STATE of KNOWLEDGE of SOIL BIODIVERSITY- Status, Challenges and Potentialities

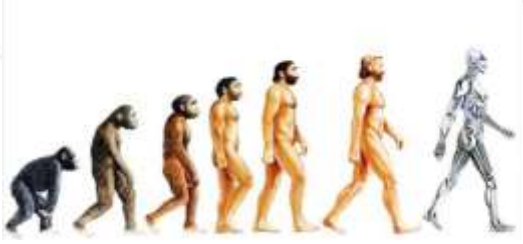
GSP secretariat Rosa Cuevas

GLOBAL SYMPOSIUM ON SOIL BIODIVERSITY | 19-22 April 2021

How many species are there in the world?

8.7 million species
Identified: 1.3 million
86 % terrestrial and 96 % marine not discovered

Only one species dominates and is transforming the planet!

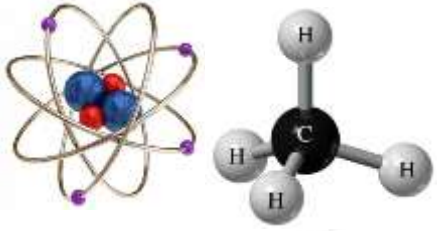


A little bit of history…

13.5 billion years

Matter, energy, time and space had their origin in the Big Bang. The account of these fundamental characteristics of our planet is called ***Physics***

3000 years after its appearance

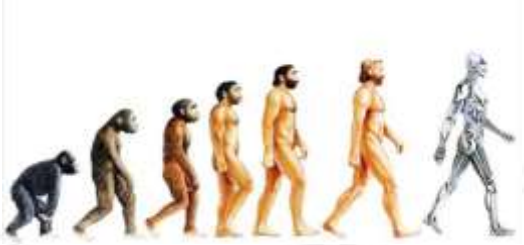


Matter and energy began to clump together into complex structures called atoms that later combined into molecules. The story of atoms, molecules and their interactions is called ***Chemistry***

3.8 billion years ago

On a planet called Earth certain molecules combined to form particularly large and intricate structures called organisms. The story of organisms is called ***biology***

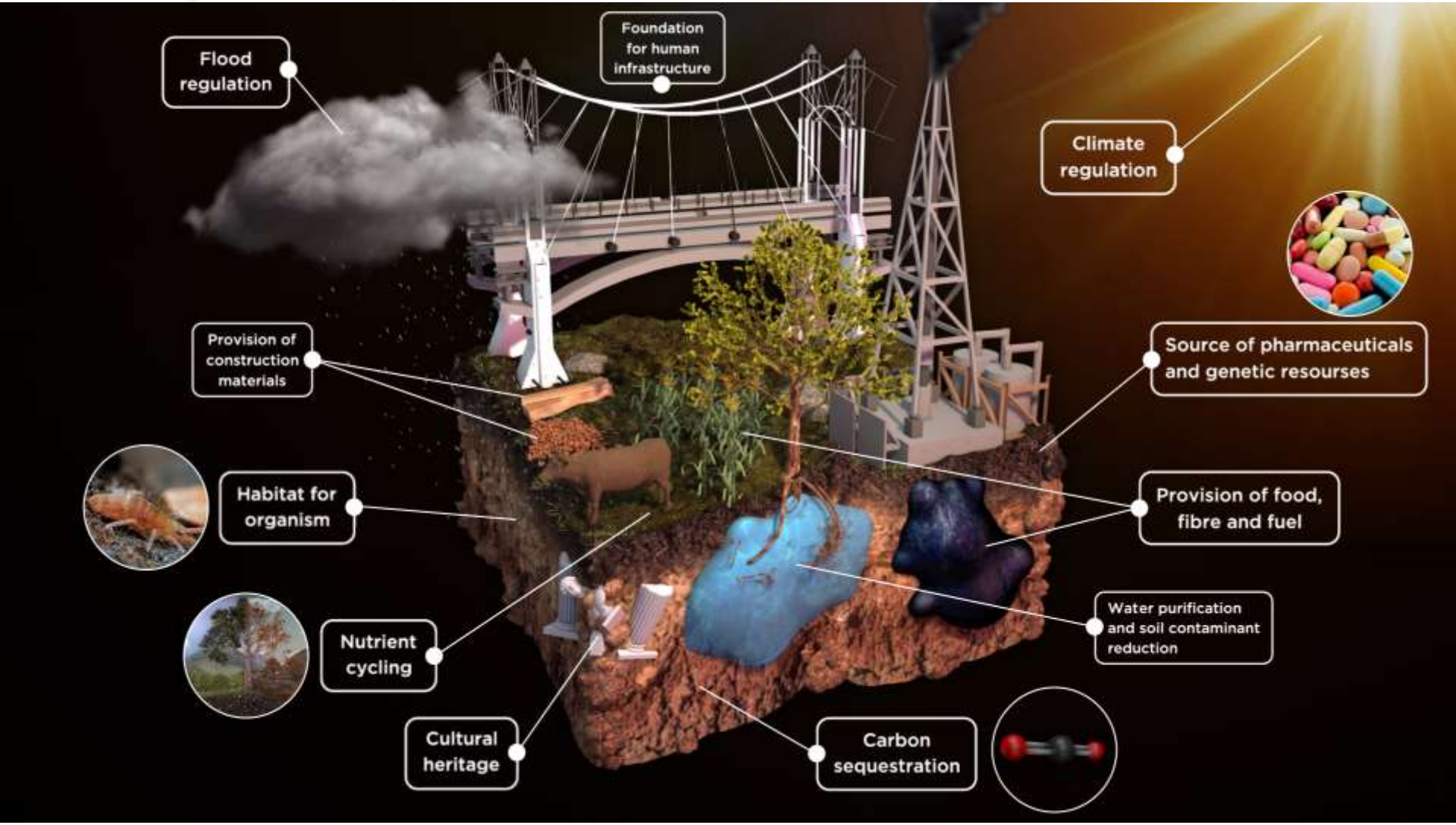
70,000 years ago



Organisms belonging to the species Homo sapiens began to form even more complex structures called cultures. The development of these cultures is called ***History***

From Animals into Gods: A Brief History of Humankind
Yuval Noah Harari

Soil is a valuable natural capital, but….
one third of our global soils are degraded



