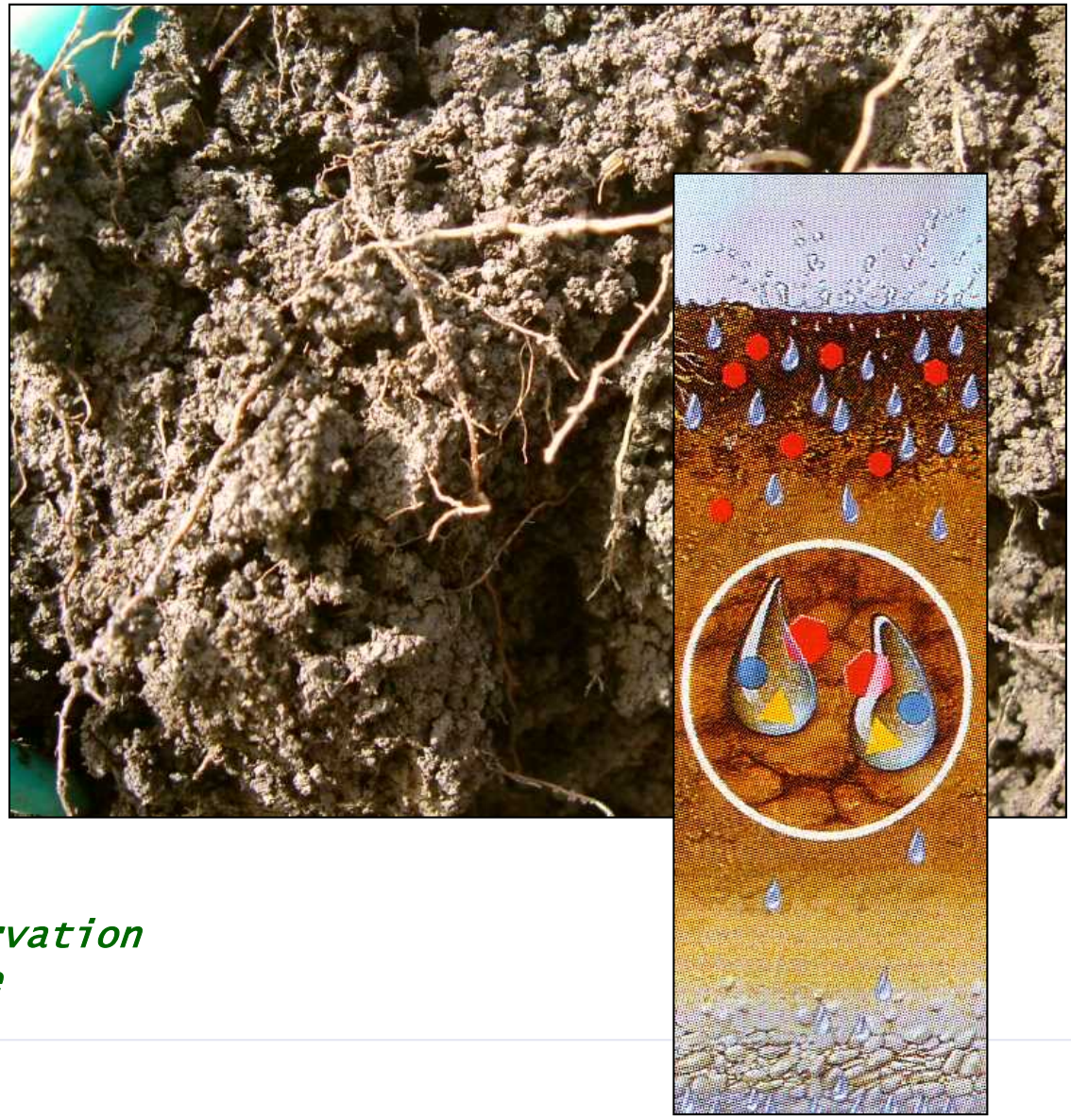
Storing water by promoting biopores!

www.gesunde-erde.net



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Institute for Soil Conservation
& Sustainable Agriculture

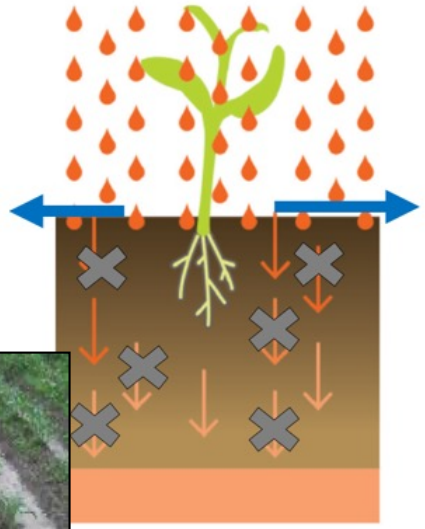
Soil structure under pressure....

www.gesunde-erde.net

EU arable soils lose 0.5% carbon per year.



