

Biodiversity must be restored

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Successful ecological restoration: The Heinz Sielmann pond at Lake Constance, which covers an area measuring 10 hectares, is currently home to 40 percent more bird species than five years ago, including rare species such as the stonechat and the red-crested pochard. Residents in nearby Owingen-Billafingen are also delighted to see the first pair of storks in living memory nesting in the area. Credit: MPI for Ornithology

The global extinction of species is rapidly accelerating. We still have a chance to stop it – at least in Germany. But time is of the essence. A simple strategy based on the biotope network model at Lake Constance (Biotopverbund Bodensee) shows a way out of the biodiversity crisis. The German federal government and the individual states must now set the right political course.

Recent decades have seen an accelerated extinction of wild plants and animals throughout the world, the scope and speed of which is unprecedented. We are bombarded with bad news about this on a daily basis across all media. One day, we are asked not to eat tuna or cod. The

next, the focus shifts to who will pollinate our fruit trees if the world's bee population dies out. How will we make our furniture in the future if climate change wipes out all of our spruce trees? And where can we enjoy some recreational snorkeling if entire coral reefs are transformed into dead haunted castles?

This loss of biodiversity is not a natural catastrophe; it has been caused by a single, massively dominant [species](#) of mammal: humankind. More than 10 million plant and animal species currently inhabit our planet. Each year, thousands of them disappear even before biologists have a chance to name them. The global causes of this mass extinction include the deforestation of large areas of rainforest, pollution and warming seas. The Living Planet Index 2008, produced by the World Wide Fund for Nature (WWF) and based on trends in 4,000 populations of 1,500 known species, shows an overall decline of 27 percent in the world's biodiversity between 1970 and 2005. The decline is most noticeable in the Asia-Pacific region.

The Red Lists of endangered species published by the International Union for the Conservation of Nature (IUCN) provides the most accurate information on the global decline in the diversity of species. The figures in the 2009 report give cause for alarm: 17,291 species – more than one third of the 47,677 species that were studied – are threatened with extinction. Among vertebrates, for example, one in eight birds, one in five mammals and one in three amphibian species were considered at risk; 277 known species (excluding fish) have already disappeared in the last few hundred years, but not one single new species has emerged.

Seventy percent of plants are at risk. The fact that the number of endangered species has increased by almost 55 percent since the 2002 IUCN list is particularly worrying. Given this “galloping consumption,” biologists predict that one fifth of all known species could be extinct by

2030 – a figure that could even rise to one third by 2050.

The current decline in the diversity of species takes two forms: the extinction of mainly rare species with mostly smaller habitats, and the dwindling of even more abundant species, some of which inhabit vast habitats. The latter are a priority in the Red Lists, whose purpose is to draw attention to endangered species, specify the causes of the threat and contribute to protective measures.

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Although they were not published in Germany until the early 1970s, the country currently has more than 350 Red Lists, and they are practically impossible to grasp. They provide the federal government and the individual states with information about 25,000 species in approximately 30 systematic groups, ranging from algae, fungi and lichens to flowering plants, and from snails, spiders and insect groups to vertebrates. In Europe, Germany leads the field with an average of 50 percent endangered species across all plant and animal groups. This proves that extinction isn't restricted to distant, exotic locations, but is also occurring right here, in a country that has a long tradition of nature conservation.

Two more examples with a geographical context deserve mention: BirdLife International reveals some interesting facts about birds, a species group that is particularly well studied, in 35 European countries. Of the more than 100 species studied, no fewer than 56 of them declined between 1980 and 2005 alone; just 29 increased, and 27 remained stable. The decline was most evident among farmland birds. The new EU countries initially had fewer losses, but they are increasingly reaching a par with the old EU members.

One of the best-studied ornithological communities in Germany is at Möggingen on Lake Constance, where the Department of Migration and Immunoecology (formerly known as the Vogelwarte Radolfzell ornithological division) is based. Since the institute was re-established there in 1946, bird populations have been recorded over an area measuring four square kilometers. Results obtained over slightly more than 50 years – from 1947 to 2002 – make for grim reading: of a previous figure of 110 breeding bird species, 35 percent have disappeared altogether or nest only sporadically; 20 percent have declined in the population; 10 percent have increased or are new arrivals; and 35 percent can be considered to be stable. In addition, the number of individual birds also fell dramatically, from an original figure of 3,300 to the current figure of roughly 2,100. The biomass has also declined, from an earlier weight of 240 kilograms to 150 kilograms today. Similar scenarios prevail in areas in Bavaria, Schleswig-Holstein, England and Switzerland.

The species listed for our region are by no means just rare birds, but also include such ubiquitous species as the house and tree sparrow, starling and skylark. The populations of the first three “pests” mentioned above, whose roosting places in Germany were exploded using dynamite even into the 1960s – like those of the skylark – have reduced in number from a former 10 million breeding pairs to less than half that figure. This would be considered genocide if our conspecifics were reduced in number in this way.

The second example relates to insects. On average, more than 50 percent of insect species are on our Red List. Our more senior readers will easily remember how anyone who drove a car in the 1950s frequently had to clean their windshields as, despite low driving speeds, countless dead insects obscured the driver’s vision. Today, however, we have no such problem – most insects have disappeared.

