



The biodiversity perspective from a botanist's point of view

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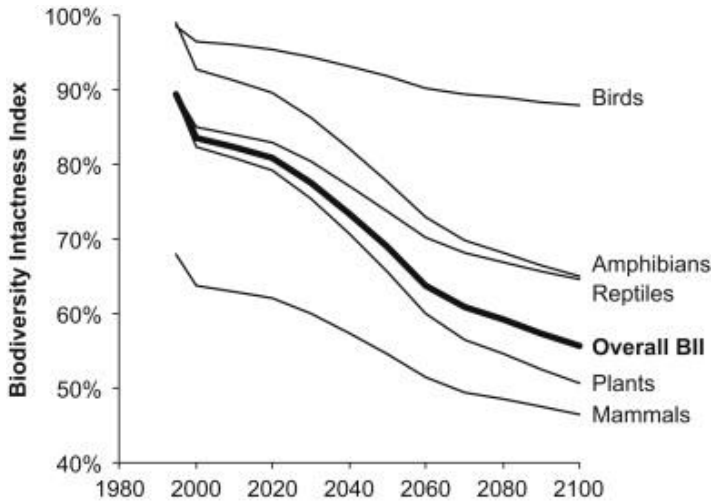
Why is the preservation of biodiversity important?

New formations and extinction events of species are natural processes

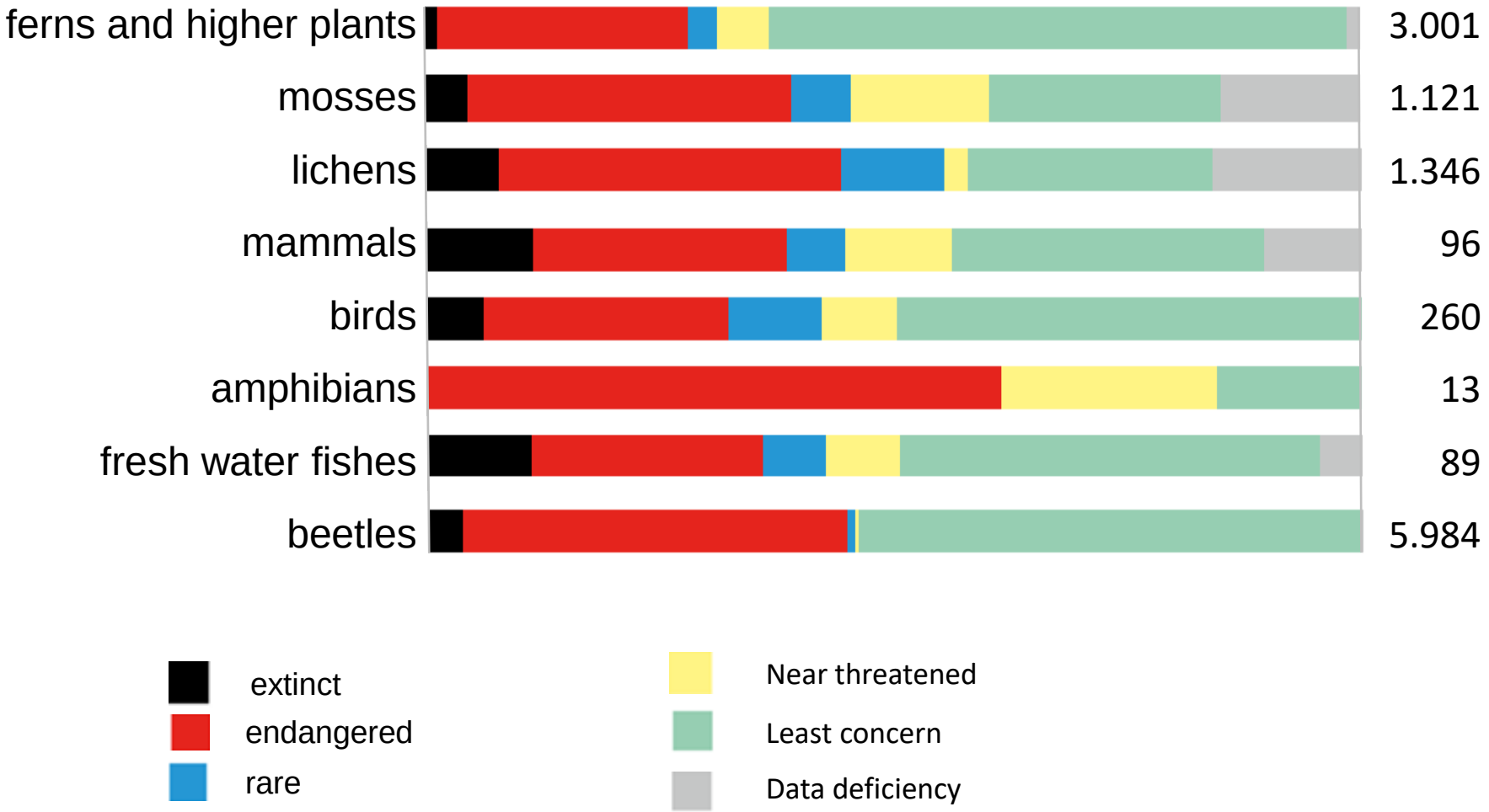
- Anthropogenic impacts have accelerated biodiversity loss 100-fold over natural extinction events in the last 100 years.
- This trend is ongoing. In the next 200 years, about half of all species on land and in water could become extinct.
- There are many more extinction events than new species formation, resulting in ecosystem biodiversity losses.