23% of the land shows severe subsoil compaction and many areas show creeping crumb compaction.



Soil structure is damaged…..



This increases susceptibility to erosion, reduces water storage capacity and yield security, and increases the risk of flooding.

(EU Commission 2021; Beste 2021, Montanarella 2018)





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Institute for Soil Conservation & Sustainable Agriculture

Causes ...

The European SOILSERVICE project, involving 11 european university and research institutes, studied the effects of different intensities of agricultural use on soil ecosystem services of soil in 4 European countries.

(2008 – 2011)

Results show:

Intensive agriculture with narrow crop rotations, intensive fertilization, and high pesticide use leads to soil biodiversity degradation, humus loss, compaction, and erosion.

(Hedlund, K. et al. 2012)

The costs associated with soil degradation currently amount to over 50 billion euros per year in the EU!

(EU Commission 2021)

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A good soil structure is created only biologically



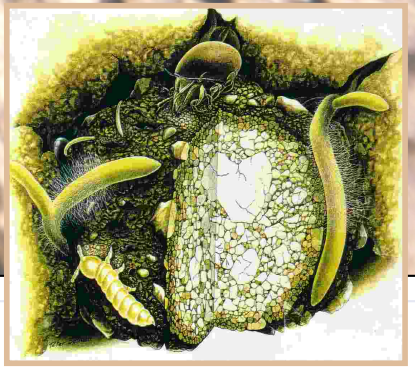
A hectare of living soil contains about the live weight of 20 cows as soil organisms.

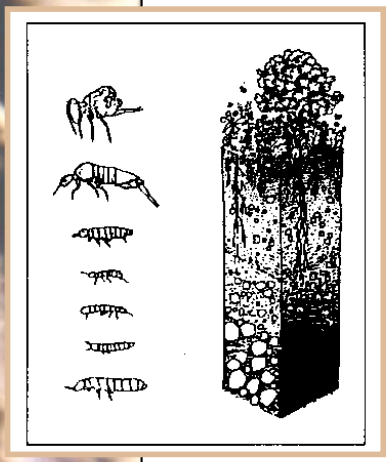
Soil organisms create soil structure by their movemend and metabolism.





They are building good soil structure conditions.





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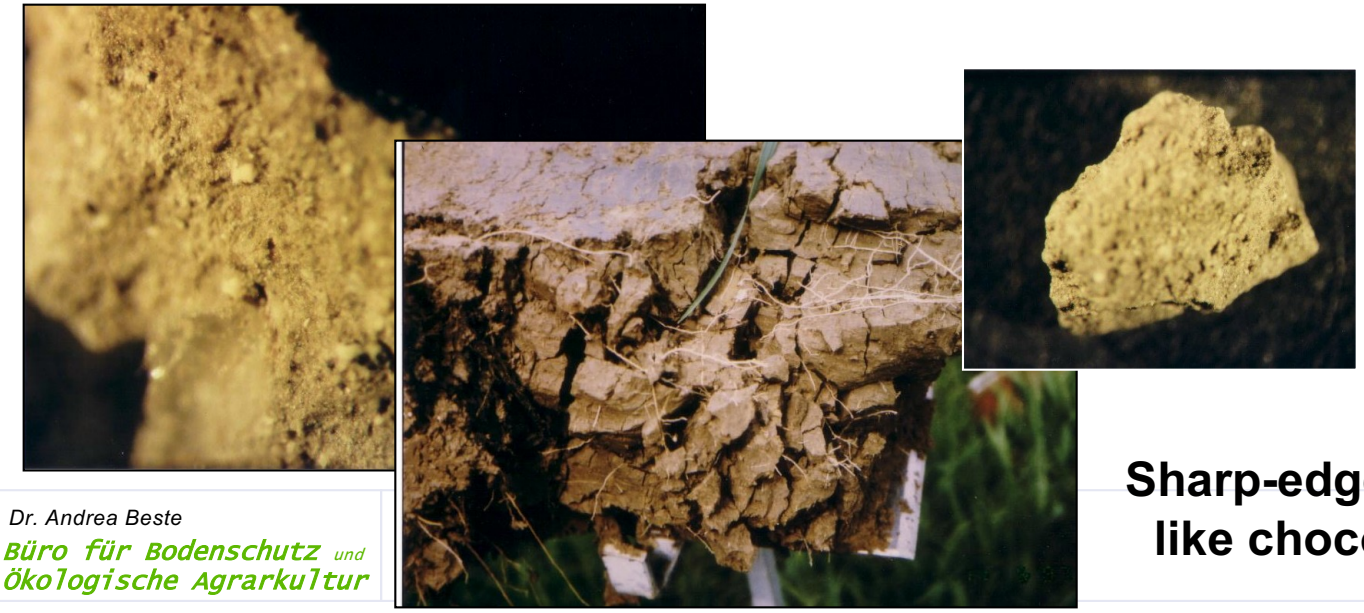
You can see good and bad conditions .....

