



Essential for Life

NABU's International Work
for Ecosystems and Biodiversity

Content

Foreword 5

Game Over?

NABU and the global biodiversity crisis 7

UN Decade on Ecosystem Restoration

A final wake-up call 10

ECOSYSTEMS:

WETLANDS

Underestimated super ecosystems 12

Java flying frog – Gliding jewels of the rainforest 16

Common crane – Migrating between continents 17

FORESTS

Fighting deforestation is key 18

Jatna's tarsier – Tiny ambassador for intact forests 22

Cottarelli's longleg – Dragonflies in distress 23

More than nature conservation

Selected NABU projects and the Sustainable Development Goals 24

OCEANS AND COASTS

Fascinating biodiversity 26

Banggai cardinalfish – Overfished and threatened 30

Mangroves – Unique coastal stabilizers in peril 31

MOUNTAINS

Vulnerable giants 32

Snow leopard – A rare cat on the roof of the world 36

Caucasian bison – Teetering on the edge of extinction 37

STEPPES AND DESERTS

Extreme habitats 38

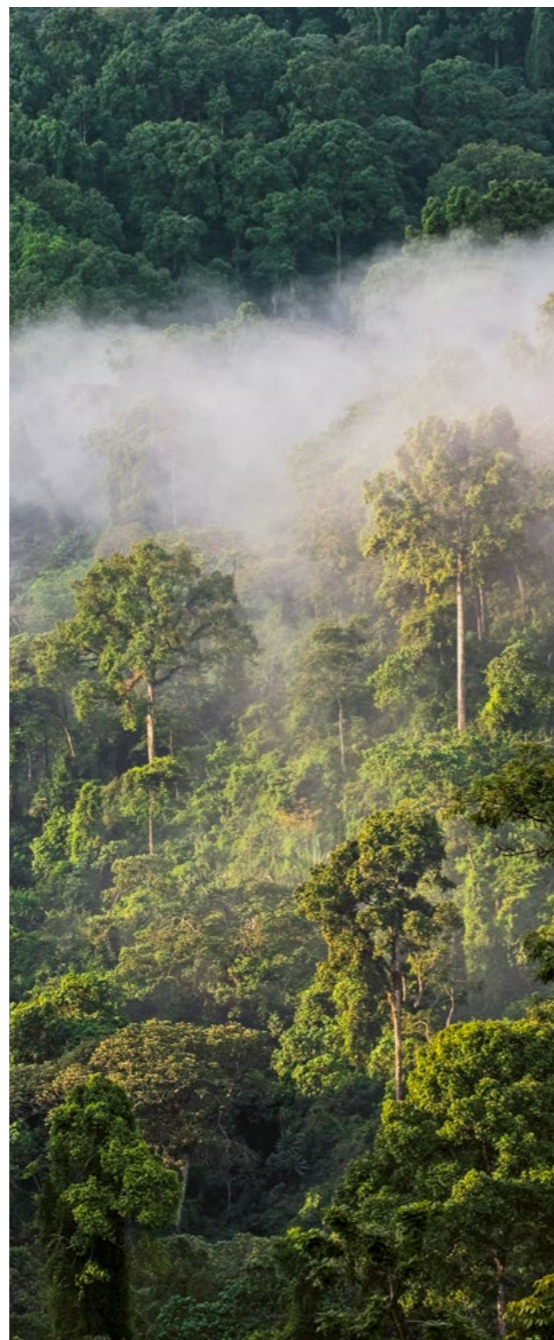
Saiga antelope – More than just a fancy nose 41

Notes, literature, and additional links 42



Nature conservation beyond borders

Visit us on en.nabu.de to find out more about our international conservation work.



Dear friends and supporters
of our international work,

What would wetlands be if they weren't wet? What would forests be without trees? And what would mountains be without mountain species? We would have to rethink far more than just our correct use of language. Sometimes it is dystopian questions like these that help us visualize what international conservation projects are for. Rather than being paralysed by such questions, we must remember what we're fighting for: intact ecosystems, a stable climate, and biodiversity!

Ecosystems are essential for life. They are complex, multifunctional, and simply beautiful. In this booklet we put a spotlight on five of them: wetlands, forests, oceans and coasts, mountains and steppes. The following pages show the services ecosystems provide worldwide, such as climate regulation, carbon storage, drinking water, and food. You'll see how species throughout the planet – such as the Java flying frog or the saiga antelope – depend on ecosystems and their conditions. Everything is connected. In the end, you might even become a tropical rainforest fan or a mangrove groupie like us. That's good, because fans can become supporters, and that's exactly what our planet needs in this crucial decade, the UN Decade on Ecosystem Restoration.

Nothing affects the state and future of our planet more than the climate and biodiversity crisis. Due to anthropogenic impacts, there are few intact ecosystems left. Most have been damaged, degraded, or destroyed. The alarm bells are ringing, and the noise is deafening. Our authors – experts from NABU's International Department – respond to this warning, share their experiences, and show how their vision for a better world is coming to life.

Together with our partners, we look back on over 30 years of successful international conservation work. The NABU International Department is supported by the Voluntary Expert Groups, which focus their considerable expertise on biodiversity in Southeast Asia and Africa, the protection of migratory birds in Cyprus and Malta, and many other topics and regions. We would like to take this opportunity to thank them. We also wish to thank the NABU activists who work with us, and the partners, supporters, and sponsors who make many of our projects possible.

We hope you will find this booklet an inspiring read and will share it with others who may be interested in international conservation work and contributing to preserving the planet.

Kind regards,

Thomas Tennhardt
Director of International Department



Thomas Tennhardt
Director of International Department

Game over?

NABU and the global biodiversity crisis

by Tom Kirschey

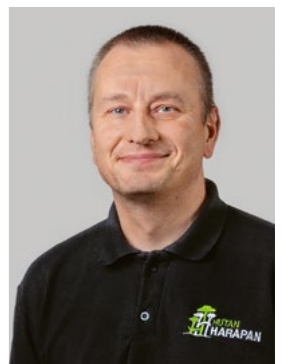
A global challenge requires a thousand local solutions and a global mindset. This is true not only of pandemics or the climate crisis, but also of the alarming crisis of biodiversity. The prospects are far from promising. The diversity of life on our planet is shrinking at a dramatic rate. Thousands of species face the immediate threat of extinction; ecosystems and their functions are about to collapse; tipping points will soon be reached. Can NABU and its partners still help to halt the loss?

For decades, environmental activists and scientists have warned the public about the consequences of inaction against the loss of biodiversity. While these warnings are no longer generally dismissed as alarmism, the majority of people in the Global North still think this is primarily a problem facing the Global South. Yet this attitude is beginning to change, and more and more people are starting to realize that this is a serious issue for all of us. The band is still playing, but the ship has hit the iceberg and started to sink.

One fairly good indicator is the rate of extinction. For millennia, life on earth gradually became more and more diverse as a result of evolutionary processes. Species as countable biological units are constantly adapting to changing environmental conditions – most evolve, few go extinct. The background rate is between 0.1 and 2.0 extinctions per million species per year. An assessment of a portion of the 112,400 species listed in the IUCN Red List of Threatened Species, the most authoritative global database on species-level biodiversity, reveals 680 documented and a further 750 very likely extinctions in the past 500 years, including a sharp increase in the past 50 years.

Among the vertebrates, amphibians, and mammals are the most affected. The loss of amphibians is particularly worrying, as they represent the most sensitive indicator for rapid environmental changes in both terrestrial and freshwater ecosystems: when the frogs start to die, humans will soon follow. Given that the IUCN Red List only covers fewer than five percent of all described species, this suggests that the current extinction rate has risen to 34 extinctions per million species per year. This is 17 to 340 times higher than normal.

The Anthropocene – the geological epoch in which humanity reshaped the world – marks the sixth mass extinction. And it seems this analysis is still far too optimistic. On the one hand, the data used here are neither comprehensive nor fully up-to-date. On the other hand, extinction is only the final and irreversible result of a development of continuous individual population decline. While conservation efforts have historically focused attention on rare, popular, charismatic, and endangered species, the more concerning aspect is the large-scale loss of abundant species and biodiversity-related functionality of ecosystems.



Tom Kirschey
Head of International
Peatland and Southeast Asia
Programme

Drosera anglica, also known as English sundew, belongs to the unique flora found in sensitive peatlands.



Understanding and predicting the response of complex, multi-functional landscapes and habitats to global changes is a major challenge for scientists and conservationists.

This has been observed in crucial functional groups such as pollinating flying insects in certain parts of the world, most of them still listed as ‘least concern’ or not even assessed. In Germany – the mother country of NABU – a scientific study published in PLOS One¹ revealed that the total biomass of flying insects has dropped by 82 percent over 27 years, across 63 nature conservation areas (!). This raises questions about traditional conservation approaches.

Is fighting against the biodiversity crisis just a hopeless endeavour, or is it vital for our own sake?

Too much time has been wasted debating whether we can afford nature conservation. We’re facing a time when the survival of humanity is threatened by humanity’s actions and inactions. NABU and its international partners have accepted the challenge. Biodiversity is distributed very unevenly on our planet. More than 80% of terrestrial species are found in just 36 regions of the world – the so-called biodiversity hotspots – covering only four percent of the earth’s terrestrial surface.

NABU’s international focus is on seven of these regions – Wallacea, Sundaland, the Mountains of Central Asia, the Caucasus, the Eastern Afromontane, the Horn of Africa, the Coastal Forests of Eastern Africa, and Madagascar and the Indian Ocean Islands. The concept of biodiversity hotspots was developed to focus efforts. However, the response of ecosystems to global changes is still poorly understood and often too complex to be explained solely by species counts. To acknowledge not only the importance of species numbers but the crucial role of a few specific species, scientists have developed the alternative concept of the biodiversity coldspot.

Just as the hotspot concept has been extremely effective at directing biodiversity funding and philanthropy, the coldspot concept reminds us that the vast majority of landscapes might not play

an equal role in terms of species diversity, but are still essential in terms of ecosystem functions. NABU reflects both concepts. Apart from the hotspots of biodiversity, NABU’s endeavours are focused on the conservation and landscape-scale restoration of globally important functional ecosystems, such as coral reefs, steppes, and peatlands.

