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Europe's nature

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Editorial

Hans Bruyninckx
EEA Executive Director

The value of nature

The loss of biodiversity and natural ecosystems we are currently witnessing is just as catastrophic as climate change. In fact, the two are closely entwined, as climate change accelerates biodiversity loss and healthy ecosystems are a vital ally in the fight against climate change.

Europe continues to **lose biodiversity** at an alarming rate, with many species, habitats and ecosystems in Europe threatened by **intensive agriculture, urban sprawl, pollution, unsustainable forestry, invasive alien species and climate change.** Recent assessments by the European Environment Agency show that most protected species and habitats do not currently have a good conservation status.

These losses are not limited to Europe either. Biodiversity loss and ecosystem degradation are a **global phenomenon**. So, as we observe this loss, and work to slow, stop and eventually reverse it, we are faced with the challenge of understanding and even quantifying nature's value. This will help not only to make the right personal, business and policy decisions but also to better understand our place as humans within nature. What is the **value of nature**?

As human beings, nature is priceless to us. After all, it was nature that provided the building blocks of life and the surroundings necessary to allow Homo sapiens to evolve at least 300 000 years ago. Fast-forward to today and we still cannot live without nature. In fact, we might be more dependent than ever on **healthy** and **resilient ecosystems** to guarantee long-term wellbeing for a (still) growing number of global citizens.

Our atmosphere, forests, rivers, oceans and soils continue to provide us with the air we breathe, the food we eat, the water we drink and the raw materials we consume, as well as spaces for recreation and recovery. This is often described as nature's **use value**.

In this context, efforts have been made to put a monetary value on this 'natural capital', so that we can frame the 'ecosystem services' it provides within our existing economic models. Indeed, the **EU biodiversity strategy for 2030** states that more than half of global gross domestic product — some EUR 40 trillion — depends on nature.

The picture is complex, however. Some ecosystem services are more tangible and relatively easy to quantify, such as crops, fisheries and timber; other services, less so. How does one accurately account for the value of pollination for agriculture or flood protection by wetlands? Properly understanding and accounting for less visible ecosystem services is crucial.

But the value of nature goes beyond the direct services it provides to us. Nature has **cultural value** too, forming the backdrop to our existence as humans and providing the conditions necessary for good physical and mental health, as well as for emotional and spiritual well-being.

Even this is not the end of the story. Acknowledging nature's use value and cultural value, we sound very egocentric, in danger of focusing exclusively on the benefits to us as human beings in the here and now. Nature has **intrinsic value** in its own right, in which human involvement is limited to the role of custodian, with an ethical responsibility towards nature itself, our own society and particularly that of future generations.

This three-pronged approach is one way to understand the value of nature: use value, cultural value and intrinsic value.

Yet we tend to take nature for granted, seeing it as a 'free' resource from which we can take not only what we need but also what we want. This makes understanding and acknowledging the true value of nature more important than ever. As counter-intuitive as it may seem to put a monetary value on nature, measurement and accounting is one way to appreciate the direct and indirect benefits we derive from nature. It may also help us choose the best approaches to **tackling degradation**, understanding, for example, that it is much cheaper to **protect nature** in the first place than to **restor**e it later — if restoration is even an option.

As we become more acutely aware of the **finite nature of natural resources**, and the **increasing demands** we are placing on the natural world, we must find ways to live within the means of our planet. Technological advances and population growth, particularly over the last 100 years, mean that Homo sapiens has come to dominate the food chain and nature's resources. The damage we have caused along the way is starting to dominate our prospects for **future wellbeing**.

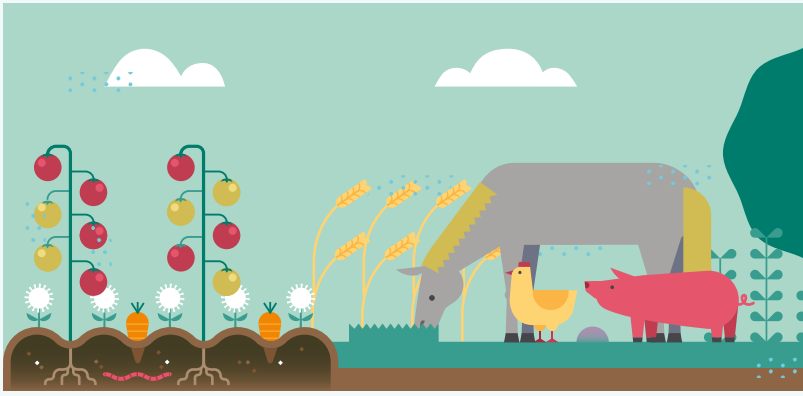
Restoring nature — and more fundamentally, restoring and re-imagining our own relationship to it — are central and urgent challenges for the next decades.

Hans Bruyninckx
EEA Executive Director

What are ecosystem services?

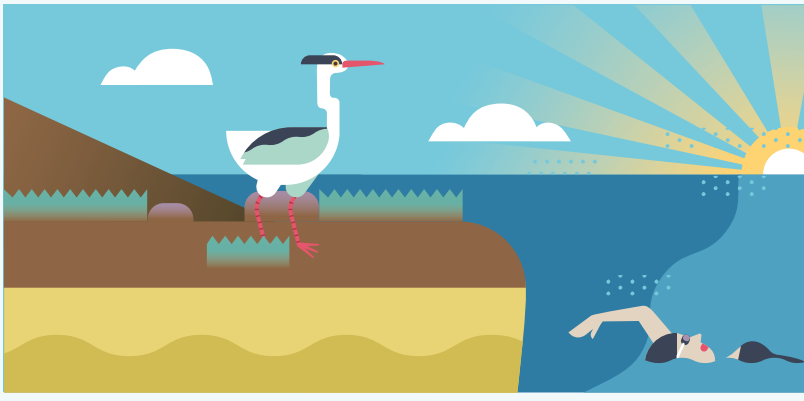
Nature provides us with many valuable services. Some of these services are relatively easy to quantify, such as crops, fisheries and timber; other services, less so. How does one accurately account for the value of pollination for agriculture or flood protection by wetlands?

Provisioning services

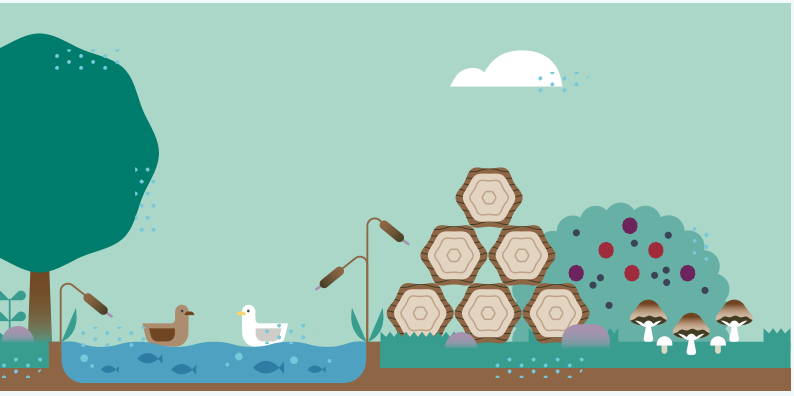


Regulating services

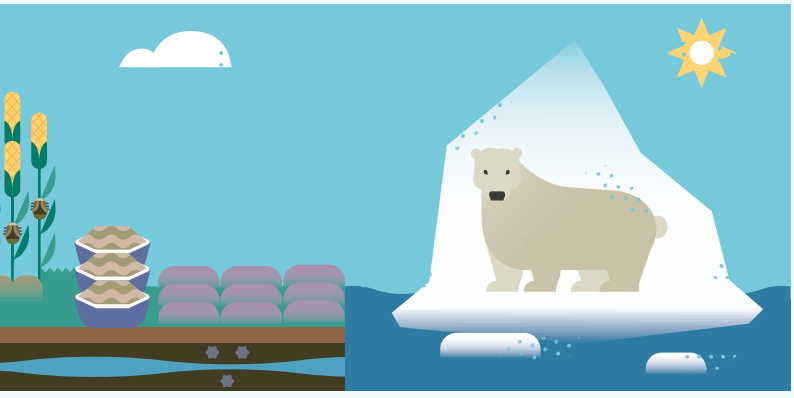
Cultural services



Read more : https://www.eea.europa.eu/themes/biodiversity/intro



- Crops, soil fertility
- Livestock
- Timber
- Fiber
- Wild foods (e.g. mushrooms, berries, etc.)
- Fisheries
- Genetic resources, medicines
- Fresh water
- Clean air



- Pollination
- Temperature regulation
- Carbon sequestration and storage
- Pest regulation
- Erosion regulation
- Flood regulation
- Water purification
- Air purification

- Recreation (e.g. swimming, hiking, skiing etc.)
- Aesthetic (e.g. sceneries)
- Cultural identity

Our nature needs urgent help

Awareness of our nature has never been as high as it is today. In the wake of the COVID-19 pandemic restrictions many of us headed outside to our nearest green spaces for respite and solace — necessary breaks from our lockdown existence. It once again reminded us of the vital and valued role that our nature plays in our mental and physical well-being.

Unfortunately, centuries of exploitation have taken a massive toll on Europe's biodiversity. Our nature is in a **poor state**, with the majority of Europe's many animal species, such as the saker falcon and the Danube salmon, and habitats from grasslands to dunes across Europe facing an uncertain future unless **urgent action** is taken to reverse the situation.

This is the dire conclusion of the EEA's latest State of nature in the EU[1] report, which is the most comprehensive health check ever conducted by the EU.

The good news is that awareness of the importance of nature and biodiversity is growing and steps to remedy the situation are already in motion. The EEA's State of nature report does show **positive developments** in conservation efforts.

Both the number and area of sites protected under the E**U's Natura 2000 network** have increased over the last 6 years, and the EU met the global targets, with around 18 % of its land area and nearly 10 % of its marine area protected.

However, overall progress has not been enough to achieve the aims of the old EU biodiversity strategy to 2020. Most protected habitats and species have either a **poor or a bad conservation status** and many of them continue to decline. Of the three main groups studied, habitats and birds lag particularly far behind, while the group of non-bird species nearly met its target.

Pollinators in decline, marine environment threatened...

Insects, and especially **bees**, are also in decline, according to EEA and other research. What is certain is that about 9 % of bees are t**hreatened with extinction** within the EU, according to the European Red List[2]. However, for most bee species, there is not enough scientific information to evaluate their risk of extinction.

The EEA's State of nature in the EU report identified that pollinators' most important habitats — grasslands, scrublands, bogs, mires, fens and forests — often have poor conservation status. The **main reason** for this situation is the abandonment of grassland, farmland expansion and the use of fertilisers.

The situation in Europe's **coastal waters** — from the Baltic to the Mediterranean — is just as alarming. Urgent action is needed to bring Europe's marine ecosystems back to good condition, after years of severe **overexploitation** and **neglect**, according to the latest EEA report looking into Europe's marine environment[3].

The impact of **human activities on land** and use of our seas has resulted in changes in the number and distribution of marine species and habitats and changes in the overall physical and chemical make-up of seas. Adding to this, problems caused by **climate change** are worsening the impacts of the other threats, and are set to change marine ecosystems irreversibly. However, there are **signs of recovery** in some areas because of ongoing efforts to reduce certain impacts, such as those caused by contaminants, eutrophication and overfishing.

Measures to tackle challenges

Overall, there are now more ambitious plans in place to address the challenges, including the new EU biodiversity strategy for 2030[4], the farm to fork strategy[5] and the EU strategy on adaptation to climate change[6], which are all core elements of the European Green Deal[7].

The biodiversity strategy is meant to **reverse the decline** in biodiversity over the next decade. It aims to strengthen and enlarge the network of protected areas, set up a **restoration plan** and ensure that ecosystems are healthy, resilient to climate change and rich in biodiversity, and deliver the range of services essential for citizens' prosperity and well-being.

Extra efforts will also be needed to improve **monitoring capacities** in Member States to support the EU targets. More data are also needed to better evaluate the role of the Natura 2000 network, and the implementation of EU legislation must be significantly improved.

Are we facing a sixth mass extinction?