The current global challenges

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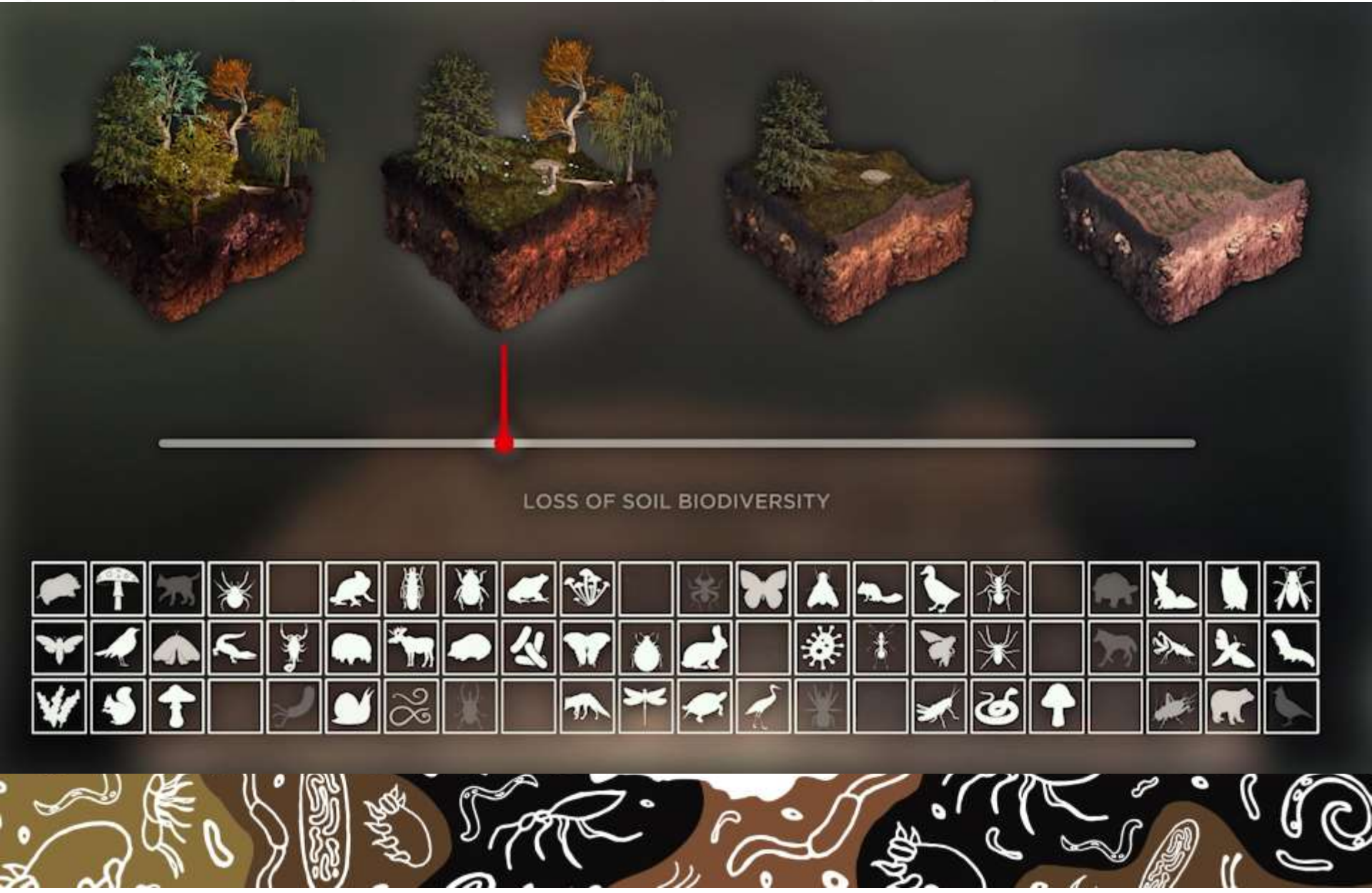
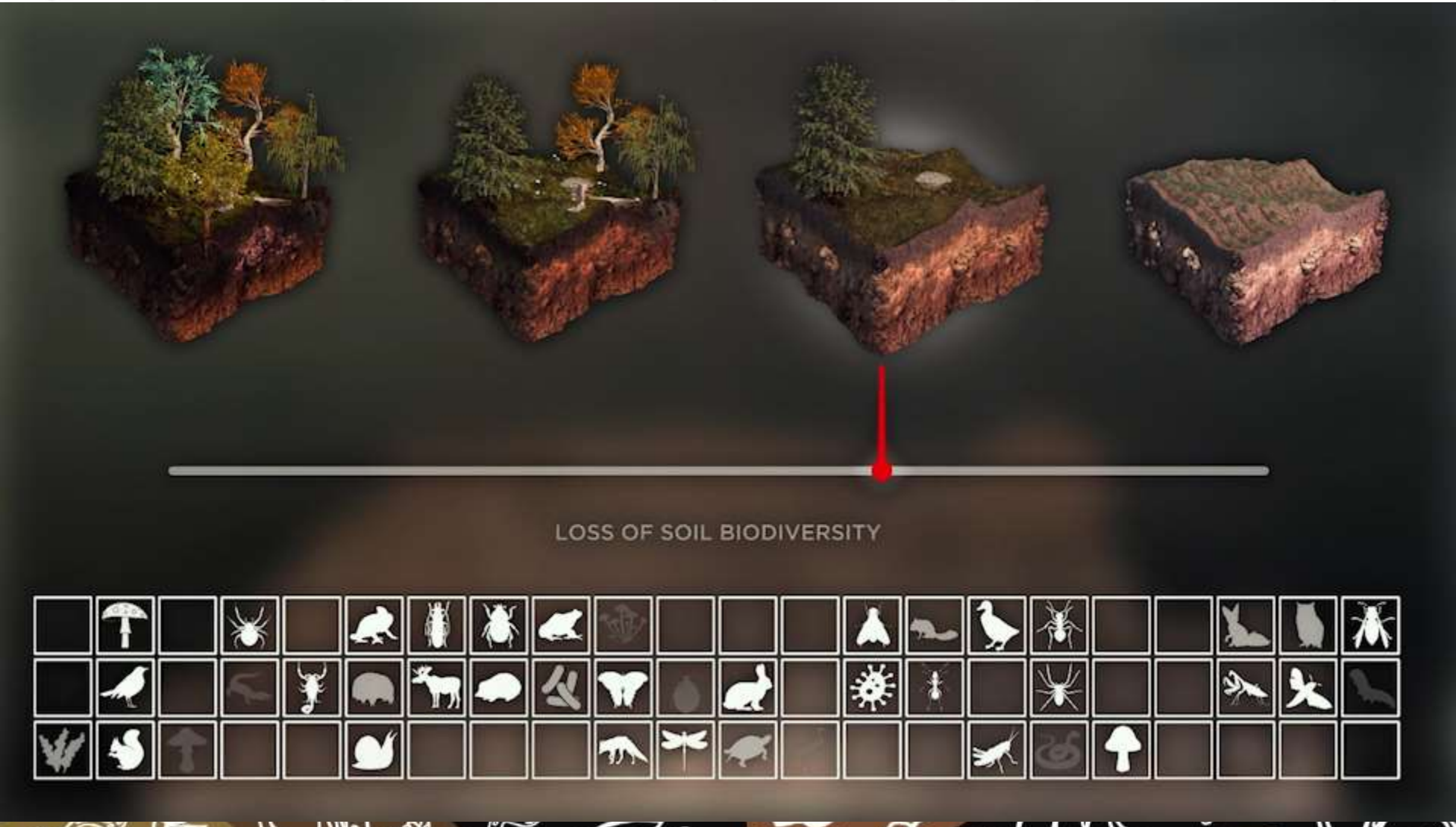
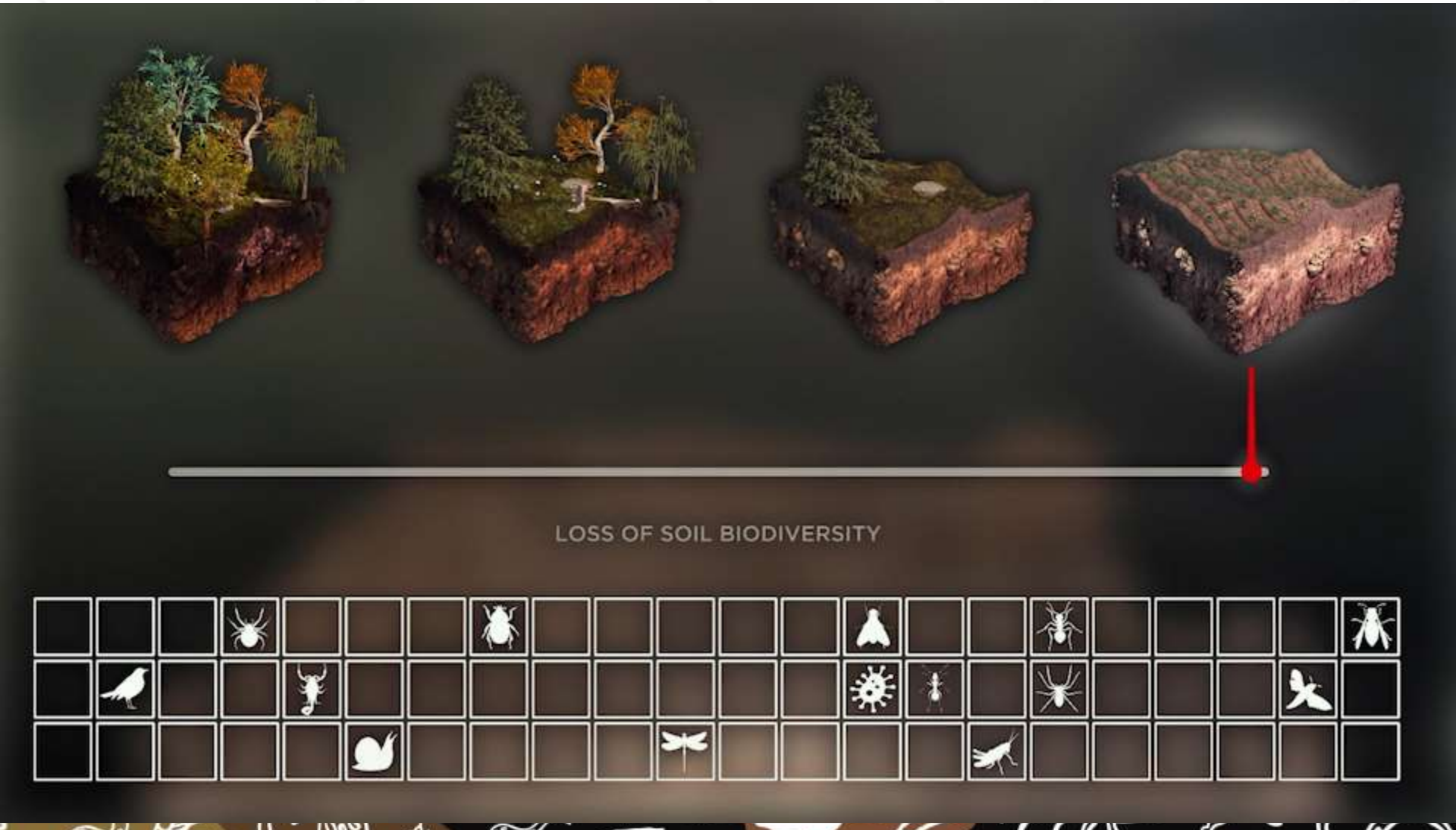