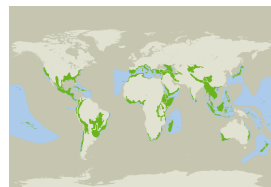
The climate-regulating and carbon-sequestering role of peatlands is crucial because they contain more than twice as much carbon as all forests. So even if they are not of direct economic value, we can only survive if we keep those ecosystems functional, and restore them where these functions have been lost. The global COVID-19 pandemic has demonstrated how vulnerable our lifestyle is and has shown that the prevention of zoonoses is directly linked to functional ecosystems.

Coral reefs, home to a quarter of all marine taxa, are crucial for human food security and livelihoods: more than 600 million people are directly dependent on them. NABU has a global profile in supporting protected areas – an essential element of biodiversity conservation – with a particular emphasis on UNESCO biosphere reserves. The challenging part of these activities is not the protection of the core zone or the prevention of human intrusion. It is finding ways to reconcile land use with the preservation of nature’s stability, to provide sustainable livelihoods, and to encourage, support and facilitate community-based local solutions for mitigating and adapting to climate change.

A global challenge requires a thousand local solutions and a global mindset. This is why we at NABU are committed to conserving and restoring ecosystems and protecting the unique species living in them. We set a good example with our projects. We support our partners and local communities and try to scale up the solutions that have proven most successful. Overcoming the biodiversity crisis is a great mission – and we need to draw attention to the issue to fundamentally change our behaviour, as individuals and as a society.

NABU focuses on the conservation and restoration of functional ecosystems of global importance – such as coral reefs.

Endemic species are very limited in distribution and more sensitive to disturbances. For the knobbed hornbill, an endemic of Sulawesi, already minor deforestation rates make a huge difference.



HOT OR NOT?

To qualify as a global biodiversity hotspot, a region has to meet two strict criteria:

- It has to contain at least 1,500 endemic vascular plant species.
- It has to have lost at least 70% of its primary native vegetation.

Right now, a 37th region, the island of New Guinea, is about to qualify, sadly, due to reaching the second of these criteria.

UN Decade on Ecosystem Restoration

A final wake-up call



Wetlands, forests and other ecosystems are what keeps us alive! So we have to treat them accordingly. The UN Decade on Ecosystem Restoration runs until 2030. It's a final wake-up call to prevent, halt and reverse the degradation of ecosystems on our planet – for people and nature. As this important chapter begins, it's time to scale up ecosystem restoration and stop further degradation. Solutions are within reach.

What are these solutions? This decade is about restoring degraded peatlands, for example in the EU, the region with the second highest greenhouse gas emissions from peatland degradation worldwide. This decade is about working with local communities, for example to develop forest landscapes for livelihoods and climate adaptation in Ethiopia. And this decade is about preserving the habitat of endangered species, such as the snow leopards roaming the high mountains of Central Asia.

Together with many other initiatives worldwide, the #GenerationRestoration, NABU is actively contributing to this UN Decade.



With its peatland site in Poland, our LIFE Peat Restore project is one of 50 officially selected implementers of the UN Decade on Ecosystem Restoration. The project has restored 1,350 hectares of degraded peatlands in the Slowiński National Park.

Ecosystems are interconnected, multi-faceted and beautiful. This peatland was photographed as part of the LIFE Peat Restore project in Latvia.



WETLANDS – Underestimated super ecosystems

by Svane Bender, Tom Kirschey, Maik Jerusalem

Wetlands are fragile ecosystems, havens of biodiversity and extraordinary carbon stores, which provide crucial ecosystem services to us. Their protection and restoration is therefore extremely important. Over decades, however, wetlands have been relentlessly exploited and damaged – their loss is more rapid than that of any other ecosystem. NABU collaborates with scientists, governments, NGOs and local communities to restore wetlands and safeguard their specialized biodiversity.

Wetland ecosystems are estimated to cover more than 1.28 billion hectares of the Earth’s surface, an area 33% larger than the United States and 50% larger than Brazil.¹ They are flooded either permanently or seasonally by water, where oxygen-free processes prevail. Wetlands by definition are a diverse assemblage of moist places. They can be permanently or temporarily wet, water can be stagnant or flowing, water content can display various levels of salinity, and they may or may not form peat deposits and sediments.

Wetlands occur in many forms depending on topography, hydrology, vegetation, and other factors such as human use. They are found in every climatic zone and are of huge ecological importance, guaranteeing critical ecosystem services such as producing, cleaning, and storing water (and thus minimizing floods), offering food and non-timber products, and preserving biodiversity.

Wetlands are reservoirs for biodiversity: they offer habitats for a wide range of species – often specifically adapted to the individual conditions and under threat when these systems are disturbed. Many species stay in wetlands all their lives and are entirely dependent on them for survival. Other species are dependent only during a segment of their life cycle for temporary stays, occasional feeding or resting. According to the Ramsar Convention², about 100,000 different animal species have so far been identified from the world’s freshwater wetlands alone. Of these, about half are insects and some 20,000 are vertebrates. New discoveries are continually being made.

Intact wetlands for our survival and wellbeing
Intact wetlands often supply food, fodder, fibre and other materials that sustain local economies. By regulating water flows, they help to minimize the risk of floods and droughts and prevent seawater intrusion. In addition, they hold essential eco-archaeological information such as pollen records and historical artefacts. But even more importantly, intact peatlands are the largest natural terrestrial carbon store.

Globally, the remaining area of near natural peatland (>300 million hectares) sequesters 0.37 gigatonnes of carbon dioxide every year and contains more than 600 gigatonnes of carbon, representing 44% of all soil carbon.³

How does this work? Peatland vegetation absorbs carbon dioxide from the atmosphere, and carbon is stored in peat layers of up to several metres as a result of biological processes.

Specialized ecosystems under pressure
Wetlands are highly significant for global efforts to combat climate change. Their protection and restoration is therefore considered crucial. Nevertheless, over decades wetlands have been severely overexploited and damaged as a result of drainage, agricultural use, burning and peat mining. The degradation and loss of wetlands and thus inland and coastal wetland species is more rapid than that of other ecosystems.¹



EUROPE Restoring peatlands for climate change mitigation

While 90% of global peatlands are still in pristine condition, the 10% degraded peatlands are responsible for more than 5% of total anthropogenic greenhouse gas emissions. Europe, including Germany, is an emission hotspot in this regard. In LIFE Peat Restore, NABU (as a coordinating beneficiary) and its eight partners from Poland, Lithuania, Latvia and Estonia have restored ten degraded peatland areas covering 5,300 hectares on a gradient between the Biesenthal Basin north-east of Berlin and Suusoo-Leidisoo west of Tallinn. Beyond the restoration measures, the project provided valuable monitoring data on hydrology, vegetation and direct gas fluxes from the sites.



Understanding the difference

The ‘Ramsar Convention on Wetlands’, adopted in 1971, is an intergovernmental treaty that sets the foundation for national action and international cooperation for the conservation and wise use of wetlands and their resources.⁴

Wetlands are distinguished from other landforms or water bodies by their characteristic vegetation of aquatic plants, adapted to the unique hydric soil. Peatlands are areas with a naturally accumulated peat layer at the surface.

Peat is accumulated material consisting of at least 30% dead organic material.

Mires are peatlands where peat is under accumulation. They arise because of incomplete decomposition of organic matter, usually litter and roots from vegetation, due to waterlogging and subsequent anoxia.

More about the project:





Wetlands encompass precious habitats, provide countless ecosystem services and are crucial for climate change adaptation and mitigation.

“There can be no such thing as a climate-neutral human society if we do not protect each and every intact peatland and restore all of those that have been drained.”

Tom Kirschey

population growth and increasing economic development are among the primary indirect drivers of degradation and loss of wetlands. This reduces the capacity of wetlands to mitigate impacts, and particularly affects poorer people in lower-income countries. At the same time, the demand for denitrification and flood and storm protection will increase due to climate change.

Disturbed peatlands are a major source of greenhouse gas emissions, annually releasing almost 5% of global anthropogenic CO₂ emissions.⁵ During drainage, oxygen gets into the peat, leading to aeration and the decomposition of organic matter. As a result, the greenhouse gases carbon dioxide and nitrous oxide (N₂O) are emitted into the atmosphere, reversing the function of peatlands: they become a source of greenhouse gases instead of a store. In addition, draining peatlands reduces the quality of drinking water due to pollution from dissolved compounds. Damage to wetlands and peatlands also results in a loss of biodiversity and thus in a general decline of ecosystem services.

Joint efforts: NABU's work for the conservation and restoration of wetlands

NABU is restoring wetlands and peatlands both in Germany and internationally, in collaboration with research institutions and local communities. In 2011 NABU initiated the German Peatland Protection Fund in alliance with Volkswagen

Leasing GmbH, to fund nature conservation and climate projects. More than ten restoration projects have been successfully implemented since then.

In order to upscale restoration to European and international level, the International Peatland Conservation Fund, supported by Volkswagen Financial Services AG, was launched in 2016. When selecting the areas for conservation, NABU strictly follows scientific guidelines. The same applies to the monitoring of biodiversity and the assessment of the greenhouse gas balance of each peatland. Since its launch, the Fund has contributed to projects in Poland and the Baltic States.

Apart from these projects, NABU implements community wetland management, for instance in Ethiopia, in forest-connected wetlands affected by the activities of local communities, e.g. cattle grazing, briquette production, or agricultural production. Here too, wetlands are mapped and assessed in terms of their ecological status and biodiversity. In consultation with communities, non-use and use zones are identified, and management plans are elaborated. In Ethiopia, NABU has contributed to the conservation of several thousand hectares of wetlands.

PROJECT



ETHIOPIA
Watershed conservation

Lake Tana, the source of the Blue Nile, and its extensive wetlands and tributaries provide 50% of Ethiopia's freshwater resources and form the basis of life for more than 200 million people in Ethiopia, Sudan and Egypt. Rapid population growth and economic development threaten the future functioning of its diverse ecosystems.

We are facilitating a multiple stakeholder partnership to secure the future water supply for all users. The process and its results have the potential to be extended to other Ethiopian watersheds in the future.



More about the project:



CONTACT:

Svane Bender
Deputy Director International Affairs / Head of Africa Programme
Svane.Bender@NABU.de

Tom Kirschey
Head of International Peatland and Southeast Asia Programme
Tom.Kirschey@NABU.de



JAVA FLYING FROG

Gliding jewels of the rainforest



COMMON CRANE

Migrating between continents

Like other amphibians, the Java flying frog faces many threats, such as habitat loss, agrochemicals and invasive species.