https://ipbes.net/global-assessment



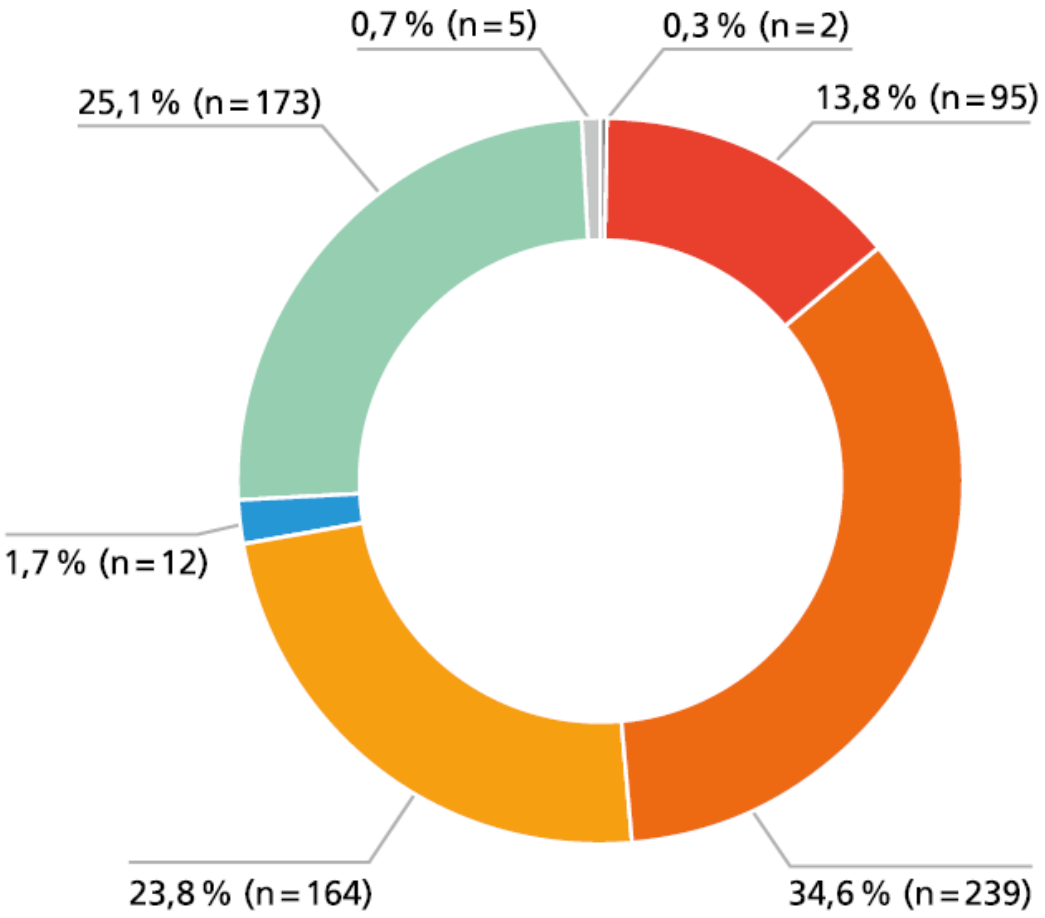
Scenarios of biodiversity loss in southern Africa in the 21st century (Biggs et al. 2008)