Despite these efforts, concerns remain over whether this action comes too late. Is our nature in Europe and elsewhere around the world already facing a new, so-called sixth **mass extinction** wave that will threaten our own human existence as well?

While scientists and experts are divided, concerns are growing that such a mass event has been under way for some years already. The loss of the West African black rhinoceros in the wild received global headlines a decade ago, but many more species, including in Europe[8], have mostly disappeared.

These include the houting, a freshwater whitefish, which used to be found in Belgium, Denmark, France, Germany and the Netherlands, and which those countries are now trying to reintroduce. A further six bird species, including the desert warbler and the northern bald ibis, are considered regionally or totally extinct. Europe's Red List of species believed to be extinct also includes several species of butterflies, mollusks and plants.

The EEA's European environment — state and outlook 2020[9] report (SOER 2020) notes that decades of accelerated social and economic activity have transformed humanity's relationship with the environment. While delivering many benefits, including alleviating suffering and poverty, they have also caused widespread damage to ecosystems.

Similarly, leading United Nations experts have already sounded the alarm bell that our **exploitation of nature, air and water pollution** at the hands of a growing global human population is having a disastrous **impact on our biodiversity**, as is climate change.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) latest Global Assessment, published in 2019[10], estimated that 1 million animal and plant species are threatened with extinction worldwide, many of them thought to be insects. The report notes that it is not too late to reverse the situation if we move quickly to cut **greenhouse gas emissions**, which fuel climate change, and **stop the exploitation of natural resources**.

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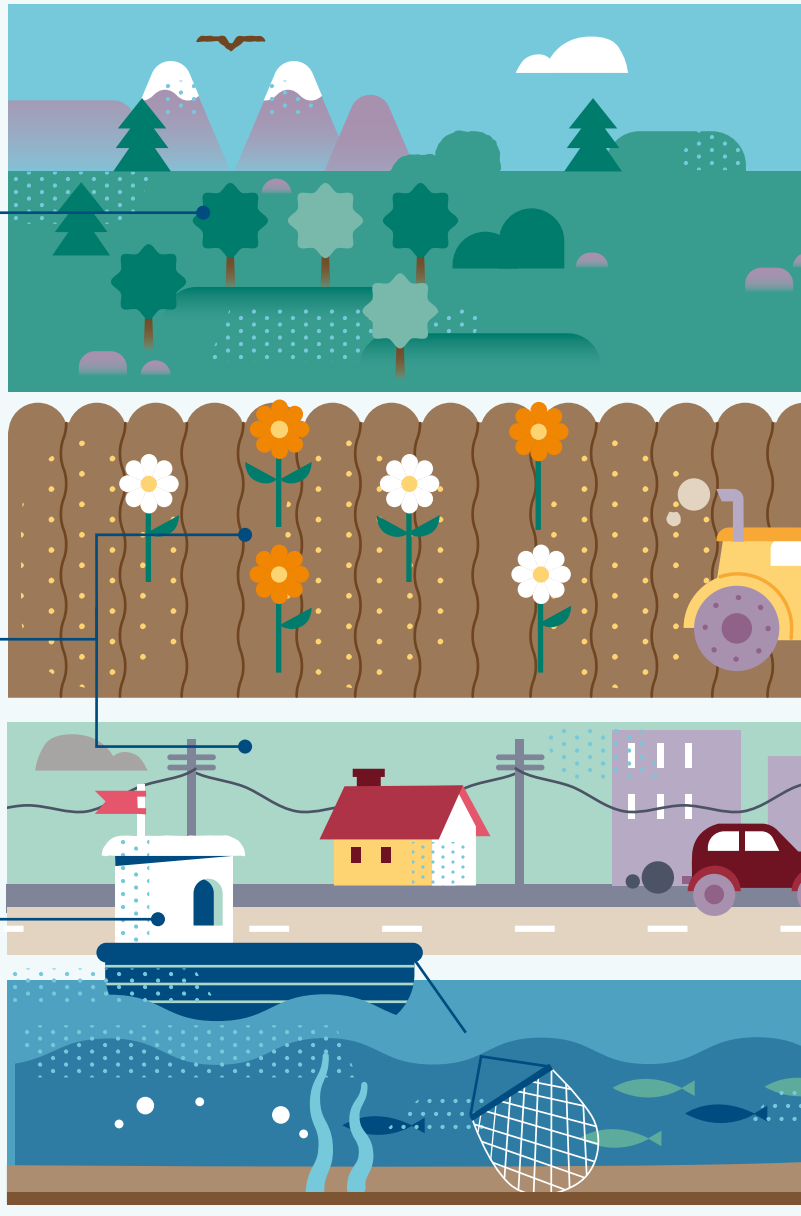
State of nature in the EU

The EEA's latest 'State of nature in the EU' report shows alarming results from the 2013-2018 reporting period. Many species and habitats in Europe face an uncertain future unless urgent action is taken to reverse the situation.

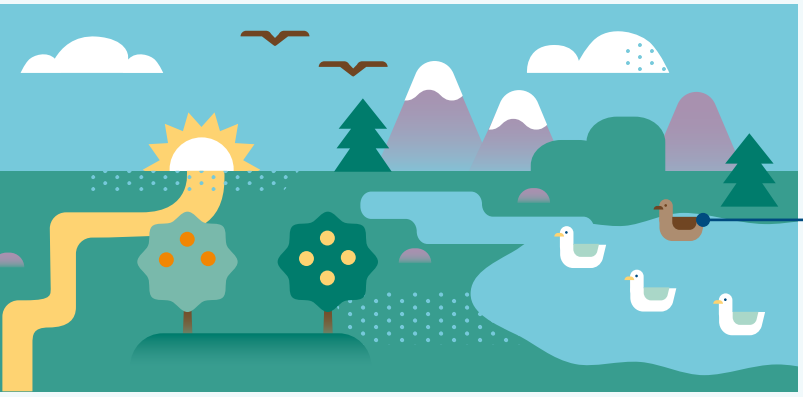
Climate change is rising threat, especially due to droughts and lower precipitation

Agricultural activities, land abandonment and urbanisation are the major pressures for habitats and species followed by pollution

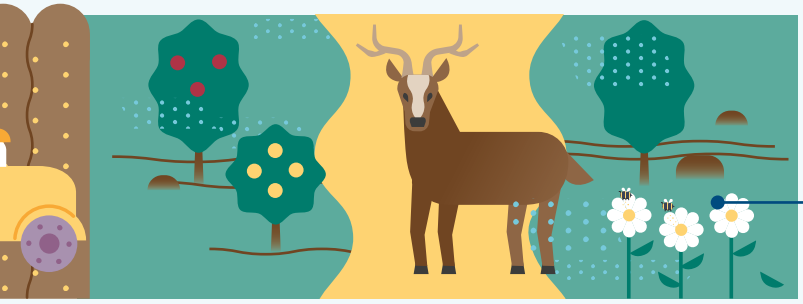
Status and trends of **marine species and habitats remain** largely unknown



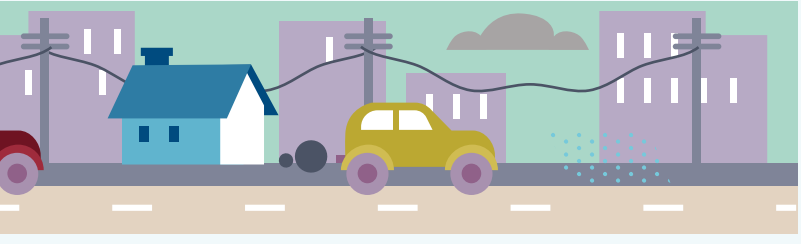
Source : State of nature in the EU, EEA Report No 10/2020.

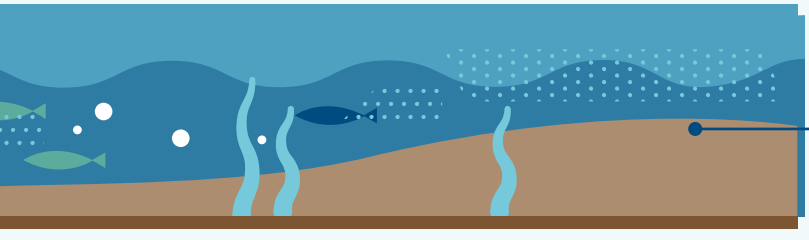


- Nearly half of the **bird species** have a 'good' population status, but **farmland birds** show least improving trends
- **Illegal killing and hunting** are the biggest overall pressures for migratory birds



- **Habitats** important for pollinators have a worse conservation status and trends than other habitats
- Only 14 % of **habitats** assessments and 27 % of **non-bird species** have a 'good' conservation status
- **Forests** show most improving trends and **grasslands**, **dunes** and **bogs** the most deteriorating trends





Natura 2000 sites cover 18 % of land and 10 % of marine waters in the EU

COVID-19 and nature

The exact cause of the coronavirus outbreak is still unknown, but evidence points to COVID-19 being a disease that jumped from animals to humans. Three quarters of new and emerging infectious diseases are transmitted to humans from animals[11], and the emergence of such pathogens, especially outside Europe, is linked to intensified agriculture, environmental degradation and human interaction with animals in the food system.

Beyond the causes of the pandemic, the resulting lockdowns have given us a rare glimpse into a world with significantly decreased economic activity and mobility. In Europe, many anecdotal stories were shared about the apparently changing behavior and distribution of wildlife, reinforcing our knowledge of nature's ability to return and recover quickly in the absence of human influence. What have been clearly quantified are significant improvements in air and water quality, which may have a positive impact on animals and ecosystems.

An increased desire to spend time in nature during the pandemic has also been reported in studies. During lockdowns, people sought refuge and recreation in forests, parks, beaches and other open areas, sometimes discovering amazing nature close to their homes. This may help people appreciate nature better, but it may also increase pressure on protected areas. What is certain is that we must take this opportunity to study and learn from the causes, effects and impacts of the pandemic on us and also on nature.

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Interview

Petr Voříšek

Member of the coordination team of the European Breeding Bird Atlas 2, Czech Society for Ornithology

Vital role of bird monitors

Monitoring wildlife and habitats plays a key role in expert assessments. We spoke with Petr Voříšek, member of the coordination team of the European Breeding Bird Atlas 2 at the Czech Society for Ornithology, about how such information and data are put together on a European scale and what challenges bird populations face today.

What work do you do specifically?

I am involved in two international initiatives in bird monitoring: the second European Breeding Bird Atlas (EBBA2) and the Pan-European Common Bird Monitoring Scheme (PECBMS), both organised within the European Bird Census Council (EBCC). My position is hosted by the Czech Society for Ornithology (CSO).

The **European Atlas** was published as a book in December 2020, but the work is not over. We are busy with an online version, making the outputs available to research and conservation and building capacity for bird monitoring in European countries where it is needed. The latter is closely linked to the PECBMS, but setting up a representative and sustainable bird monitoring scheme is a challenge, and we need more monitoring systems, especially in southern and eastern parts of Europe.

How does your work contribute to the assessments done by the EEA?

The **wild bird indicators** produced by PECBMS are directly used by the EEA. Together with the population index of grassland butterflies, the population index of common birds in Europe contributes to the EEA's set for the indicator 'Abundance and distribution of selected species in Europe'[12].

The outputs of our work have been used in the **State of nature in the EU** report and other publications. We have been in regular contact with colleagues in the EEA and coordinate our efforts and the feedback from the EEA is extremely important. Recently, we started exploring how the atlas data (EBBA2) can contribute to the work of bodies like the EEA.

How did you get interested in this area of work?

Probably as many other ornithologists, since my childhood I have been interested in birds, nature and conservation. I studied zoology at the Charles University in Prague where I did my Master's degree and PhD on buzzards. Then I took an opportunity to work for the CSO as a director, where I was the only paid employee at the time.

The link between scientific knowledge and policy is the main issue that keeps me interested in large-scale bird monitoring and atlas work. Working with diverse people, various methodological approaches and cultural differences make this kind of work exciting too. I also appreciate fieldwork, which, although not automatically part of the job, is the key issue that helps to understand the data and the needs of the fieldworkers and makes one happy.

How do you assess a species' health?