The current global challenges



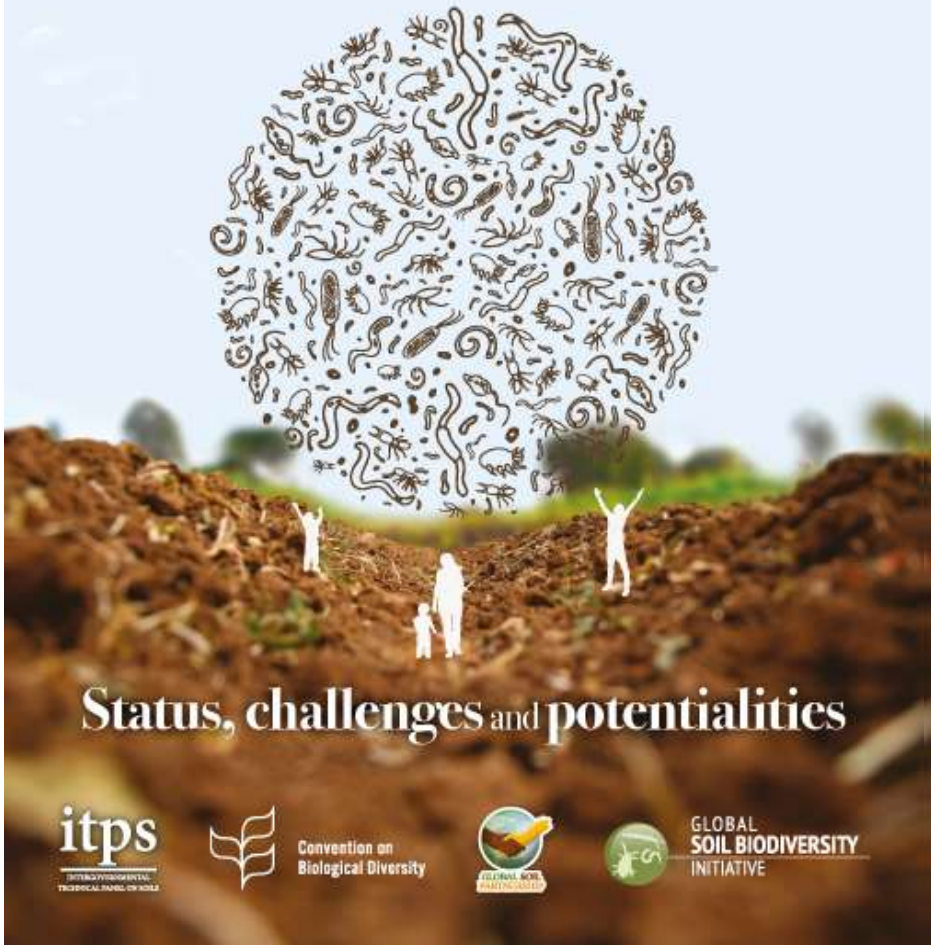
The current global challenges



Food and Agriculture Organization of the United Nations

Report 2020

STATE of KNOWLEDGE of SOIL BIODIVERSITY



Status, challenges and potentialities

itps

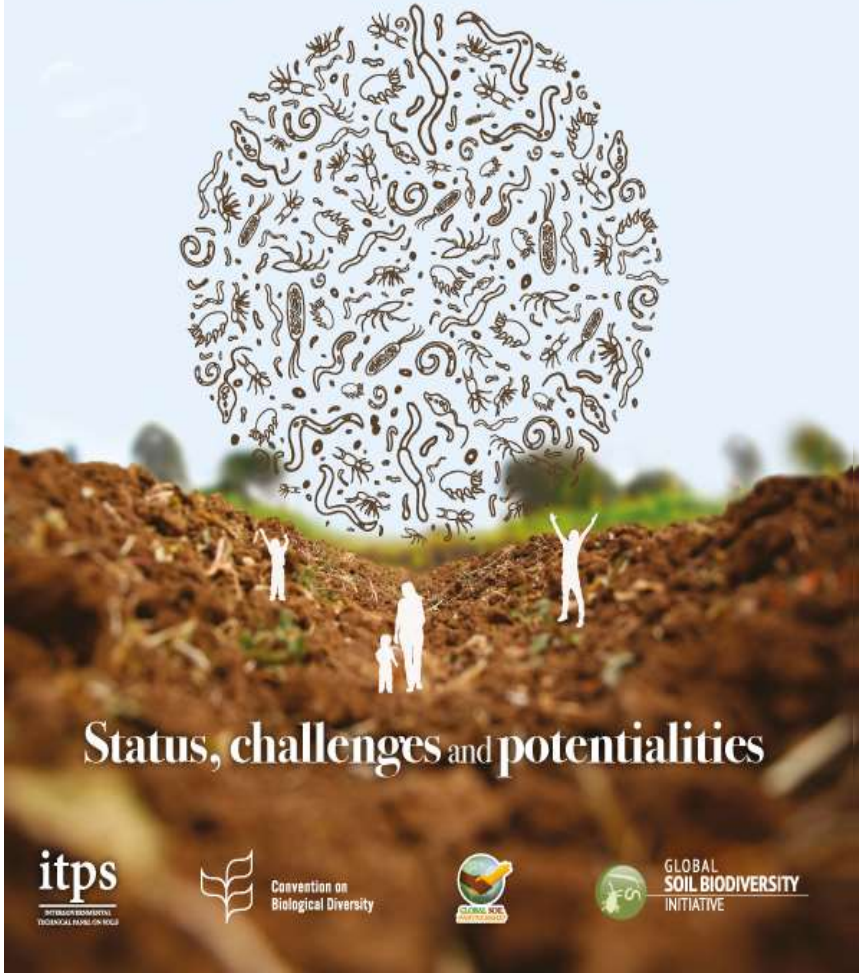
Convention on Biological Diversity

GLOBAL SOIL BIODIVERSITY INITIATIVE

Food and Agriculture Organization of the United Nations

Summary for policy makers 2020

STATE of KNOWLEDGE of SOIL BIODIVERSITY



Status, challenges and potentialities

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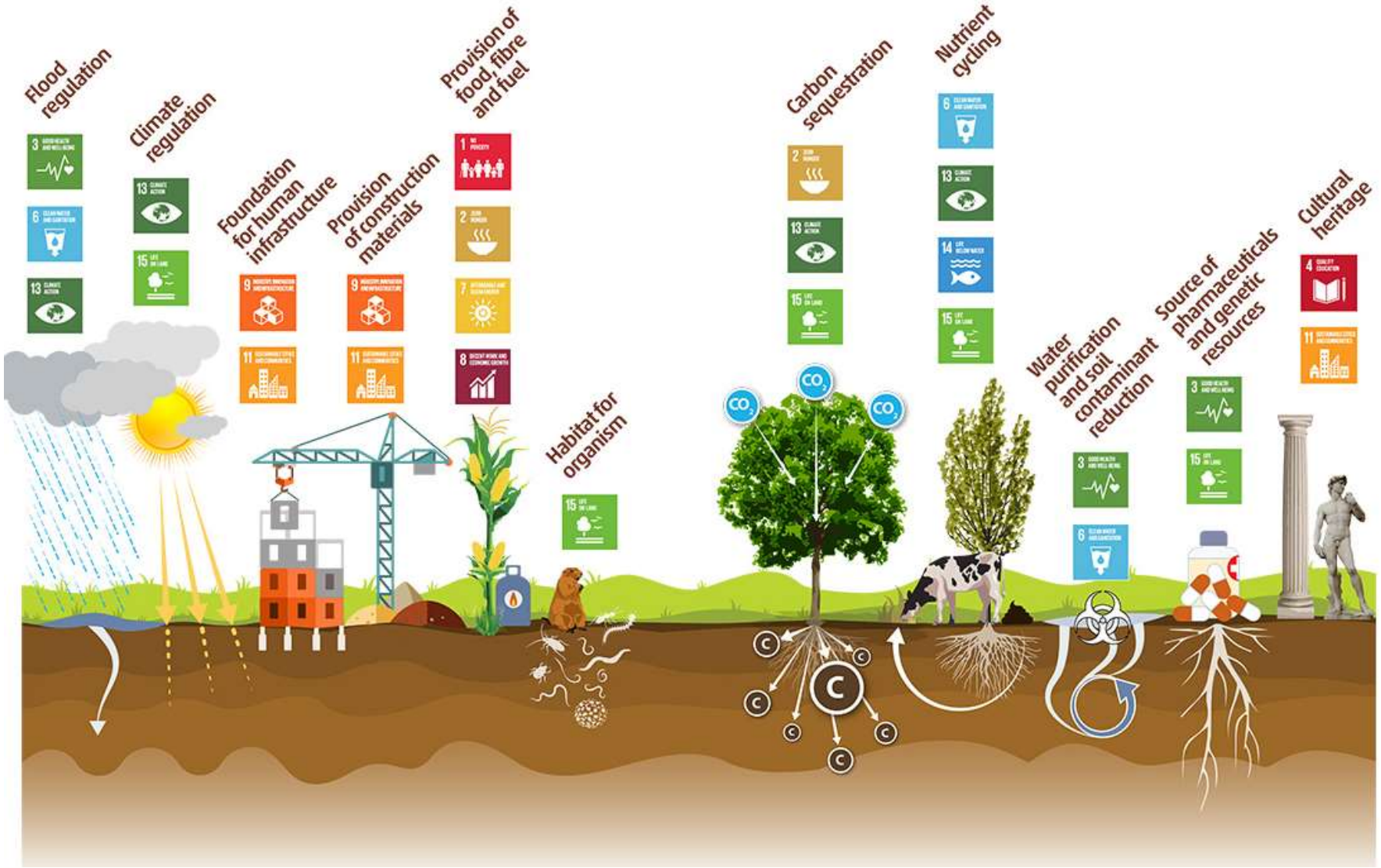
GLOBAL SOIL BIODIVERSITY INITIATIVE

A healthy soil is capable of providing most terrestrial ecosystem services, therefore contributing to achieve the SDGs and human well-being



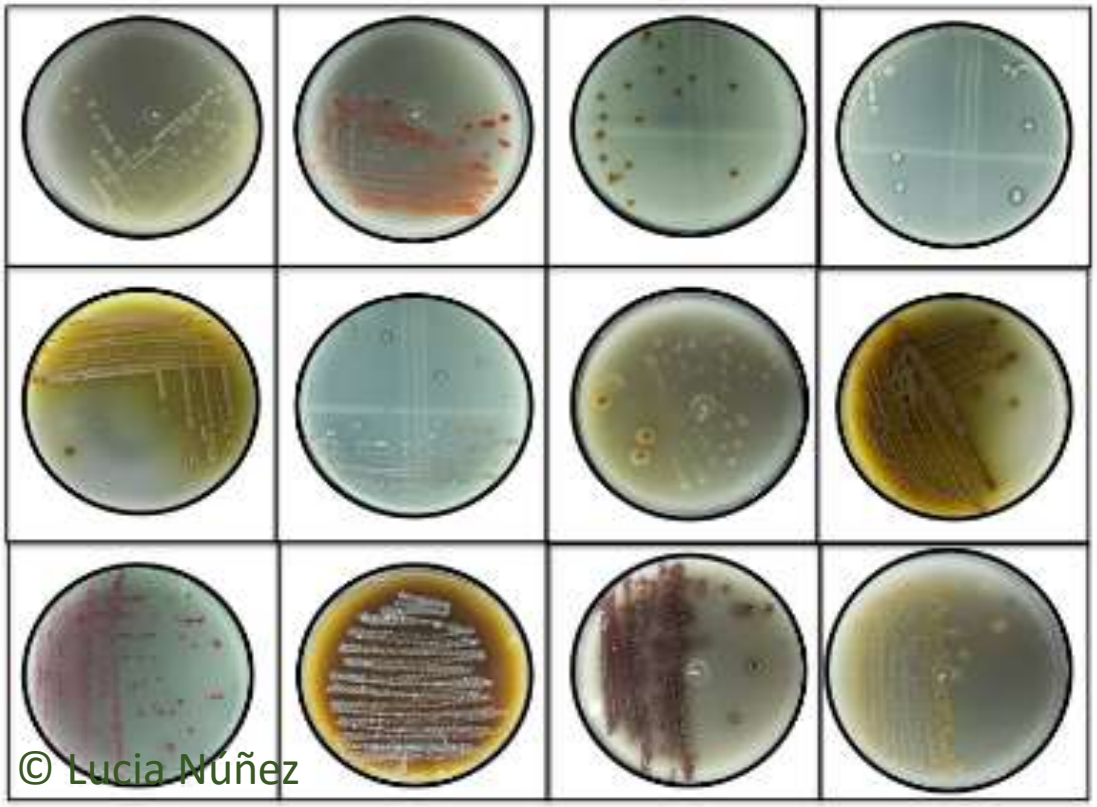
5 DECEMBER 2020

What is soil biodiversity?

We define soil biodiversity as the variety of life belowground, from genes and species to the communities they form, as well as the ecological complexes to which they contribute and to which they belong, from soil micro-habitats to landscapes.

World Soil Day

What is soil biodiversity?



What is soil biodiversity?

© Sergii Dymchenko

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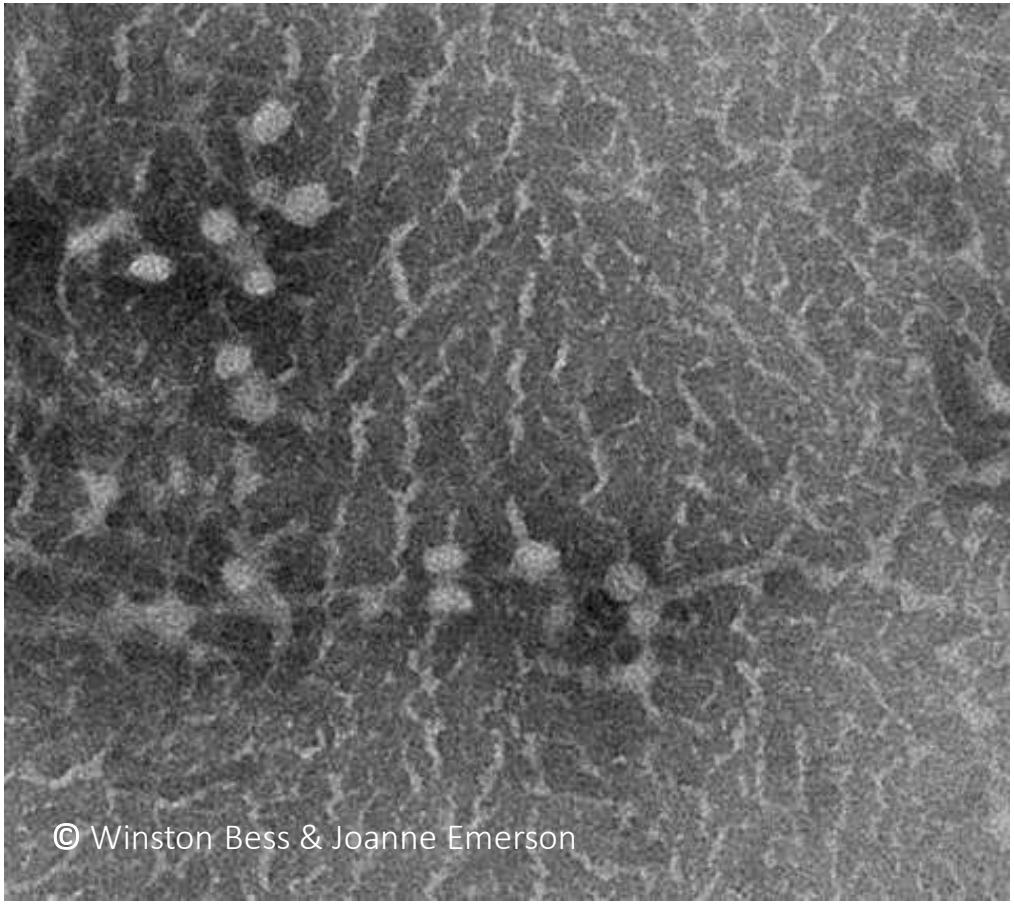