~ 71.500 species have been detected in Germany



https://www.bfn.de/infothek/daten-fakten/bezugsquellen-daten-zur-natur-2016.html

690 different habitate types and their vulnerability analysis in Germany



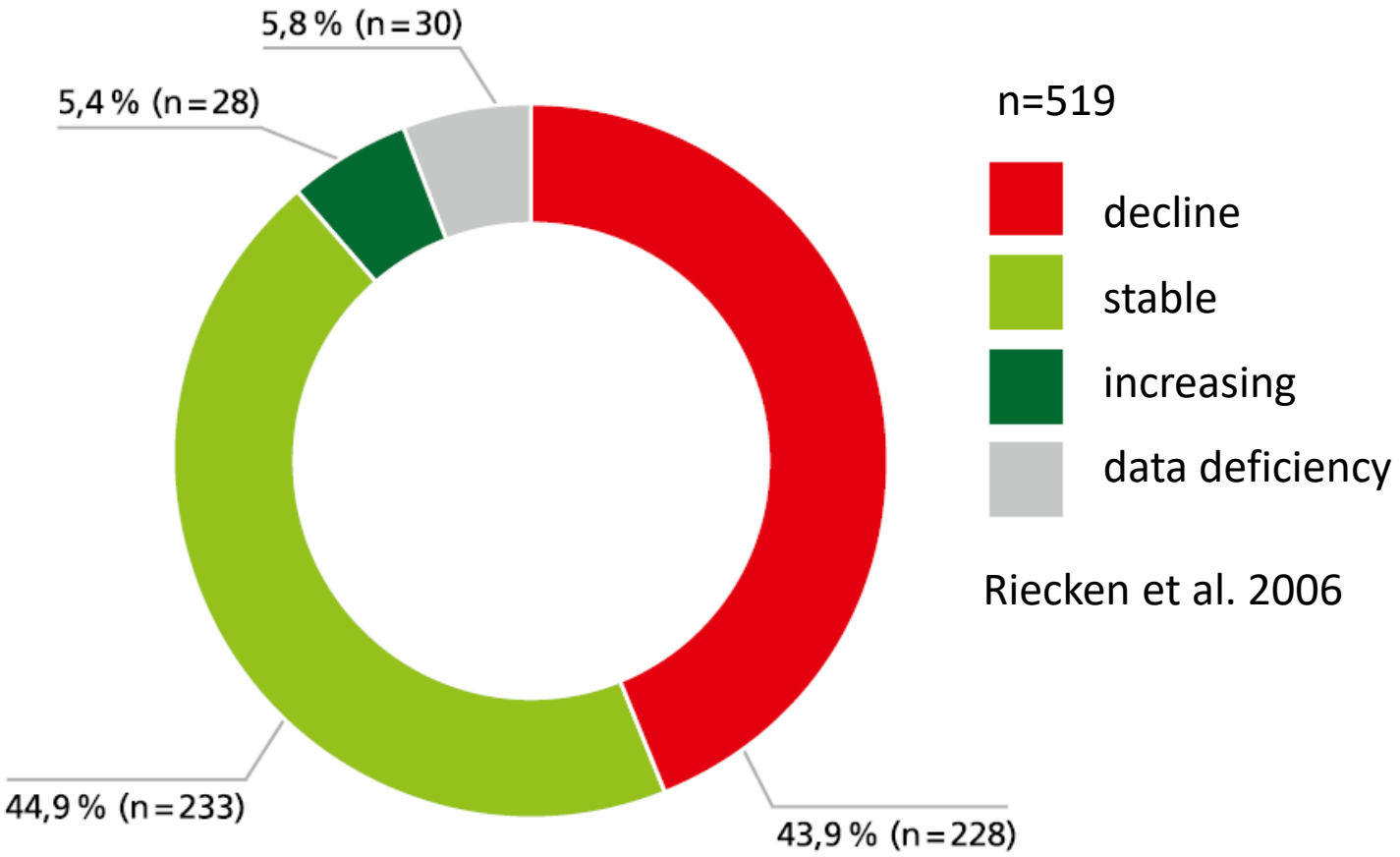
n=690

- destroyed
- threatened with destruction
- strongly endangered
- endangered
- rare
- not threatened
- data deficiency

Riecken et al. 2006

https://www.bfn.de/infothek/daten-fakten/bezugsquellen-daten-zur-natur-2016.html

Trend analysis of habitats in Germany

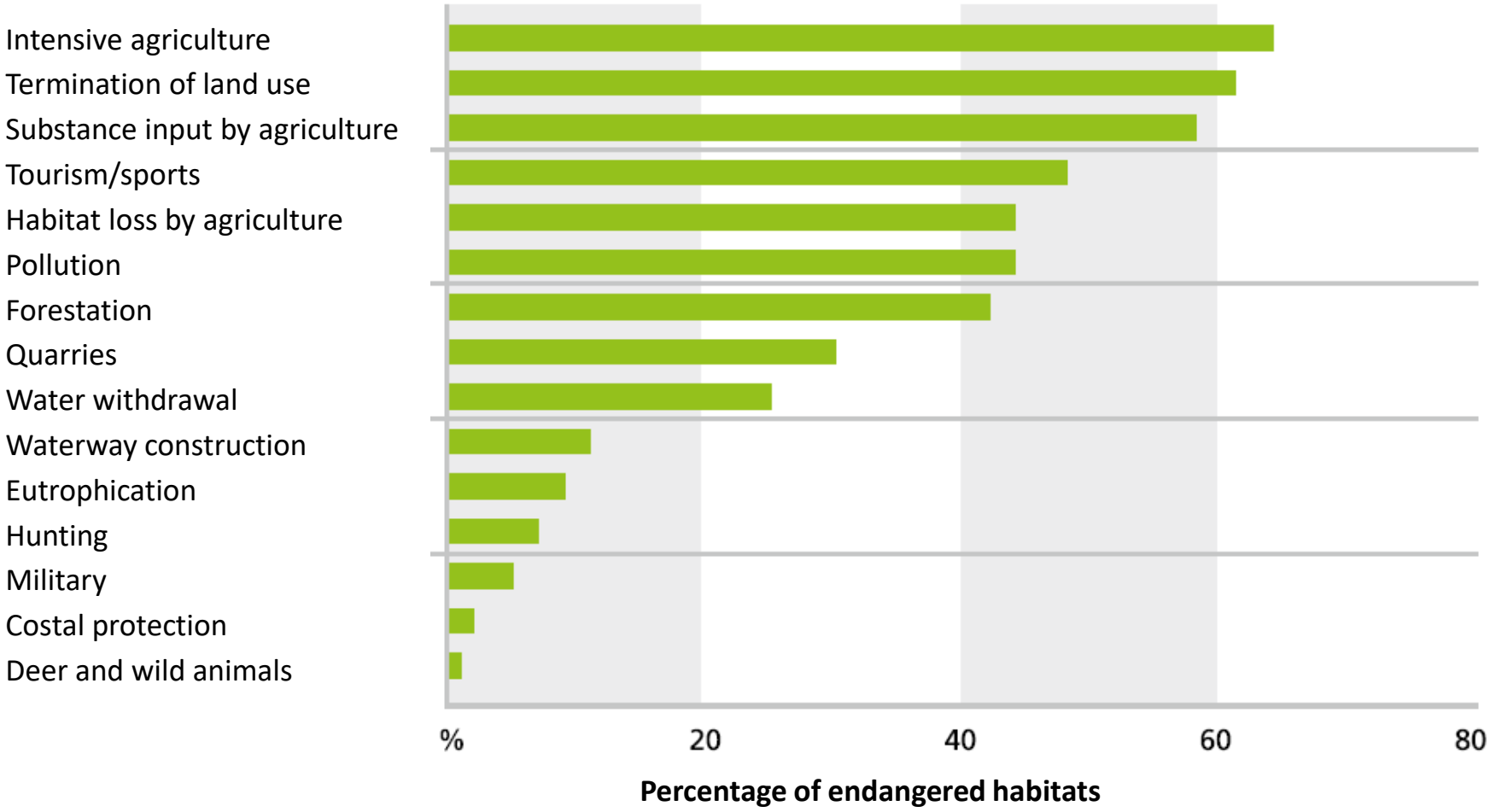


Riecken et al. 2006

Every fourth biotope type is not or hardly regenerable

https://www.bfn.de/infothek/daten-fakten/bezugsquellen-daten-zur-natur-2016.html

Main hazard factors of predominantly agricultural open-land biotope types in Germany