Around 80% of all amphibian species are exclusively found in tropical forests. Among the adaptations they have developed to cope with their environment, the most spectacular is the ability to fly, or more precisely to glide from tree to tree without needing to set foot on the dangerous forest floor. Gliding adaptations have evolved independently in e.g. flying squirrels, draconid lizards, and even in some snakes such as the paradise tree snake.

The flying frogs of the genus *Rhacophorus* have long fingers with a strong webbing between them, enabling them to spread their feet into a kind of parachute when falling. Undoubtedly the Java flying frog (*Rhacophorus reinwardtii*), with its sky-blue skin webbing between orange fingers, is one of the most beautiful representatives of the genus. Though its distribution is not limited to Java, it shares this island with a human population of almost 150 million – the most populous in the world.

In its forest habitat, it requires more than just trees; it also needs shallow stagnant or slow-flowing water bodies as a reproduction habitat. Since early development stages are

especially sensitive to predation, radiation, and fluctuating water tables, the Java flying frog and others of its family have developed an advanced strategy to protect their offspring: during mating, a foam nest is produced on leaves and branches just above a suitable water body. This means that early development from egg to tadpole can take place up in the air, protected from aquatic predators. The tadpoles then drop from their foam nests into the water, where they continue to grow and complete the larval phase up to their metamorphosis.

Amphibians are the vertebrate class with the highest proportion of species threatened by extinction. Habitat loss, agrochemicals, newly emerged and anthropogenically distributed pathogens, predatory alien invasive species and climate crisis are the dominant factors driving the global amphibian crisis. To advocate for amphibians and boost environmental education, NABU has helped a dedicated amphibian conservation team publish a book about the amphibians of Java.

The common crane (*Grus grus*) is a large and widespread bird in Eurasia and northern Africa. It can reach a length of 110 to 130 cm and a wingspan of 220 to 240 cm. With its elongated, elegant silhouette, black and white head markings and red crest, it is a striking and highly recognisable species which has featured in culture and mythology for centuries.

The natural distribution of the common crane is divided into two seasonal habitats. The breeding grounds are mostly in watershed habitats in Eastern Europe, Scandinavia, large parts of Russia, and areas of Central Asia. The common crane prefers to breed in damp to wet areas such as upland moors and wet meadows, and the breeding season usually begins in April. Incubation lasts about 30 days and the crane chicks leave the nest after only 24 hours.

In both seasonal habitats, the crane often feeds in fields and meadows and returns to sheltered roosts in shallow water areas at nightfall. Its diet is wide-ranging: from insects, crops, and grains to amphibians, reptiles, and small mammals. Due to extensive international and national protection measures and its large distribution,

the species is classified as being of ‘least concern’ by the IUCN Red List for Birds – a success for nature conservation.

From August/September to March the common crane is mostly found in southern areas extending from Spain and northern and eastern Africa to southern India and China. Up to 70,000 have been counted in Ethiopia. In the most important wintering area for cranes in Ethiopia, in and around the Lake Tana watershed, NABU has been involved in the establishment of a UNESCO biosphere reserve since 2012.

Even if the crane population is increasing, many habitats are coming under growing pressure, including those in Ethiopia. Here the common crane still finds wide swamp and shallow water areas, but this habitat is also under threat and intensive agricultural practices and the expansion of infrastructure projects are spreading further into its refuges. Conserving or restoring floodplains, extensively used wet meadows, degraded swamp forests, and swamps must be a priority for the protection of the common crane.

From its northern breeding grounds to its southern wintering areas – the migrating common crane relies strongly on intact watershed habitats across several continents.

FURTHER READING



Alhadi, F., Kaprawi, F., Hamidy, A. & Kirsche, T. (eds) 2021

Amfibi Pulau Jawa

ARS & NABU, Jakarta, 213 pages
ISBN: 978-3-9822269-9-6

Orders can be made through the Burung Indonesia bookshop: www.burungshop.com



FORESTS – Fighting deforestation is key

by Tom Kirschey, Stella von Sassen, Anna Wenzel, Svane Bender, Maik Jerusalem

Forests cover about 31% of the global land area and are home to the vast majority of terrestrial biodiversity. The effective conservation of forests therefore plays a key role in combating the biodiversity crisis. Together with local partners, NABU promotes forest conservation, restoration and sustainable forest management in different parts of the world for the benefit of people and biodiversity.

Forests can be found in different regions of the world, from the tropics and subtropics to the boreal and temperate domains. They provide important ecosystem services and goods, not only to the people living in and around forests, but to everyone on the planet.

Indispensable forest products include wood, fruits and ingredients for medicines. In addition, ecological functions such as the purification of water and air, disaster mitigation, climate regulation and carbon storage are of global importance for securing healthy environments and fighting the climate crisis. Many local communities and indigenous groups directly depend on forests for their livelihoods and food security. For about 1 billion people globally, wild foods provided by forests are an important part of their diet, and are often a key source of vitamins and trace elements. In addition, forests provide employment to more than 80 million people in the informal as well as the formal sector.¹ The social and cultural benefits of forests, including recreation and spirituality, are also increasingly being recognized as important.

How much biodiversity is found in forests?

It is uncontested that forests provide a home to a large number of living organisms in the soil, understorey and canopy. It is often stated that 80% of all terrestrial flora and fauna can be found in forests, but such numbers can only be seen as a very rough estimate, since new species are still being discovered and there is considerable uncertainty about how much more remains undetected.

Of the almost 70,000 known and described vertebrate species, 80% of all known amphibians (almost 5,000 species), 75% of all known birds (almost 7,450 species) and 68% of all known mammals (more than 3,700 species) live in forest habitats.¹ Of the 1.3 million invertebrate species described, many are insects, the vast majority of which also lives in forests.¹ Since much of the soil biota, including bacteria and fungi, is probably still unknown to science, its abundance in forests (both absolutely and in comparison to other ecosystems) is even more difficult to estimate.

Biological diversity is not evenly distributed among different forest biomes. It depends on factors such as forest types, geography, soils, climate and also human activities. Tropical forests are particularly diverse, with about 60% of the 391,000 known species of vascular plants.¹ Boreal forests in comparison display a

much lower diversity of both plants and animals, with only about 20 different tree species, for example.¹

Forests under threat

Unfortunately, about one third of the more than 60,000 known tree species are already globally threatened, with more than 1,400 even listed as critically endangered on the IUCN Red List of Threatened Species.¹ The biggest threats to forests and their biodiversity are deforestation, forest fragmentation and degradation. While global deforestation rates dropped in the 5 years between 2015 and 2020 compared to the 1990s, the ongoing destruction – especially of the highly biodiverse tropical primary rainforest – is still alarming. In 2020, an area of humid tropical primary rainforest approximately the size of the Netherlands was destroyed, an increase of 12 % compared to the previous year.²

Ongoing forest destruction not only threatens these important habitats, but also leads to increased fragmentation of remaining forest areas. Fragmentation not only negatively impacts the movement and dispersal of forest species, but also increases the number of forest



edges with altered habitat properties. Degraded forests are disturbed ecosystems which are unable to function well or to provide vital ecosystem services and goods to people and nature. In addition, they are less resilient to disturbances such as diseases and natural disasters.

The main drivers of forest degradation, over-exploitation and fragmentation are of human origin and include the expansion of agriculture, the excessive extraction of goods such as wood, infrastructure development, the exploitation of

“Forests are so much more than just trees – they provide us with essential ecosystem services and are a real safety net for many impoverished families around the world.”

Svane Bender

NABU preserves, restores, and conducts research throughout forests in Africa and Southeast Asia.

More about the project:



PROJECT

INDONESIA

Restoring forests for future needs

Hutan Harapan (“Forest of Hope”), a tropical secondary lowland forest in Sumatra, Indonesia, is one of our most precious conservation and restoration programmes. Its 98,000 hectares make up about a quarter of all remaining lowland forests in Sumatra. We are working to save its stunning biodiversity and support sustainable livelihoods for the indigenous Batin Sembilan.

The project is supported by the German government’s International Climate Initiative (IKI) and the German Development Bank (KfW), and jointly managed by an international consortium of Burung Indonesia, the Royal Society for the Protection of Birds (RSPB), BirdLife International and NABU. It is based on an Ecosystem Restoration Concession, granted by the Indonesian government to protect and restore the forest.



Forests are the home for countless species, such as the mantled guereza native to Africa.

natural resources, pollution, and the introduction of invasive species. Even though forest fires are naturally occurring events, fire seasons are becoming more intense and widespread as a result of climate change. For example, previously unaffected tropical rainforests are drying up, making these degraded ecosystems susceptible to fires.

Besides the above-mentioned threats, which affect the whole forest ecosystem, threats to single species from poaching and wildlife trade can have substantial impacts on population numbers in a given region – ultimately leading to extinction.

Working with local communities to protect forest habitats

Forests are of global importance but need to be protected on a local level involving the people depending directly on them. For a long time, forest conservation neglected the importance of forest ecosystems for local communities and indigenous peoples. Since any human activity in protected areas was perceived as undesirable, and as counteracting the goal of returning forests to their “wild” state, many people were displaced and denied access to their ancestral land. In addition, the value of their knowledge about the forest and its biodiversity has often been underestimated.

Today, the involvement of local communities and indigenous peoples has largely been acknowledged as an integral part of successful forest protection projects. Recognizing the importance of stakeholder engagement, NABU always works closely with local communities and indigenous peoples as well as local staff



and partners during every stage of a project, from project design to implementation. In those partnerships, NABU also supports capacity development of local communities and local government representatives in different aspects of sustainable forest management.

To help local communities generate income from activities that do not harm forests and their biodiversity, NABU actively promotes commodity development within its projects. Examples of forest goods being produced and sold include coffee, cacao, fruits, honey, herbs, and spices. Moreover, NABU promotes participatory forest management (PFM), enabling local forest communities to take over the management and conservation of forests while at the same time securing forest access for forest-dependent communities. For the conservation of forests, NABU joins forces with relevant institutions and stakeholder groups, such as the Ethiopian Orthodox Church, the Indonesian BirdLife partner, Burung Indonesia, or the KfW German Development Bank.