The main output of our work is collecting information about the changes in the **abundance of birds** and their **distribution**. In other words, where the birds are, how many there are and how these two parameters change. It is a long process that starts with standard fieldwork following a strict methodology.

It is not possible to cover Europe with professional fieldworkers only. But ornithology takes advantage of a crowd of amateur ornithologists or birdwatchers, who know birds and are keen to follow the methodology. Thanks to them, we can get the data from all of Europe in EBBA2 and from 28 countries in PECBMS.

The fieldworkers have to survey birds at prescribed sites, which are often selected in a randomised manner in order to ensure that the sample is representative. The observer counts all birds seen or heard at their site and records other characteristics, helping better assessment of the data at specific day times and dates.

Recordings for the distribution atlas also require information about the **probability of breeding**. Most of the surveys are done in early morning hours, when many birds are most active in spring, but some species are surveyed in the evenings, too. Then, the fieldworkers send the data to the national coordinators, who perform data quality checks and submit the data to the European coordinators.

How does this monitoring help governments in taking action?

Information about bird distribution and abundance helps decision-makers to prioritise management and conservation actions. The information about population trends and changes in the distribution serves as a signal of the health of bird populations and of the wider environment.

Monitoring outputs are regularly used in an assessment of a conservation status of species, including the European Red List categorisation. Changes in abundance and

distribution of groups of species, such as farmland birds, provide signals about the health of a particular habitat type or the impact of a large-scale phenomenon like climate change.

Linking the monitoring data with environmental or other variables can tell us more about forces driving the trends; it can help to shape management practices too.

How do environmental degradation and climate change impact bird life?

The changes in European landscapes and climate are sometimes dramatic and they affect bird populations. However, the **impact is not uniform**: some species benefit from the changes, others do not. Overall, however, it appears that there are more losers than winners.

Intensive land use is leaving less resource for birds — this is the main human pressure. This is particularly evident for farmland and birds using this type of habitat. Intensive agricultural practices, including **excessive use of pesticides** and **fertilisers**, **heavy machinery** or **removal of fallow land**, makes modern farmland less and less suitable for birds and other wildlife.

Overall, the **homogenisation of agricultural fields** has a negative effect on biodiversity. The **farmland bird index** in Europe declined by 57 % between 1980 and 2018[13] and the distribution range of the farmland birds as a group shrunk in the last 30 years in Europe (EBBA2). Regionally, we also see a negative effect of **intensive forestry**, **land abandonment** or **intensive use of inland wetlands**.

Breeding ranges are moving north. We observe a 28 km shift of the centres of the distribution range northwards on average. Although not all these changes are caused by climate change, the effect is obvious. We also detect the impact of climate change on bird populations: species with a preference for colder climates are declining and those that prefer warmer climates are increasing.

Can we still turn things around for the better?

We have documented **positive trends** in distribution of several protected species for which conservation measures have taken place (for instance white-tailed sea eagle or white stork). Also, in PECBMS we have shown that conservation can work, and especially Natura 2000 sites can be beneficial, also for non-target species. This suggests that conservation can reverse negative trends.

The problem is that we still don't do enough, partly because of limited resources and partly because traditional conservation approaches (especially protected species, nature reserves) are not sufficient to help biodiversity in the wider countryside.

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What can citizens or even hobby bird watchers do to help protect birds and their habitats?

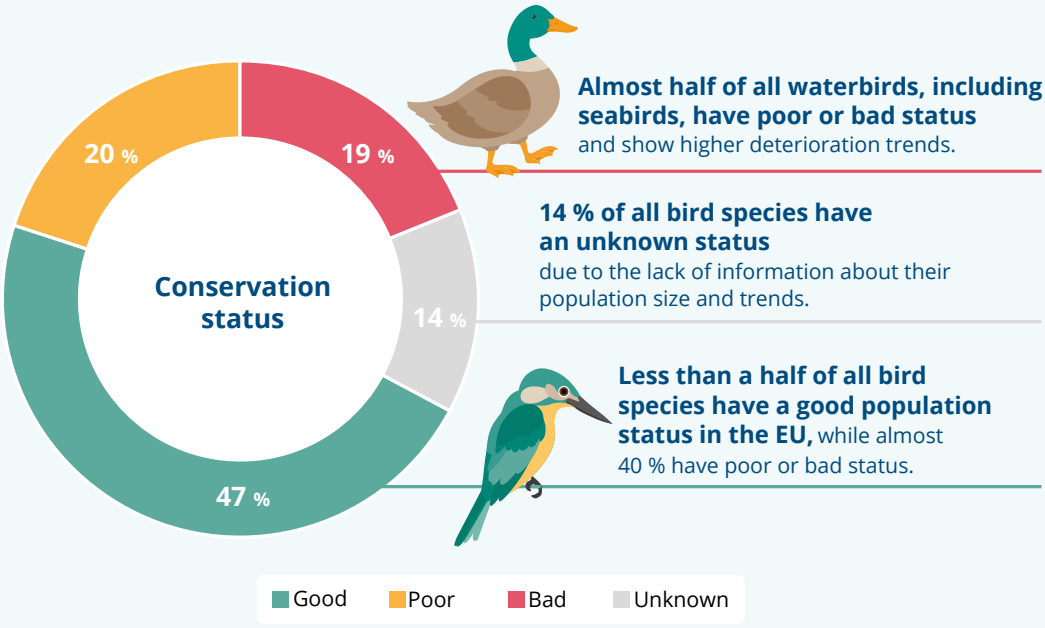
Birdwatchers are key factors for a knowledge-based conservation of birds and biodiversity. They help as **volunteer fieldworkers** taking part in atlases and bird monitoring: in EBBA2, some 120 000 fieldworkers contributed data, 35 000 providing highly standardised survey data. In PECBMS, around 15 000 fieldworkers take part in bird counts.

We would not have had such knowledge without these skilled people — they are absolutely essential. In principle, everybody can help — even observations of single species, including those easily identified (like the white stork), can help informed decision-making. With the recent development of online portals organised within the EBCC initiative EuroBirdPortal[14] and the development of mobile apps enhancing recording and submitting the observations, it is easier than ever before.

Many birdwatchers participating in bird monitoring schemes and atlases are also active at a local level in conservation. As they know sites where they survey birds, they often serve as guardians of the sites and initiate interventions if the sites become threatened. Their **local knowledge** is a big asset for conservation at the local level too.

Conservation status and short-term trends in bird populations

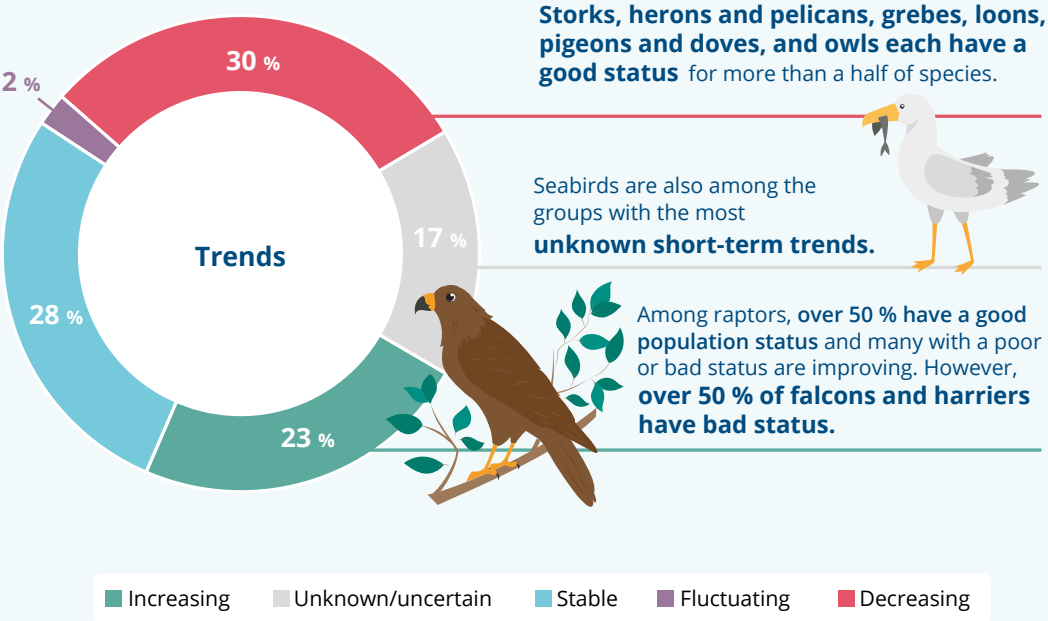
Less than half of all bird species have a good population status in the EU.



Almost half of all waterbirds, including seabirds, have poor or bad status and show higher deterioration trends.

14 % of all bird species have an unknown status due to the lack of information about their population size and trends.

Less than a half of all bird species have a good population status in the EU, while almost 40 % have poor or bad status.

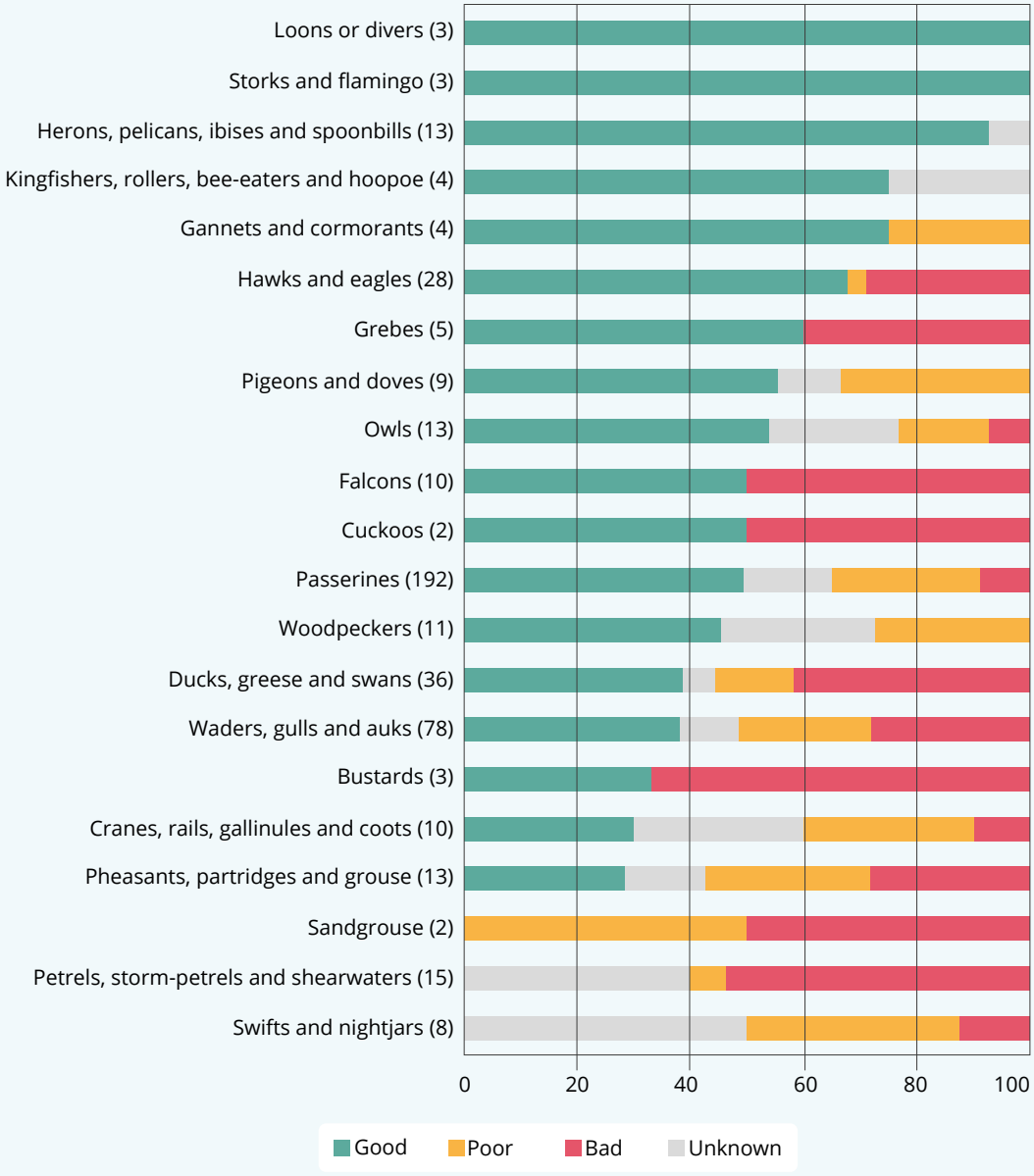


Storks, herons and pelicans, grebes, loons, pigeons and doves, and owls each have a good status for more than a half of species.

