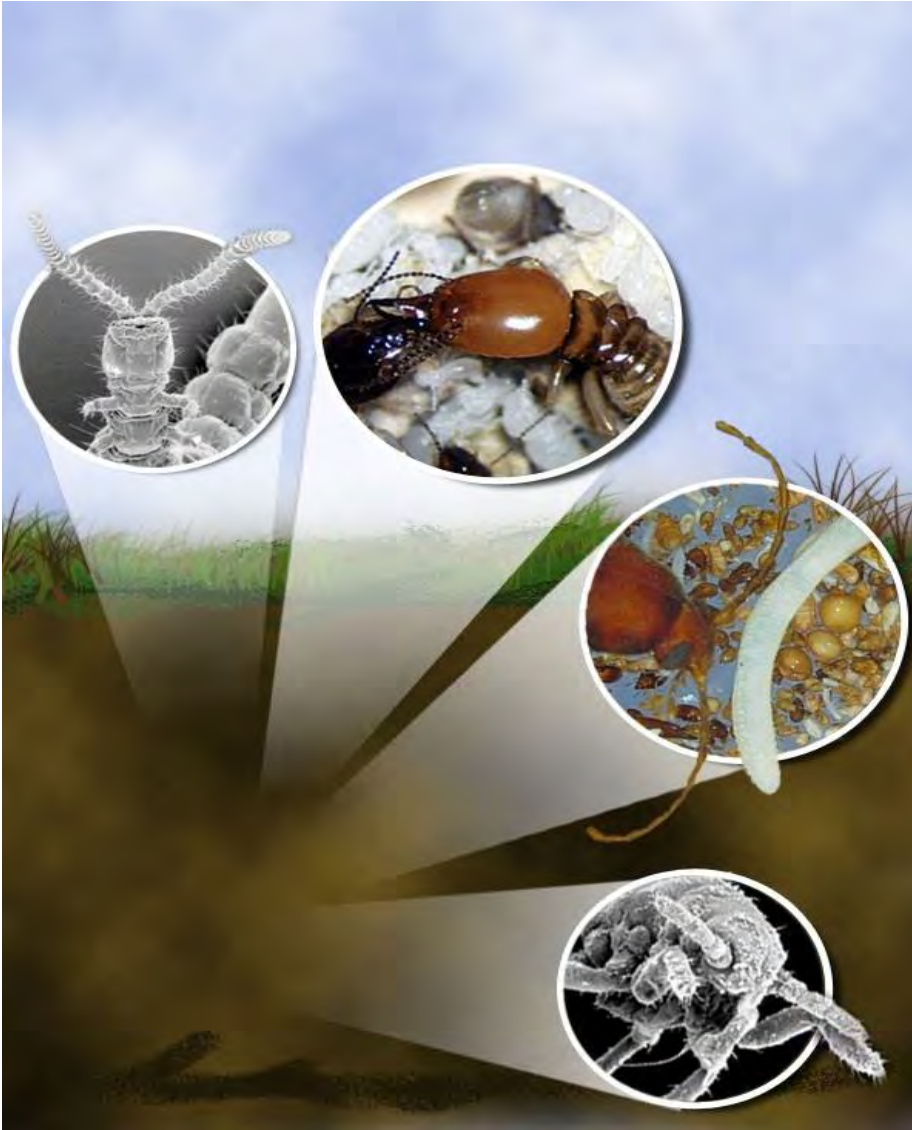




Picture courtesy of D. Bignell

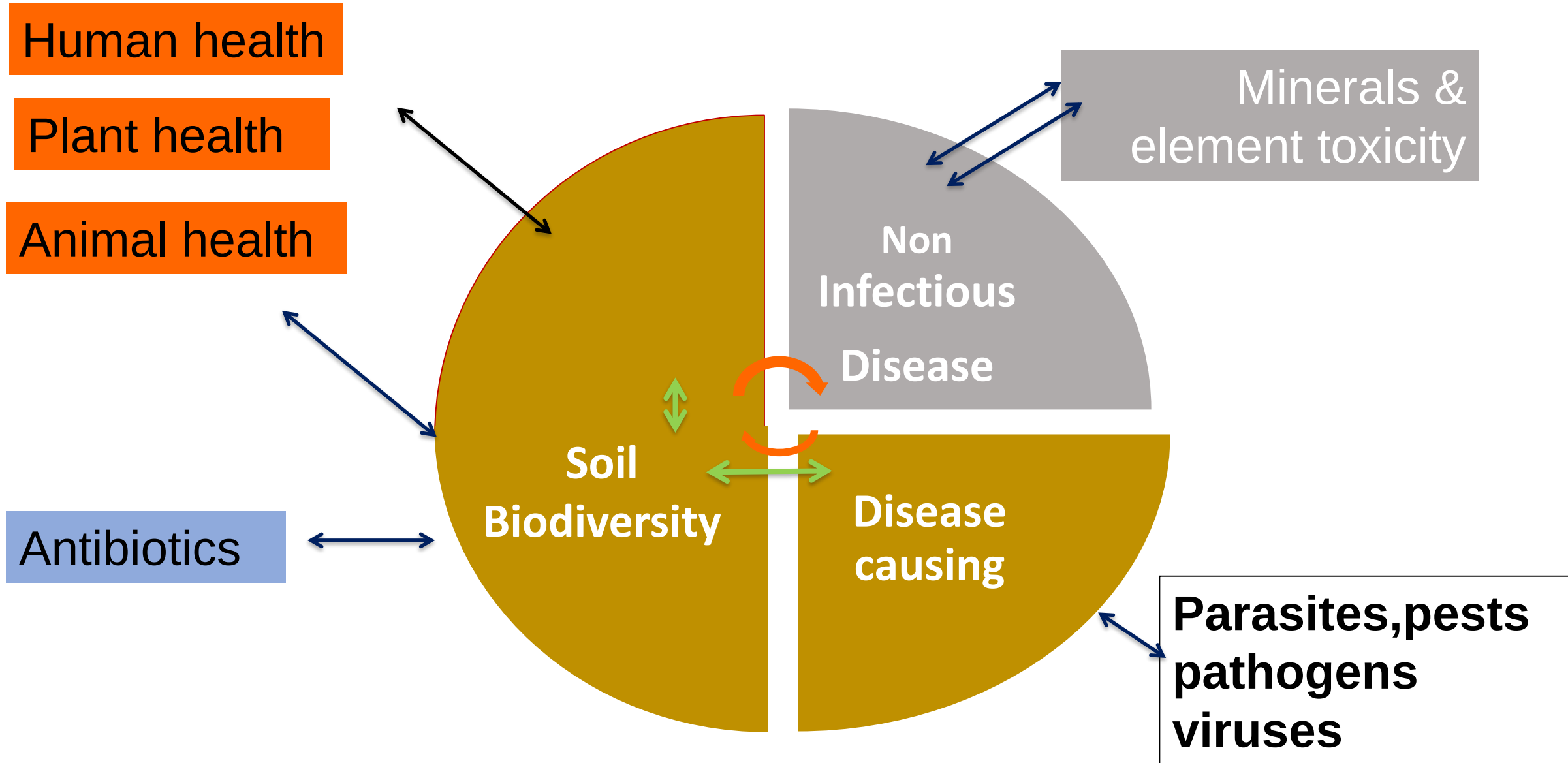
Panel III: Biodiversity and Health

Diana H. Wall

School of Global Environmental Sustainability &
Department of Biology
Colorado State University, USA

*China-US Scientific Engagement on Sustainability: Workshop 1:
Sustainability and Biodiversity
National Academies
Washington, DC
July 27-29, 2022*

