

Challenges and opportunities for protecting European soil biodiversity

submitted

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UNIVERSITÄT
LEIPZIG

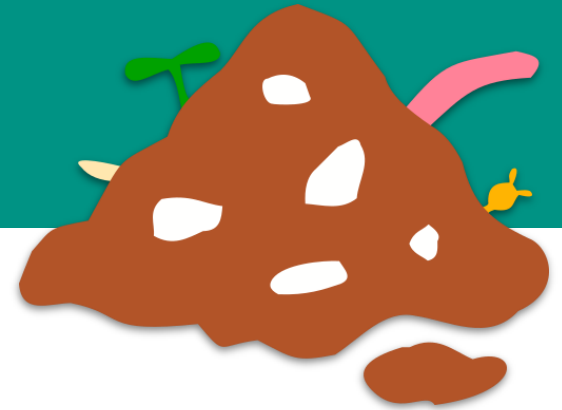


German Centre for Integrative
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Halle-Jena-Leipzig

experimental
interaction
ecology



Soil ecology & me



2016-2019 B.Sc. Biologie
Uni Leipzig *“Impacts of **earthworm invasion** on aboveground invertebrate communities in North American forest ecosystems”*

2019-2021 M.Sc. Biodiversität, Ökologie & Evolution
Uni Leipzig *“How (well) does European policy protect soil organisms – Challenges of protecting European **belowground biodiversity** beyond productive systems”*





BfN 2021



Soil



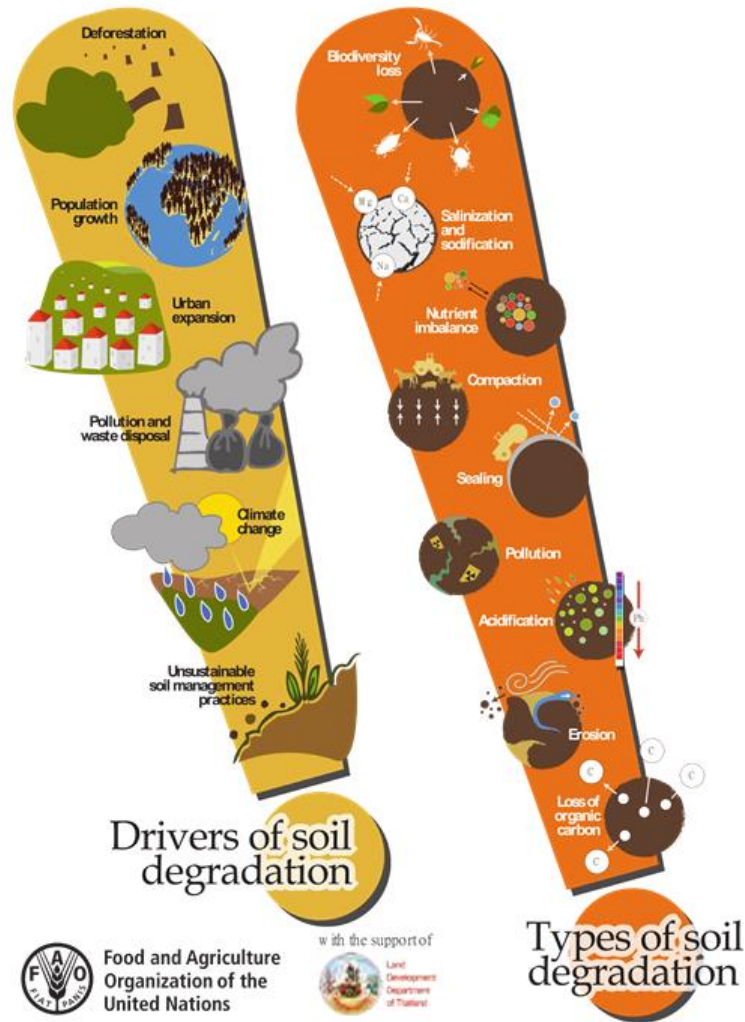
- **Digestive system**
decomposition of organic and inorganic material
- **Storage**
of carbon, nitrogen, and other (essential) elements
- **Immune system**
in terms of the regulation of pathogens and (plant) pests
- **Habitat**
of bacteria, fungi, algae, unicellular organisms, nematodes, earthworms, mites, isopods, collembola, and insect larvae, among others