https://www.bfn.de/infothek/daten-fakten/bezugsquellen-daten-zur-natur-2016.html

Challenges for biodiversity in Germany

1. The **loss of biodiversity** is a **global, scientifically well documented phenomenon**.

2. The current species extinction reaches loss rates, as they are known only from the large mass extinction events in the history of the earth.

3. This leads to a **loss of ecosystem services**, which causes immense **economic damage worldwide**.

intensification

climate change

invasive species

landscape changes

habitat loss due to land use, settlements and transport routes

soil degradation, nutrient and pollutant inputs

Challenges for the biodiversity in Germany

Major knowledge gaps - extent and specific **causes of biodiversity decline.**

Need for research in the evaluation and valorisation of biodiversity and ecosystem services, in particular in the development of integrative assessment approaches that combine ecological, economic, social and ethical aspects.

The protection and sustainable use of biodiversity need to be integrated into many policy areas.

The **implementation and enforcement deficits must be eliminated.**

Conservation oriented interdisciplinary linking of scientific, social science and humanities.

https://www.senckenberg.de/de/wissenschaft/forschungsprojekte/frankfurter-erklaerung/
Frankfurt Declaration of Scientists 2018

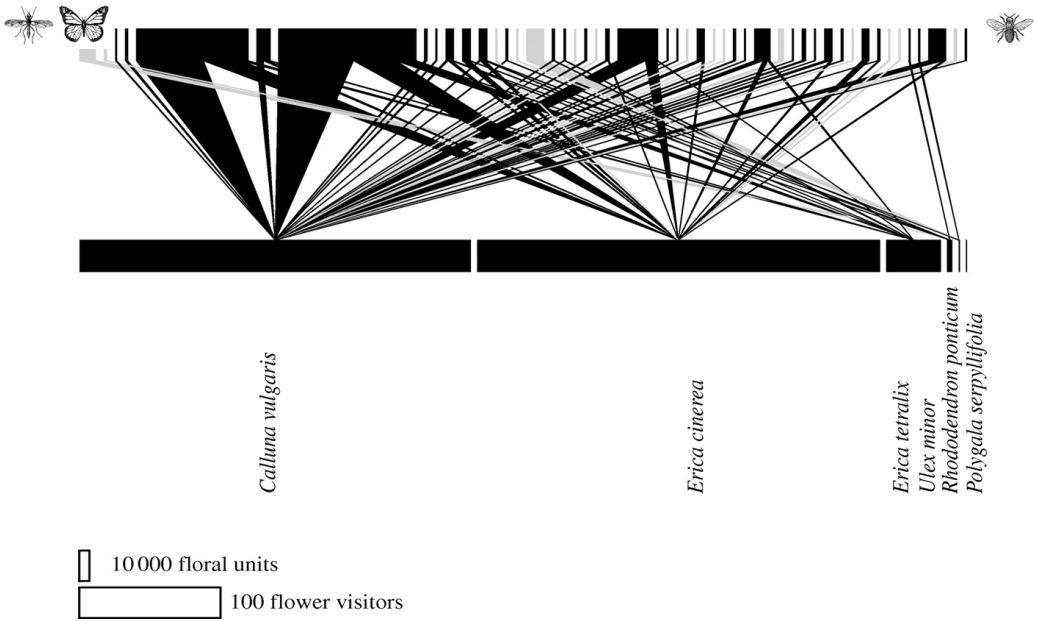

Foto: Andreas Kolter
Foto: Andreas Kolter

https://de.freepik.com/fotos-premium/kind-mit-einem-schmetterling-idea-leuconoe-tiefenschaerfe_4457348.htm