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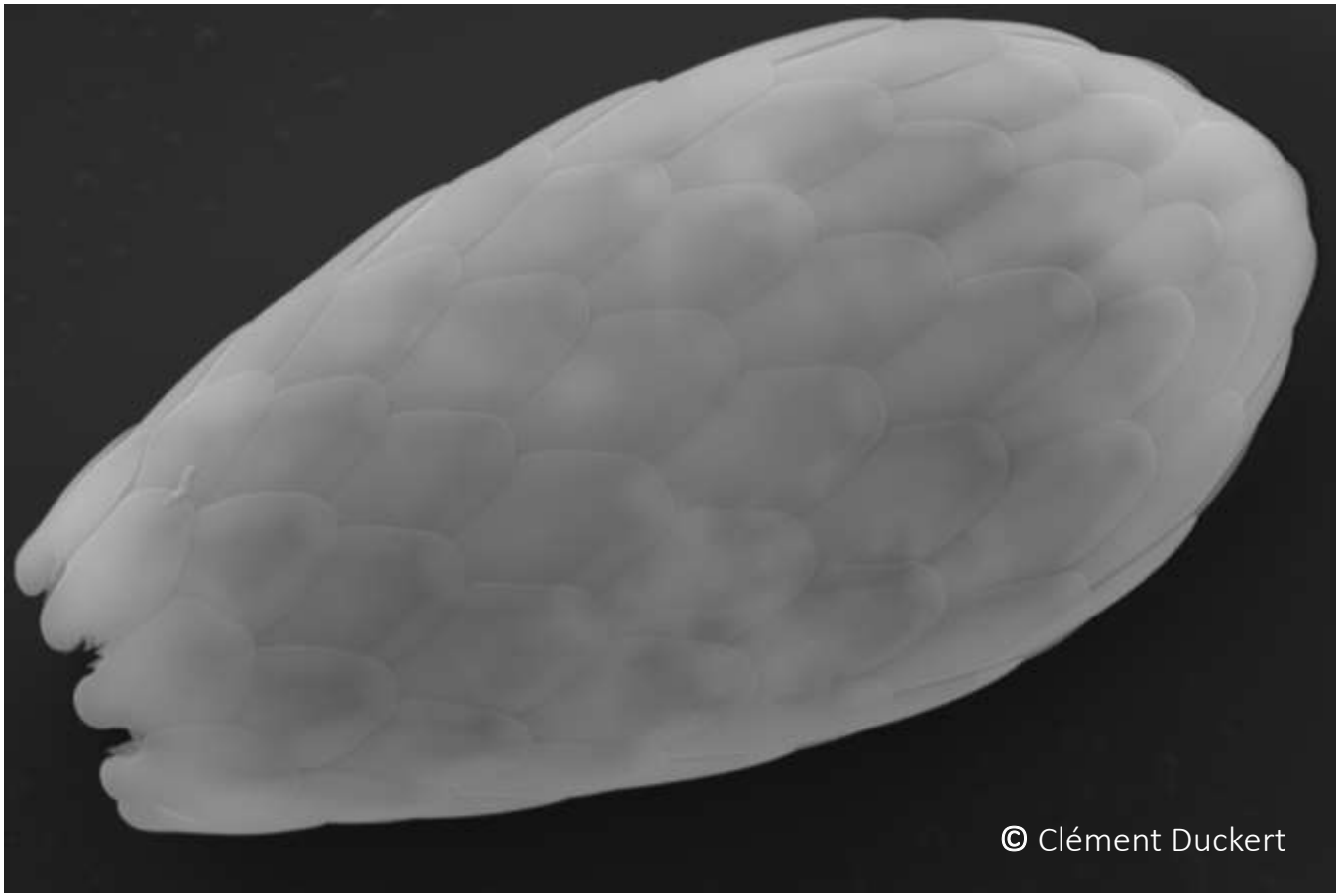

What is soil biodiversity?

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Andy Murray

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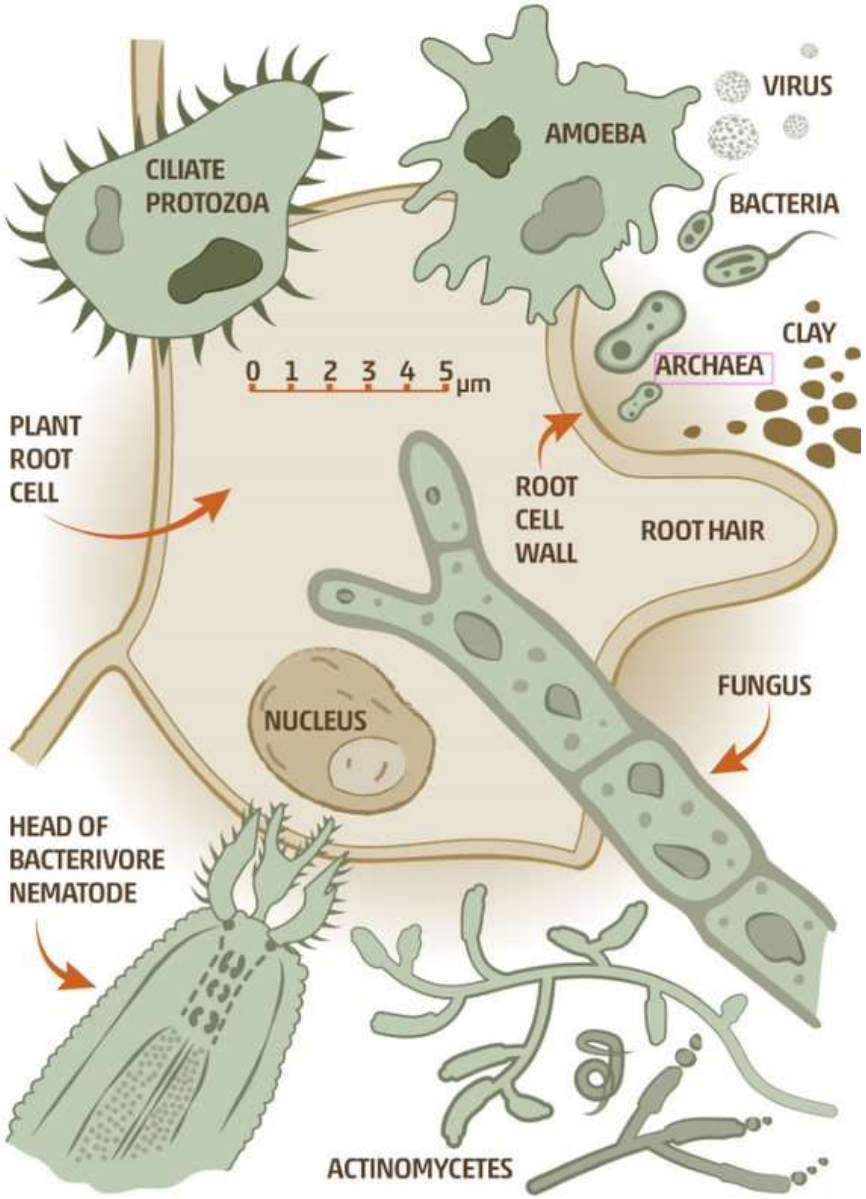
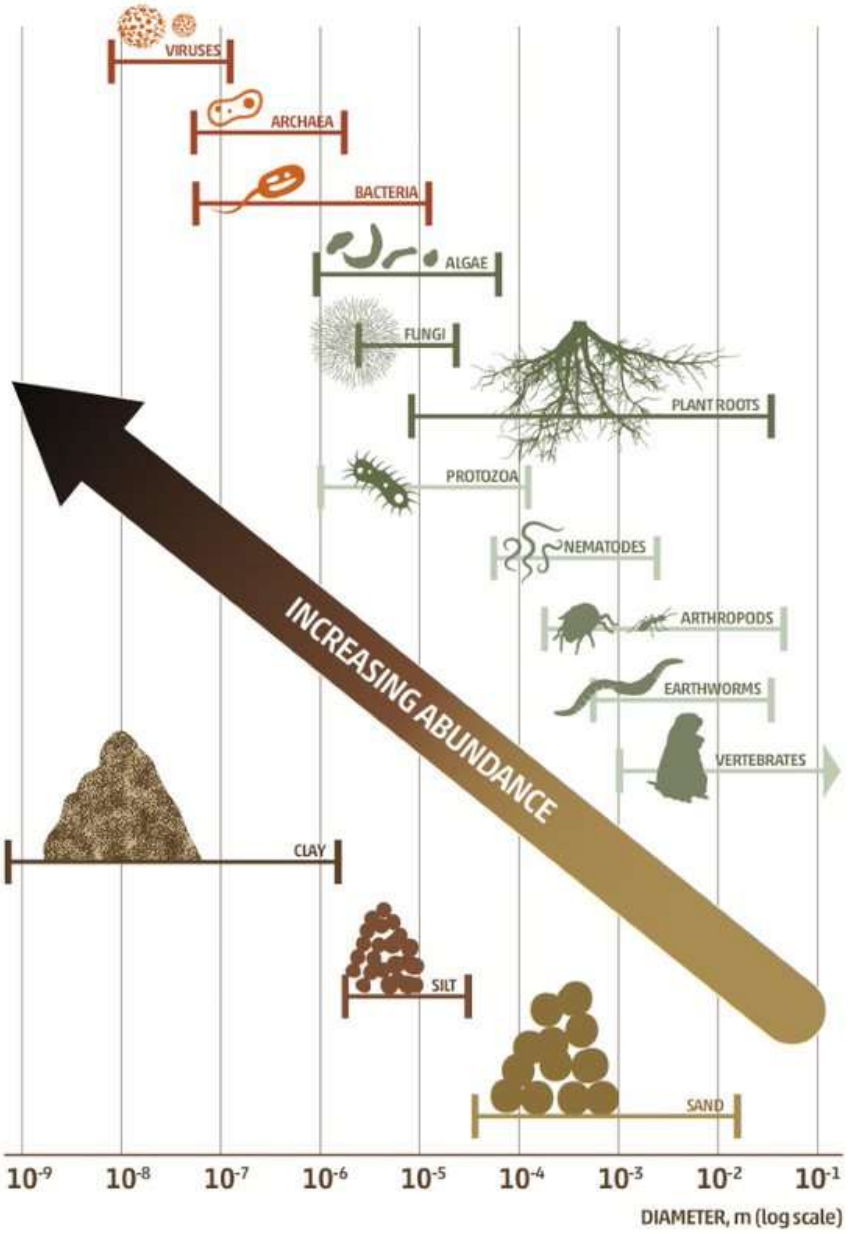
What do we know about soil biodiversity?