FAO 2020 3

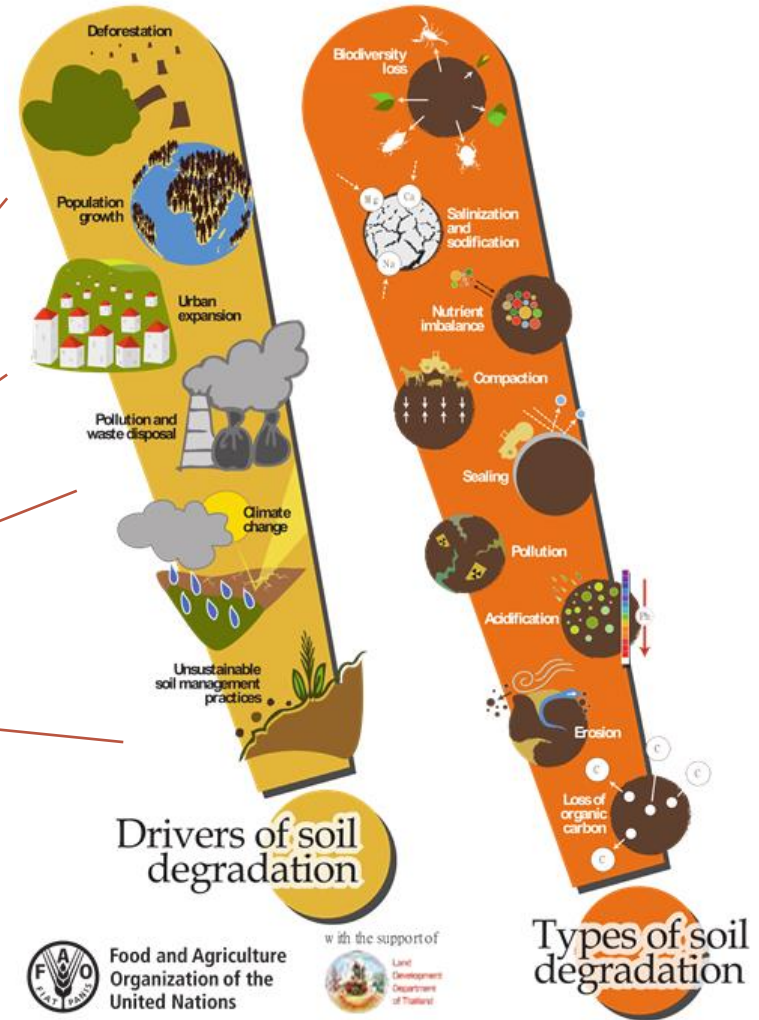
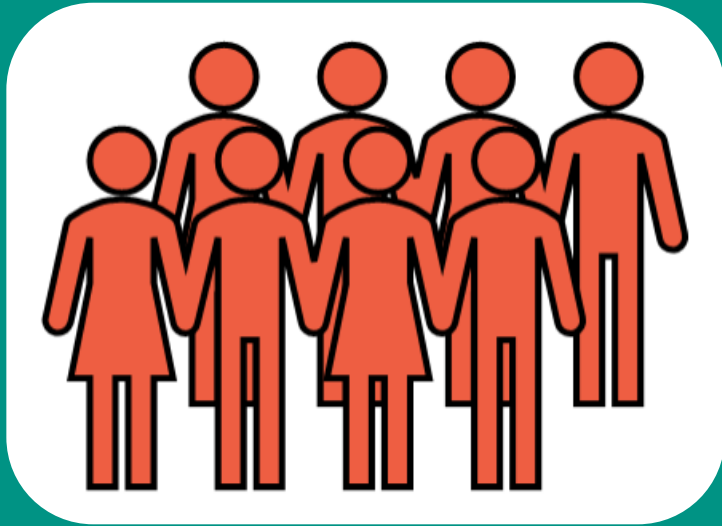
Threats of soil (biodiversity)