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Porous, like a sponge: soil life intact.





Sharp-edged with smooth surface, like chocolate: soil life disturbed.

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Büro für Bodenschutz und Ökologische Agrarkultur

In many cases, soil structure conditions are bad….

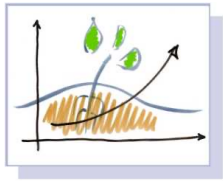
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What to do?



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Sustainable soil management

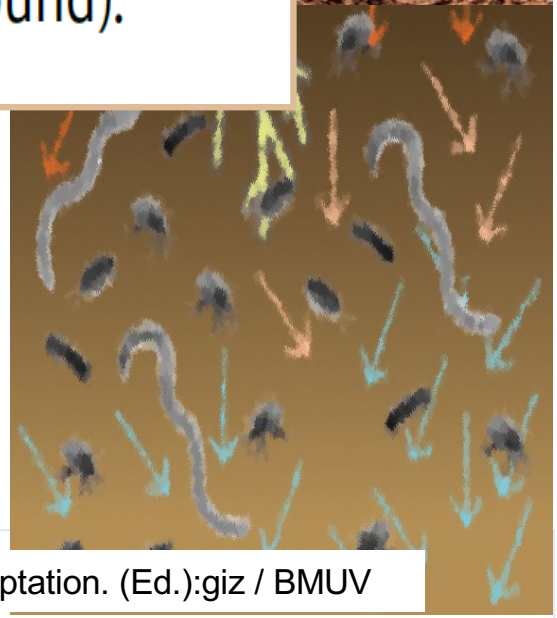


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Essential elements of sustainable soil management are well known….



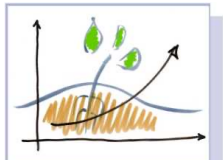
- → Increasing soil organic matter
- → Promoting soil life
- → Promoting diversity (both below and above ground).

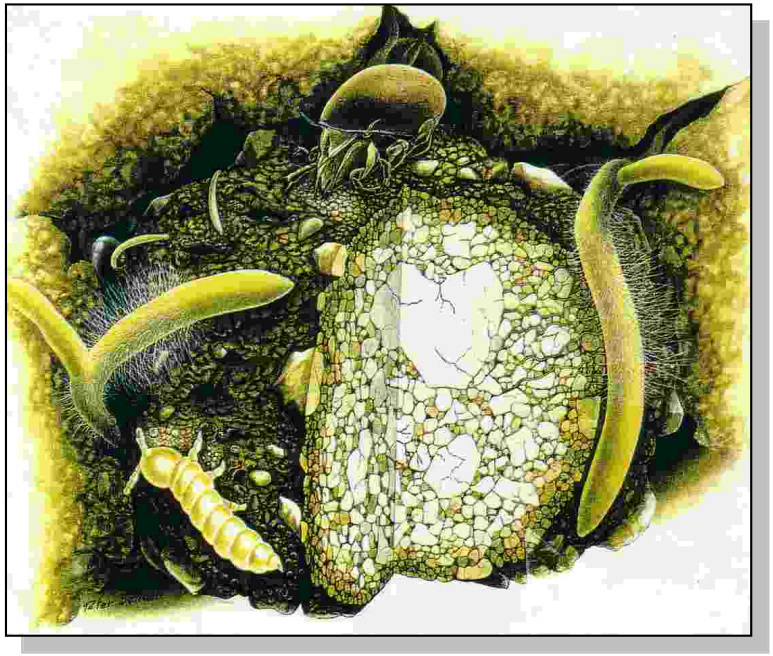


The main principle in all sustainable management systems and tools is:
DIVERSITY!
Above and below ground!

Beste/Lorentz (2022): Down to earth – why soils play a key role in ecosystem-based adaptation. (Ed.):giz / BMUV

Only soil organisms can form biopores …





Source: BSF1991



Only soil organisms can form biopores, it does not work technically.

Only biopores (middle sized pores) can store water and release it to plants.

Coarse or fine pores do not fulfill this function.