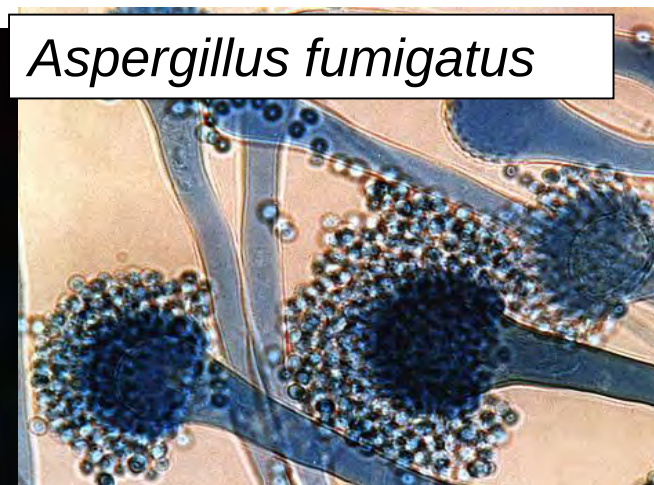
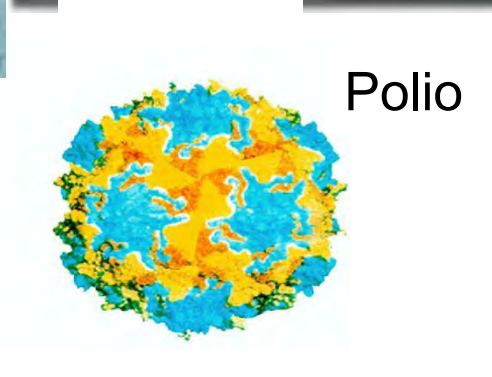
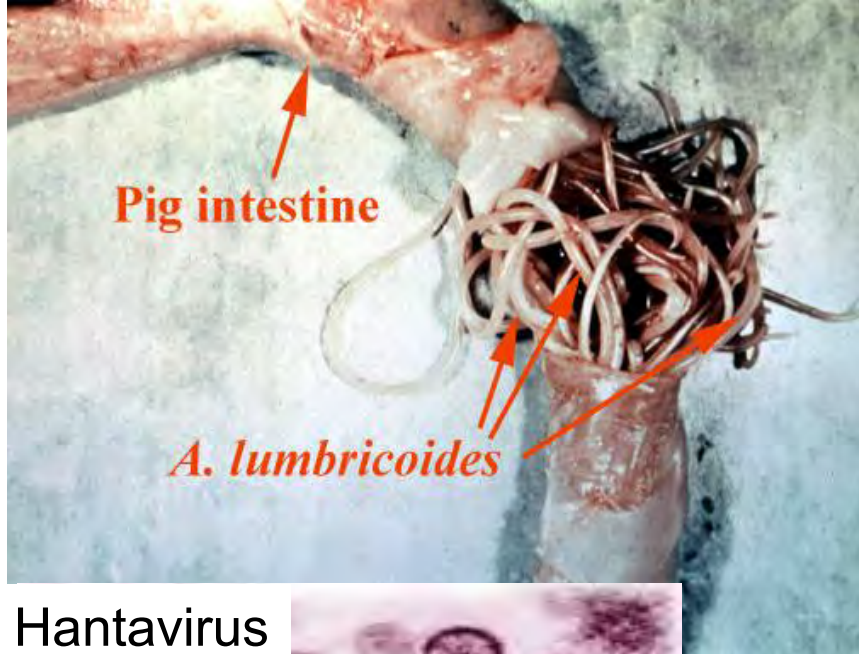
Soil biodiversity and plant, animal and human health



