threats to biodiversity, endangering about half the IUCN red-listed species analysed in one study[195]
Models for sustainability	Agroecology recognizes the benefits from soil and pollinator biodiversity, and maximizes the long-term fertility and value of land Sustainable diets supply more nutritious food to all by shifting demand to less resource-intensive proteins	Sustainable infrastructure harnesses natural infrastructure services (e.g., flood protection from mangroves), and minimizes impacts of human-built infrastructure (e.g., building animal migration bridges)	Nature-positive forestry recognizes that biodiversity is a key component to growing high-value timber, and encourages indigenous-led management to provide ecosystem services and acknowledge forests' intrinsic value
Indicative size of opportunity	Agroecology can increase farmers' income by ~30%.[196] and by helping to halve global obesity, planetary diets could save up to US$500 billion[197]	Mangroves provide flood protection benefits of >US$65 billion per year, protecting 15 million people from flooding every year[198]	By protecting forests, we can safeguard natural capital worth almost twice the value of global stock markets, or US$150 trillion[199]
Example of required policy action	1. Enhanced and strictly enforced sustainability protocols among importer countries of agricultural commodities (e.g., beef, soy, palm oil, etc.) 2. Restrictions on land speculation and incentives for farmers to invest into land (including in pollinator and soil biodiversity) for long-term productivity 3. Financing mechanisms to reward farmers for maintaining biodiversity as a social good (e.g., rewards for minimized fertilizer use)	1. Promote adoption of the Aligned Set of Sustainability Indicators (ASSI) among project financiers 2. Adopt a hierarchy of 'grow-avoid-mitigate': grow natural instead of 'grey' infrastructure where possible (e.g., mangrove flood protection), avoid projects harming biodiversity where possible (e.g., large-scale damming), and mitigate harmful impacts where grey infrastructure is needed (e.g., animal migration bridges)	1. Address drivers of deforestation (e.g., land speculation, expansion of low-productivity cattle herding, etc.) 2. Tighten enforcement of logging bans in protected areas and improve traceability in the supply chain 3. Provide long-term financing so growers can invest in timber plantations for the long term, instead of logging rare timbers illegally

	Fisheries & aquaculture	Manufacturing	Mining
Indicative links to biodiversity loss	Overfishing for human consumption, fish feeds and from bycatch endangers ~34% of fish stocks[200] and has altered ~66% of marine ecosystems[201]	Industrial facilities dump 300–400 million tonnes of heavy metals, toxic sludge and other wastes into the world's waters each year, critically endangering many species and ecosystems[202]	Mining is among the largest contributors to biodiversity loss in biodiversity hotspots in the Amazon, the Congo Basin and tropical areas in Asia;[203] associated infrastructure enables illegal logging[204]
Models for sustainability	Banning harmful fishing practices, introducing fisheries quotas, and promoting an ecosystem approach to protecting seascapes maximizes long-term profits of fisheries and reduces reliance on (often harmful) subsidies	Circular economy practices can minimize the resource footprint that drives the biodiversity impacts of manufacturing, while reducing harmful waste streams and increasing operational efficiencies	Mining can minimize its impact on the environment by avoiding biodiversity hotspots and ensuring that mining-associated infrastructure does not cause biodiversity loss. Fully exploited open pit mines should be rewilded
Indicative size of opportunity	Making fisheries more sustainable could deliver an additional US$50 billion, or 18% above current value-add to global GDP[205]	The potential opportunity of adopting a circular economy model is worth US$4.5 trillion[206]	Demand for 'energy transition minerals' will triple to ~US$150 billion by 2030, requiring new, sustainable supply[207]
Example of required policy action	1. Tighten enforcement of fishing bans in marine protected areas, and impose harsh penalties on illegal fishing 2. Make fisheries subsidies conditional on compliance with product traceability requirements (e.g., 24hr availability of fishing vessel GPS records) 3. Encourage sustainable aquaculture, e.g., by requiring farmers to minimize wild fish ingredients in fish feed, and managing pollution from aquaculture waste streams	1. Encourage manufacturers to maximize the lifetime of products (e.g., via tax breaks on refurbished product sales) 2. Create recycling infrastructure and incentivize 'reverse supply chain' providers to cycle raw material from waste back to manufacturers 3. Ban the release of untreated waste streams into waterways and enforce existing bans; encourage industrial symbiosis programmes that allow manufacturers to monetize each other's waste streams	1. Tighten bans on mining in or near biodiversity hotspots, and require impact assessments on buffer zones outside immediate mining zones 2. Formalize illegal small-scale mining, and create facilities to minimize the leakage into waterways of toxic chemicals used for purification 3. Minimize demand for mineral resources, e.g., by taxing rare decorative metals (e.g., gold) more and by encouraging a circular economy of metals (e.g., via better recycling of minerals from e-waste)

METHODOLOGY NOTE FOR JOB CREATION MODELLING

To estimate the job creation potential of the nature-positive economy, Dalberg Advisors conducted some high-level modelling. The findings are presented in Chapter 4, "The Opportunity". Here, we outline the methodology used.