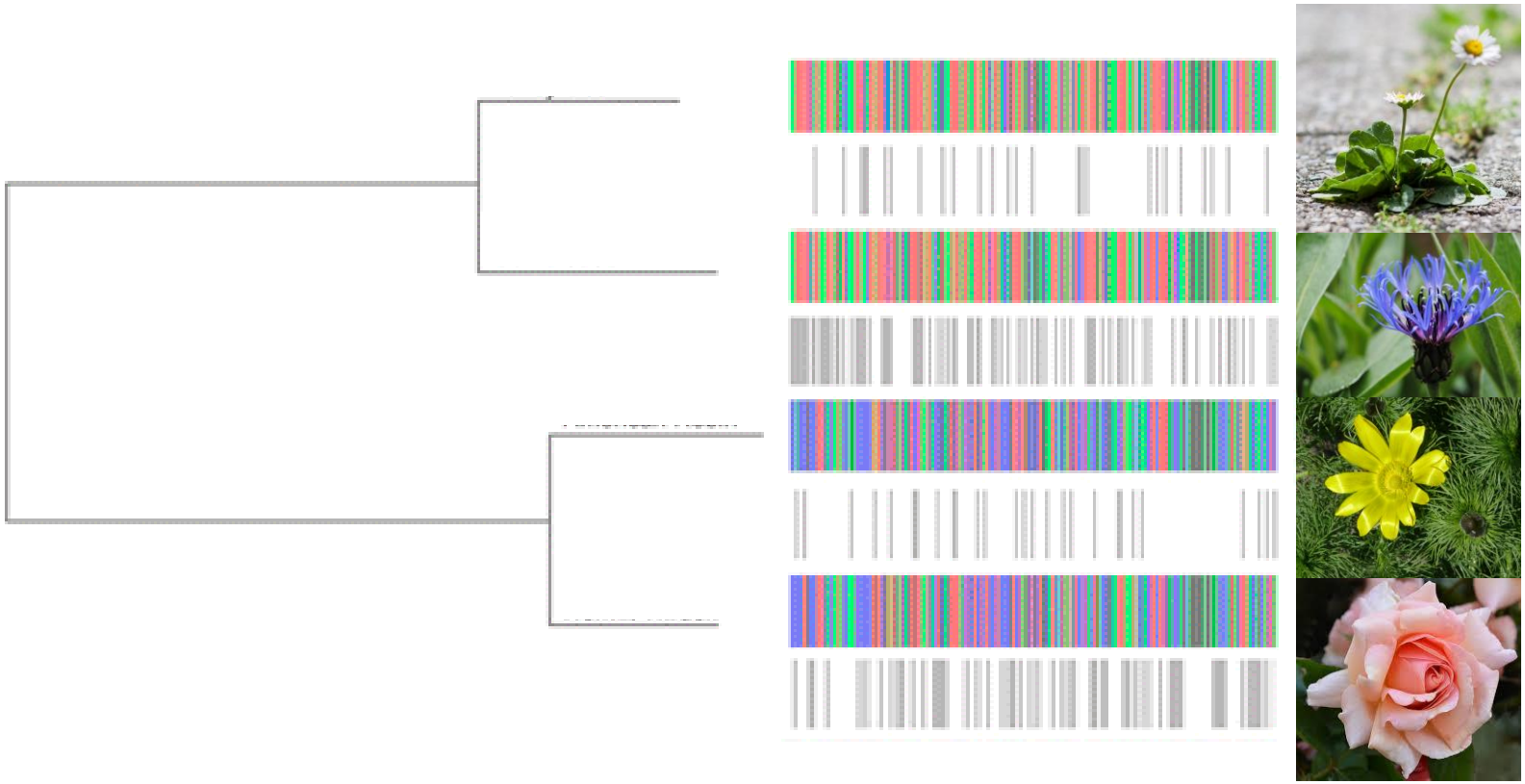
//www.thoughtco.com/must-have-tools-for-studying-live-insects-1968282

Plant–pollinator network from an ancient heathland field site in Dorset, UK

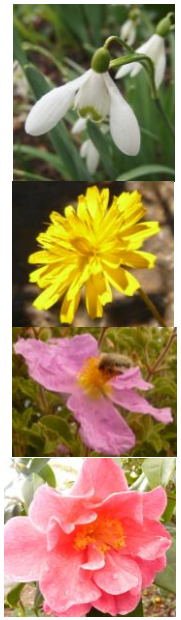
J. Memmott (2009) Phil Trans. Royal Soc. B 364:1524