25% of terrestrial diversity is estimated to be belowground

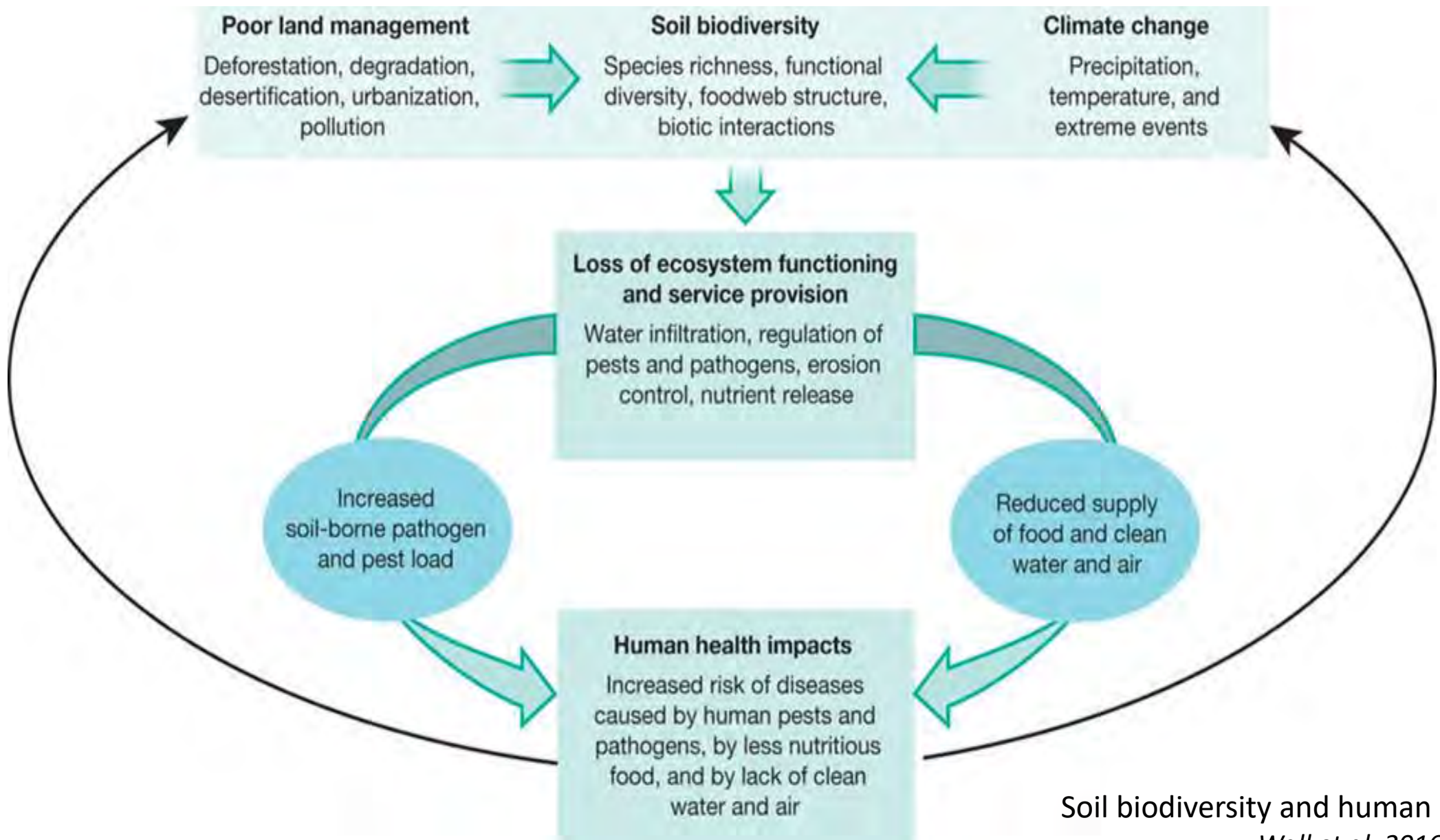


Bardgett and van der Putten (2014) Nature 515, 505-509, DeCaens et al, 2006.



