

Human-made species loss

Causes, acceleration and fields of action

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Disclaimer	Provides orientation on the state of research; assessments and demands are set out in standpoint S01.

Abstract

The current loss of species is caused by humans, and it has accelerated in recent decades. On this the major assessment reports of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES, of 2019 and 2024 agree. This paper names the drivers, reads the common indicators together with their reference bases, presents the situation in Austria and the link to the diversity of crop plants, sets out the points of dispute and orders measures by actor and evidence of effect. The situation is serious; the figures support this statement if they are read carefully. Assessment and demands are set out in standpoint S01 ‘Biodiversity before capital’.

1. The findings

The IPBES global assessment report of 2019 estimates that around one million of an estimated eight million or so species are threatened with extinction; in the assessed species groups the figure is around 25 per cent. The number is an extrapolation from the assessed groups, not a count, and is listed in the data layer as partially verified. According to the same report, 75 per cent of the ice-free land surface and 66 per cent of the ocean area have been significantly altered by humans.

The IPBES Nexus report of 2024 summarises the development across all assessed indicators: over the last 30 to 50 years, biodiversity has declined by 2 to 6 per cent per decade. The loss is therefore not a remnant of earlier interventions but an ongoing process.

That humans are the cause is not disputed among experts. What is disputed is how to name and measure the extent (section 5).

2. The drivers

2.1 Direct drivers

IPBES ranks the direct drivers by their global weight. The ranking applies globally and across all habitats; for individual species groups and regions it may differ. Figure 14 ‘Drivers of species loss’ shows it.

Rank	Driver	Examples
1	Change in land and sea use	ploughing up, intensification, soil sealing, loss of hedgerows and fallow land
2	Direct exploitation	overuse, fishing, logging, wild harvesting

Rank	Driver	Examples
3	Climate change	shifting of habitats, drought, heat
4	Pollution	pesticides, nutrient surplus, light
5	Invasive species	introduced species and diseases

The drivers do not act separately: a habitat reduced by intensification copes less well with heat, drought and pollutant inputs than a large, connected one.

2.2 Indirect drivers

Behind the direct drivers stand the indirect ones: consumption patterns, international trade, which shifts a country's land use to other countries, and economic incentives. For the incentives, the Nexus report gives an order of magnitude: public subsidies with harmful effects on nature amount to around 1.7 trillion US dollars a year worldwide; in addition there are 5.3 trillion US dollars of private financial flows with such effects. A separate figure for biodiversity-harmful subsidies in Austria is not available to the data layer. Studies on climate-harmful subsidies answer a different question and are not drawn on here.

3. The indicators, read correctly

Living Planet Index. The Living Planet Report of WWF and ZSL (2024) reports a decline of 73 per cent for 1970 to 2020. What is measured is the average relative decline of monitored vertebrate populations, based on 34,836 populations of 5,495 species. The value does not mean that 73 per cent of animals or of species have disappeared. A small population that shrinks sharply enters with the same weight as a large one; outliers and mathematical biases influence the value (Leung et al. 2020; Toszogyova et al. 2024). The direction of the index is nevertheless clear.

IUCN Red List. According to Red List 2026-1, 28 per cent of the 175,909 assessed species are threatened, that is more than 49,500 species. The share refers to the assessed species, not to all species on Earth.

Insects. The Krefeld study (Hallmann et al. 2017) found, in 63 German protected areas over 27 years (1989–2016), a decline of 76 per cent in the biomass of flying insects. The finding is regional, and many sites were not resampled. The meta-analysis by van Klink et al. (2020) finds a decrease of 0.92 per cent per year for terrestrial insects worldwide, around 24 per cent in 30 years; freshwater insects increased by 1.08 per cent per year. The study is methodologically contested, its data come predominantly from North America and Europe, and in January 2026 *Science* published an Editorial Expression of Concern because the underlying database is said to contain studies with experimentally manipulated conditions and errors; the authors disagree. The figure should therefore only be used with this caveat.