Seabirds are also among the groups with the most **unknown short-term trends.**

Among raptors, **over 50 % have a good population status** and many with a poor or bad status are improving. However, **over 50 % of falcons and harriers have bad status.**

Population status of EU bird species and subspecies, by taxonomic order (%)



Note : The total number of all species is 463. The number of taxa concerned is shown in parentheses.
Source : State of nature in the EU, EEA Report No 10/2020.

What is harming Europe's nature?

European nature is suffering the consequences of long-term exploitation and pollution. Nature keeps providing us with food, clothes, medicines, housing, energy and other resources, but ecosystems and many plants and animals are in decline, sometimes being pushed to extinction. What are the human activities that harm nature the most and how can we stop and reverse current biodiversity loss?

We humans are the species that has changed the Earth like no other species. We have had a major impact on almost all other species that share the planet with us and on their habitats. Europe, as one of the most densely populated areas on Earth, is no exception.

Agriculture puts the biggest pressure on nature

Almost 40 % of the EU's land is used for growing food, according to Eurostat[15]. While traditional agriculture allowed a diverse range of animals and plants to coexist with crops, changes in agricultural practices since 1950, in the direction of intensification and specialisation, have contributed to a high degree of biodiversity loss. According to the EEA's State of nature in the EU report[16], the increased use of fertilisers, irrigation and pesticides and the intense modification of the land are key pressures on local animals and plants, and especially on birds.

Pollution by pesticides used in agriculture is the main cause of the worrying decline in the number of insect-eating birds and farmland birds.

One of the most important pressures is the **ceasing of traditional grassland management**. Pollinators, such as bees, bumblebees and butterflies, are highly affected by it. **Fragmentation of the land** and **drainage**, for agricultural purposes, destroy the habitats where birds, reptiles and small mammals used to feed, find shelter and breed.

Europe's ecological footprint in the world

Europeans' ecological footprint far exceeds what Europe's ecosystems can supply. This has negative consequences for the environment within and outside Europe.

European production and consumption, which is higher than the global average, contribute to environmental degradation in other parts of the world. For example, more than half of Europeans' land and water consumption footprints occur outside Europe[17], including those due to goods imported into the EU and consumed by Europeans.

According to the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES)[18], about 75 % of the terrestrial environment and 40 % of the marine environment are severely altered globally.

As the world's biodiversity is declining, and the global ecological footprint is already exceeding biocapacity, Europe's ecological deficit may result in the depletion of natural capital, biodiversity loss and ecosystem collapse in other parts of the world.

However, as the EEA's European environment — state and outlook 2020 report[19] notes, the EU can play a positive role in responding to these global challenges through its economic, diplomatic and trade links and its leadership in environmental governance. Moreover, European product standards and business practices can have positive effects well beyond Europe's borders.

Pollution of water, air and soil

We often link pollution to industry, transport and energy production, which are important sources, but almost 50 % of the pressures on nature related to pollution come from agricultural emissions to air, water and soil. **Pollution by pesticides** used in agriculture is the main cause of the worrying decline in the number of insect-eating birds and farmland birds. Pesticide pollution also affects amphibians, such as frogs, toads and salamanders, insects and small mammals, including bats, hamsters and the European ground squirrel.

Similarly, pesticides and fertilisers have negatively affected about 80 % of the 576 butterfly species that live in Europe[20]. Agriculture is also a major source of pollution for surface water and for groundwaters, affecting many ecosystems.

Pollution from agriculture is one of the main problems to be tackled by the EU biodiversity strategy for 2030 and the **EU's farm to fork** strategy, which aims to reduce the use of chemical pesticides by half and to promote less intensive farming practices, including at least a 20 % reduction in fertiliser use.

Fragmenting and damaging habitats

Urbanisation is another serious pressure on nature, but, perhaps surprisingly, most of the damage no longer comes from converting nature areas to urban territory (11 % of the pressures in this field, according to the EEA's State of nature in the EU[21]) but instead from sports, tourism and leisure activities (25 % of urban pressures). However, construction and modification within urban areas also affect many species that are used to living in urban habitats (accounting for about 10 % of urban pressures).

Moreover, roads, railways, dams and other infrastructure also fragment habitats and destroy landscapes. Traffic disturbs and kills wildlife. Soils, as important reservoirs of biodiversity, are damaged when they are sealed with buildings, asphalt or concrete.

Much of the European coastline is modified for **tourism**, leaving little space for intact marine and coastal habitats. Water birds, such as ducks, geese, herons and grebes, and threatened raptors, such as the Egyptian vulture and the bearded vulture, are severely affected when their nesting areas are destroyed.

Unsustainable forestry, hunting and overfishing

Almost all of Europe's forests have been transformed by human interventions. Even after reforestation, the nature of human-managed forests is different. For example, the habitat can be negatively affected if there are fewer trees of different species and ages.

The **removal of dead and old trees** and the **reduction in old-growth forests** affects many species of insects, birds, amphibians, reptiles, bats and small mammals, such as the western barbastelle, the Caucasian squirrel and the forest dormouse.

Despite all the protection measures, we still see local deforestation and clearcutting[22] without new trees being planted in Europe.

At least 52 million wild birds are hunted by humans every year in Europe, according to research that covers 26 European countries[23]. Moreover, illegal killing is threatening many species, particularly birds and mammals, while feral and free-ranging cats and dogs present an additional threat.

Fish are affected by harvesting, as are marine mammals, such as the short-beaked common dolphin and the harbour porpoise, which sometimes fall prey to bycatch.

Even when we try to enjoy nature, we may unwillingly harm habitats and species around us. Many recreational activities, such as **outdoor sports**, **leisure aircraft**, **drones**, **human trampling** and **unregulated wildlife watching**, can be very damaging to nature.

Aliens are taking over

Sometimes intentionally, sometimes by accident, Europeans have brought new plants and animal species to the continent. These new species are sometimes taking over habitats and disturbing ecosystems, which is why they are called **invasive alien species**.

Some of the most damaging invasive aliens are **American mink**, **coypu** and **raccoon**, which have become predators of European birds, and **Reeves's muntjac**, which browses understory habitats. The comb jellyfish, first introduced into the Black Sea through ships' ballast water, has devastated certain fish populations.

There are also alien species of plants that are taking over from local ones. False indigo-bush, Japanese knotweed and Himalayan balsam are just some examples.

Climate change — the main emerging threat to nature

Climate change is already affecting life in Europe, with increased temperatures, droughts, changes in rain patterns, wildfires and less snow. It is seen as an emerging threat to European species, and it will affect more and more animals and plants.

We are witnessing **local and regional extinctions** of species, as well as a move of the species northwards and uphill. Amphibians, birds and bats are the most affected species by droughts and changes in rain patterns.

The EEA's European environment — state and outlook 2020 report[24] warned that ocean warming, acidification and deoxygenation continue to worsen, endangering marine habitats.

To mitigate climate change, we need to produce energy in a sustainable way. Europe is leading the efforts towards decarbonisation, aiming to be **carbon neutral** by 2050. This is a critical goal but, in some cases, development of **renewable energy** can harm habitats and species. For example, wind turbines can create a threat to bats and birds, which can collide with the blades, and dams can block the passage of sediments and migratory fish.

It is crucial, therefore, that all measures towards decarbonisation are taken in a coordinated manner with biodiversity policies, to **minimise the impacts** on animals and habitats. There are many good solutions that benefit both climate and nature, such as improving the state of soils.

The factors described above are the most serious pressures on nature, in Europe, but they are not the only ones. **Noise** and **light pollution** coming from human activity also harm many species. There are many issues to tackle, but what is clear is that humans must learn again how to give space for nature to thrive. Failing to do so urgently could have consequences we cannot reverse.

What are the main pressures on Europe's nature?

Europe's biodiversity continues to be shaped by human activity. Pressures to habitats and species remain high and more than 67 000 individual pressures have been reported at the EU level.

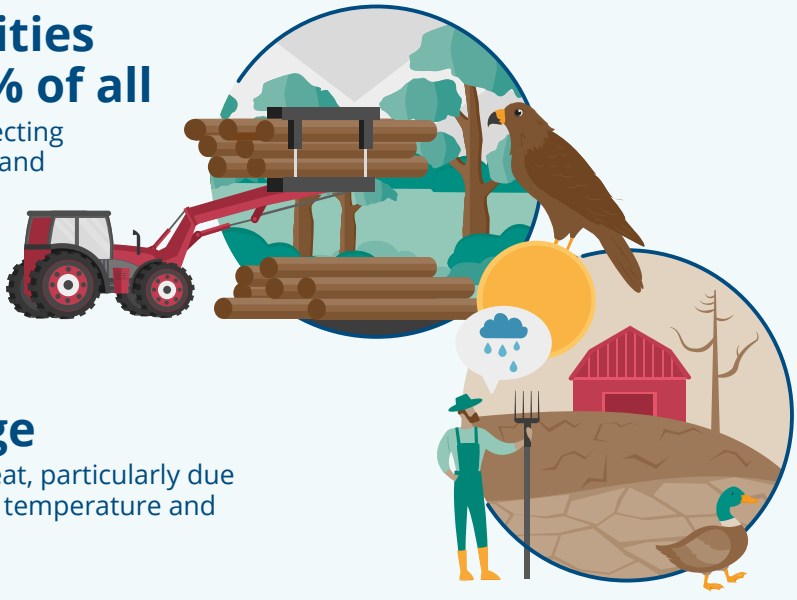
With 21 %, agriculture is

the most frequently reported pressure for habitats and species.

Abandonment of grasslands and intensification is particularly impacting pollinator species, farmland birds and semi-natural habitats.

Invasive alien species

such as the False Indigo-bush, particularly affect dunes and sclerophyllous scrubs as well as species such as breeding seabirds.



Forestry activities represent 11 % of all

pressures, particularly affecting forest habitats, and woodland species.

Climate change

is reported as a rising threat, particularly due to ongoing changes in the temperature and decrease of precipitation.

Source: State of nature in the EU, EEA Report No 10/2020.

Urbanisation and leisure activities account for 13 % of all reported pressures, representing

48 % of all marine pressures.

The modification on water regimes, physical alterations of water bodies and removal of sediments predominantly affect

freshwater habitats and fish.

13 % of all pressures

for birds stem from the exploitation of species, mainly relating to illegal killing and hunting.