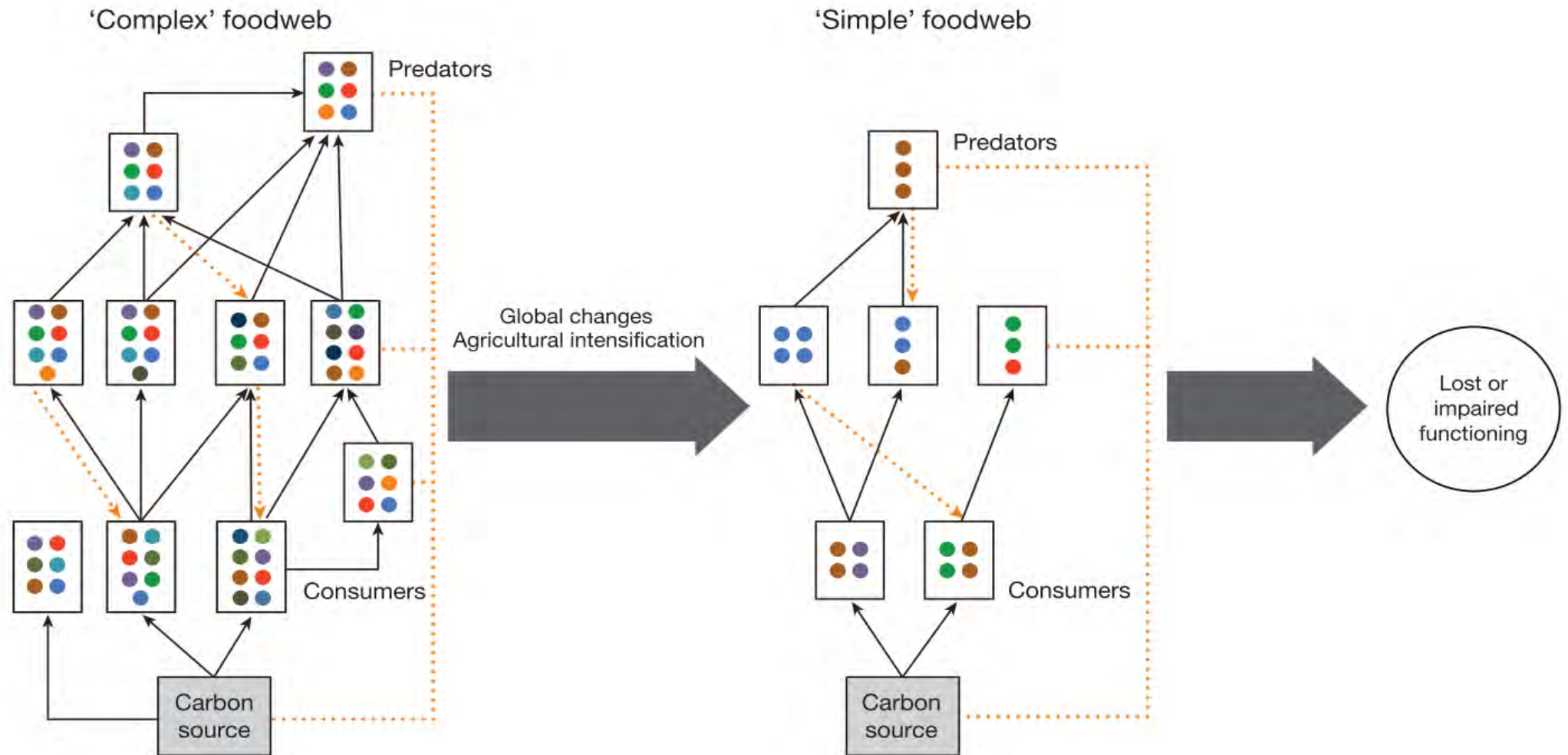
Soil borne diseases

- **Soil Transmitted Helminths Infections (2020).**
- 1.5 Billion people or 24% of world's population—
Nematodes (Guinea worm, *Ascaris*, Hookworm, Pinworm, Strongyloidiasis, whipworm), Flatworms (Schistosomiasis, Tapeworm)
- ***Viruses*:** Diarrhea, Conjunctivitis, Hand-Foot-and-Mouth Disease, Hantavirus, Hemorrhagic Fever, Hepatitis, Meningitis, Polio, Respiratory Infections, Smallpox