As forest destruction poses the biggest threat to the biological diversity found in these eco-

systems, patrols are conducted to prevent encroachment and the conversion from forest to farmland, and to detect and fight fires at an early stage. Restoration work is carried out on degraded and cleared lands, with the main aim of creating conditions under which forests can recover by themselves and support the organisms living in them. Where needed, trees are planted to create buffer zones and close gaps between forest patches. NABU’s forest projects focus not only on protected areas, but also on the important areas in between to secure vital corridors for species.

Many of our forest projects are located in biodiversity hotspots in Africa and Southeast Asia, where inventories of species are still highly incomplete. Understanding species population dynamics is crucial for assessing and improving management practices. NABU therefore organizes and conducts assessments of species and biodiversity and is involved in designing and implementing long-term biodiversity monitoring systems and species action plans.



PROJECT

ETHIOPIA

Forest landscapes for livelihoods and climate adaptation

The last highland forests of south west Ethiopia are particularly valuable ecosystems. These diverse forest landscapes are considered to be among the most food-secure in the country. Forest degradation and reduction lead to a loss of biodiversity and reduced ecosystem services. Together with our partner EWNRA, we are building capacities and establishing structures for community-based restoration, conservation, and income generation.



More about the project:



CONTACT:

Svane Bender
Deputy Director International Affairs / Head of Africa Programme
Svane.Bender@NABU.de

Tom Kirschey
Head of International Peatland and Southeast Asia Programme
Tom.Kirschey@NABU.de



JATNA'S TARSIER

Tiny ambassador for intact forests

Its big eyes and ears together with its ability to rotate its head like an owl, help the Jatna's tarsier to hunt in the dark.

This cute primate, described as a species new to science only in 2017, is known locally as “mimito” – an indication of its tiny size. It was scientifically named in honour of the Indonesian primatologist and conservationist Prof. Jatna Supriatna.

Jatna's tarsier (*Tarsius supriatnai*) is distributed in the western part of the northern arm of the bizarrely shaped island of Sulawesi, the biggest island of the Wallacea biodiversity hotspot. The rate of endemism on Sulawesi is incredible: 100% of its mammals (with the exception of the flying ones, i.e. bats) are endemic, including the cute tarsiers with their exceptionally large eyes and ears – clearly showing their nocturnal nature. Tarsiers never choose the veggie option; their diet consists solely of arthropods.

In the recently published fourth volume of the book series Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea, one chapter is dedicated to the results of a NABU study providing preliminary insights into the ecology and population density of Jatna's tarsier in the Popayato-Paguat landscape – a key biodiversity area in the west of Gorontalo Province. The investigation area was not chosen at random:

it is the site where NABU and its partners, Burung Indonesia and KfW German Development Bank, have implemented a landscape-scale forest conservation and restoration project supported by the International Climate Initiative (IKI).

By providing ecological data on the tarsier's population density, the study aims to support sustainable forest management decisions and thus protect the habitats of the island's unique species. The results are unequivocal: while average population densities of Jatna's tarsiers in degraded forest patches and areas converted into agroforest systems are only around 1.22 individuals per hectare, up to 5.37 individuals per hectare can be found in undisturbed parts of the forest.



COTTARELLI'S LONGLEG

Dragonflies in distress

Ethiopia's biodiversity has an exceptionally high rate of endemism compared with other countries. One of its endemic species is the Cottarelli's longleg (*Notogomphus cottarellii*), a dragonfly unique to the Kafa province in the southwest of the country.

The dragonfly hatches in small streams and rivers in higher altitudes shaded by montane forests. It is well adapted to the natural dynamics of the Ethiopian Highland resulting from geological changes (caused by e.g. volcanism) and traditional human land use. However, even the most adaptable species may not be able to withstand the current unprecedented levels of deforestation, habitat degradation, and water pollution. Facing progressive habitat loss, the Cottarelli's longleg is classified as 'endangered' in the IUCN Red List of Threatened Species.

NABU is on a mission to protect Ethiopia's precious forest habitats. Since 2006, NABU has worked with national and international partners to conserve and restore the Afromontane cloud forests and wetlands of the Kafa province, and has supported the establishment of the UNESCO Kafa Biosphere Reserve. To assess and document the region's biodiversity and

ecological integrity, NABU conducted the first biodiversity assessment of the Kafa Biosphere Reserve in 2014, followed by a second assessment in 2019, in collaboration with rangers and local and international experts².

The assessments confirmed the high biodiversity and endemism, discovered many species new to science, and identified indicator and flagship species. The Cottarelli's longleg is one of these species, used to monitor the habitat's integrity. The dragonfly thus serves as an indicator for the state of the forest and freshwater ecosystems, and helps conservationists plan and prioritize conservation action across Kafa, Ethiopia and other areas in Africa.

Fragile and illuminating: Dragonfly species, like the Cottarelli's longleg, help to understand and preserve forest and wetland ecosystems.

FURTHER READING



Telnov, D.; Barclay, M.V.L. & Pauwels, O.S.G. (eds) 2021
Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea, Volume IV

Entomological Society of Latvia, Riga, 443 pages
ISBN: 978-9984-9768-9-1

Orders via email:
anthicus@gmail.com

FURTHER READING



Both of NABU's **Biodiversity Assessments at the Kafa Biosphere Reserve** are provided free of charge in the NABU Shop:

www.NABU-Shop.de

MORE THAN NATURE CONSERVATION

Selected NABU projects and the Sustainable Development Goals



COFFEE AS MODEL FOR GREEN DEVELOPMENT

Yayu Biosphere Reserve is one of Ethiopia's threatened wild coffee forest areas. NABU and ECFE are working with coffee farmers towards sustainable coffee production, participatory forest management, and long-term forest conservation.



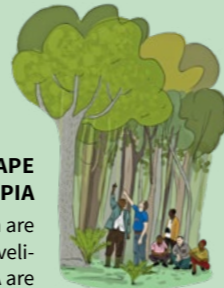
TARSIER MONITORING FOR FOREST PROTECTION

Tarsiers are a suitable indicator of forest degradation and deforestation. All of the twelve known tarsier species are endemic to Sulawesi and adjacent islands. NABU is supporting research about their spatial distribution and habitat use.



FOREST LANDSCAPE DEVELOPMENT IN ETHIOPIA

The last highland forests of southwest Ethiopia are particularly valuable ecosystems and essential livelihood for thousands of people. NABU and EWNRA are implementing large-scale forest conservation, capacity building, and livelihood programmes.



FORESTS



MARINE BIODIVERSITY AT TOGEAN ISLANDS

In the Togeau-Banggai marine corridor, Indonesia, NABU organized a Marine Rapid Biodiversity Assessment. It showed dramatic changes in species composition within twenty years. The results are used to improve fisheries management and to develop adaptation strategies.



OCEANS AND COASTS

GREEN COASTS FOR WESTERN MADAGASCAR

The coastal communities of the Mahavavy-Kinkony Nature Reserve suffer from heavy exploitation of marine resources and degradation of coastal ecosystems. NABU and ASITY are working towards marine and coastal conservation, climate change adaptation, and income generation.



COMMUNITY-BASED CONSERVATION IN USTYURT, KAZAKHSTAN

NABU supports villagers in the Ustyurt region to patrol the saiga habitats and prevent poaching in the vast semi-desert and steppe. They aim to recover the saiga population up to a level that allows local communities a legal and sustainable use of the antelopes.

STEPES AND DESERTS



COMMUNITY-BASED CONSERVANCIES IN TAJIKISTAN

To protect snow leopards and their prey species, such as the markhor, the Asiatic ibex and the Marco Polo sheep, hunters and former poachers work together to protect wild animals and nature. They modify pasture use to secure habitats for wildlife and strive to reduce conflict between herders and carnivores.



PROTECTED AREA MANAGEMENT FOR SPECIES CONSERVATION

The Caucasus Nature Reserve in southern Russia protects a pristine mountain wilderness. NABU supports the protected area management and has successfully assisted saving the Caucasus bison, which is threatened by extinction due to extensive poaching.

SAVING THE GHOST OF THE MOUNTAINS

The high mountains of Central Asia are home to the rare snow leopard. Loss of habitat, poaching and climate change are the main factors that spell doom for these rare "mountain spirits". Applying various methods, NABU has been committed to the survival of snow leopards since 1999.



MOUNTAINS



WATER FOR LIFE - PARTNERSHIP FOR A SUSTAINABLE FUTURE OF LAKE TANA WATERSHED

Lake Tana and its extensive wetlands and tributaries in northwest Ethiopia are the main source of life for millions of people. Within a multi-stakeholder partnership, NABU connects local actors to ensure long-term access to drinking water, functional ecosystem services and sustainable sources of income.

PEAT- AND WETLANDS



CLIMATE CHANGE MITIGATION THROUGH PEATLAND RESTORATION

Restoring peatlands is one of the most effective ways to reduce greenhouse gas (GHG) emissions. In the LIFE Peat Restore project NABU and its partners apply a mix of established and experimental techniques, e.g. stopping drainage or establishing peat-forming vegetation to restore peat excavation sites. GHG measurements are taken to document project success.



In 2015, all 193 member states of the United Nations agreed on the 17 Goals for Sustainable Development (SDGs). They shall pave the way for a sustainable world without poverty and inequality, with education and health for all, a secured environment, climate protection, and a sustainably acting economy. The goals reflect all three dimensions of sustainability: ecological, social, and economic. NABU is committed to contributing to the achievement of these 17 goals through its national and international projects. For more information about the projects visit en.NABU.de

Goal 14 aims to conserve and sustainably use the oceans, seas and marine resources for sustainable development.

Goal 15 aims to protect, restore and promote sustainable use of terrestrial ecosystems to halt and reverse land degradation and biodiversity loss.



OCEANS AND COASTS – Fascinating biodiversity

by Svane Bender, Maik Jerusalem, Anna Wenzel, Tom Kirschey

Oceans cover more than 70 % of the earth's surface, represent about 95 % of the living biosphere and contain 97 % of all water on our planet. Life on earth would be unthinkable without the complex interplay of currents and cycles, large bodies of water and interactions with the atmosphere. However, marine ecosystems are under severe pressure from rising sea levels and increasing global average temperatures due to climate change. In addition, enormous damage is caused by pollution, destruction and overfishing. NABU works towards the preservation of the world's oceans, particularly their coasts.