In Europe, the annual hunting bag amounts to at least **52 million birds.**

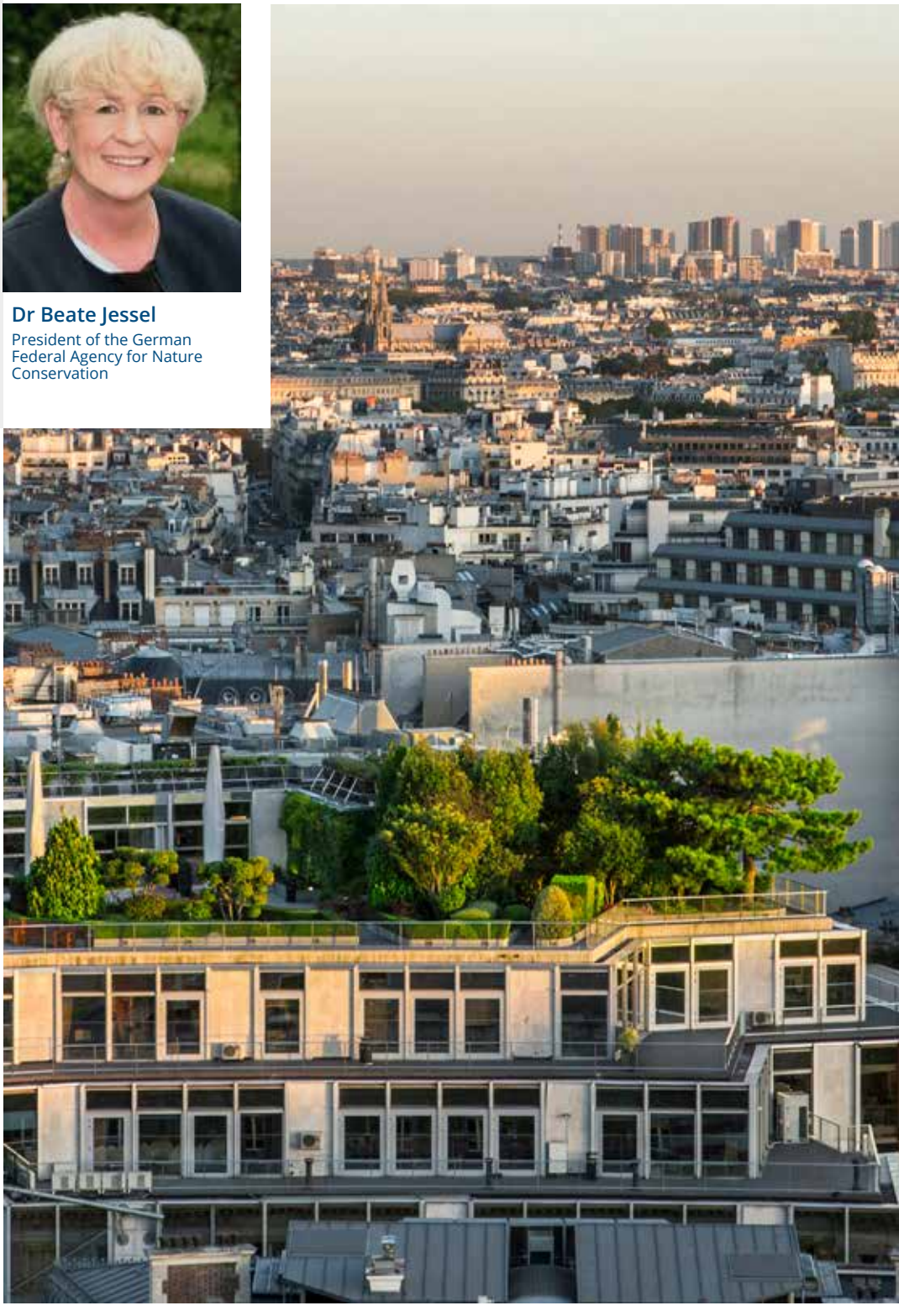
Almost 50 % of all pressures related to pollution

can be attributed to air, water and soil pollution caused by agriculture.

Interview

Dr Beate Jessel

President of the German Federal Agency for Nature Conservation



Protecting nature in a changing climate: our actions must focus on resilience

From changes in species habitats and communities to water availability and flowering seasons, climate change impacts ecosystems and biodiversity. We asked Professor Dr Beate Jessel, President of the German Federal Agency for Nature Conservation, about the links between biodiversity and climate change and what could be done to boost nature's resilience in a changing climate.

How does climate change impact nature?

Climate change is introducing major **changes to the living conditions** of many species through rising temperatures, changes in precipitation distribution and more frequent extreme weather events such as heavy rain, storms, heat waves and droughts. This results in a shift in the **ranges** of many species and changes in their **seasonality** and the composition of **species communities**. As a result of the lower climatic water balance in summer, species in wetlands and water bodies are particularly endangered. Even deciduous trees were severely damaged or affected by the summer droughts of 2018 and 2019 in Germany.

For some species that previously occurred together in the same habitat, such as the butterfly scarce large blue (Phengaris teleius) and the prey species of its caterpillars, the great burnet (Sanguisorba officinalis), their respective climatically suitable habitats are shifting to different locations. This leads to a **spatial decoupling** and thus to a decline in the butterfly population. Similarly, **temporal decoupling** also occurs, for example when insects start to fly earlier before the flowers they feed on are in blossom, or in the case of the cuckoo, whose host birds start breeding earlier than the cuckoo's return from its winter quarters. Furthermore, species from warmer regions, including those with invasive potential, can immigrate and change the relationship structure between the species.

Can nature provide us with solutions to address some of these impacts?

Nature has a great potential to counteract the impacts of climate change. And there are plentiful '**nature-based solutions**' that not only support **climate adaptation** but also provide multiple synergies. **Floodplain** restoration projects, for example, effectively decrease water levels in rivers in extreme flood events and moreover contribute to nutrient retention.

The restoration of **salt marshes** helps to protect coasts in temperate zones, while in tropical coastal regions flooding impacts can be massively reduced through the restoration of **mangroves**. Similarly, the rewetting of **peatlands** can lessen drought effects. If such nature-based solutions are applied thoughtfully, they can combine significant socio-economic benefits with a net gain for nature and biodiversity.

Globally, nature-based solutions are already an important component to address climate change impacts. We have knowledge, data and tools on hand for their implementation.

What is needed to boost nature's resilience to climate change?

To enhance nature's resilience to climate change, a coherent and well-connected network of protected areas is needed. The European Natura 2000 network of protected areas is an important backbone for the conservation of species and habitats.

These protected areas must be made '**fit for climate change**', so that they can continue to fulfil their function. This means that **existing pressures**, for example due to intensive land use, such as high nutrient and pesticide inputs and disturbances of the water balance, must be reduced both inside and outside protected areas. However, the resilience of protected areas must also be enhanced through additional **preventive measures**, such as improved water management within the area and at landscape level.

In order to provide alternative habitats with suitable (micro)climatic conditions for sensitive species and to enable these species to reach these habitats, protected areas need to be enlarged to include a wider range of altitudes and exposures, and their connectivity needs to be improved. Besides, protected areas must be subject to **adaptive management** in order to be able to adjust protection goals to match the timing of climate change-induced changes.

It is equally important to consider land use as a whole. Forestry and agriculture have to adjust their management concepts to mitigate the adverse effects of climate change. For example, current silvicultural management concepts, control instruments and planning approaches need to be revised so that they can better meet the challenges of climate change. More emphasis has to be put on **enhancing the self-organising capacity** of ecosystems, for example by preventing the introduction of invasive alien species, using native tree species or applying close-to-nature management concepts.

Last but not least, there is need for a stronger focus on **urban nature**, for example by building up networks of blue-green infrastructure to adapt to a changing climate.

Based on your experience, what kind of challenges do you see?

Although climate protection currently is gaining political importance, we must not forget that climate mitigation, adaptation and biodiversity conservation issues must not be set against each other.

The energy transition in Germany is a good example of the opportunities but also the challenges of simultaneously reducing energy demand, developing renewable energy sources and considering nature conservation aspects. We need to **exploit the synergies** that arise from **combined actions** against climate change and biodiversity loss.

For example, the protection and sustainable management of **forests and grassland** offers both: ecosystem services such as carbon storage and biomass for material and energetic production. If we focus unilaterally on short-term climate mitigation measures, such as maximising biomass output for fossil energy substitution, we may jeopardise the biodiversity of our forests and thereby probably reduce their capability to adapt to climate change.

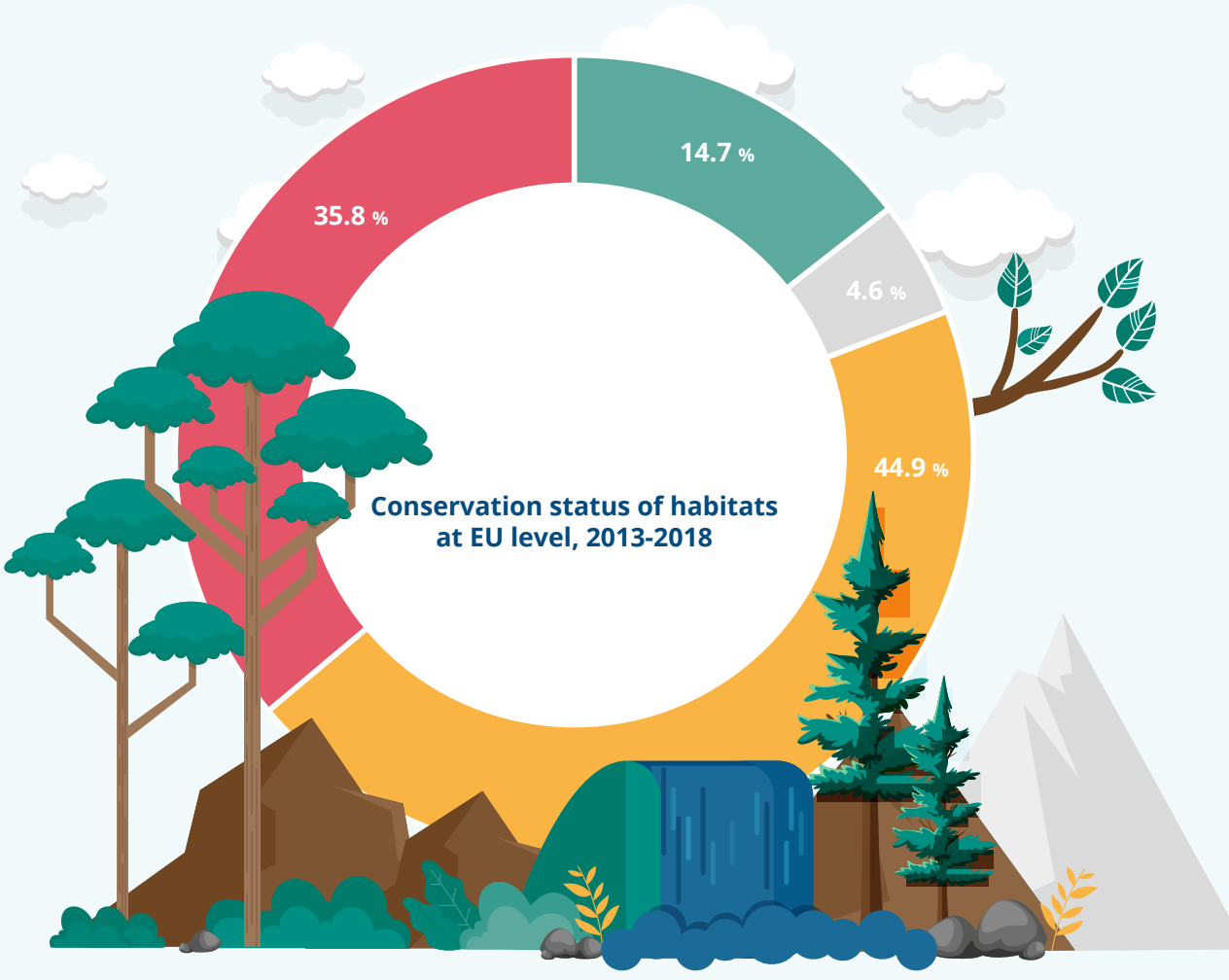
Nature conservation and sustainable management strategies need to better take into account the dynamics and unpredictability of climate change and the complex responses of ecological systems to such changes. This means that nature conservation needs to move away from its traditional focus on the preservation and protection of rigid objects and must increasingly allow **dynamic processes** and promote the **resilience** of ecosystems. In the case of forestry, this entails moving away from the traditional, anticipatory management paradigm towards a more process-oriented **gradual and adaptive nature** paradigm.

Are there initiatives that have succeeded in boosting nature's resilience?

Various **floodplain restoration projects** have been very successful in terms of strengthening the resilience of ecosystems to the consequences of climate change, such as the large-scale nature conservation project 'Mittlere Elbe' and the floodplain restoration project on the Elbe in the area 'Hohe Garbe'. Large floodplain areas were reconnected to the Elbe through a dyke relocation or a dyke slit, and today they are once again subject to a **near-natural flooding** regime.