Job creation per investment figures:

Our modelling work is based on publications by WWF & ILO, the World Bank, and various academic papers.[208, 209, 210, 211] Most of these sources only provide data on the investment needed to create a number of jobs for specific contexts; we used them mainly because macro-level estimates of investment costs of job creation are highly scarce. As such, we should stress that our aim in using these papers was to have an estimate of the nature-positive job creation potential for advocacy, rather than making an academic contribution, which is beyond the scope of this report. That said, here is how we derived our estimates of job creation potential per US$million invested:

- **Sustainable agriculture and food, sustainable infrastructure and circular economy:** For these, we used the data provided by David Robalino in a World Bank blog post on the cost of job creation in Tunisia.[212] We averaged the data provided for food and agriculture to get to an assumption for the job creation cost in sustainable food and agriculture. We used data provided for the 'Construction' sector as a proxy for sustainable infrastructure, and data provided for 'Textiles' as the nearest proxy for the cost of job creation in the circular economy sector with regards to manufacturing. We also summed indirect job creation into the total job creation figures. Though for these indirect jobs to materialize some additional investments might be required, we assume that this would be absorbed by the wider economy. At ~US$30,000 per job created in Tunisia, a country with ~US$3,400 per capita GDP in 2018,[213] we also found the author to be rather pessimistic about the value creation potential of investing in jobs. As such, we applied a qualitive adjustment factor to various sectors based on their job creation potential as perceived in the wider literature, while still erring on the conservative side for the cost of job creation, especially given that nature-positive job creation will likely have a cost premium on job creation in conventional sectors.[214]
- **Sustainable fisheries.** Here we used Edwards et al's estimate for job creation per US$million in the US as a conservative baseline figure for job creation in HICs.[215] We then applied an adjustment factor based on the GDP/capita differential between an average LMIC and HIC to derive an equivalent figure for an average LMIC. Here it is important to stress that the authors only look at coastal ecosystem restoration, rather than fisheries themselves, for which we could not find better data. As such, we assumed that coastal ecosystem regeneration would be a decent proxy for the job creation potential in sustainable fisheries, especially seeing as employment in the fisheries sector might currently already be somewhat bloated due to its decades-long reliance on subsidies.[216]
- **Sustainable forestry.** Here we had comparably good data from a joint WWF & ILO report on nature-based solutions,[217] building on an earlier academic paper.[218] Figures provided in this report, however, were mostly based on estimates for LMICs, so we adjusted the expected cost of job creation upwards, again based on the GDP/capita differential between an average LMIC and an average HIC. To adjust somewhat for a large margin of uncertainty inherent in the model by making conservative estimates, we chose the lower bound of the confidence interval for job creation per dollar invested in the provided data as our default scenario.

Population vs GDP-led stimulus and other inputs:

We chose US$500 billion as a sizeable stimulus, which we deemed broadly realistic in line with broader spending on the post-COVID recovery (e.g., ~US$10 trillion in Q2 2020 alone).[219] US$500 billion is also equivalent to the amount governments spend each year on subsidies that are harmful to biodiversity.[220] We created two scenarios of how this stimulus could be allocated across the world population. One scenario allocates spending between HICs and LMICs based on population, the other based on GDP. The population-based stimulus allocates 84% of spending to LMICs, vs 37% for the GDP-based scenario. We chose the population-based scenario as our default because biodiversity tends to be greatest in LMICs, because it is a much more cost-effective means of job creation (cf. figures above) and for associated equity implications. Our model finds that the job creation from the population-led scenario (~39 million) is about twice the size of the GDP-led scenario (~20 million).

Model outputs (population-led scenario):

Headline outputs	
# of jobs created (rounded to millions)	38,900,000
US$ / LMIC job	US$11,011
US$ / HIC job	US$96,878
US$ / job (average)	US$12,845

Jobs by sector	# jobs (rounded to 100k)
Sustainable agriculture / food	11,300,000
Sustainable fisheries	8,500,000
Sustainable forestry	9,100,000
Circular economy	6,900,000
Sustainable infrastructure	3,100,000
Total	**38,900,000**

Jobs by region	# jobs (rounded to 100k)
East Asia & Pacific	12,500,000
Europe & Central Asia	2,700,000
Latin America & Caribbean	3,600,000
Middle East & North Africa	2,300,000
North America	300,000
South Asia	10,900,000
Sub-Saharan Africa	6,500,000
Total	**38,900,000**

Model outputs (GDP-led scenario):

Headline outputs	
# of jobs created (rounded to millions)	20,100,000
US$ / LMIC job	US$11,011
US$ / HIC job	US$96,878
US$ / job (average)	US$24,842

Jobs by sector	# jobs (rounded to 100k)
Sustainable agriculture / food	5,900,000
Sustainable fisheries	4,400,000
Sustainable forestry	4,700,000
Circular economy	3,500,000
Sustainable infrastructure	1,600,000
Total	**20,100,000**

Jobs by region	# jobs (rounded to 100k)
East Asia & Pacific	9,500,000
Europe & Central Asia	2,800,000
Latin America & Caribbean	2,700,000
Middle East & North Africa	900,000
North America	1,400,000
South Asia	1,900,000
Sub-Saharan Africa	900,000
Total	**20,100,000**

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