The oceans have a global influence on climate and weather and provide a wide variety of species-rich habitats worldwide, which in turn are the source of life for every living organism in water and on land. Only intact and diverse seas are able to maintain the impressive ecosystem services and their stabilizing effects on the climate. But many ecosystem services and interactions with other ecosystems, including currents, water temperature and precipitation, are strongly connected to the global climate. According to the report of the World Biodiversity Council¹, the mean temperature will rise further due to climate change, and ecological tipping points will be reached. Passing the tipping points will disrupt the fragile interplay of ecosystems and lead to irreversible changes, which will damage or destroy habitats and endanger species.

Biodiversity of our marine ecosystems

There are diverse and unique ecosystems in our oceans, but probably the most striking are the colourful coral reefs of the tropics. Coral reefs are by far the most species-rich and productive marine formations. They are home to about a quarter of all marine animals and plants and are among the oldest ecosystems on earth.

In coral reefs, permanent reef dwellers such as the clownfish and the reef shark share the habitat with species of the open ocean, which are searching for food or breeding sites. Every part of a healthy reef is inhabited: sea urchins and mussels can be found in the gaps between the corals; moray eels, octopuses and shy fish species inhabit the reef caves; turtles rest at the dazzling underwater oases on their migrations through the ocean. But the heart of every coral reef is the coral itself.

Corals consist of marine invertebrates and symbiotic algae, which form calcareous structures. Formed over centuries, these provide the structure for coral reefs worldwide. But the slow growth of corals, combined with their high habitat requirements, makes the system particularly vulnerable to change. Corals are highly sensitive to increasing water temperatures due to climate change. Once the water temperature rises just slightly, the symbiotic algae leave the polyps. The polyps themselves are colourless and the coral appears bright white. This state is

known as coral bleaching. If the temperatures stay continuously high, the coral polyps die, are overgrown by algae and leave behind bare, colourless calcareous skeletons.

Oceans encompass diverse and unique habitats – especially on their coasts where marine and terrestrial ecosystems meet.



Besides coral reefs, mangrove forests on the coasts of tropical seas are an important refuge for many species and serve as breeding grounds and places for foraging. Numerous fish and even some shark species use the flooded root zones of mangrove forests to raise their young. Mudskippers and crabs live in the muddy fringes, and numerous birds forage here. The tree-tops of the mangrove forests serve as nesting sites for seabirds; monkeys and reptiles use the mangrove forests as a refuge. The Sundurbans, a huge mangrove forest on the Bay of Bengal, is home to the largest tiger population in Bangladesh. These ecosystems are also endangered by human activities. The forests are cleared to develop areas with wide white-sand beaches for tourism, and accidents at oil production facilities cause lasting damage to mangrove forests.

Marine ecosystems under threat

Tropical coral reefs are particularly at risk from climate change and rising average temperatures. NABU has discovered the seriousness of the damage through a study in the Western Pacific Coral Triangle, around the Togeian Islands. One of the most species-rich reef formations in the world, it is heavily damaged and its functionality is impaired. The survey confirmed that most fish populations are overfished and reefs have been damaged by dynamite fishing.

90% of the world's commercial fish stocks are overfished or fished to their biological limits

30% of coral reefs have disappeared globally

40% have been considered endangered in recent years

35% of mangrove forests have disappeared since 1980



INDONESIA

Providing context on marine megadiversity

“Conservation is all about context”, wrote the famous conservationist Richard Lindsay. “It is impossible to know whether something is rare, distinctive, or characteristic unless one knows where it occurs and where it does not occur.” This is even truer of the marine environment, of which over 95% is still unexplored by scientists. The Togeian Islands in the Gulf of Tomini, surrounded by northern and central parts of the island of Sulawesi, are a treasure of coral reefs in the heart of the Coral Triangle, the global epicentre of marine biodiversity. After a baseline study on marine biodiversity twenty years ago, NABU organized a marine rapid assessment in this Key Biodiversity Area (KBA) and provided the data to local and regional governments to improve the management of the area.



NABU has also been able to show that large parts of the coral reef are massively affected by coral bleaching. This is not surprising: for several months in 2015, the El Niño effect (a significant warming of the water in the tropical East Pacific, triggered by climate change) caused critical temperatures of over 33° C in the region. El Niño has led to massive coral mortality in Australia’s Great Barrier Reef, and the results of the survey show that many of the Indonesian coral reefs have been affected as well.

All marine ecosystems are interconnected, and the interactions with terrestrial ecosystems are also essential. For many inhabitants of the coral reef, such as fish and crustaceans, neighbouring mangrove forests are used as breeding grounds for their young. Likewise, animals of the open ocean come to the reefs and mangroves to find shelter to safely rear their offspring. This proves that the persistence of individual ecosystems keeps the whole ocean functioning.

There are also important links between the protection of rain and mangrove forests and the protection of the reefs. If the forest disappears, the underlying soil is exposed to erosion, and after rainfall rivers deposit large amounts of sediment on the offshore reefs. Organic material that enters the sea through erosion deprives the water of oxygen and lowers the pH value, to which the corals are very sensitive. There is a risk of the reef dying if too much sediment is washed in. Intensive exploitation of fragile coastal and marine ecosystems is leading to severe degradation, erosion and the decline of ecosystem services that are vital for the region’s inhabitants.

In Madagascar, NABU and its partner ASITY Madagascar have supported the transition of the unique coastal mangrove estuary complex Mahavavy-Kinkony into a community-managed protected area. The coastal ecosystems’ flora and fauna are regularly monitored to detect changes and threats. In partnership with coastal user communities, the coasts are being monitored to reduce illegal fisheries and marine extraction, and a sustainable fisheries management concept is being established in collaboration with the local authorities. Alternative income measures, particularly for women, are helping to reduce pressure on the already exploited coastal ecosystems, while farmers are being trained to adapt their land use to climate change.

Fishing for litter – cleaning our oceans

It is not only coral reefs and mangrove forests that need protection, however. Another major problem is the pollution of coasts and seas by plastic waste. More than ten million tonnes of waste enter the oceans every year. Animals feed on this plastic or become entangled in ‘ghost nets’; thousands of animals die in this way every year.

The residual plastic is gradually crushed by the tides in the sea and eventually enters the food chain as microscopic plastic. NABU is tackling

this problem with a trial project. The idea is as simple as it is effective. German coastal fishermen in the North and Baltic Sea catch considerable amounts of waste in their nets every day. Often this is simply thrown back into the sea; so far there has been no regulated and environmentally friendly waste disposal system. NABU is therefore developing effective disposal structures for the “fished” waste in numerous ports.



MADAGASCAR

Intact coastal ecosystems for improved livelihoods

Madagascar is part of one of 36 biodiversity hotspots on Earth. Its protected Mahavavy-Kinkony complex includes parts of a river delta, extensive mangrove galleries and dry forests, wetlands and the Kinkony Lake. Here the intensive use of coastal and marine ecosystems, together with impacts of climate change and a lack of adaptation practices, are leading to the decline of essential ecosystem services. Together with our partner Asity, we are supporting communities to improve livelihoods, conserve resources and adapt to impacts of climate change.



The fishermen collect rubbish in large bags, which are provided for free, and bring it to containers at the port. Afterwards, the waste is sorted and documented by NABU volunteers, to collect important information on the composition and origin of the waste. Once the waste has been disposed of properly, NABU uses the data for studies to build pressure on politicians and decision-makers.

Together with fishermen and volunteers, NABU fights against marine litter in the North and Baltic Sea.



CONTACT:

Svane Bender
Deputy Director International Affairs / Head of Africa Programme
Svane.Bender@NABU.de

Tom Kirschey
Head of International Peatland and Southeast Asia Programme
Tom.Kirschey@NABU.de

More about the project:



“ Marine and coastal ecosystems are among the most vulnerable ecosystems on earth and more than a billion people are directly dependant on the ecosystem services they provide.”

Svane Bender



BANGGAI CARDINALFISH

Overfished and threatened

▲ Endangered beauty: the Banggai cardinalfish is a popular aquarium fish and therefore still captured in large numbers in the wild.

The Banggai cardinalfish (*Pterapogon kauderni*) is truly one of a kind – this marine fish is the only member of its genus and characterized by unusual biological traits.

Each individual has a distinct whitish dot pattern across contrasting dark and light bars. The small fish (up to 8 cm long) interacts with invertebrates such as anemones and is the only diurnal member of its family. In addition, it reverses reproductive roles. The males are responsible for parental care, hatching the eggs in their mouths. However, its uniqueness and outstanding beauty are both a blessing and a curse: as a popular aquarium fish, it is extensively fished for the ornamental fish trade.

The species is endemic to the Banggai Archipelago off Central Sulawesi in Indonesia and has a very limited range. It inhabits the shallow, calm waters of coral reefs and seagrass beds. Its natural habitats are threatened and destroyed by overfishing (including the highly destructive practice of dynamite fishing), ocean warming, waste pollution and nitrogen influx from agricultural and household runoff. A particular threat to tropical coral ecosystems, like the

Togean Archipelago in the Gulf of Tomini, is massive coral bleach and irreversible functional impairment.

Although the Banggai cardinalfish is unique, the threats it faces are not: it represents the fate of an entire ecosystem and a large number of coral reef inhabitants who are exposed to habitat loss and overexploitation. Like many other coral fish, the species faces the threat of extinction and is listed as 'endangered', with a declining population, in the IUCN Red List of Threatened Species.

To evaluate the state of the Togean-Banggai marine Key Biodiversity Area and its inhabitants, NABU organized a marine rapid assessment. The results confirmed the seriousness of the ecosystem's degradation related to overfishing, pollution and climate change. The data were provided to local and regional governments so they could develop conservation measures and improve management. Further marine and coastal conservation work on a local and transnational scale is crucial to mitigate the complex threats to tropical coral reefs and ensure the persistence of endangered marine species such as the Banggai cardinalfish.



MANGROVES

Unique coastal stabilizers in peril

Through highly developed adaptations, mangrove trees can grow where conditions would be deadly for almost all other tree species. They can survive the high salinity of seawater, the scorching heat of the sun and the constant cycle of the tides. Because of these specific abilities, mangroves have spread far across the globe and along many tropical and subtropical coasts on nearly all continents.

A distinction is made between the western and eastern mangrove forests. While the western mangroves thrive on the coasts of the Americas and western Africa, the eastern mangrove forests occur on the coasts of eastern Africa, Madagascar and South to Southeast Asia. The western mangrove forests are relatively species-poor: of eight different species, the black, white and red mangroves are the most dominant. In contrast, the eastern mangrove forests show a high diversity, with up to 50 different species.