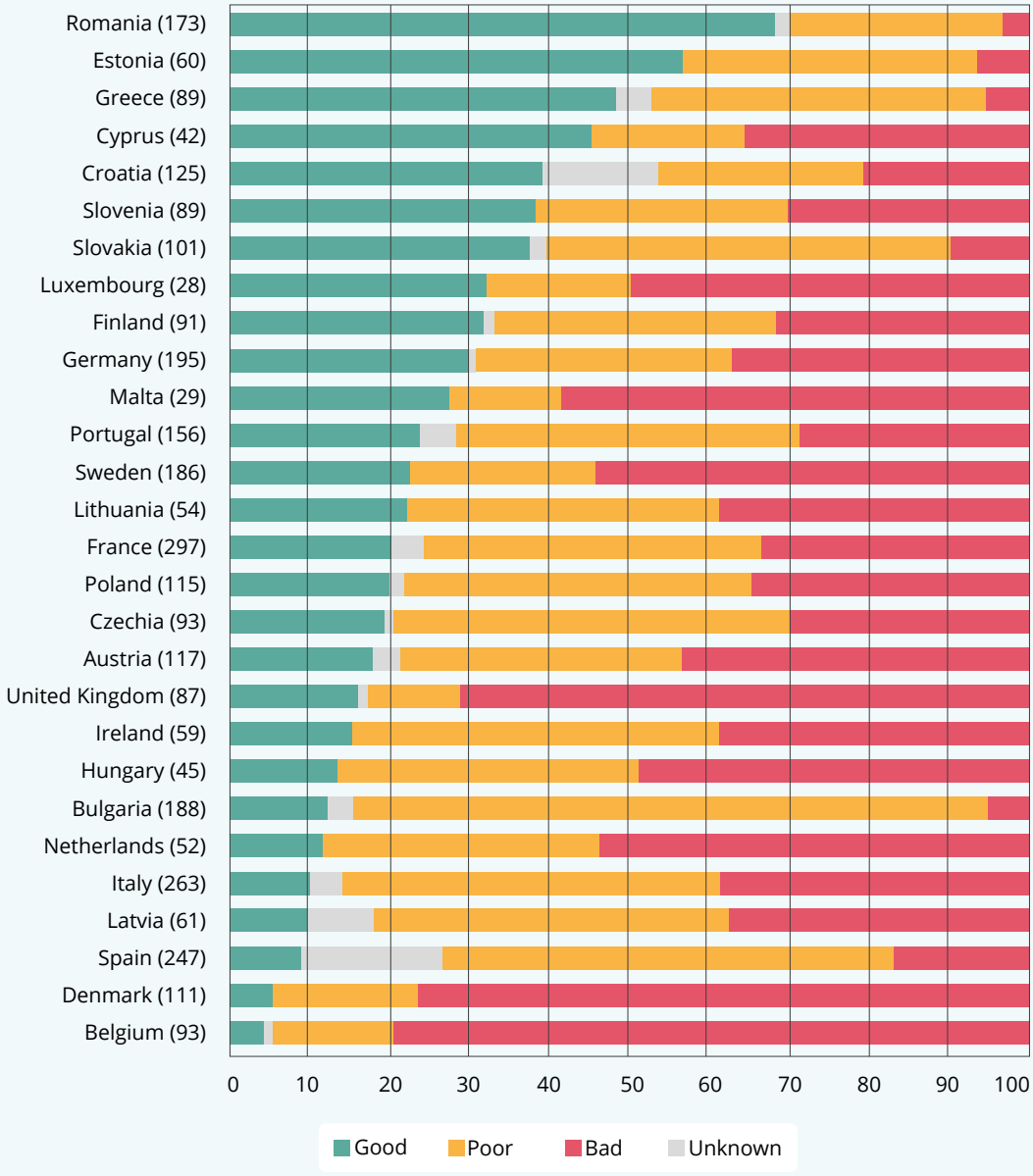
Not only have these measures increased the flooding area and thus the retention area of the Elbe, which leads to a lowering of the water head during flood events, but these habitats have also become more resilient to droughts and dry periods.

State of nature in Europe: Habitats



Note : The figure shows the conservation status of habitats at EU level. Statistics are based on the number of EU habitats assessments (818).
Source : State of nature in the EU, EEA Report No 10/2020.

Conservation status of habitats at Member State level, 2013-2018 (%)



Restoring the natural world

Europe has set ambitious policy goals to allow nature to recover and flourish, increasing the benefits to society of a healthy natural world. From protected areas and green and blue infrastructure to restoration, rewilding and using nature-based solutions to climate change, much needs to be done to reverse the deterioration in the health of nature.

Protecting nature is the first step. Biodiversity in Europe continues to decline but there have recently been positive developments for forests, mammals and birds, which are benefiting from conservation measures.

Currently, conservation efforts for more than 2 000 species[25] are covered by EU legislation such as the Birds and the Habitats Directives[26]. At the heart of these directives is the EU's Natura 2000 network[27] of protected areas, the largest of its kind in the world. It makes up 18 % of the EU's land area and 8 % of its marine territory.

Some of the most valuable and threatened species and habitats in Europe are protected by Natura 2000. **Protected sites** contain **breeding and resting places** for rare and threatened species, while some rare habitats are designated as sites in themselves.

The target of the new EU biodiversity strategy[28] is to increase the protected area to at least 30 % of EU land and 30 % of surrounding seas by 2030. Primary and old-growth forests and other carbon-rich ecosystems, such as peatlands and grasslands, will be the focus of conservation efforts.

Moreover, the strategy calls for planting at least **3 billion trees** by 2030 to support biodiversity and ecosystem restoration. More forests will also be managed to promote biodiversity-friendly practices.

Joining the dots

Developing the **Trans-European Nature Network** by enlarging protected areas to meet the 30 % target is part of the biodiversity strategy. Many Natura 2000 protected areas are already connected[29] by natural and semi-natural landscapes that provide ecosystem services, such as pollination, soil fertility, flood control and recreation, and are essential for climate change mitigation and disaster risk. The Emerald Network of Areas of Special Interest[30], to which the EU contributes via Natura 2000, also supports the same efforts. Together, these areas form a **green infrastructure** network across Europe. Studies suggest that nature is better protected inside this network, which contains a greater area providing the required services and experiencing fewer ecosystem pressures.

However, **barriers** such as roads, railways, urban areas and agricultural land **fragment the landscape**, limiting the movement of species and hindering the network's development. Increasing the connectivity of the network helps ensure that habitat conditions are improved, biodiversity decline is prevented and ecosystem service delivery is boosted.

Free-flowing water

Barriers hinder the health of Europe's water bodies. There are **over 1 million barrier**s on **European rivers**, including dams, weirs and sluices. Most are small and obsolete. They contribute greatly to the poor state of nature in our rivers, as many species require rivers to be free-flowing to thrive and currently the movement downstream of sediment is prevented, causing blockages and altering habitats.

The biodiversity strategy aims to restore at least 25 000 km of free-flowing rivers by 2030 by removing barriers, constructing bypasses for migrating fish and re-establishing the flow of sediment[31]. By October 2020, almost 5 000 dam removals had been recorded in Europe, based on data from 11 countries[32]. Restoring floodplains and wetlands is also an important element of this work.

Call of the wild

While the above solutions require intensively managed processes to restore nature, **rewilding** is a newer, more natural approach. By identifying spaces where natural processes are encouraged, it allows nature to heal so that it can start to manage on its own again. Initiatives such as Rewilding Europe[33] are working to increase Europe's biodiversity in this way.

Today there are eight large rewilding areas in Bulgaria, Croatia, Germany, Italy, Poland, Portugal, Romania and Sweden. These are home to various rewilding projects including the re-establishment of free-roaming populations of European bison[34] in Romania's Southern Carpathians and the protection of the black and griffon vultures[35] in the Rhodope mountains in Bulgaria.

Changing human-made systems

The EEA's landmark assessment of the state of Europe's environment[36] showed that, in addition to conservation measures, we need to fundamentally change the way we produce and **consume** food and **energy**, how we develop and experience the **cities** we live in and how we **move people** and **goods** around.

Agricultural activities and other land management practices exert the greatest pressure on nature, with the abandonment of grasslands having a particularly big impact on pollinators, farmland birds and semi-natural habitats. By increasing organic farming by a quarter, reducing pesticide use by half by 2030 and restoring some agricultural land to high-diversity landscapes, we will help restore biodiversity.

Urban green spaces have been used more than ever during the COVID-19 pandemic. Protection of such spaces is increasing, but grey infrastructure still often dominates as urban populations grow. The biodiversity strategy calls on citizens to develop urban greening plans, and to create and connect urban parks, gardens, meadows and farms, as well as install green roofs and walls, and line streets with trees and hedges to allow biodiversity to return. Plans should also aim to eliminate pesticides and, for example, establish pollinator-friendly areas in cities.

Finally, the European Commission has presented a zero pollution action plan[37], T**owards zero pollution for air**, **water and soil**. Goals include a 50 % reduction in nutrient loss by reducing the run-off of nitrogen and phosphorus from fertilisers, while protecting soil fertility. In addition, the farm to fork strategy[38] for a fair, healthy and environmentally friendly food system will also reduce the use of pesticides.

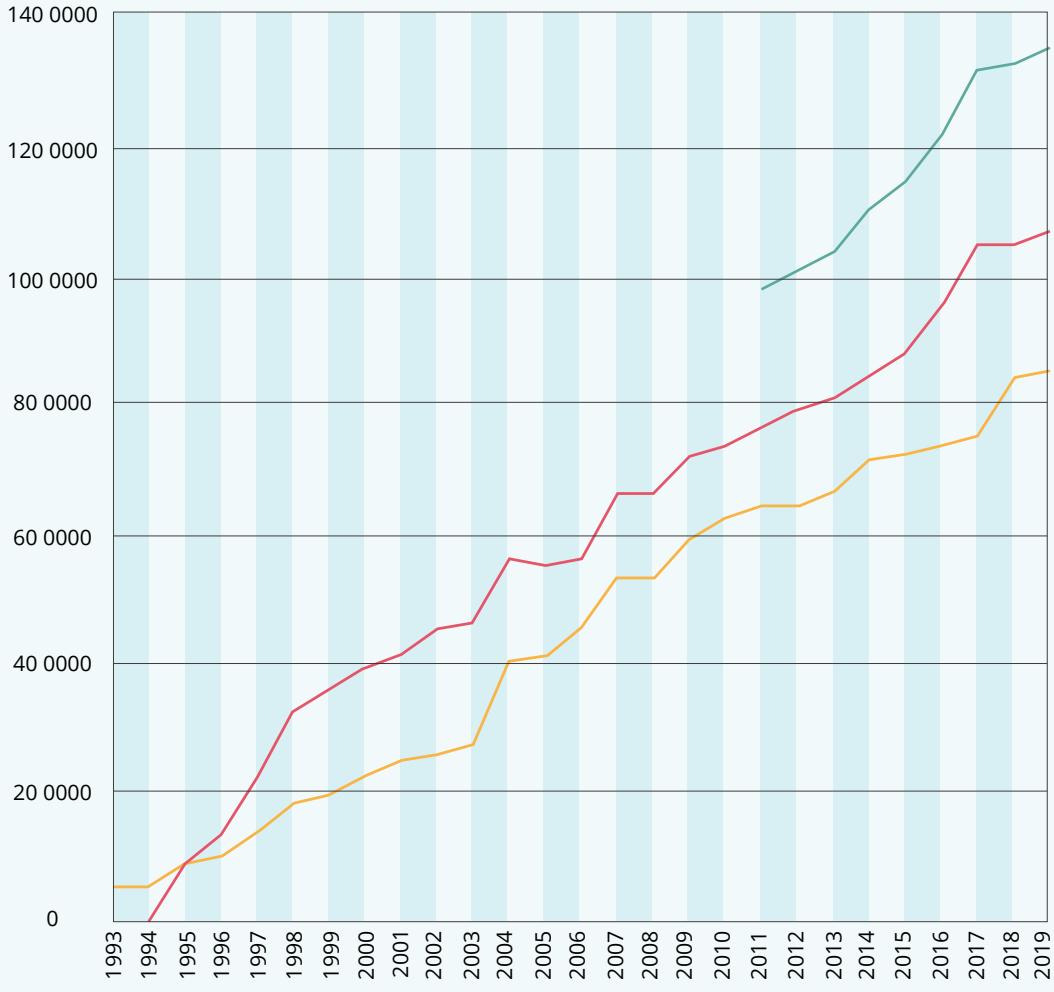
Europe's nature overseas

The EU's outermost regions and overseas countries and territories cover about the same land area as the EU and the world's largest marine territories.