→ soil degradation

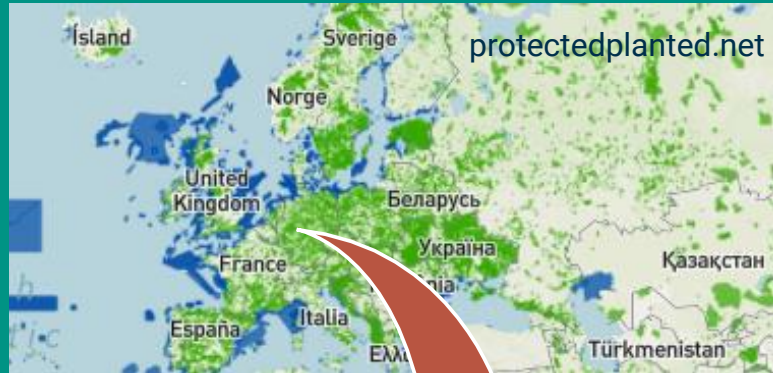


Threats of soil (biodiversity)

→ soil degradation



Nature conservation vs. soil biodiversity



Aboveground biodiv. patterns \neq Belowground



What are we doing to protect soil organisms?



Past:
Policy review

- soil-related policies
- timeline
- global & EU



Present:
Effect of Conservation

- a) comparing nature conservation areas & non-protected areas
- b) text mining for “soil” in management plans