More than 350 Red Lists currently exist and are practically impossible to grasp

Nevertheless, we hear time and again about the biodiversity paradox. Politicians are particularly prone to using the term, misleadingly and cynically, and we should not fall for it. The “paradox” is that, even though our plant and animal populations are continuously declining, species lists for large areas like the whole of Germany are getting longer. How can this be? Quite simply, if most, but not all, of the individuals in a particular species have died out, the species remains on the federal list, even if it has disappeared from many regional lists.

If, for example, parrots make a run for it, as it were, and settle in Cologne or Stuttgart, or runaway rheas settle in Mecklenburg, these invasive species are added to our lists even if, as “spots of color,” they replace only a fraction of the estimated 75 million individual birds that we have lost since 1800. We need to exercise caution if the lists are getting longer, but the habitats populated by the species are getting emptier.

When we see the efforts that are being made – ranging from amateurish to helpless – to put a stop to the extinction of species, of all places in a country with a long tradition of nature conservation, one could think that it had happened very suddenly, like a plague descending upon the unprepared. Not at all! Ornithologists warned of this 150 years ago. Illuminating the case: on the reduction in birds in central Germany (*Beleuchtung der Klage: über Verminderung der Vögel in der Mitte von Deutschland*) is the name of a work published in 1849 by Johann Friedrich Naumann, the father of ornithology in Central Europe.

Naumann’s work made it clear that the peak in bird populations that developed magnificently in the mosaic cultural landscape of the Middle

Ages, when habitats and food were abundant, had been passed. The increasingly intensive use of land meant that animals and plants were driven back. Consequently, the first real measure was taken in 1888 and resulted in the Reich Bird Protection Act. At the same time, the term “conservation” was coined. However, this Act did nothing to achieve its actual goal – to permanently stabilize bird populations.

And that is symptomatic of the practically endless chain of subsequent measures, only a fraction of which are mentioned here: establishing private conservation associations (beginning in 1899); setting up an ornithological station (Rossitten) with bird conservation programs (1901); establishing the State Agency for Natural Heritage Preservation (1906); the Reich Law for the Protection of Nature, which designated a number of conservation areas (1935); the Federal Nature Conservation Act (1976); the EU Directive on the Conservation of Wild Birds (1979); the EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (also known as the Habitats Directive, 1992).

These ordinances led to a surge in activity that, in Germany alone, resulted in the establishment of 21,402 protected areas in 13 different categories, some of which overlapped significantly. In the end, this huge raft of measures turned out to be nothing more than a paper tiger: the destruction of habitats and the depletion of species continue as before, the Red Lists are getting longer – perhaps even being sugarcoated, for instance by changing the evaluation criteria. Analysis shows that, despite the great number of protected areas, only a small percentage of the land area really fulfills the intended purpose of protection.

The causes of the extinction of species have been well researched: human overpopulation and the destruction of habitats by increasingly intensive farming combined with urban sprawl, the disturbance of natural environments and overconsumption of resources.

Nevertheless, we do very little to protect our existing species. Instead, we adopt a firefighting approach: limiting the damage by trying to extinguish the fire when it is already burning. And then sitting on the fence when there's no fire burning.

A huge raft of measures proved to be nothing more than a paper tiger

A new dimension to the ludicrous conservation strategy that prevails revealed itself in 1992. As part of its Convention on Biological Diversity (CBD), the UN proclaimed 2010 to be the International Year of Biodiversity and set out to significantly reduce the loss of biodiversity – a mission that failed completely.

A sustainability indicator for species diversity was developed for Germany. The aim is to achieve a value that is higher than the 1975 value by 2015. In 2007, in a best-case scenario, the data showed a stagnation of 69 percent of the target value. Trying to achieve an improvement of 31 percent in the eight remaining years is utopian, frighteningly naïve and, given the measures currently in place, about as promising as illuminating the far side of the moon by then.

Still, one thing has had an effect on the decline of the diversity of species: EU regulations have become much more strict. When Germany didn't implement the above-mentioned Habitats Directive promptly, the country was threatened with a fine of 1.5 million Deutschmarks per day in 1998. Improvements were subsequently made and the threat is currently off the table. However, there is still a fear, particularly among authorities that grant permits, that species protection requirements, which are now rigorously enforced, will be violated. And, for the first time, conservation organizations have the tools that allow them to do their work effectively: delay, examine in detail, push through protective

measures and, if necessary, derail projects.

Politicians, on the other hand, continue to railroad through projects as much as possible before “dangerous” species are discovered. This wrangling over biodiversity resulted in the recent publication of an article in the business section of the German daily FRANKFURTER ALLGEMEINE ZEITUNG, whose headline exclaimed: “Millions for newts – biodiversity gone mad.” We can understand how conservationists, who have always had their backs to the wall in these power struggles, highlight species for which the necessary protective measures are, in some cases, useless or absurdly expensive. Conversely, only a reliable biodiversity and conservation strategy would help – something that we in Germany have been waiting in vain for for 150 years.