Farmland birds. The EU index of common farmland bird species fell by 41 per cent from 1990 to 2024, according to the European Environment Agency (2025).

4. Austria

Indicator	Value	Reference	Source
Farmland Bird Index	–43 %	1998–2023; 15 of 20 species with a long-term trend are declining	BirdLife Österreich (2024)

Indicator	Value	Reference	Source
Habitats Directive conservation status	18 % of habitat types, 14 % of species favourable	reporting period 2013–2018	Environment Agency Austria, REP-0734
Red List of vascular plants	37 % in threat categories; 66 extinct or missing	around 3,460 assessed ferns and flowering plants	Schratt-Ehrendorfer et al. (2022)
Land take	6.5 ha per day, around half of it sealed	2022–2025, new method	BMLUK and ÖROK (2025)

Three caveats belong to this table. The farmland bird report was prepared by BirdLife Österreich on behalf of the Ministry of Agriculture. The figure on Habitats Directive conservation status is taken from the summary by the Umweltdachverband and is listed in the data layer as partially verified; it concerns the reporting period up to 2018. The land take figure is not comparable with older figures of 11 to 15 hectares per day, because it was calculated using a different method; a decline cannot be derived from the comparison.

5. Points of dispute in science

Is a sixth mass extinction under way? In palaeontology, a mass extinction is defined as a loss of more than 75 per cent of species. Barnosky et al. (2011) consider this threshold not yet reached, but regard it as possible within centuries. Cowie et al. (2022) estimate that since 1500 possibly 7.5 to 13 per cent of known species have become extinct, far more than the documented cases. Briggs (2017) sees the crisis not in the extinction of whole species but in the shrinking of populations. Undisputed in all three positions is the sharp decline of populations.

How fast are species going extinct? According to Pimm et al. (2014), current extinction rates are about a thousand times higher than the likely background rate; according to Ceballos et al. (2015), for vertebrates up to a hundred times higher than a deliberately high background rate. The range is explained by the background rate itself, which is uncertain. This figure is listed in the data layer as partially verified.

The dispute concerns terminology and yardstick, not direction.

6. Species loss and agrobiodiversity

6.1 Crop wild relatives

The wild relatives of crop plants carry traits that are missing from cultivated varieties, and they are under-represented in collections (paper P01). They are directly affected by general species loss. In 2021 the IUCN assessed 224 crop wild relatives for Mesoamerica; 35 per cent of them are threatened, 44 per cent in the maize-related genus *Zea*, 33 per cent in *Tripsacum*. The figure concerns one region and an assessed selection, but it shows that the genetic reserve of food is dwindling where the crop plants originated.

6.2 Loss of varieties

Alongside the loss of wild species stands the narrowing of crop diversity itself. Of around 6000 cultivated plant species, nine account for more than 60 per cent of global crop production (paper P01). What disappears from cultivation often also disappears from the knowledge of how to grow it.

6.3 Why genebanks do not replace loss in situ

Genebanks secure a section of diversity at one point in time. First, only orthodox seed can be frozen; recalcitrant species cannot be stored in this way (paper P01; risk R-12). Second, conservation itself is fragile: worldwide, around 41 per cent of ex situ holdings are safety-duplicated, and 24 per cent are awaiting regeneration (paper P06; risks R-06 and R-01). Third, particularly for wild relatives, there is often a lack of experts to collect and of land for multiplication (risk R-13). Fourth, a population continues to evolve only at its site; a sample in the cold store remains at the state of its collection. The genebank is a reinsurance, not a substitute for habitats.

7. Fields of action

The data layer `handlungsfelder.json` lists 23 measures for five groups of actors: individuals and households, municipalities, farms, associations and networks, and policy and administration. Each measure is assigned to a driver and rated by its effect: “evidenced” means that a study or meta-analysis supports the effect; “plausible” means well founded in the subject but without its own measurement of effect; “political” denotes a framework condition whose effect depends on implementation. The selection below names twelve measures; all 23 can be filtered in the Action Compass by actor, driver and effort.