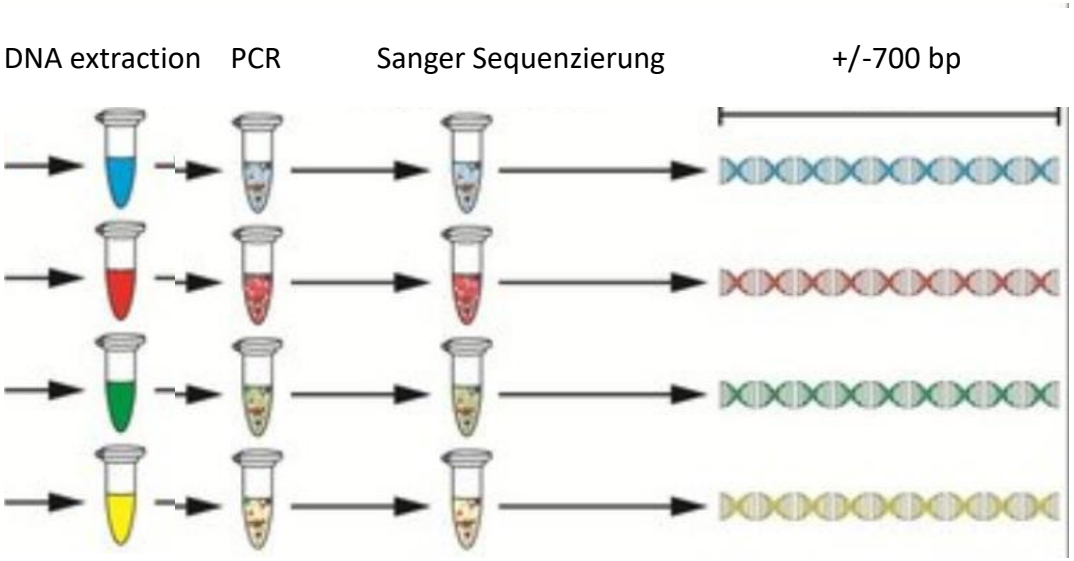


DNA Barcoding



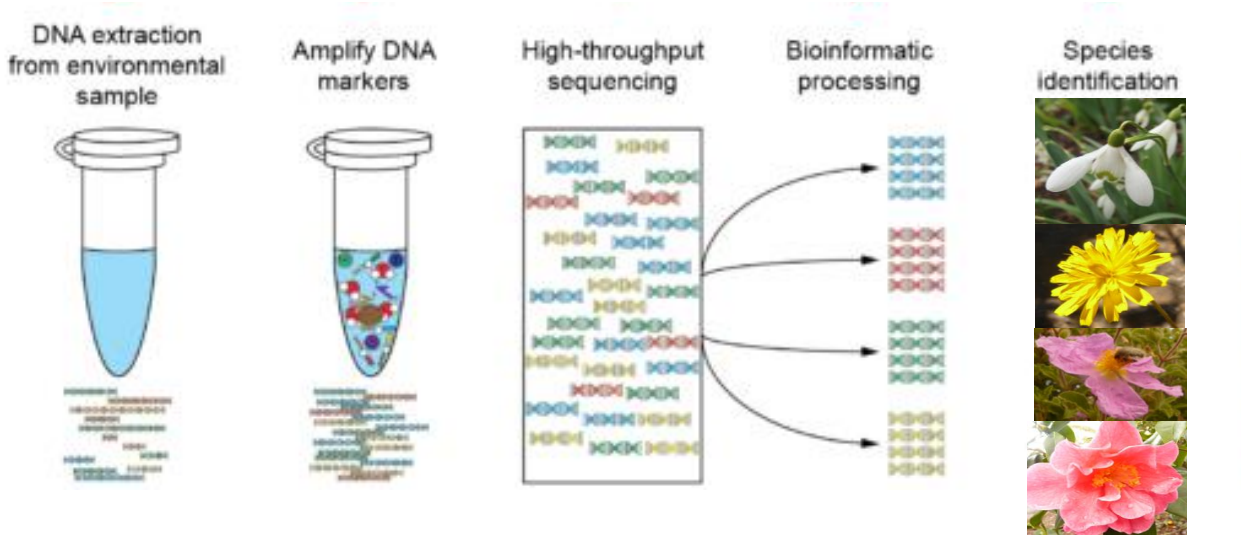
DNA Barcoding





https://www.researchgate.net/publication/290441728_Gill_et_al_2016_Adv_Ecol_Res_Accepted_manuscript_PDFversion/figures?lo=1

eDNA Barcoding oder Metabarcoding



https://www.researchgate.net/publication/290441728_Gill_et_al_2016_Adv_Ecol_Res_Accepted_manuscript_PDFversion/figures?lo=1

eDNA Barcoding or Metabarcoding advantages

If the error rate is known, the technique is optimized, the method can be routinely used in an automated way for routine biodiversity monitoring

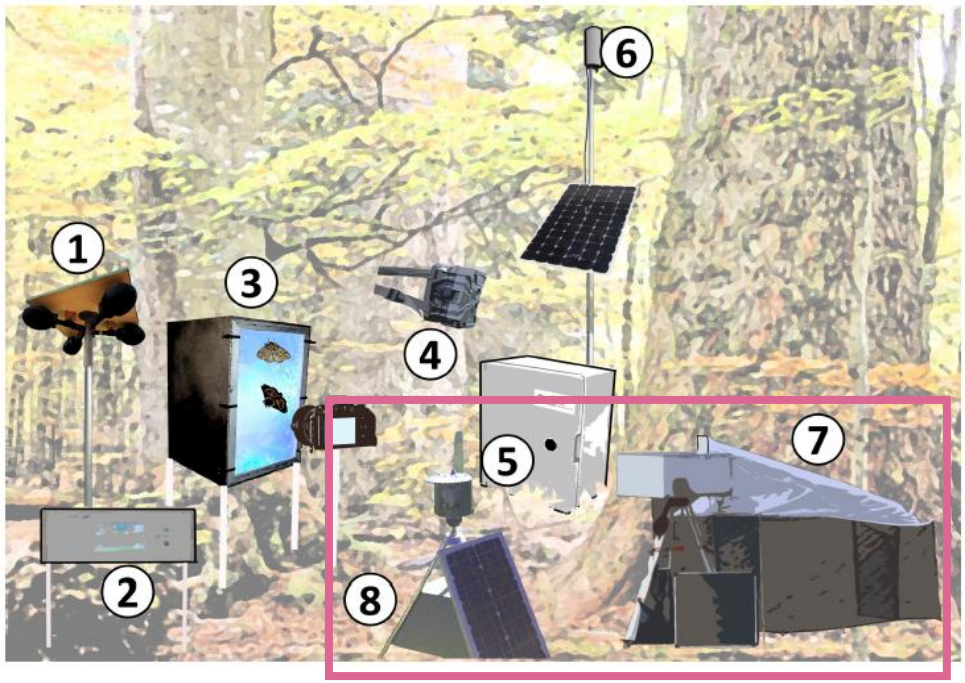
- a fast way for:
    - Pollen forecasts
    - Drug controls
    - Food control
    - Conservation issues
    - Forensic investigations
    - Plant-pollinator interactions
    - Flowering phenologies

Automated Multi-Sensor Stations for Monitoring of Species Diversity - AMMOD

(development of a “weather station for biodiversity”
an innovative infrastructure for biodiversity monitoring)

AMMOD

Module	Number
Acoustic monitoring	①
Smellscapes (VOCs)	②
Visual monitoring	
Moth scanner	③
Camera trap	④
Base station	⑤
Data management	⑥
Metabarcoding	
Malaise trap	⑦
Pollen trap	⑧