To prevent the harmful effects of salt water on their metabolic processes, mangroves have developed various strategies for desalinating seawater. Large parts of the salt ions are already

filtered through the roots. Further salt is stored in the vacuoles of the cells or excreted through salt glands in the leaves. As the anaerobic mud soils provide stability, but only insufficient access to oxygen, above-ground aeration systems in the form of stilt roots ensure the oxygen supply. Furthermore, mangrove seeds already germinate on the mother tree till the tree sheds the seedlings and float upright on the water surface for up to a year until they get stuck in the mud and take root.

Mangrove trees can grow for up to 100 years, protecting the coasts from erosion, waves, tidal currents, and storms, providing food and shelter for a plethora of species and supporting the livelihood of millions of people. However, climate change, logging and extensive agri- and aquaculture threaten the survival artists. Around one third of mangrove forests have disappeared during the last 40 years. In North-western Madagascar, NABU and ASITY Madagascar transformed an area of 302,900 hectares into a community-managed protected area to protect the terrestrial and aquatic ecosystems and preserve the livelihoods of local people.

▲ Mangrove biomes are bridges between terrestrial and marine ecosystems and true multitaskers. They provide habitats, prevent erosion, and store carbon – just to name a few of their ecological functions.



MOUNTAINS – Vulnerable giants

by Katja Kaupisch, Marco Philippi, Ekaterina Kovtun

As the highest and most dramatic features of the landscape, mountains have fascinated, inspired, and challenged humankind throughout history. Complex and fragile mountain ecosystems occupy more than a fifth of the Earth's land surface and are home to more than 10% of the world's population. They exhibit an especially high biodiversity and provide indispensable ecosystem services to humankind. However, these vulnerable ecosystems are undergoing rapid changes due to the climate crisis and human land use. NABU works tirelessly to protect mountain landscapes, especially in the Caucasus and Central Asia.

Mountains are remarkable in many ways, but in particular for harbouring an exceptionally rich biodiversity. While accounting for less than 25% of the land area, mountain ranges support an estimated third of terrestrial biodiversity and host about half of the world's biodiversity hotspots. The most diverse hotspots are the Tropical Andes, which alone contain more than 15% of all plant life on the planet. One of the key factors contributing to mountain biodiversity is environmental heterogeneity. Mountains encompass a wide range of climatic and topographic conditions across short geographic distances, resulting in high habitat diversity and allowing more species to coexist than would otherwise be possible.

Sources of water and life

Mountains not only host an outsized share of the world's biodiversity, but also provide ecosystem services that extend beyond their geographical boundaries. All major rivers in the world – from the Rio Grande to the Nile – have their headwaters in highlands, and half of humankind relies on the freshwater that accumulates in mountain areas. Even in temperate areas, 30 to 60% of freshwater can come from highland watersheds. In the Rhine basin, for example, the Alps provide 31% of annual flows, even though they make up only 11% of the basin's land area. In semi-arid and arid regions, mountain discharge can represent up to 95% of the total flow in a catchment. The high mountains of Asia, which include the Himalayas, the Karakoram, the Hindu Kush, and the Tibetan Plateau, store more frozen water than anywhere else in the world outside the polar regions. For this reason, the region is often referred to as the Third Pole.

Closer to the gods

Along with essential ecosystem services, mountains provide income, a sense of identity, and spiritual values to people and communities all over the world. As the highest features of the landscape, mountains may serve as natural temples, places of worship, inspiration, and transformation. Many religions have traditions centred on sacred mountains which are considered holy (such as Mount Olympus in Greek mythology) or are related to famous events (like Mount Sinai in Abrahamic religions). Because of their outstanding natural and cultural values, many mountains and mountainous areas have been designated as World Heritage sites.

Growing threats

Although they may appear eternal and everlasting, mountains are experiencing rapid

changes and are among the most vulnerable landscapes on Earth. The main drivers of mountain landscape transformation are land use and climate change. Unsustainable land use practices, namely overgrazing, deforestation, and non-conservation agriculture, result in the degradation of natural habitats and create niches for invasive species. Other significant threats are the development of large-scale infrastructure and unsustainable natural resource projects, the most considerable being hydrocarbon exploration and mining activities. Linear infrastructure, such as pipelines, fences, and roads, including the roads required to access mining sites, cut through natural habitats and disrupt animal movement, leading to declining populations of many wildlife species. In addition, improved access for humans can lead to an increase in wildlife poaching. The remoteness and vast scale of mountainous areas make it difficult to control illegal activities, even more so as many mountain ranges constitute geopolitically sensitive international border areas.



Although found on every continent including Antarctica, mountain ranges are not homogeneously distributed around the globe. All of the world's mountains above 7,000 metres are in Asia, and all peaks above 8,000 metres, including the highest, Mount Everest, are situated in the Greater Himalayan range.

▲ Species inhabiting mountainous ecosystems are perfectly adapted to the harsh living conditions.

The effects of land use are further aggravated by climate change, which is reported to be occurring more rapidly in mountains than in any other ecosystem outside of the Arctic and Antarctic. Iconic symbols of the changing climate are the diminishing glaciers on Africa's highest mountain, Kilimanjaro. Of the ice cover recorded in 1912, 85% has already disappeared, and most of what remains could be gone by 2033. At the same time, mountain ecosystems are particularly sensitive to climate warming since their biota is generally adapted to lower temperatures. As cold habitats are often restricted to small summits, alpine species may not have sufficient suitable habitat to survive rapid changes. This scenario is known as "nowhere to go".



NABU is committed to the conservation of mountainous biodiversity hotspots, especially in the Caucasus and Central Asia.

More about the project:



CIRCASSIAN ORCHARDS: Cultural heritage of the Caucasus

In the Western Caucasus, the last remnants of a unique landscape type still exist: the Circassian orchards. They are the result of a traditional form of land use by the Circassians – the original inhabitants of the Republic of Adygea.

Through grafting, cultivated fruit varieties are combined with their wild relatives. This results in unique and robust fruit varieties which are optimally adapted to the local climate. NABU supports volunteer groups working to preserve this traditional heritage.

We facilitate training and experience sharing with volunteers from Germany and carry out measures to revive this ancient form of gardening.



Moving mountains for mountain conservation

Over the last few decades, mountains have received increasing attention from the scientific, environmental, and political communities. The global importance of mountains was first officially recognized by the United Nations in 1992 in Agenda 21, a global action plan for sustainable development into the 21st century. Chapter 13 of Agenda 21 emphasizes the role of mountains as fragile ecosystems that matter for humankind.

In line with global environmental trends, NABU has been committed to the protection of mountain biodiversity since the mid-1990s. Internationally, we have focused particularly on the mountain biodiversity hotspots in the Caucasus and the highlands of Central Asia. In the Caucasus, NABU works with partners and local communities to preserve the unique natural treasures of the region – from the robust fruit variations cultivated in Circassian orchards in Armenia in the South Caucasus to the last remaining Caucasian bison in the North Caucasus. To protect the biodiversity and precious habitats of these mountainous regions, one of NABU's main priorities is to promote environmental education and sustainable regional development.

In Central Asia, NABU's work is focused on and around the snow leopard – a flagship species of sensitive high mountain ecosystems. On NABU's initiative, the Global Snow Leopard Conservation Forum, held in 2013 and 2017, brought together the 12 home countries of the snow leopard for joint conservation efforts. In addition to such cross-national efforts, NABU actively supports local organizations

for wildlife protection in Tajikistan, Pakistan, Nepal, Bhutan, Mongolia and Kyrgyzstan.

In Kyrgyzstan, NABU has supported nature conservation programmes for decades. One example of NABU's nature conservation activities is the Ilbirs rehabilitation centre for wild animals in the Terek valley in the Talai region. Anti-poaching work carried out in collaboration with the government of the Kyrgyz Republic has substantially reduced poaching rates in the country. The anti-poacher unit Gruppa Bars, launched and supported by NABU, is on a mission to protect wild animals by seizing illegal weapons, traps and skins. Animals rescued from poachers, such as snow leopards, lynx and birds of prey, are given veterinary treatment in the rehabilitation centre in Terek and returned to the wild if possible.



KYRGYZSTAN On the lookout for poachers

Since 1999, NABU has been working to protect the iconic snow leopard in Central Asia. One prominent example of our efforts is the establishment and support of the anti-poaching unit "Gruppa Bars" (Team Snow Leopard) in Kyrgyzstan.



The unit consists of four trained employees of the local NABU office and aims to stop snow leopard poaching in the northern regions of the country. With their help, more than 300 poachers and traders have been arrested in the last 20 years, and seven living snow leopards have been rescued. Following the success of this work, NABU plans to establish a second anti-poaching unit in southern Kyrgyzstan in 2022.

As well as measures that directly contribute to the protection of the snow leopard and its habitats, NABU's local office in Kyrgyzstan monitors the species population and carries out ecological education work, with up to 200 events, courses and other participatory activities per year. Since 2002, the office in Bishkek has been a major partner for the implementation of local NABU projects and is now considered to be the most important association for nature and species conservation in Kyrgyzstan. The 30 full-time employees and 50 volunteers are key partners for the Kyrgyz government and perform nationwide ecological monitoring programmes on its behalf.



TAJIKISTAN Community based wildlife protection

NABU works with local hunters, farmers and pasture committees to establish long-term solutions, ensuring peaceful coexistence between humans and snow leopards in Tajikistan. We build leopard-proof corrals to protect livestock as an immediate measure, with the financial support of many private donors. An insurance system grants farmers financial compensation for lost livestock. In addition, wildlife protection organizations were established to help local hunters and farmers prevent poaching and lease land which can be turned from pasture farmlands into wildlife reserves to increase and stabilize prey animal populations.



“Preserving the richness of mountain ecosystems and improving people's living conditions should go hand in hand.”

Katja Kaupisch

More about the projects:



CONTACT:

Katja Kaupisch
Head of Central Asia and
Eastern Europe Programme
Katja.Kaupisch@NABU.de

Vitalij Kovalev
Head of Caucasus
Programme
Vitalij.Kovalev@NABU.de



SNOW LEOPARD

A rare cat on the roof of the world

▲ Snow leopards love cold, dry climates and live at altitudes of up to 5,000 metres. Their distribution area extends over twelve countries, including China, Russia, Pakistan and Tajikistan.