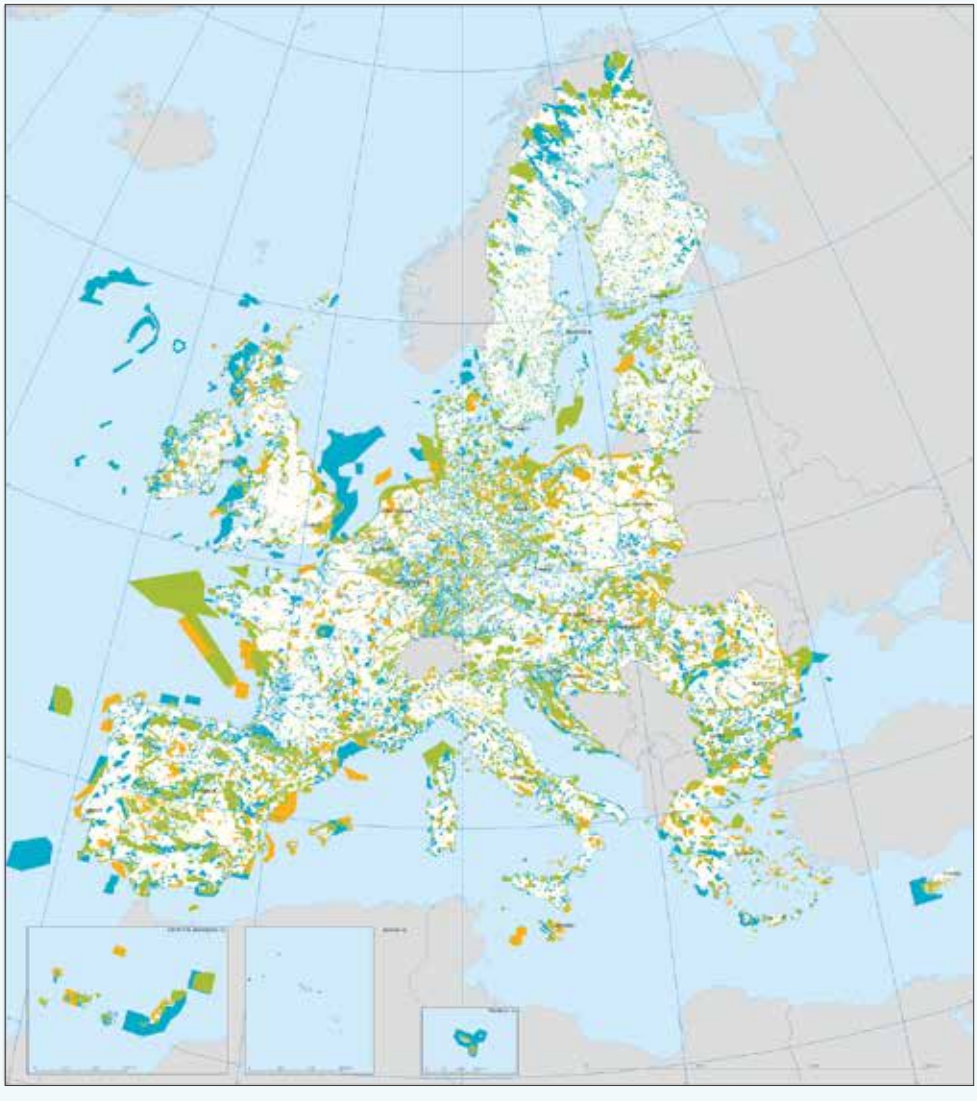
The EU's more than 150 overseas islands host more than 20 % of the world's coral reefs and lagoons and have a very rich biodiversity. However, these island ecosystems are also highly vulnerable to invasive species, human activities and climate change impacts.

The BEST initiative[39] — biodiversity and ecosystem services in territories of European overseas — aims to support the conservation of biodiversity and sustainable use of ecosystem services in the EU outermost regions and overseas countries and territories. Currently, BEST projects support conservation efforts in EU territories around the world, from the Amazonia and Caribbean regions to the Macaronesia and Polar regions.

EU-27 + UK — Area of Natura 2000 sites designated under the EU Habitats and Birds Directives



Note : Since 2005, the area calculation has been based on spatial data. Before 2005, tabular data were used.
Many sites are designated under both the Habitats and Birds Directives. The calculation of the Natura 2000 area, which takes this overlap into account, has only been available since 2011.
Source: EEA indicator assessment: Natura 2000 sites designated under the EU Habitats and Birds Directives.



NATURA 2000 - European Union

- Birds Directive sites (SPA)
- Habitats Directive sites (pSCI, SCI, SAC)
- Sites - or parts of sites - belonging to both Directives

Source : NATURA 2000 - DG ENV, compiled from databases from the Member States. Sources background map: © EuroGlobalMap/Eurogeographics and DG ESTAT, validity of NATURA 2000 data for : Europe, Updated End 2019. Projection : Lambert Azimuthal Equal Area.

Interview

James Vause
Lead economist at
UNEP-WCMC

Economics of biodiversity: can accounting help save nature?

Can putting a value on nature help protect it or do we need new governance models? How is trade linked to biodiversity loss and inequalities? We talked to James Vause, the lead economist at the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), who contributed to the Dasgupta review on the economics of biodiversity, especially to the chapter focused on trade and the biosphere.

What would it take to halt biodiversity loss — putting the 'right' economic value on nature?

A c**ross-cutting understanding** is essential for effective action. This could be on understanding the role of nature in enabling economic activity, the impact of economic activity on biodiversity, the costs and benefits of **policy options** to address those impacts or assessing the multiple benefits of investments in nature. This is what we try to do at UNEP-WCMC. Our work looks at, among other things, protected areas, agriculture, sustainable finance, tourism, trade, infrastructure and the blue economy.

We recently published a paper[40] looking at an enormous quantity of work that has been produced over the last few years. It all points to the need to address the underlying drivers of biodiversity loss outside the conservation sector. We have to change the way we meet human needs and desires, to ensure the world economy operates within the constraints of the planet.

This might require making the **economic value of nature** much more visible and ensuring that it is taken into account. But this is just a part of it. As the Dasgupta review highlighted, a big part of the problem is linked to an **institutional failure** — how we regulate economic and financial activity and also how we measure progress.

What are the points you would like to highlight from the Dasgupta review?

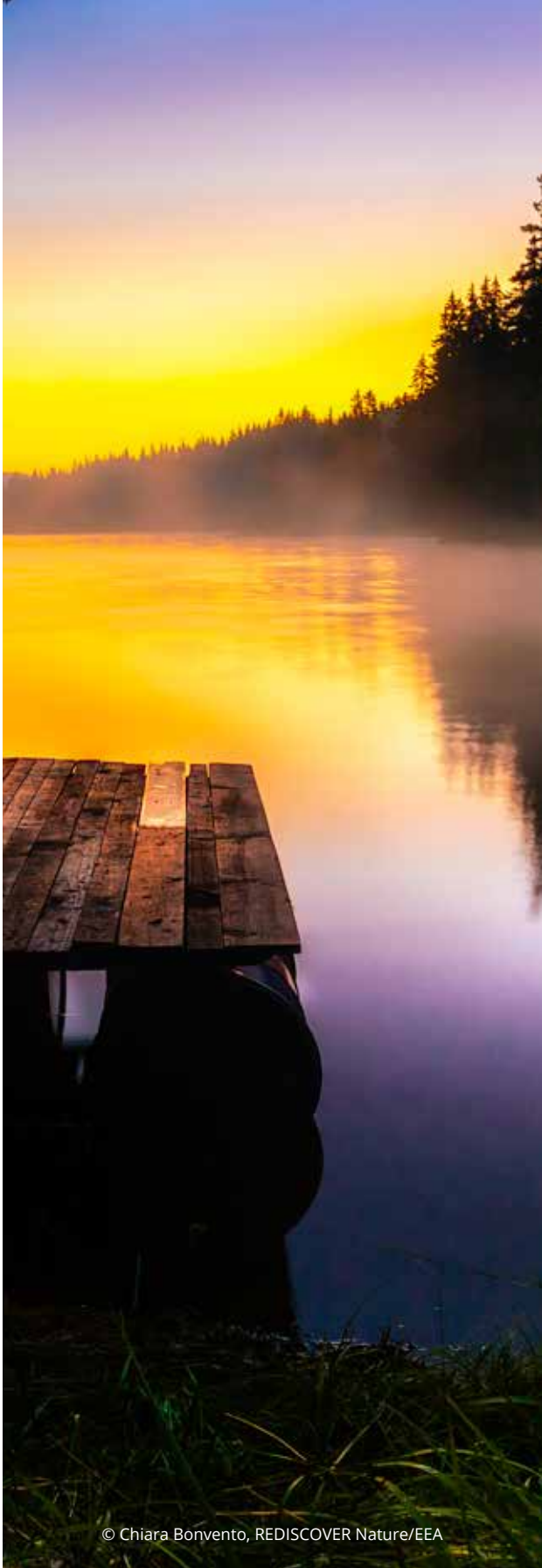
The Dasgupta review[41] does not shy away from the scale of the challenge we face. It highlights that, if we are to increase the supply of natural capital and reduce our demands on the biosphere, large-scale changes will be needed. These changes need to be underpinned by levels of ambition, coordination and political will at least as great as those of the Marshall plan launched after the Second World War. It shows that we need engagement both across governments and across international boundaries.

It flags the importance of **education** and making sure that we appreciate **our place in nature**, so that we are willing to take and sustain the action we need to. It also flags the role of the individual. We all make decisions that impact on nature, so we can be part of the change. I have, for example, recently changed my bank and pension plan.

What kind of governance structures do we need to overcome this 'institutional failure'?

With our Cambridge Conservation Initiative partners, we are looking at the type of **governance that is needed** to manage landscapes for multiple benefits, including biodiversity. We can see that there are different organisations with different mandates and interests working within different but overlapping administrative boundaries, none of which tend to match up with ecological boundaries. There can even be an international dimension, for example if there are international trade and investment interests. How do we balance **international interests** with l**ocal people's goals** and national-level biodiversity targets? It is a governance challenge.

According to the World Economic Forum's New Nature Economy[42] work programme, around half of the world's gross domestic product (GDP) is moderately or highly dependent upon nature, and this **dependency** is not concentrated in the world's big agricultural producing countries because of **global trade** links.



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Changing how our economies relate to biodiversity is not just about agreeing a good post-2020 framework in the Convention on Biological Diversity but also about its uptake by other international institutions — the World Trade Organization in this case. Fortunately, some progress is being made there. For example, the Agreement on Climate Change, Trade and Sustainability is trying to establish how trade rules can support climate and sustainability goals.

Like in all governance structures, it is essential to have an **enforcement mechanism**. Ultimately, this depends on countries' and their leaders' commitment to allocating sufficient resources to address biodiversity loss. Here, too, there are some encouraging developments, such as the European Green Deal and the Leaders' Pledge for Nature[43] from the UN Biodiversity Summit 2020. However, as the Dasgupta review highlights, we need coordinated action at an enormous scale.

What kind of social inequalities are linked to biodiversity loss?

First, there is **impact inequality** among countries. Trade allows us to have places where the footprint of humankind outstrips the local capacity of nature to supply that footprint. Looking at this globally, it means that, through trade, richer countries are driving biodiversity loss around the world. If we plot how countries perform on the human development index against their ecological footprints, **only very few countries** with high human development index scores operate within an equal share of the world's biocapacity.

Then there are **differences within society**. Building on the trade example above, if we consider that the benefits of engaging in trade aren't necessarily captured by the poorest in society, it paints a worrying picture. This is because the poorest in society are also likely to bear the greatest costs of any biodiversity loss associated with trade, as they rely most heavily on nature in their day-to-day lives.