Actor	Measure	Effect	Evidence
Individuals	Mow lawns at most twice a year	evidenced	Proske et al. (2022), meta-analysis
Individuals	Grow open-pollinated varieties and pass on seed	plausible	ARCHE NOAH, custodian network
Individuals	Reduce outdoor lighting	plausible	Owens et al. (2020), review
Municipalities	Extensify mowing of public green spaces	evidenced	Watson et al. (2020)
Municipalities	Limit land take	plausible	BMLUK and ÖROK (2025)
Municipalities	Set up a seed library	plausible	Province of Lower Austria (2024)
Farms	Diversify cultivation	evidenced	Tamburini et al. (2020), 98 meta-analyses
Farms	Perennial, species-rich flower strips	evidenced	Albrecht et al. (2020)
Farms	Use landraces and heterogeneous material	plausible	Delegated Regulation (EU) 2021/1189
Associations	Create safety duplicates	plausible	Case study: retrieval of the ICARDA collection
Policy	Remove harmful incentives	political	IPBES (2024)
Policy	Make the national restoration plan binding	political	Scientists for Future (2026)

In the case study by Watson et al. (2020), maintenance costs fell by 36 per cent with extensive mowing. According to Albrecht et al. (2020), flower strips increase pest control in adjacent fields by an average of 16 per cent. According to the province, there are 80 seed libraries in Lower Austria (concept K01).

Two limitations apply. The evidence on land take documents the extent of land take, not the effect of limiting it; the measure is therefore rated as plausible, as is the safety duplicate, whose evidence is a documented single case. The evidence on the national restoration plan is a statement by Scientists for Future criticising the Austrian draft as non-binding; it is a position, not a measurement of effect. Variety conservation is dealt with in papers P05 and P15; existing associations are listed in the Network Directory.

8. The policy framework

Global. The Kunming-Montreal Global Biodiversity Framework (2022) sets 23 targets for 2030, among them to protect 30 per cent of land and sea area effectively, to at least halve the risk from pesticides and to reduce harmful incentives by at least 500 billion US dollars per year.

European Union. The EU Biodiversity Strategy for 2030 provides for 30 per cent protected areas, 10 per cent of them strictly protected, 25 per cent organic farming, the halving of pesticide use and risk, and landscape features on 10 per cent of agricultural land. The Nature Restoration Regulation (Regulation (EU) 2024/1991) has been in force since 18 August 2024 and requires measures on at least 20 per cent of the area by 2030. Austria submitted the draft of its national restoration plan on 1 September 2026; the public consultation runs until 15 October 2026.

Other instruments were weakened or abandoned. The regulation on the sustainable use of plant protection products (SUR) was rejected by the European Parliament on 22 November 2023 and withdrawn by the Commission in 2024. In the Common Agricultural Policy, Regulation (EU) 2024/1468 removed the obligation (GAEC 8) to keep 4 per cent of arable land out of productive use; it was replaced by voluntary support.

Austria. Around 87 per cent of supported farms, on around 83 per cent of agricultural land, take part in ÖPUL, the Austrian agri-environmental programme; under environmentally sound and biodiversity-promoting management (UBB) and in organic farming, at least 7 per cent biodiversity areas are required. The Farmland Bird Index nevertheless fell by 43 per cent from 1998 to 2023. This does not prove a causal link, but it shows that agri-environmental support has not halted the decline. The Austrian Soil Strategy was adopted on 29 February 2024 by the spatial planning officials of all provinces without the binding target of 2.5 hectares per day; the 2025 government programme provides for a target path by the end of 2026.

The legal bases are recorded in the Legal Register; the assessment of this situation is contained in standpoint S01.