The snow leopard (*Panthera uncia*) is native to the high mountains of Central Asia and one of the world's most elusive and least studied large animals. It has thick whitish to grey fur, with black spots on the head and neck and larger black rosettes on the back, flanks and tail. The colour resembles the rocky and snowy environment of its habitat and provides camouflage. Snow leopards are smaller than other big cats but have an exceptionally long tail for balancing on rocks and wrapping around their bodies to protect them from the cold.

The global population of the species is estimated at 4,000 to 6,400 animals. These figures, however, are possibly closer to guesses than estimates due to the secretive nature of snow leopards, their sparse distribution, and their preference for remote and inaccessible habitats. Despite being protected by law in all 12 countries where it occurs, the snow leopard is listed as 'vulnerable' on the IUCN Red List of Threatened Species and is at risk of extinction as its population is declining.

Major threats to the survival of snow leopards include illegal hunting for fur and bones, as

well as loss of prey and habitat due to livestock farming, mining, and infrastructure development. A decline in natural prey forces the cats to feed on local livestock, bringing them into direct conflict with herders and putting them at risk of retaliatory killing. Climate change is expected to exacerbate these threats by reducing the extent of alpine habitats suitable for snow leopards and their prey species.

NABU has been committed to the protection of the iconic big cat for more than 20 years, supporting research and conservation projects in six Asian countries. Our extensive work in Kyrgyzstan has helped to significantly reduce poaching and to increase the acceptance of snow leopards among local communities. In 2013, NABU initiated and co-organized the Global Snow Leopard Conservation Forum, bringing together official representatives of all 12 range states of the species for the first time. October 23, the day on which the forum adopted the Bishkek Declaration on the Conservation of the Snow Leopard, is now celebrated as International Snow Leopard Day.



CAUCASIAN BISON

Teetering on the edge of extinction

The last Caucasian bison (*Bison caucasicus*) living in the wild was shot in 1927. A century earlier hundreds of the impressive relatives of our domestic cattle roamed the mountain landscapes of the Greater Caucasus, perfectly adapted to the harsh conditions of this alpine environment. But years of intensive poaching after the First World War drove the species to extinction – almost.

A single male specimen, named Caucasus, survived in a German zoo. Throughout the next decades, scientists in the Soviet Union strove to rebreed the Caucasian bison using genes from the last remaining bull, several American bison and the last remaining specimen of the European lowland bison, also eradicated from the wild and surviving only in captivity. In the 1960s their efforts bore fruit: a small herd of bison was released into the pristine forests and mountain meadows of the Caucasus Nature Reserve, a specially protected area of almost untouched wilderness.

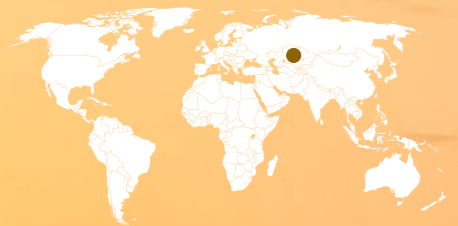
The bison quickly reclaimed their former habitat and the population flourished: by the 1980s, 1,400 animals formed the largest bison

population in the world. However, poaching on an unprecedented scale began during a period of instability sparked by the end of the Soviet Union. Within a few years the population dropped to roughly 200 and the Caucasian bison was once again on the verge of extinction.

To prevent the renewed extinction of the "king of the forest", as the locals call the Caucasian bison, NABU, in close cooperation with the management of the Caucasus Nature Reserve, took action to improve their protection. Winter feeding was crucial for the rescue of the species, in combination with a study investigating the bison's most important habitats and the establishment of an anti-poaching unit to patrol the protected area. Another total loss was averted at the last minute, and after years of growth, the population has settled at around 1,200 in recent years.

Today the bison population in the Caucasus Nature Reserve is stable and the animals can live undisturbed in the protected area. The bison conservation project is one of the biggest success stories of NABU's international work.

▲ Good news: Once on the verge of extinction, the Caucasian bison was able to recover thanks to the dedicated work of NABU and other conservationists.



STEPPE AND DESERTS – Extreme habitats

by Til Dieterich, Stefan Michel, Anna Wenzel

Steppes and deserts are famous for their extreme climatic conditions and sparse vegetation. Wide landscapes and extraordinary geological formations characterize these barren ecosystems. Their natural inhabitants are survival artists – from tiny crepuscular jerboas to saiga antelopes with their famous noses. However, human activities threaten these species and their habitats. NABU actively promotes the conservation of the precious steppe and desert ecosystems in Central Asia, using community-based approaches to protect their biodiversity.

Cold winter (or temperate) steppes and deserts are among the driest areas of our planet and are shaped by the unique climatic conditions of their inner-continental locations. They are mainly located in Eurasia, where they stretch from the Black Sea to the north-eastern parts of China. But temperate steppes can also be found in the Great Plains of North America, mostly referred to as prairies, and in small patches of Patagonia and the southern Andes, where they are called pampas.

Cold winter steppes and deserts

In Central Asia, temperate steppes and deserts are by far the dominant ecosystems, covering about two thirds of the land surface. Here, the view stretches almost uninterrupted to the horizon, due to the mostly flat or undulating landscape, where trees are absent and large shrubs are rare.

The ecosystems are dominated by extreme climatic conditions and sparse vegetation. Temperatures can drop to -40°C in winter and rise to over $+50^{\circ}\text{C}$ in summer. The landscape is mainly characterized by clay and loess soils, and as the precipitation only stays on the surface and evaporates quickly this creates dust and increases aridity.

While the steppes are dominated by herbs and grasses, wormwood, dwarf and semi-shrubs and succulent species predominate in the deserts. To adapt to the dry climate, larger shrubs such as the saxaul form relatively small stands on sand as well as moist areas. The fauna of the region consists mainly of small rodents, such as jerboas and ground squirrels, and large herbivores, like the saiga antelope and goitered gazelle. Here, every life form has had to adapt to the harsh conditions and become a survival specialist.

Fragile ecosystems under pressure

However, even the most adapted survival artists are struggling in the face of the increasing anthropogenic influence. Intensive farming, grazing, poaching and infrastructure expansion are putting the ecosystem under pressure. In recent years, additional gas and oil pipelines as well as roads and railroads have been built through the steppes and deserts of Central Asia. Along with barbed wire fences, for example along the borders of Kazakhstan, these linear structures pose serious obstacles for the migrations of animals. Extensive poaching of birds and mammals remains a major challenge in these sparsely populated and vast landscapes, which are difficult to control.



Grasses and sparse vegetation as far as the eye can see: a typical view in the vast steppes of Central Asia.

Historically, the semi-nomadic lifestyles of the local population, such as the Kazakh tribes, allowed humans and nature to coexist. However, this balance ended abruptly with the collectivization campaign of the Soviet Union in the 1930s and the subsequent forced sedentarization of the semi-nomadic tribes. By the 1960s, most of the northern steppes had been ploughed under to grow crops, such as durum wheat. Today the expansion of agriculture and grazing continues to degrade the landscapes and poses a major threat to large ungulates such as the saiga antelope. They are losing their summer pastures and habitats to agricultural areas and are driven away by farmers trying to keep them off their crops.

As a result, wildlife has drastically declined in the region and you can often travel for hours without seeing any large animals. The only abundant species are rodents like steppe marmots, gerbils, ground squirrels and crepuscular jerboas. Occasionally saiga antelopes and rarely goitered gazelles or kulans (Asiatic wild asses) can be observed. Others, such as wild horses and camels, went extinct over a century ago. The same fate was met by the iconic Asiatic cheetah, which hunted goitered gazelles and saiga antelopes in Central Asia until the middle of the 20th century. Evidence of the former abundance of wildlife in these ecosystems is provided by hundreds of so-called 'desert kites', ancient stone-and-dirt structures which were used by Neolithic hunters to hunt ungulates in large numbers.

The Ustyurt Plateau

In the tri-border area between Kazakhstan, Uzbekistan and Turkmenistan lies the Ustyurt Plateau – one of the last places of refuge for various species, some of them rare and en-



Curious formations

The high daily temperature fluctuations accelerate physical weathering, resulting in spectacular geological formations, such as chalk cliffs, fields of stone balls (known as concretions), or pillars up to several hundred metres high. Large sand deserts like the famous Kyzylkum and Karakum can also be found in this ecoregion.

” With recovering saiga numbers, local communities fear damage to their fields and pastures. To increase acceptance for them, we help develop economically attractive sustainable use.“

Stefan Michel

dangered. Urials (a type of wild sheep), goitered gazelles, honey badgers and desert lynx find a home in these extreme landscapes even today. Single leopards also irregularly cross the Turkmen border into Kazakhstan and Uzbekistan. In the north of the Ustyurt Plateau, deserts covered with dwarf shrubs merge into vast grassy steppes. Feather grasses sway in the wind and saiga antelopes populate these landscapes in growing numbers. To the east, the plateau borders the largely dried-up Aral Sea, on whose former lake bed herds of kulans can still be observed. Today, brine shrimp also reproduce in the increasingly salty water. This in turn attracts flamingos, for which brine shrimp are the preferred food source.

Access to water in these arid ecosystems is especially important for domestic and wild animals. Precious water holes, at the foot of chalk cliffs up to 150 metres high bordering the Ustyurt Plateau, allow the animals to survive in this arid landscape. The cliffs are remnants of a

More about the project:



KAZAKHSTAN

Community-based conservation of the saiga

NABU works with the local population to protect the saiga antelope in the Ustyurt region in Kazakhstan. Central to this is the establishment of local wildlife protection associations. Former poachers and hunters are becoming “saiga protectors”. There are now four such organizations in the saiga antelope range, united under the umbrella organization Tabigi Orta. The current increase in saiga numbers indicates that the measures taken, alongside those of government agencies, are effective. If this trend continues, future sustainable use of the saiga by locals is planned. NABU also produces environmental education materials, such as schoolbooks and comics, to inspire more people to protect the saiga.



coastline of the Tethys Sea, which existed here in the Mesozoic, 250 to 66 million years ago. Numerous fossils of marine animals, including shark teeth, sea urchins and shells, bear witness to this period.