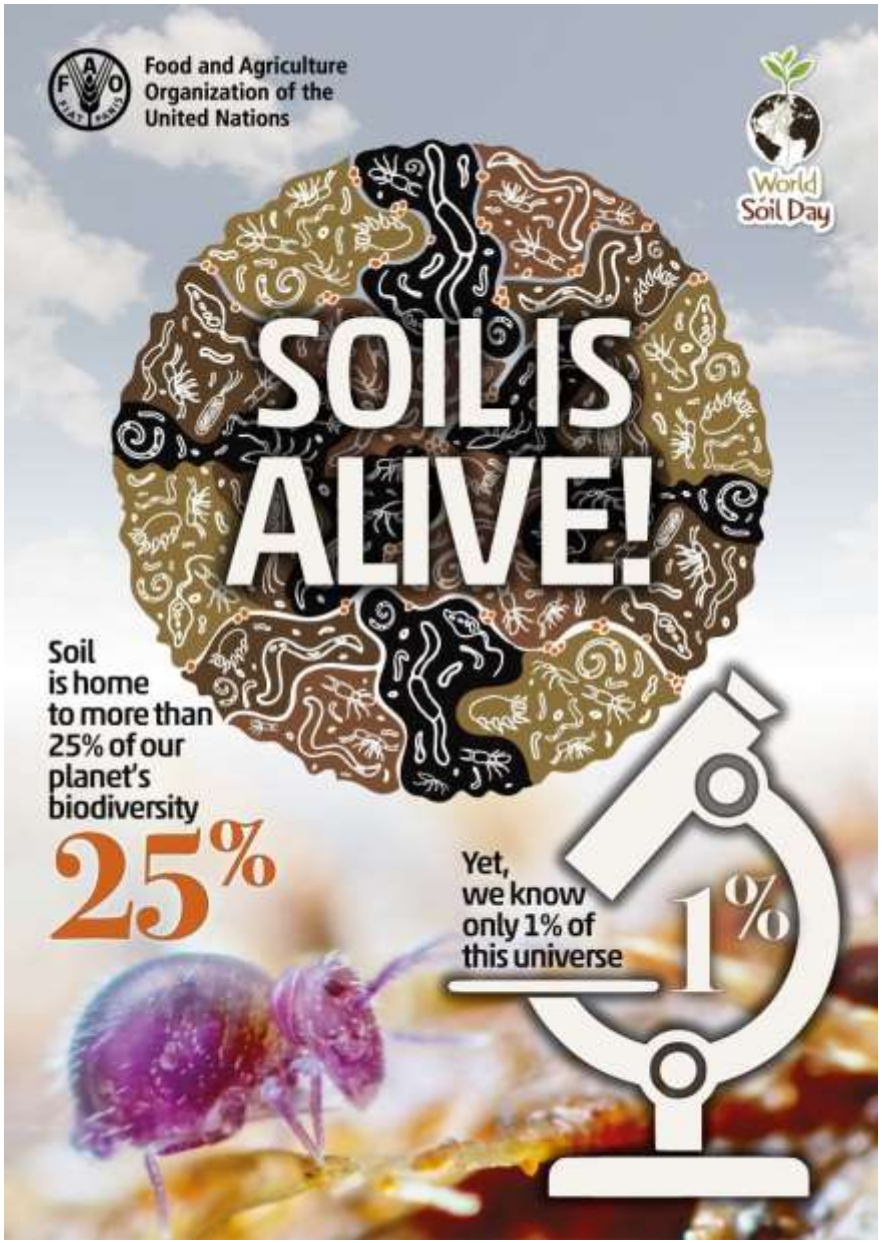
- **Bacteria and Archaea**: 2.5×10^{30} cells.
- **Fungi**: 0.8-3.8 million species.
- **Nematodes**: 4×10^{20} individuals in soils alone.
- **Mites**: 20 000 described, 80 000 undescribed species.
- **Collembola**: 8 000 described species worldwide.
- **Earthworms**: 6 000 species, from 20 families
- **Termites**: 2 934 species in 282 genera.
- **Ants**: 20 000 species.

What do we know about soil biodiversity?



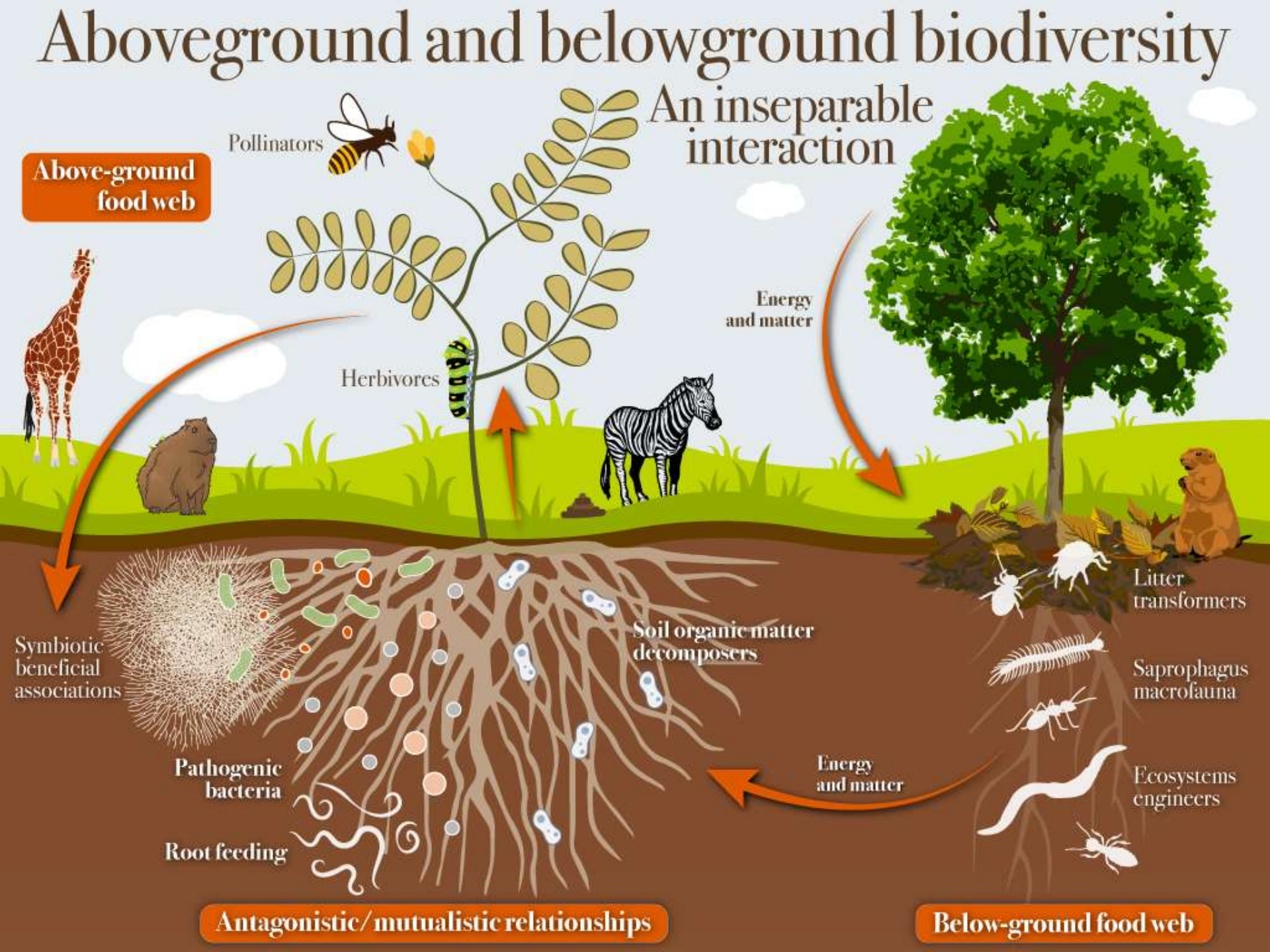


What do we know about soil biodiversity?



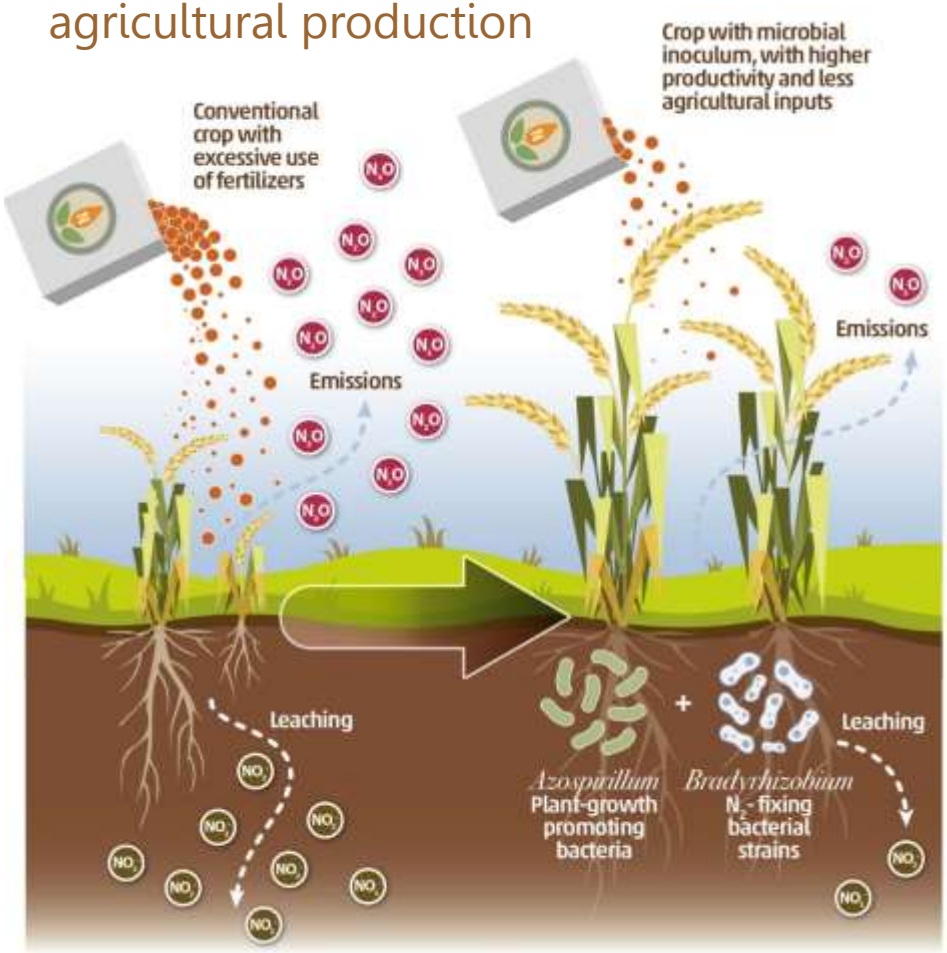
- More than 40% of living organisms in terrestrial ecosystems are associated during their life-cycle directly with soils.
- Soils contains arguably the most diverse terrestrial communities on the planet.
- It supports most life above ground by means of increasingly well-understood above and belowground linkages.

Aboveground and belowground biodiversity

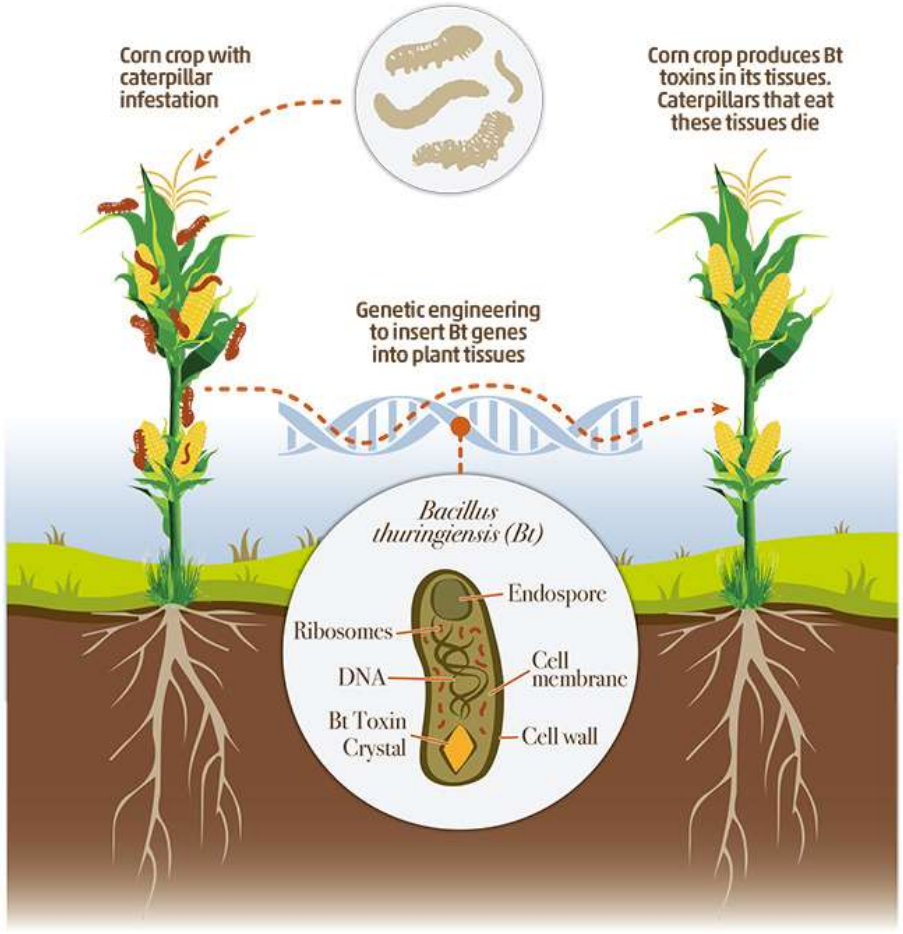


Why is soil biodiversity important?