Figures

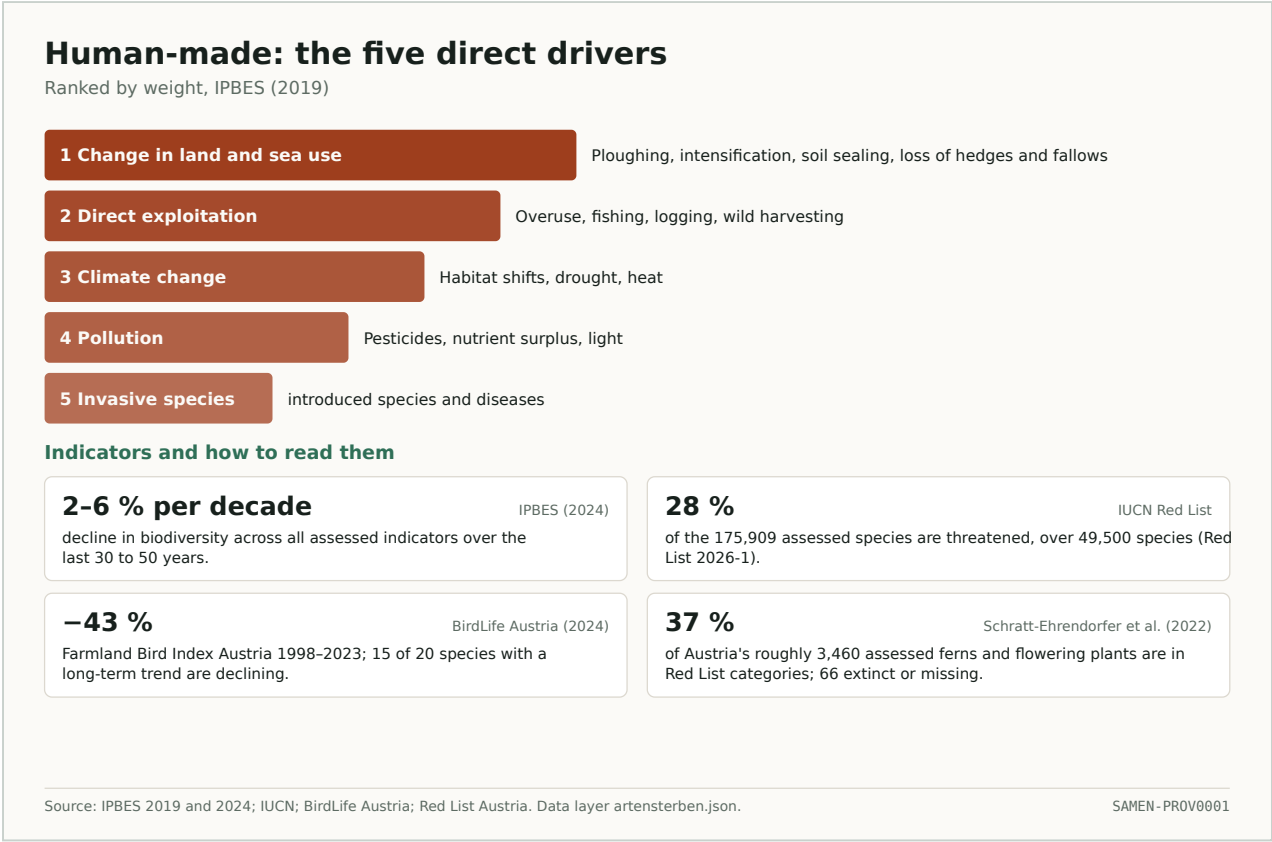


Figure 1. Drivers of species extinction. Source: data layer of the strand, see figure footer.

Limits of this paper

The paper relies on published reports and studies, not on its own surveys. Several figures are listed in the data layer as partially verified: the IPBES values of 2019, the Habitats Directive conservation status, the extinction rates and the targets of the Kunming-Montreal Framework. The rating of the measures by effect and effort is a classification by this strand; “plausible” means that a separate measurement of effect is lacking. The actor groups follow the data layer, which includes associations and networks but no separate group for business and trade; market questions are dealt with in paper P17. The state of Austrian policy is that of 24 September 2026; the consultation on the national restoration plan had not been concluded at that time.

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