As more than six billion people now inhabit the Earth and we can neither stop the population explosion nor adequately feed the masses and are thus reliant on every resource, we must seriously ask ourselves how much biodiversity we actually need. Apart from crop plants and domestic animals, are other species necessary, or are they merely parasites, competitors or even pests?

Many agriculture technocrats seem to be aiming for increasingly simplified, reduced ecosystems. In the East, such an ecosystem looks like it would consist of humans/rice/poultry/freshwater fish, plus some fruit and vegetables; for us in Germany, it could be humans/wheat/corn/pork/beef and a few additional products and luxuries. We now know that such mini-systems are not sustainable in the long term. Avian influenza (bird flu), a pesticide-resistant corn rootworm or some type of grain AIDS could break a link in this short chain and suddenly wipe out millions of people. This is one area where we should learn from history: when a potato blight ravaged the potato crop, the staple diet of the Irish population, one million people died of

starvation in the country in 1845. We also know that the more diverse ecosystems are, the more stable they are.

For this reason alone, we should ensure that as many species as possible are preserved. There are also a number of other reasons to preserve biodiversity. To date, we have used only a fraction of the above-mentioned 10 million species. But even among these, certain species have proved themselves to be trendsetters for almost every advance. So practically every species could play a key role at some stage in important areas of our life. We therefore need to preserve as many species as possible as a precautionary measure.

The more drastically our environment changes, the more the various species that inhabit it have to continuously adapt – through selection and micro-evolution. This is predicated on sufficient genetic diversity, a hallmark of large, stable populations. Yet another reason to safeguard not only different species, but also large populations with high evolutionary potential. The current threat of extinction facing the world's bee population is probably one consequence of genetic impoverishment (resulting from breeding).

Genetic engineering promises great advances in many areas of life, including food, disease and pest control, and even the prolongation of life. Its continued progress will depend more and more on finding the correct genes and gene combinations. These can be sourced from many different species, each of them a benchmark for successful evolution. One important objective would thus be to maintain their entire gene pool as much as possible.

Finally, there is an important aesthetic and ethical aspect to be considered. Many people find it difficult to live without beautiful wildlife, or to be partly to blame for its extinction. (Unfortunately, this argument loses weight if we look at the millions of people who live quite

happily in degraded ecosystems in places like China, for instance.)

Since the plethora of measures implemented over the past more than 100 years has certainly slowed down – but not stopped – the decline in the diversity of species in some places in Germany, my colleagues and I called for, and also formulated, a new and sustainable conservation strategy in 1988. This strategy envisaged the ecological restoration of between 10 and 15 percent of the land area that can be spared by establishing restored “living spaces” for plants and animals in every municipality.

Dense network of high-quality habitats as “living spaces” for plants and animals

This would produce a dense network of high-quality habitats that all species could reach through natural distribution. Following my retirement in 2004, I was able to initiate this kind of ecological restoration project with the help of the Heinz Sielmann Foundation. The Lake Constance Biotope Network is a major experiment consisting of more than 100 modules on a generous 500 square kilometers. At a cost of 3.5 million euros, the first 11 projects have been completed and the next 15 are in progress. Wetlands are a priority – located in the cleared cultural landscape, they produce the greatest biodiversity.

The results are astonishingly positive. The pioneering module, the “Heinz Sielmann pond” with adjoining wet biotope mosaic (measuring around 10 hectares), was created in a valley that had been subject to intensive farming. Bird populations had been recorded here for three decades and showed similar signs of decline as those in Möggingen, mentioned at the beginning of this article. Once the wetland was set up, the number of bird species observed increased from 115 to 165 in just five years, an increase of 43 percent; 10 species settled in the wetland as

new breeding birds during the period. Of the 75 dragonfly species living in Germany, 33 of them have immigrated; 215 flowering plant species are developing abundant populations and providing a home for myriads of insects; five amphibian species are depositing several hundredweight of spawn each spring.

The most important finding is that Germany is extremely capable of regenerating itself in terms of biodiversity. We were also surprised by the virtually euphoric acceptance among the general public – more areas are being offered than we can ecologically restore. The project was also generously supported by donations.

We therefore suggest that every municipality in Germany should receive its own pond or biotope through ecological restoration. A new wetlands biotope located every ten kilometers would mean around 3,000 modules in Germany, at a cost of 350,000 euros each. This new biotope network would come to just one billion euros, which works out to around 65,000 euros per municipality. This seems absolutely feasible.

In a second step, expert groups worked with the local authorities to determine what exactly would be restored in each municipality. The necessary funding could be obtained from foundations holding private assets. The roughly two billion euros in bequest wealth lying in the accounts of well-to-do Germans could be a good source; more funding will emerge when the initial success becomes apparent. And other countries would follow this type of good example.

In addition, a moderate rise in the “greening” of all agricultural land would be necessary, in particular by increasing the diversity of species and varieties of crop plants. The toleration of roughly 5 percent wild herbs is also on our wish list. We want to see an end to the annihilation of as many “non-plants” and “non-herbs” as possible, as the non-words of the plant “protection” services state. This would herald the return of

our insects, birds and bats, and we would once again be able to enjoy the pleasure of walking through fields and open countryside.

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