Clean biotechnology in agricultural production



Biological control



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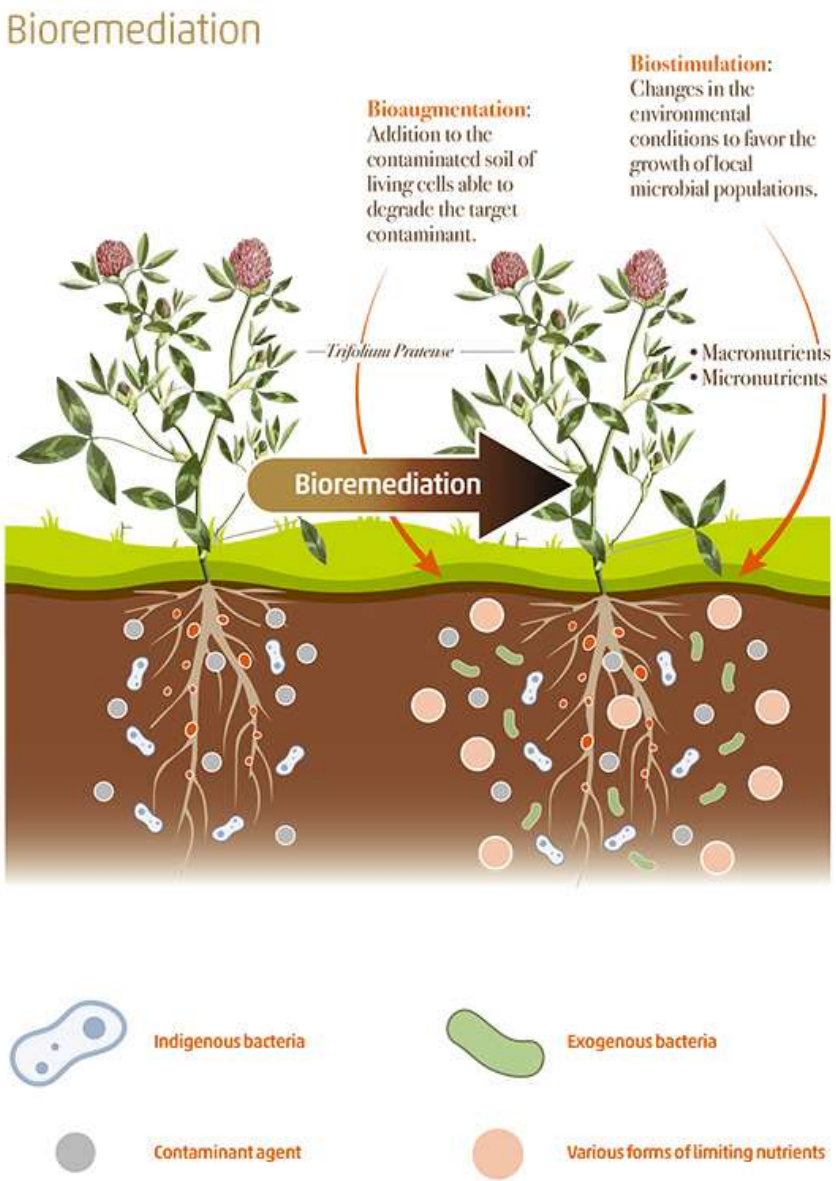

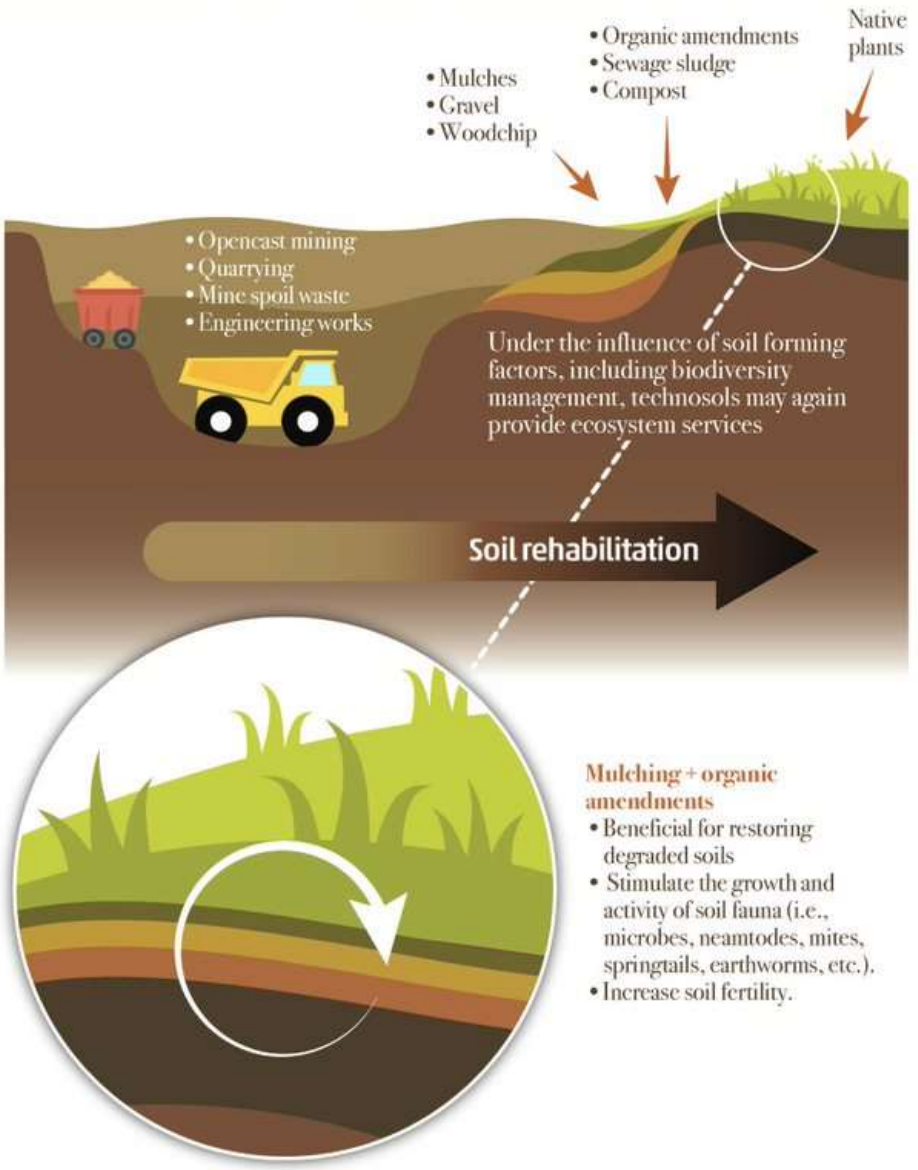

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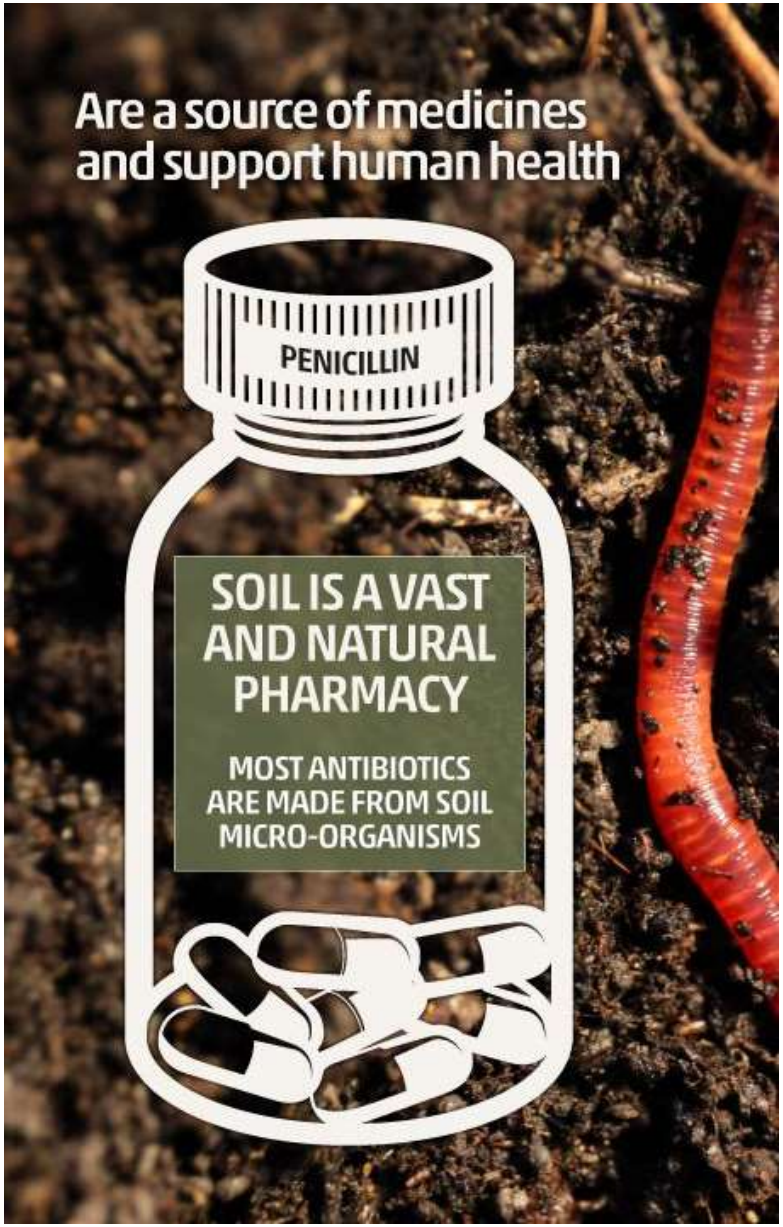
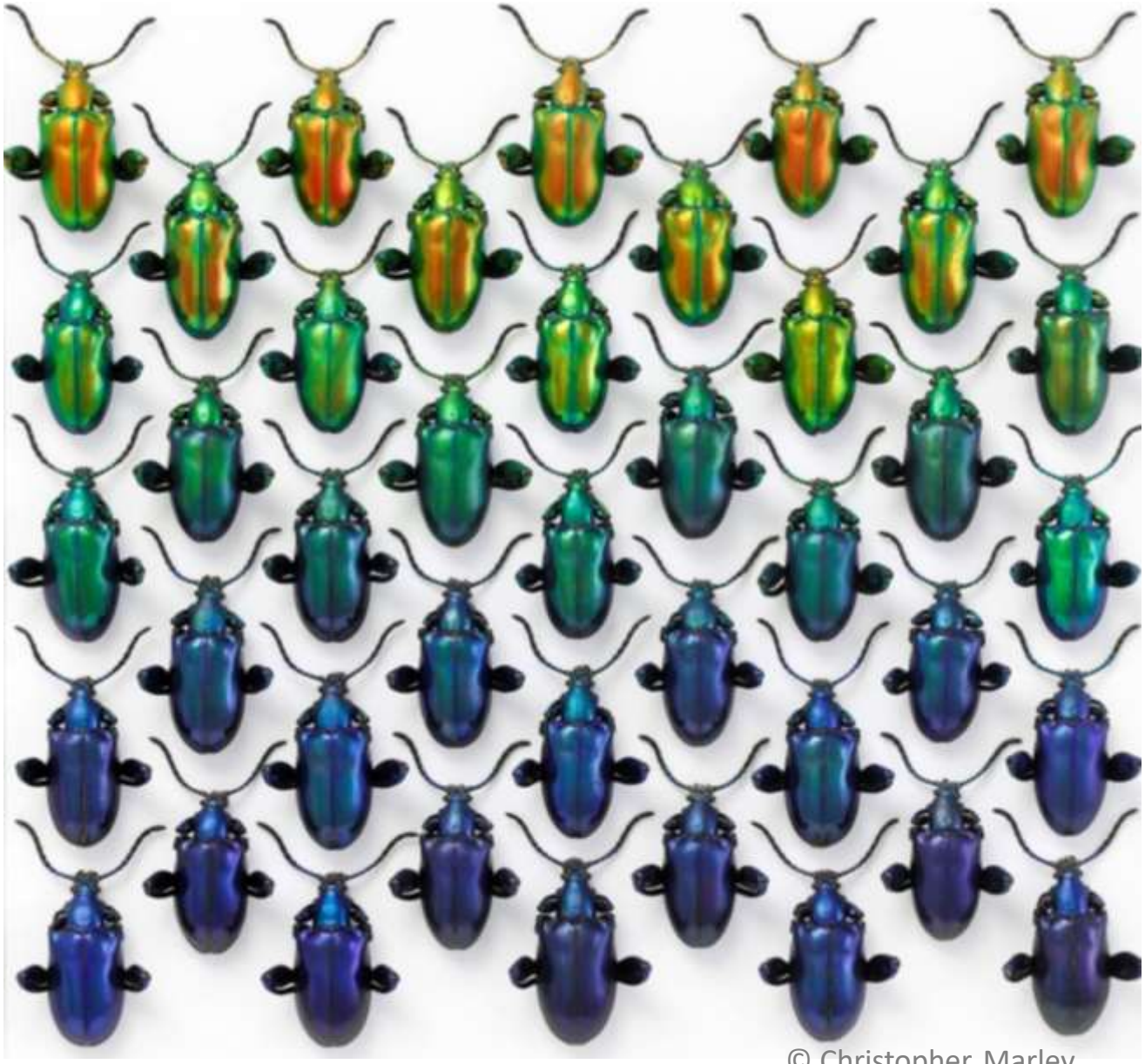