- ***Bacteria*:** Actinomycetoma, Anthrax, Botulism, Diarrhea, Dysentery, Guillain-Barre Syndrome, Leptospirosis, Listeriosis, Melioidosis, Nocardiosis, Q Fever, Rocky Mountain Spotted Fever, Tetanus, Tularemia
- ***Protists*:** Amebiasis, Balantidiasis, Cryptosporidiosis, Cyclosporiasis, Giardiasis, Isosporiasis, Toxoplasmosis
- ***Fungi*:** Aspergillosis, Blastomycosis, Coccidioidomycosis or Valley Fever, Histoplasmosis, Sporotrichosis



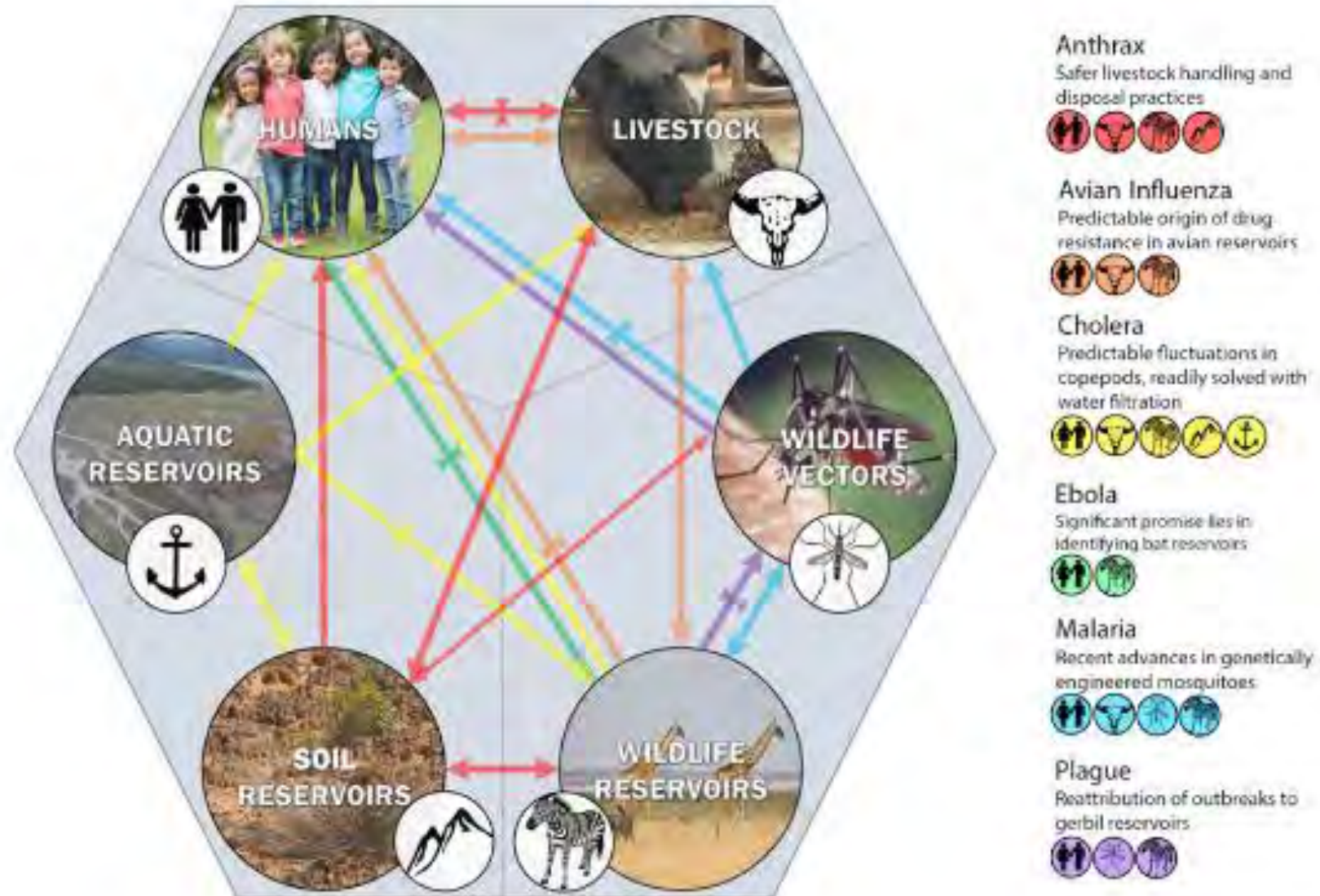
Soil biodiversity and human health
Wall et al. 2016 Nature