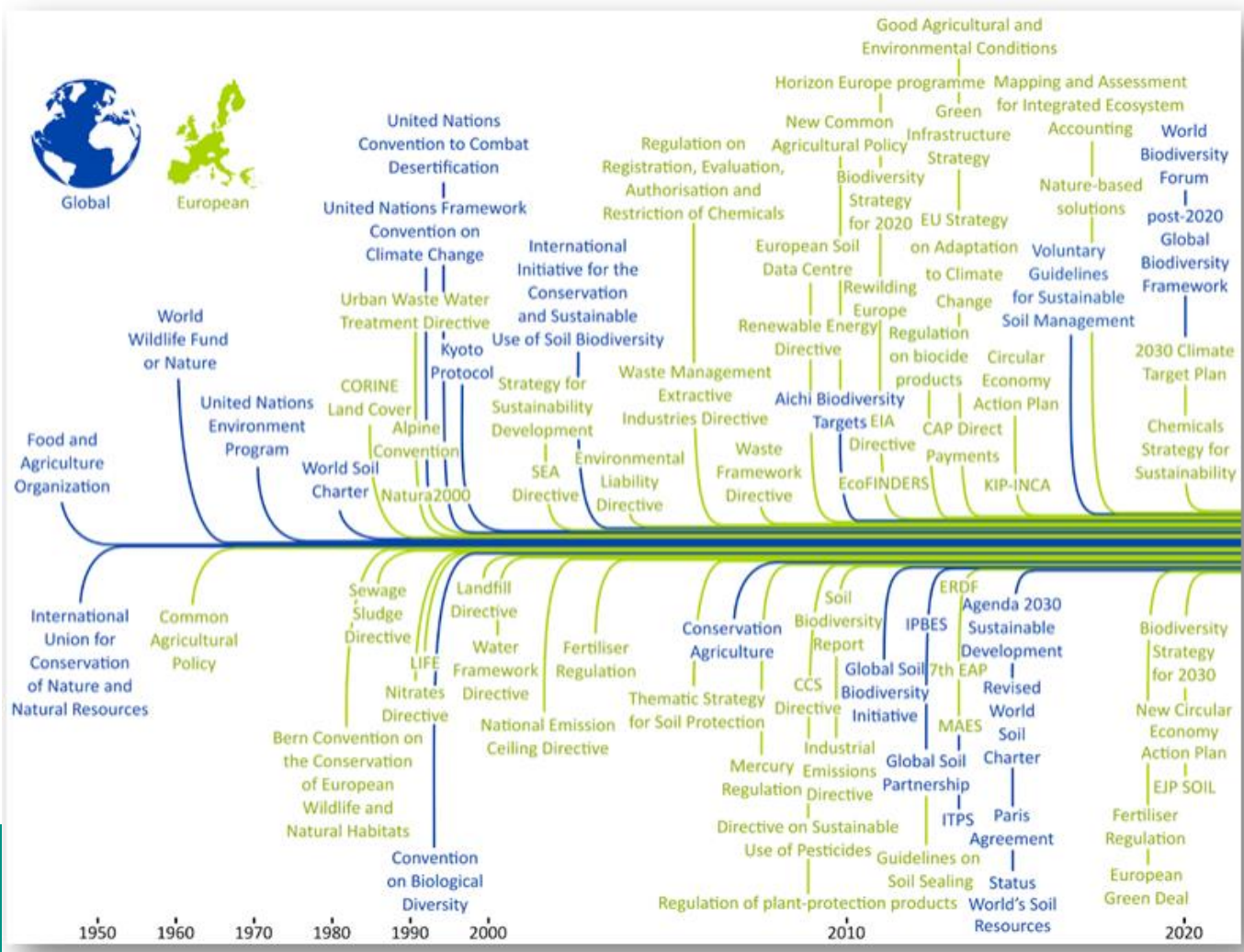
Future:
Way forward

- How to actually target soil biodiversity in nature conservation?
- collecting ideas

Past:
Policy review

Soil-related policies

focus on soil abiotics instead of biota, and are often unenforceable.



Time line

What are we doing to protect soil organisms?



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Present:
Effect of Conservation

LUCAS Soil Survey 2018

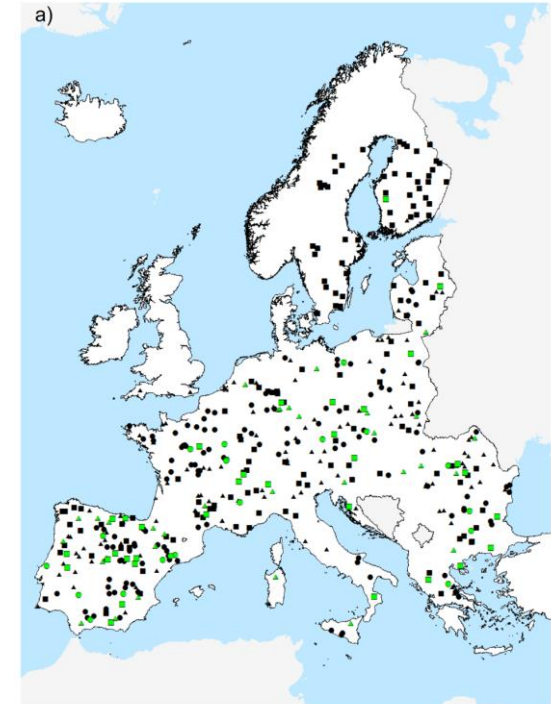


- nature conservation areas vs. non-protected sites

Dataset:

- total n=521,
protected=85,
non-protected=436
- 3 land-use types
- 9 soil functions

Microbial activity	Basal respiration
	Microbial biomass
	Acid-Phosphatase
Enzyme activity	Beta-Glucosidase
	Cellulase
	N-Acetylglucosaminidase
	Xylosidase
Aggregate stability	Mean weight diameter
	Water stable aggregates