- **The discovery of antibiotics has had a major impact on increasing human life expectancy.**
- **The early exposure to a diverse collection of soil microorganisms might help prevent chronic inflammatory diseases, including allergy, asthma, autoimmune diseases, inflammatory bowel disease and depression.**

Why is soil biodiversity important?



© Christopher Marley

Beauty inspires art!!

YET SOIL BIODIVERSITY IS IN GREAT DANGER FROM

Unsustainable soil management practices

MONOCULTURES LIMIT THE PRESENCE OF BENEFICIAL BACTERIA, FUNGI AND INSECTS, AND CONTRIBUTE TO ECOSYSTEM DEGRADATION

75 bn t

Erosion

EACH YEAR, 75 BILLION TONS OF SOILS AND THEIR ORGANISMS ARE STRIPPED FROM THE LAND BY WIND AND WATER EROSION

Pollution

POLLUTION CAUSES A CASCADE OF SOIL DEGRADATION PROCESSES AND AFFECTS SOIL ORGANISMS BY REDUCING BIOMASS AND SPECIES RICHNESS

Surface sealing and urbanization

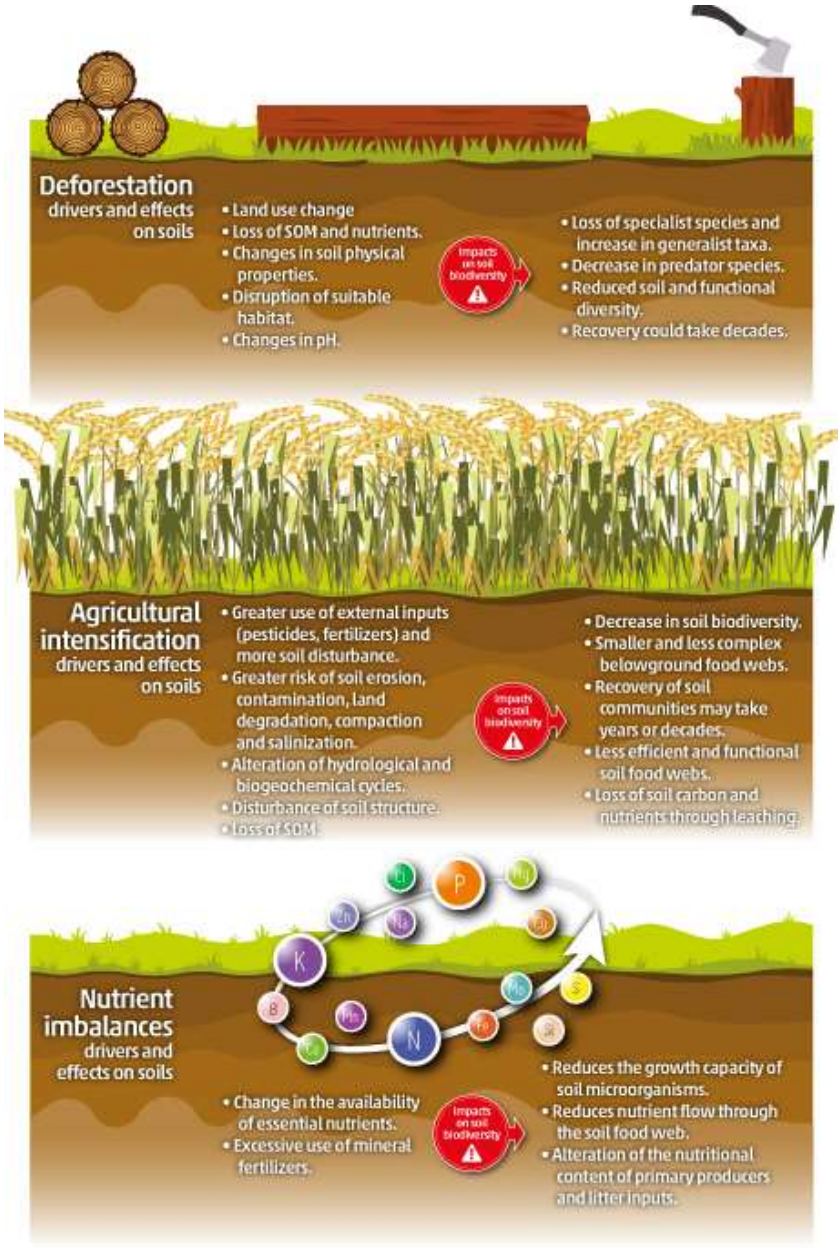
IN EUROPE, 11 HECTARES OF SOIL ARE SEALED UNDER EXPANDING CITIES EVERY HOUR

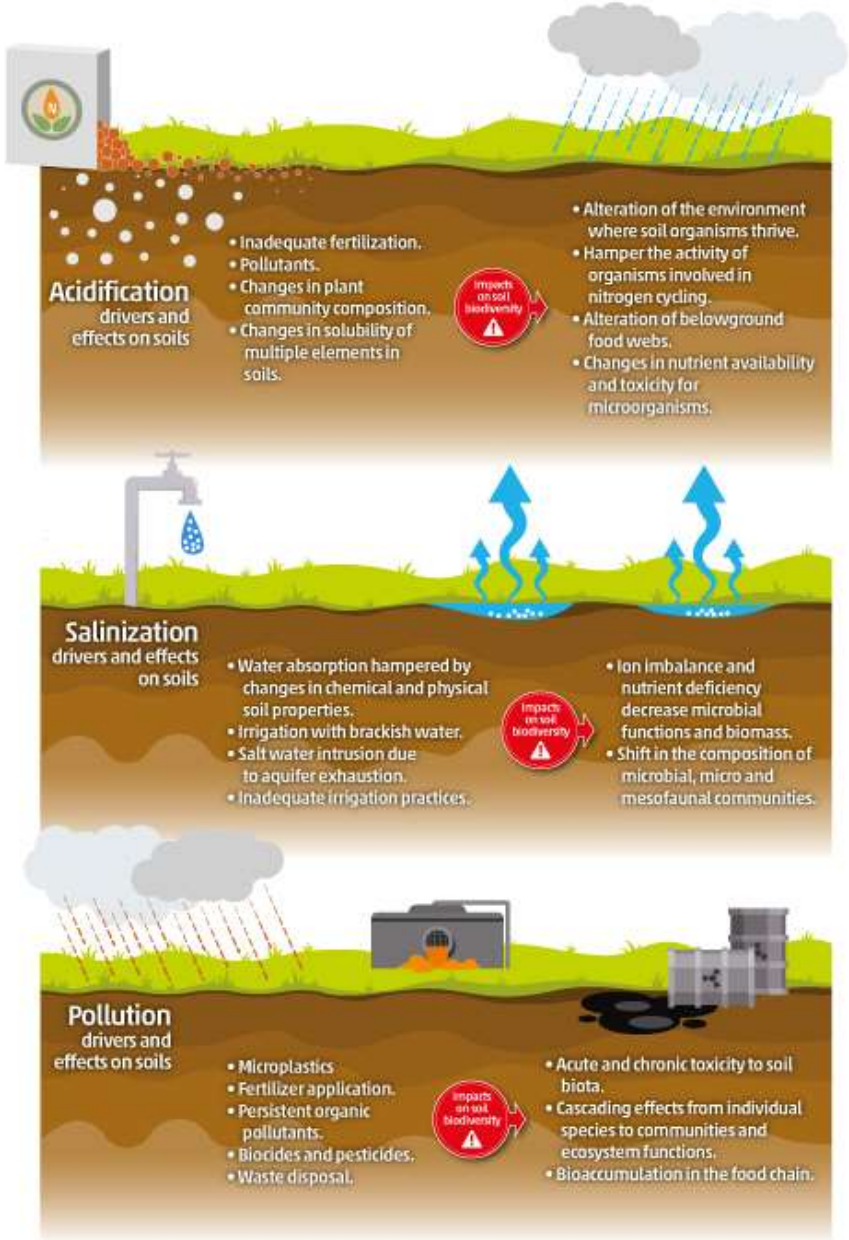
11 ha/h

SOIL BIODIVERSITY IS A NATURE BASED SOLUTION

COST OF INACTION:
50 BILLION €
PER YEAR AND COULD REACH
14 000 BILLION €
IN 2050

How is soil biodiversity threatened?