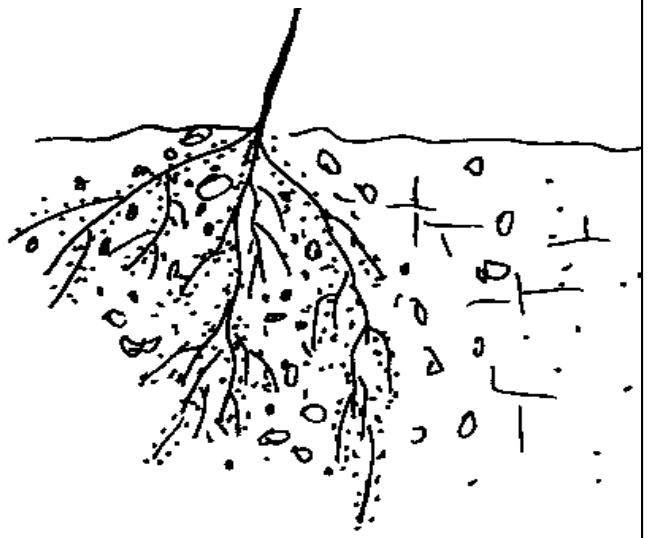


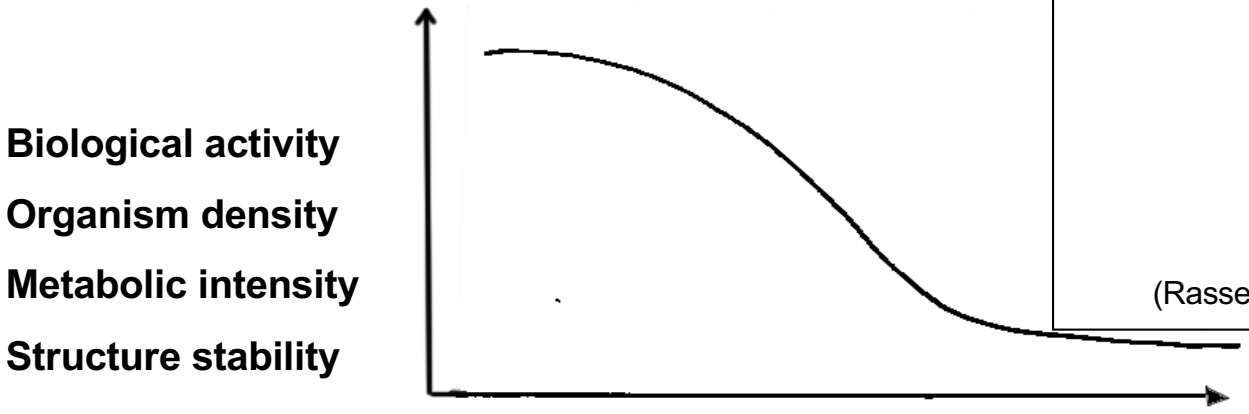


Roots build up humus and loosen the soil

www.gesunde-erde.net

Higher biological activity near roots





They feed soil life with roots (exudates and dying roots)

Studies show:

Microbial biomass increases according to the root mass.

Roots are the greatest humus builders.

(Rasse et al. 2005, Sokol et al. 2018, Gentsch 2020).

Figure: BESTE 2001

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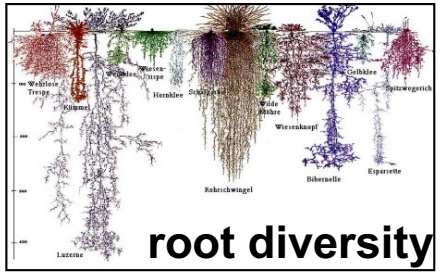
We have well known management tools…

Support of soil biota is best achieved with:

- **green manure & compost application**
  (microbiome diversity)
- **crop rotation**
  (crop and root diversity)
- **inter cropping**
  (crop and root diversity)
- **agroforestry**
  (spatial plant species diversity)
- **permaculture**
  (spatial plant species and root diversitP













> Soil biota diversity

Beste/Lorentz (2022): Down to earth – why soils play a key role in ecosystem-based adaptation. (Ed.):giz / BMUV

This brings a high resilience to climatic extremes such as heavy rainfall and drought.

Means better adaption to climate change.







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Conclusion

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To meet the challenges of climate change, we need water-storing landscapes.

At the field level, biopores play the biggest role. That only works with vivid living soil.



The main principle in sustainable soil management is:

DIVERSITY!

Above and below ground!

Dr. Andrea Beste
Büro für Bodenschutz und Ökologische Agrarkultur

More about soil and sustainable agriculture:
https://www.gesunde-erde.net/en/

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