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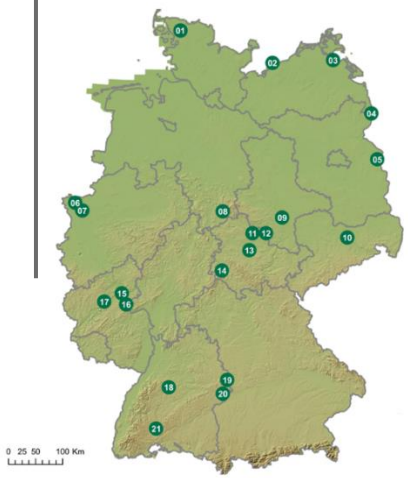
Forschungsmuseum KOENIG

Diversity of insects in nature protected areas (DINA)



Assessment of:
Flying insects
biomass, species identification & abundance for selected taxa (Malaise traps)
+ metabarcoding & morphological determination

& causal factors
- Vegetation (plant communities, pollen)
- Pesticides (air, soil, vegetation, insects)
- Landscape indicators (GIS)

+ Stakeholder analysis:
Societal, political and economic needs

Synthesis

1 Malaisefallen-Transekt am Standort Hofberg (Thüringen) © Martin Sorg

Bundesministerium für Bildung und Forschung

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https://www.dina-insektenforschung.de/aktuelles?lang=en

Linking Plant Diversity and Bumblebee Diversity in a historic context

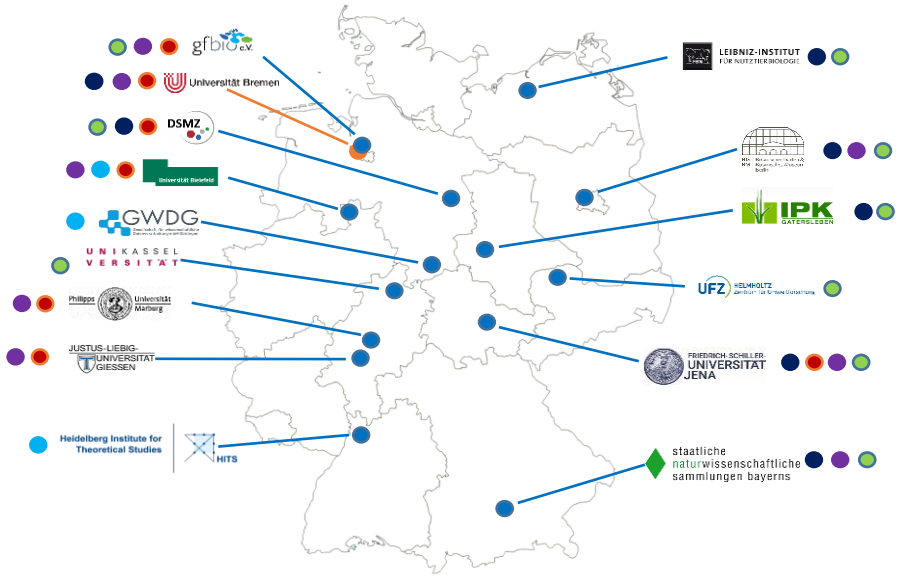
- *Which plants are being visited by which insects at which time of the year?*
- *Can a change in plant availability explain bumblebee decline?*

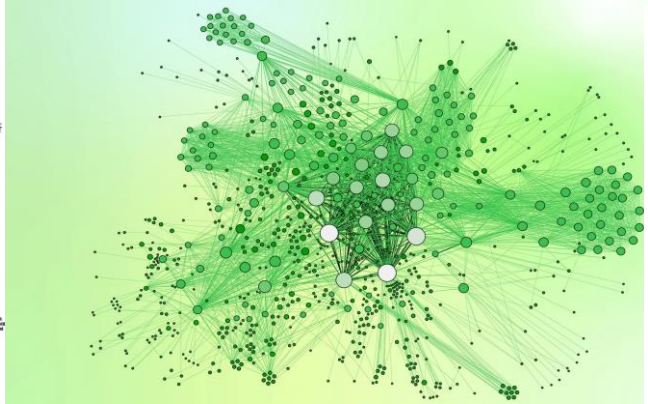
comparing 1980's to todays bumble activities