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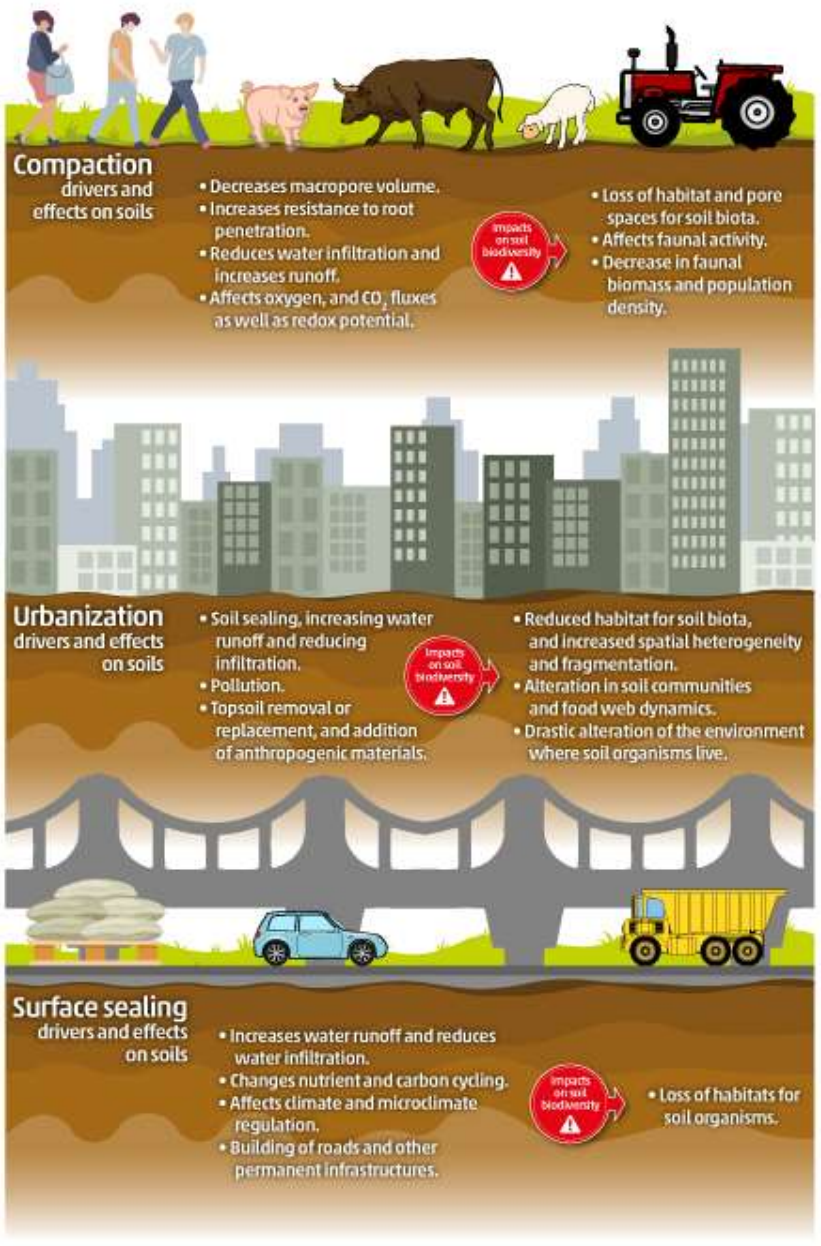
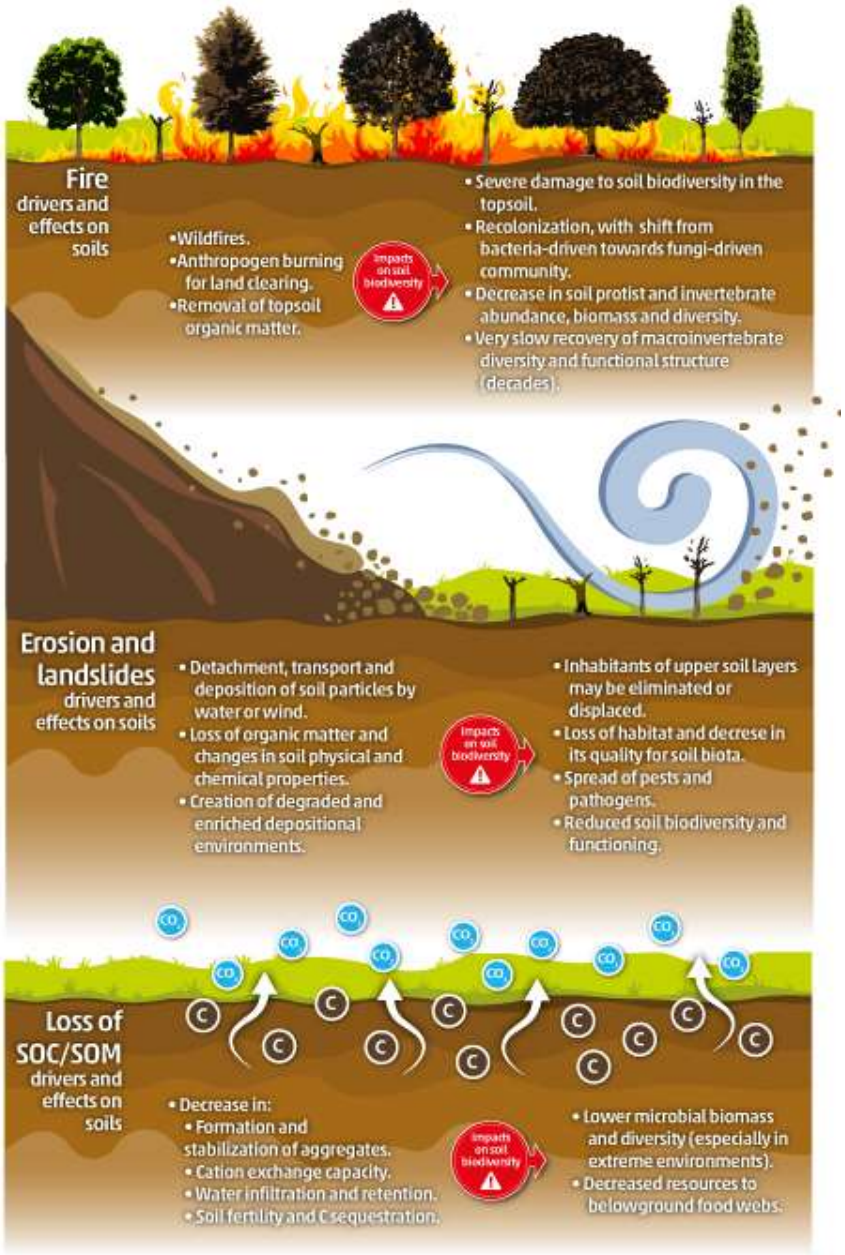
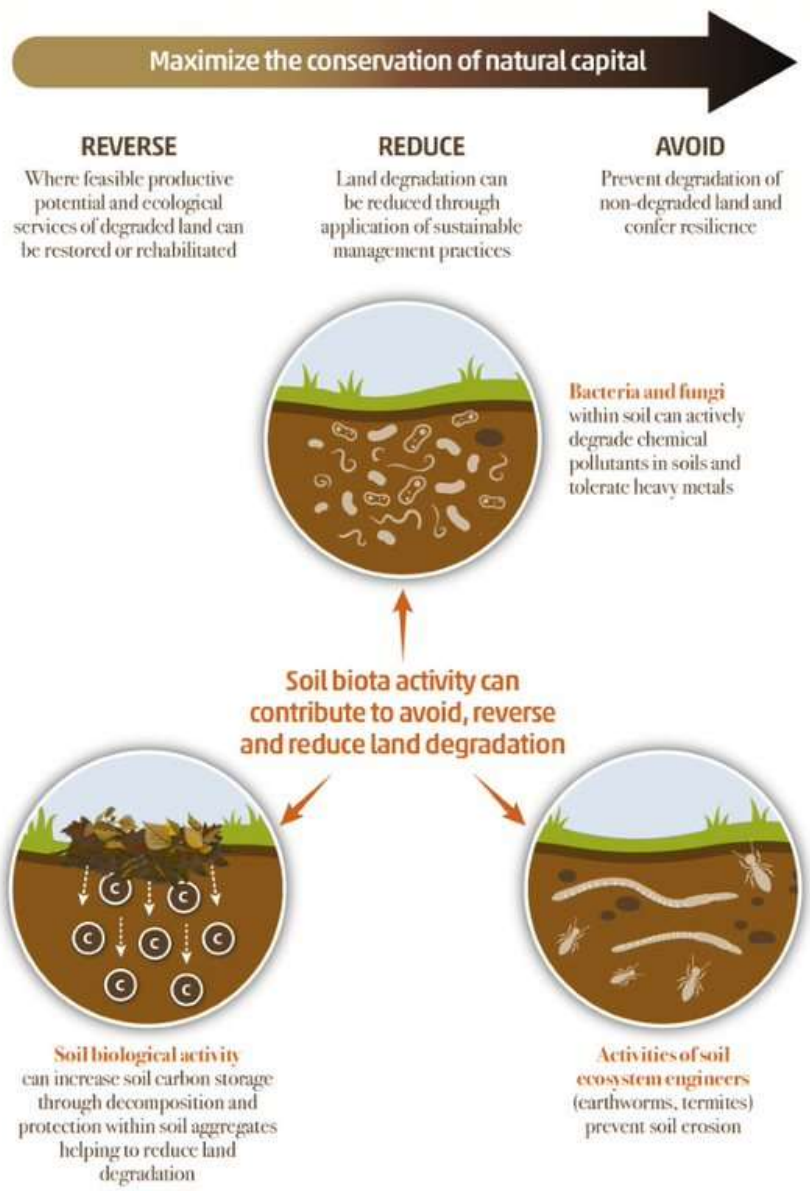




What are the challenges and gaps?

What are the potentialities?

- **Food security and food safety:** improvement of agricultural production (biofertilizers, nitrogen fixation, pathogen control).
- **Biological control:** pests, diseases.
- **Environmental remediation (bioremediation):** bioaugmentation, phytoremediation, vermiremediation**.**
- **Climate change mitigation/adaptation:** carbon sequestration, GHG.
- **Nature-based solutions:** stimulate the growth and activities of soil fauna for ecosystem restoration.
- **Nutrition and human health:** vaccines, medicines, traditional medicine, microbiome.



The way forward

1. **Advocate for mainstreaming Soil Biodiversity** into the sustainable development agenda, the **Post-2020 biodiversity framework**, **the UN decade on ecosystem restoration**, and all areas where SB can contribute;
2. **Develop standard protocols and procedures for assessing SB** at different scales;
3. Promote the **establishment of soil information and monitoring systems that include SB as a key indicator of soil health**;
4. **Improve knowledge** (including **local or traditional knowledge**) of the **soil microbiome**;
5. Strengthen the **knowledge on the different soil groups forming SB** (i.e., microbes, micro, meso, macro and megafauna);
6. Establish a global capacity building programme for the use and management of soil biodiversity and the **Global Soil Biodiversity Observatory**.
7. Execute the **Implementation Plan** of the International Initiative for sustainable management of Soil Biodiversity initiative.

WHAT CAN YOU DO?

REDUCE YOUR FOOD WASTE BY COMPOSTING

SUPPORT AGRO-ECOLOGICAL TOURISM

CLEAN-UP YOUR NEIGHBOURHOOD

MINIMIZE THE USE OF FERTILIZERS IN GARDENS/ FARMS

DISPOSE OF YOUR GARBAGE AND MASKS RESPONSIBLY

TAKE PART IN WORLD SOIL DAY AND RAISE AWARENESS

STIMULATE INTEREST IN SOIL BIODIVERSITY AT SCHOOL

TAKE A MAGNIFYING GLASS AND ENJOY THE SMALLER THINGS IN LIFE

Thank you for your attention