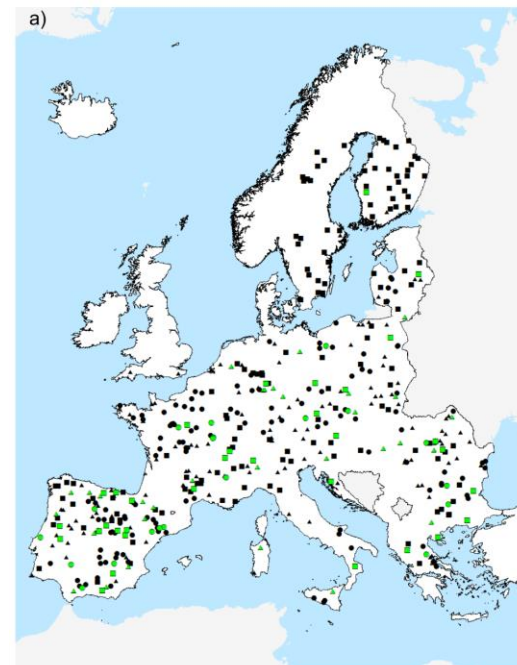
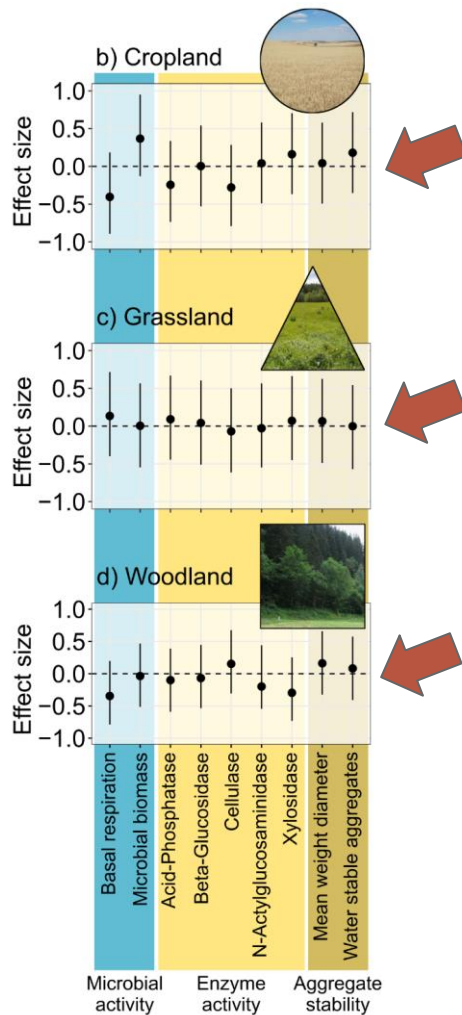


Conservation sites	Non-conservation sites
■ Woodland (33)	■ Woodland (139)
● Cropland (20)	● Cropland (124)
▲ Grassland (34)	▲ Grassland (124)

Present:
Effect of Conservation



protectedplanet.net



- Conservation sites Non-conservation sites
- Woodland (33)
 - Woodland (139)
 - Cropland (20)
 - Cropland (124)
 - ▲ Grassland (34)
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What are we doing to protect soil organisms?



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Present:

Effect of Conservation

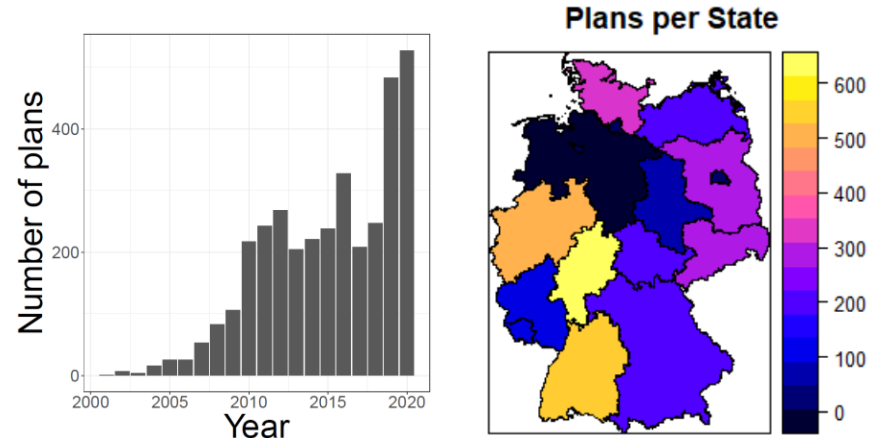
Management plans

- ❖ Germany: recommended (i.e. obligate) for most of Natura 2000 areas
- ❖ **n=3,505** from all 16 Federal States
- ❖ focus on FFH areas



What is (in) a management plan?

- area description → “geology and soil” & protected objects
- species, habitats & biotopes: methods to monitor & map
- development goals
- use, disturbances, threats
- action plans & implementation