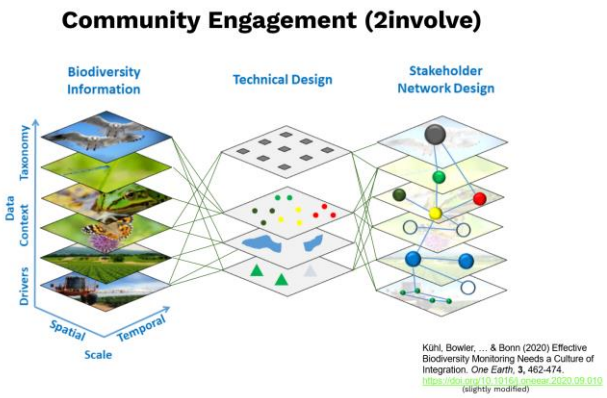
Deutsche Forschungsgemeinschaft
DFG

NFDI4BioDiversity:
National Research Data Infrastructure 4 Biodiversity Data

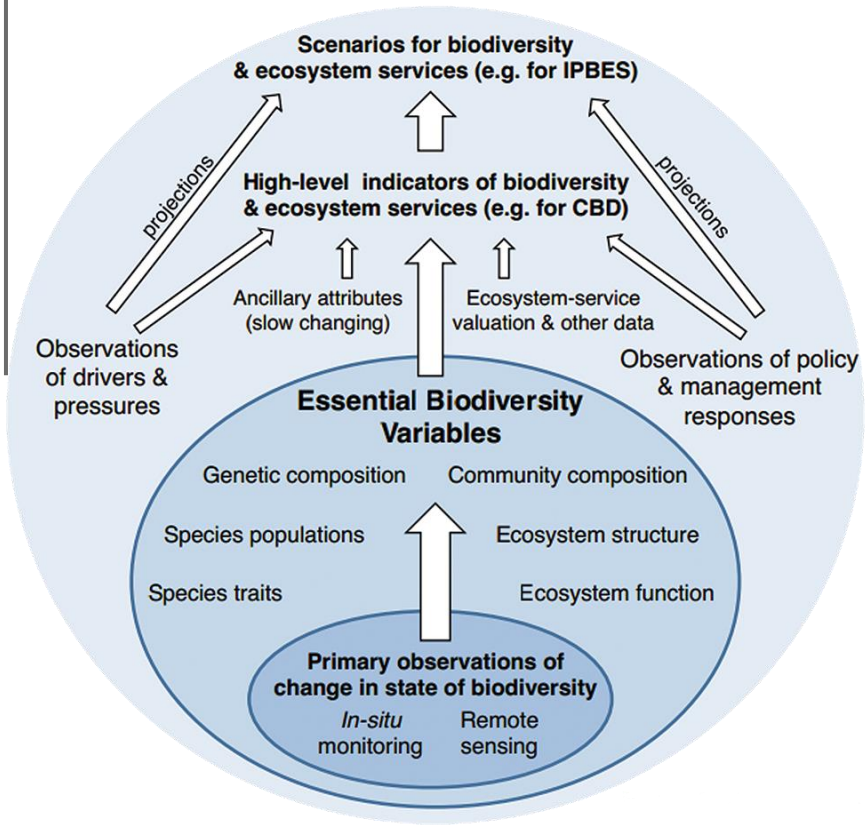
- Data Center
- Infrastructure Provider
- Computer Science
- Biology/Env. Sciences
- Teaching/Training



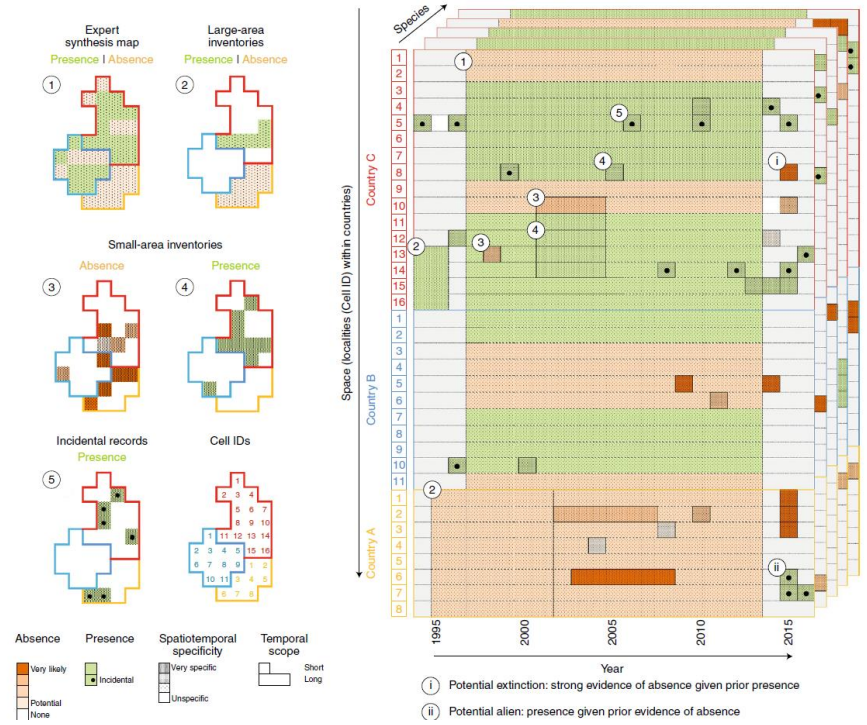




How much biodiversity knowledge is available, e.g. in Hesse?



https://geobon.org/ebvs/what-are-ebvs/



Jetz, W., McGeoch, M.A., Guralnick, R. *et al.* Essential biodiversity variables for mapping and monitoring species populations. *Nat Ecol Evol* **3**, 539–551 (2019). https://doi.org/10.1038/s41559-019-0826-1

Organic agriculture and biodiversity – What is the impact of modified crop cultivation on biodiversity?

Prof. Dr. Miriam Athmann

https://www.innovations-report.de/fachgebiete/agrar-forstwissenschaften/die-mischung-macht-s-goettinger-forscher-entwickeln-neuen-vereinsansatz-zum-anbau-von-mischkulturen/; https://www.pinterest.de/pin/339951471872849565/

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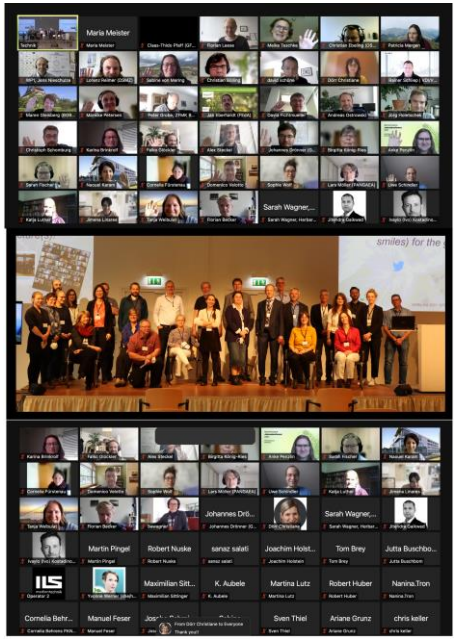

… and all the administrative personell in the background!