Soil Food webs become disconnected with disturbance



**Spores and soil from six sides:
interdisciplinarity and the environmental
biology of anthrax**

Carlson, CJ *et al.* 2018 *Biol. Rev.*, 93, 1813–1831.

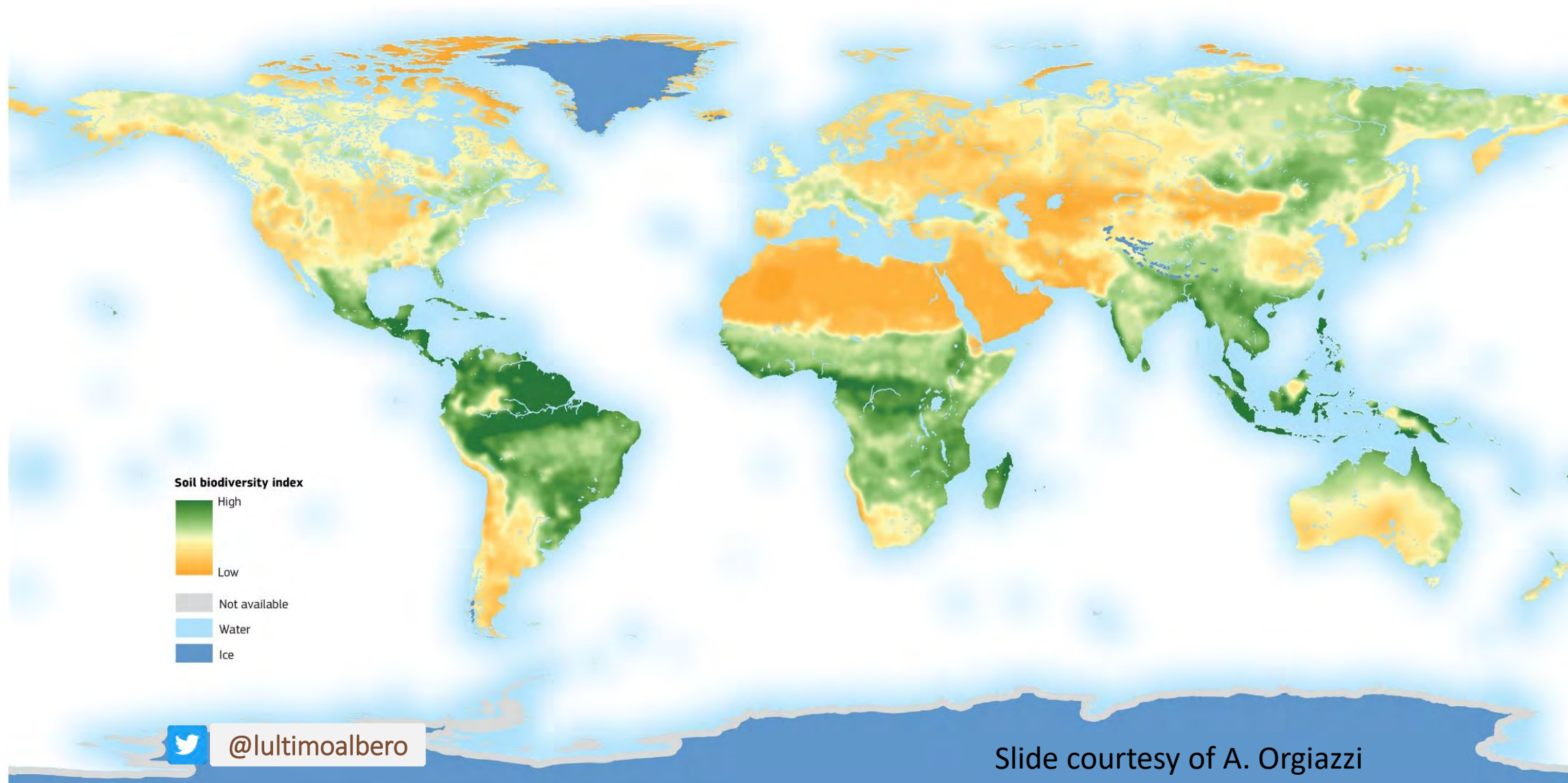


6 years ago