Lastly, there is **intergenerational inequality**. Having recently read David Attenborough's 'A life on our planet', the intergenerational point terrifies me. Our world is changing very fast. An analysis done for the Dasgupta review by the Natural History Museum and Vivid Economics[44] also highlighted that, if we delay action on biodiversity by a decade, the costs of stabilising biodiversity loss double and the chance of maintaining levels of biodiversity similar to those we enjoy today disappears. So the **urgency of acting now** is also clearer than ever.

Can the UN's new accounting system be a game changer in the way we value nature?

The Dasgupta review suggests that we need to move to measuring our wealth as a measure of economic progress, rather than our income or levels of activity as captured by GDP. It proposes that we measure our progress based on **inclusive wealth**, which includes natural capital. This idea is embedded in the UN's new **system of environmental economic accounting — ecosystem accountin**g (SEEA-EA), as a crucial part of the natural capital stock are our ecosystems.

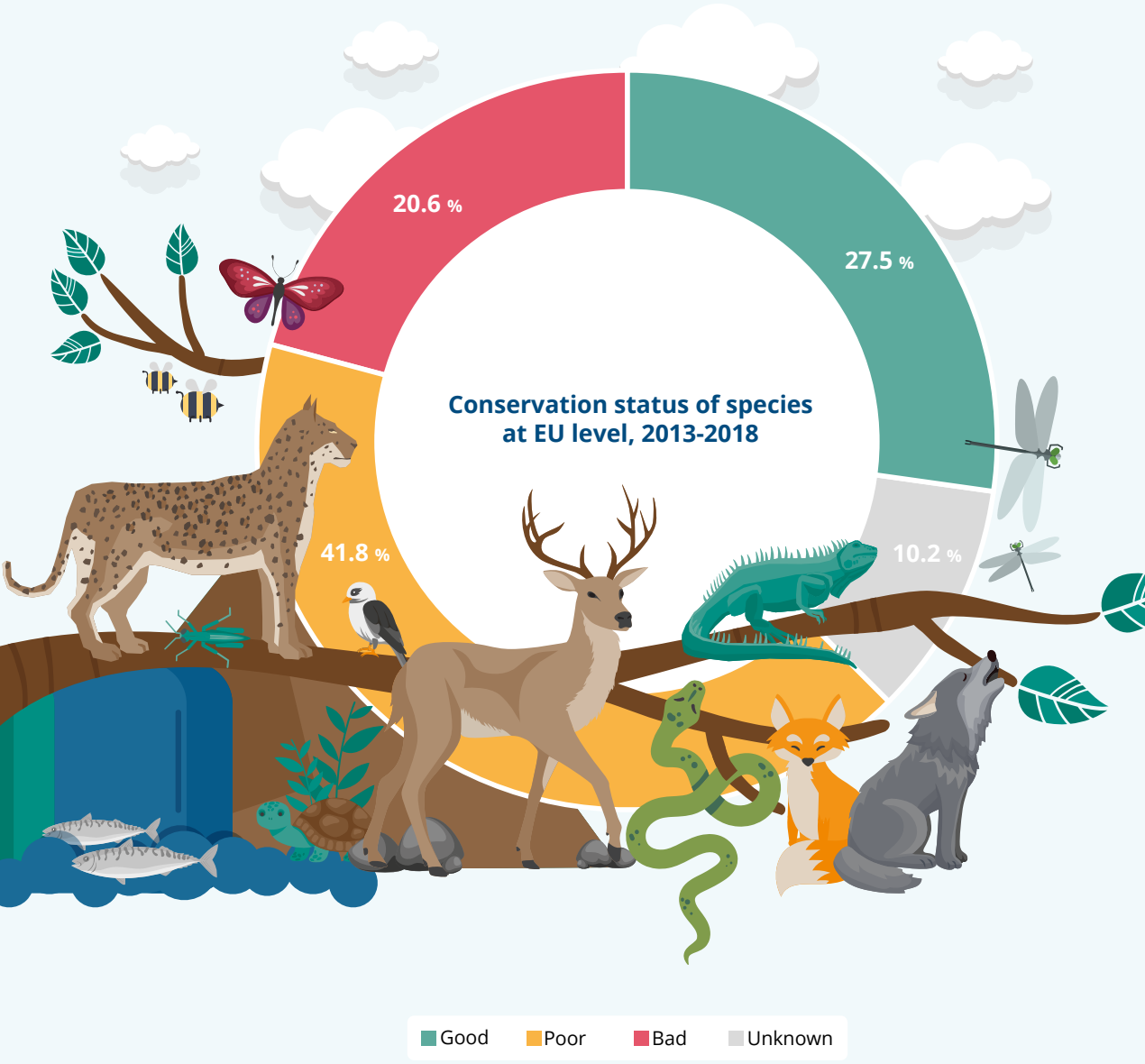
We are already seeing the impacts of the new system in our work. The SEEA-EA guidance has extended the reach of biodiversity data. Rather than being of interest to the environment ministry, data are now being collated and disseminated by offices of national statistics, which are then scrutinised by economic planning departments, who are then advocating policies to protect nature but from the perspective of socio-economic progress. It is quite exciting and promising.

Are you optimistic about our ability to change the way we value and interact with nature?

I think people do want change and do want more from governments than words. I also think COVID-19 has given us a bit of a wake-up call.

In the Dasgupta review, too, there is a focus on the idea of **socially embedded preferences**, meaning that a person's behaviour and practices are influenced by the behaviour and practices of others. This offers hope that widespread behaviour change could be possible, and at lower cost than we might expect if people like to conform. The current fashion for more plant-dominated diets could be a good example.

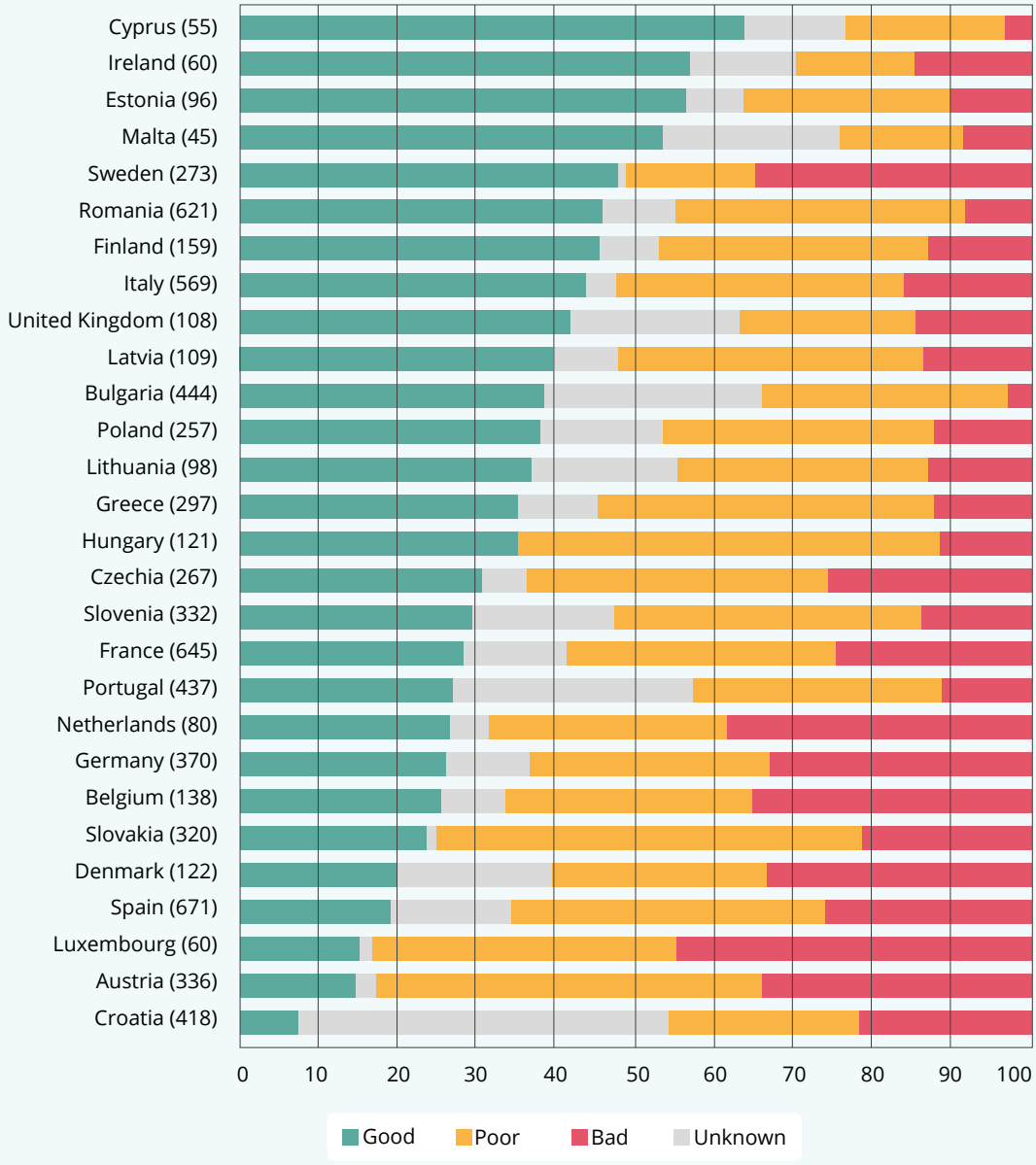
State of nature in Europe: Other species



Note : Statistics are based on the number of EU species assessments (2 825). For the period covered in the chart, the EU consisted of the EU-27 countries plus the United Kingdom

Source : State of nature in the EU, EEA Report No 10/2020.

Conservation status of species at Member State level, 2013-2018 (%)



At a glance: EU legislation on nature

EU Member States started coordinating environmental policies in the 1970s and nature was the first area for European action. To this day, the nature directives — the Birds Directive and the Habitats Directive, first adopted in 1979 and 1992, respectively — constitute the cornerstone of the EU's efforts to protect and preserve biodiversity.

The two directives put many species and habitats under a **common protection scheme** with **regular monitoring** and **reporting requirements**. The degradation documented thanks to these directives calls for more extensive and coordinated action across many policy domains in Europe and globally.

Today, the EU has one of the most comprehensive sets of environment and climate legislation in the world. Some EU laws tackle **pollutant or greenhouse gas emissions**, pollution levels in the air or water, or emissions from **specific sources**, such as industry or transport.

Some EU nature legislation, such as the EU Pollinators Initiative[45], call for targeted action. Others, the Water Framework Directive (WFD)[46] and the Marine Strategy Framework Directive (MSFD)[47] in particular, play a central role in protecting nature through ecosystem-based management. The WFD requires Member States to achieve 'good status' for all water bodies (lakes, rivers and groundwater) through sustainable and coordinated management of entire **river basins**.

Similarly, the MSFD calls for good environmental status in the **marine environment**, tackling pressures and pollution. Nature-related legislation is supported by, among other things, **circular economy** legislation aimed at reducing waste and contamination risks, for example through better waste management, improved eco-design and limiting single-use plastics.

These laws help EU Member States enjoy cleaner air, shift towards cleaner energy, reduce greenhouse gas emissions and place an increasing share of their land and marine areas under protection, including through the Natura 2000 network[48]. The EU **green infrastructure** connects more and more natural spaces, allowing wildlife to move between them. Cities are planning green and blue spaces as a way to prepare for climate change impacts and help preserve biodiversity.

The European Green Deal[49] outlines the EU's long-term ambition of becoming the first climate-neutral continent with a sustainable economy by 2050 and is implemented through key policy instruments such as the EU biodiversity strategy for 2030[50], the farm to fork strategy[51], the EU strategy on adaptation to climate change[52] and the new EU forest strategy for 2030[53]. It is also supported by others, including the circular economy action plan[54], the chemicals strategy[55] and the zero pollution action plan[56].

To reduce pressures on nature, halt the decline and restore biodiversity, Europe will need to act on all fronts, **transform its energy**, **food and mobility systems**, and do so with global partners.

EEA's information systems on nature

BISE — Biodiversity Information System for Europe[57]: the key source of data and information about biodiversity in Europe.

FISE — Forest Information System for Europe[58]: an entry point for sharing information with the forest community on Europe's forest environment, its state and development.

WISE — Water Information System for Europe[59]: the European information gateway to water issues. It contains resources on both freshwater and marine environments.

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