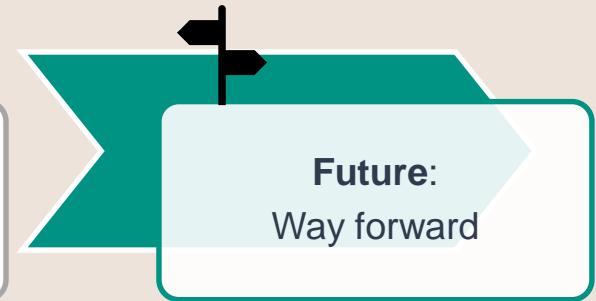
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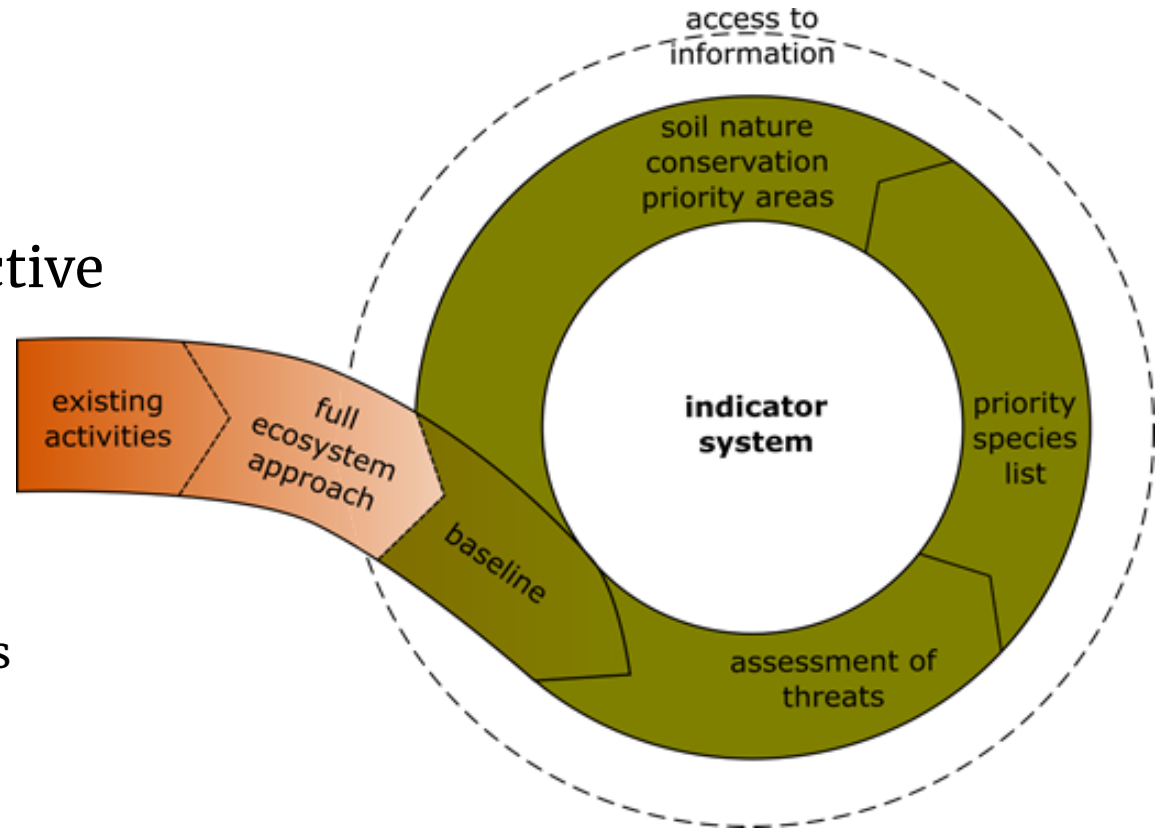
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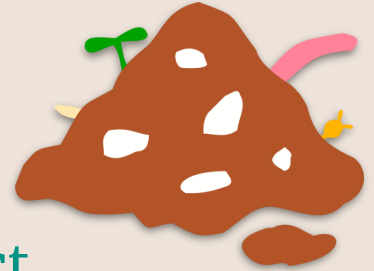
1. Integrative perspective

2. Targeting soil biodiversity

- Indicator system
- Baseline as reference
- Identify & assess threats
- Species lists
- Priority areas



Conclusion



Nature conservation of soil biodiversity is **no side effect**.

- consideration of soil biodiversity increases, but
- policies still don't protect soil biodiversity

Policy review

- protected areas don't affect soil functioning
- management as one reason for neglectable effect

Nature conservation measures

Ways forward through

- an integrative perspective &
- directly targeting soil biodiversity

in nature conservation

Ways forward

Thank you for your attention!

Questions?

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