Humans also live in the dry steppe and desert region of the Ustyurt Plateau. In the arid climate, the local population almost exclusively raises livestock such as camels, horses, cattle, sheep and goats, while the northern steppes are partly used for agriculture. While parts of the region are under the protection of nature reserves, such as the Kaplankyr Nature Reserve in Turkmenistan and the Ustyurt Nature Reserve in Kazakhstan, human activities are expanding onto the Ustyurt Plateau and endangering its ecosystems and wildlife.

Protecting the last places of refuge

Since 2014, NABU has been increasingly alarmed by reports of the rapid decline of saiga antelopes and the ongoing development of the Ustyurt Plateau for oil and gas exploration. This has prompted NABU to advocate for the protection of this unique habitat and its iconic species and to campaign for the Ustyurt Nature Reserve to be designated a UNESCO World Heritage Site. A challenging mission, as there were plans to develop gas fields in the immediate vicinity of the nature reserve. With the combined efforts of local partners, NABU succeeded in persuading the government to abandon this project. Currently, there are even plans to expand the 230,000 hectares Ustyurt Nature Reserve by up to 600,000 hectares – a glimmer of hope, as this would ensure long-term protection for a particularly valuable part of the Ustyurt Plateau.

NABU and its experts work actively with local communities in the Ustyurt region to protect the saiga antelope from extinction. By supporting the establishment of local wildlife protection organizations, we aim to prevent poaching, protect habitats and restore the population of the saiga antelope. These efforts have been successful: based on aerial surveys, the population of the species in the Ustyurt region had recovered to 12,000 individuals in 2021.¹

This local species conservation work is not only helping one of the oldest mammal species in the world; it is also preserving the ecosystem of the steppes and deserts from degradation. The steppe needs the grazing herds: the ungulates fertilize it, spread plant seeds and keep the grass short, thus restricting wildfires and providing ideal habitats for other species, such as the sandgrouse or the endangered saker falcon.

SAIGA ANTELOPE

More than just a fancy nose

The saiga lives in the cold winter deserts and steppes of Central Asia, in Russia, Mongolia and Kazakhstan. With its long seasonal migrations, the saiga not only braves harsh climatic conditions but thrives in them. It can form huge herds of several hundred thousand animals. Its famous trunk-like nose is a multifunctional tool: in summer, it acts as a dust filter and air conditioner to avoid heat stroke; in winter, it warms the inhaled air to protect the lungs and brain from the extreme freezing temperatures.

Saiga antelopes can run at speeds of up to 80 km/h, enabling them to outrun predators. They hardly stand a chance, however, against poachers with modern weapons and vehicles. In the past decades, the saiga population has seen extreme ups and downs, forcing it to the verge of extinction in the early 2000s. The main reason was extensive poaching, fuelled by the demand for saiga horns for traditional Chinese medicine (TCM). Mass deaths due to extreme weather and disease further threatened the species.

The range of the western saiga (*Saiga tatarica tatarica*), which lives mainly in Kazakhstan, has been split into four largely isolated populations for decades. There is good news, according to latest estimates: the Ural population has reached the highest ever recorded numbers. Also, the Betpak-Dala population has recovered following a mass die-off in 2015 and is further increasing. However, the situation of the Ustyurt population remains particularly critical. It had fallen from an estimated 254,000 animals in 1992 and 1994 to only 1,270 in 2015 – a dramatic decline of 99.5%.¹

Since 2015, NABU has been working in the Ustyurt region to save this smallest population of the saiga antelope from extinction. In 2021, the population was estimated to have slightly recovered to a calculated total of 12,000 animals.² However, the clumped distribution of saigas in the area means that such counts and further predictions are subject to considerable uncertainty. In any case, the estimated population is still far below the potential of the habitat and the level required for conservation. NABU therefore aims to establish a sustainable conservation model with the involvement of the local population.

▲ Saiga antelopes belong to the steppe. Yet this rare animal only survives in five areas in Asia. NABU is helping to preserve the saiga in Kazakhstan with projects for community-based conservation and environmental education.

Notes, literature, and additional links

GAME OVER?

- 1 Hallmann, C.A.; Sorg M., Jongejans, E.; Siepel, H.; Hofland, N.; Schwan, H.; Stenmans, W.; Müller, A., Sumser, H.; Hörrén, T.; Goulson, D.; de Kroon, H., 2017
More than 75 percent decline over 27 years in total flying insect biomass in protected areas
PLoS ONE 12(10): e0185809
<https://doi.org/10.1371/journal.pone.0185809>

WETLANDS

- 1 Millennium Ecosystem Assessment, 2005
Ecosystems and human well-being: Wetlands and Water. Synthesis
World Resources Institute, Washington, DC.
- 2 Ramsar Convention Secretariat, 2011
Wetland ecosystem services Factsheet 6: Reservoirs of biodiversity
- 3,5 IUCN, 2021
ISSUES BRIEF: Peatlands and climate change. November 2021
Retrieved March 14, 2022, from www.iucn.org/resources/issues-briefs/peatlands-and-climate-change
- 4 Ramsar Convention Secretariat, 2014
About the Convention on Wetlands
Retrieved March 10, 2022, from www.ramsar.org/about-the-convention-on-wetlands-0

FORESTS

- 1 FAO and UNEP, 2020
The State of the World's Forests 2020. Forests, biodiversity and people
Rome. <https://doi.org/10.4060/ca8642en>
- 2 The Nature and Biodiversity Conservation Union (NABU) (eds.), 2017
NABU's Biodiversity Assessment at the Kafa Biosphere Reserve
Berlin, Addis Ababa

The Nature and Biodiversity Conservation Union (NABU) (eds.), 2020
NABU's Follow-up Biodiversity Assessment at the Kafa Biosphere Reserve, Ethiopia
Berlin, Addis Ababa

OCEANS AND COASTS

- 1 IPBES, 2019
Global assessment report on biodiversity and ecosystem services of the Inter-governmental Science-Policy Platform on Biodiversity and Ecosystem Services
E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (eds.)
IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

STEPPE AND DESERTS

- 1 The population estimates of the saiga antelope are provided by the government of Kazakhstan. They are based on aerial counts and extrapolations.
- 2 The estimate is based on the results of an aerial survey in spring 2021 performed by the Association for the Conservation of Biodiversity of Kazakhstan (ACBK) on behalf of the government.

Imprint

© 2022, NABU-Bundesverband
1. Edition 08/2022

Naturschutzbund Deutschland (NABU) e.V.
Charitéstraße 3 • 10117 Berlin • Germany

Phone: +49 (0)30.28 49 84-0
E-mail: NABU@NABU.de
www.NABU.de

Text: Tom Kirschev, Svane Bender, Maik Jerusalem, Stella von Sassen, Katja Kaupisch, Marco Philippi, Til Dieterich, Laura-Sophia Koschwitz, Anna Wenzel, Ekaterina Kovtun, Stefan Michel, Charlotte Lorentz, Manja Graham, Britta Hennigs
Editorial board: Anna Wenzel, Sarah Stoll
Design: Sigi Reiss, Darmstadt
Illustration: Julia Friese
Pre press: Bär-Medien GbR

Order information: The publication is available in the NABU shop.
Online order at www.NABU-Shop.de, Phone: +49 (0)2163.57 55 270

Item No.: NB9069-D

Photo credits (from left to right and top to bottom of each page): **cover:** Volker Gehrmann /KARACHOBERLIN; **page 4:** NABU /Til Dieterich, Andy Fabian, mirecca / adobe.stock.com, NABU / Bruno D'Amicis (2x); **page 6:** Mara Pakalne; **pages 8 / 9:** NABU / Behruz Boev & ANCOT, willyam / adobe.stock.com, Ondrej Prosicky / adobe.stock.com, map: CC BY-SA 3.0, <https://commons.wikimedia.org>; **pages 10 / 11:** Mara Pakalne; **pages 12 / 13:** Mara Pakalne (2x); **pages 14 / 15:** NABU / Bruno D'Amicis (4x); **pages 16 / 17:** NABU / Tom Kirschev, Dieter Damschen; **pages 18 / 19:** Davide Bonaldo / adobe.stock.com, Mathias Putze; **pages 20 / 21:** Forest Protection Team / Hutan Harapan, Mathias Putze, NABU / Maheder Hailleselassie; **pages 22 / 23:** Lara Shirin Bienkowski, Klaas-Douwe B. Dijkstra; **pages 26 / 27:** Avalon / juniors@wildlife, Urban Photographer / iStockphoto; **pages 28 / 29:** hunterkitty / adobe.stock.com, Alvarez & Riziky / adobe.stock.com, NABU / Phillip Scholl; **pages 30 / 31:** Francesco Ricciardi / adobe.stock.com, damedias / adobe.stock.com; **pages 32 / 33:** irisphoto2 / iStockphoto, Dmitry Andreev; **pages 34 / 35:** Alexander Perevozov, NABU Kavkaz, NABU Kyrgyzstan, BWCDO; **pages 36 / 37:** slowmotiongli / adobe.stock.com, Sergei Trepel; **pages 38 / 39:** Tatiana / adobe.stock.com, NABU / Stefan Michel, NABU /Til Dieterich; **pages 40 / 41:** Victor Tyakht / adobe.stock.com, P. Romanov; **back page:** NABU / Tom Kirschev

Project illustrations and graphics on pages 24/25: 2. Edition 08 / 2022, concept and text: Julia Friese, Britta Hennigs, Ronja Krebs, Sarah Stoll, Anna Wenzel; illustration and layout: NABU / Julia Friese; 1. Edition developed within the SDG-campaign, funded by the Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).



Close-up of the colourful feet of a Java flying frog in Indonesia.

NABU

Founded in 1899, NABU (Nature And Biodiversity Conservation Union) is the oldest and largest environmental association in Germany. It encompasses more than 875,000 members and supporters, who commit themselves to the conservation of threatened habitats, flora, and fauna, to climate protection and energy policy. NABU's main objectives are the preservation of habitats and biodiversity, the promotion of sustainability in agriculture, forest management, and water supply and distribution, as well as to enhance the significance of nature conservation in our society.

About 40,000 volunteers play an active role in practical nature conservation work, with great success: this is something that is unique to NABU. These active NABU members look after more than 110,000 hectares of valuable protected reserves in Germany. NABU also has volunteer groups working on an international level to conserve nature, protect species and support livelihoods in Africa, Eurasia, and the Caucasus. This work is backed by professionals at our regional offices and at our national headquarters in Berlin, who take care of public relations, project development and management, and political lobbying.