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Global Soil Biodiversity Atlas - Orgiazzi et al, 2016

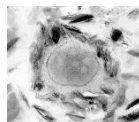


@lultimoalbero

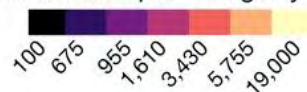
Slide courtesy of A. Orgiazzi

Today

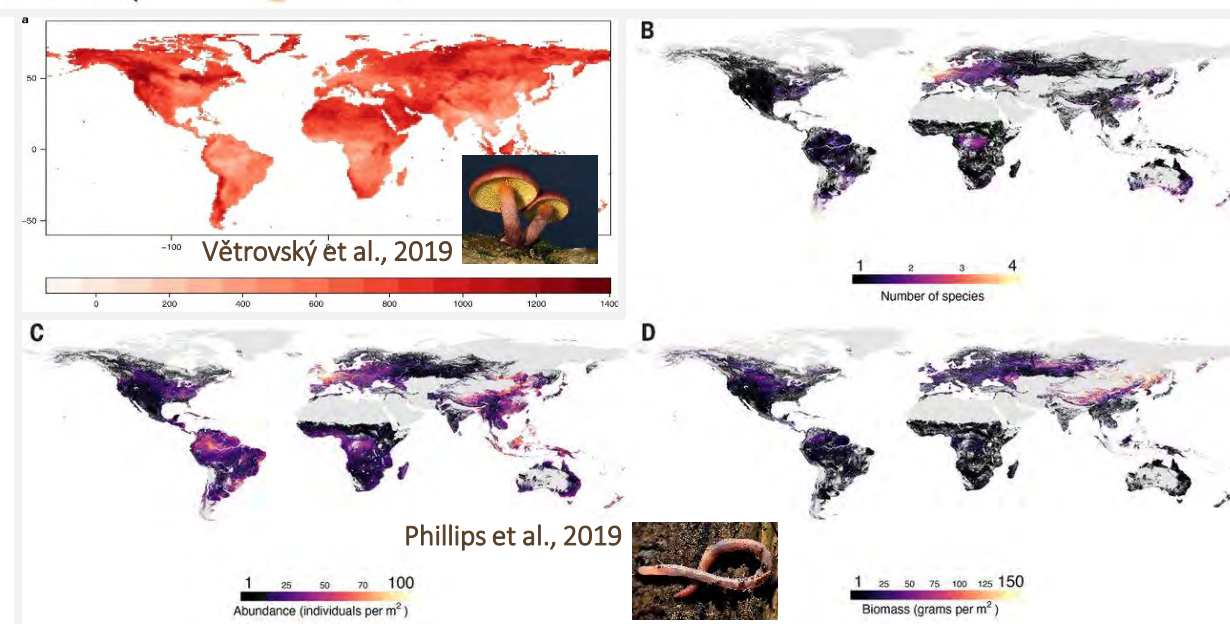
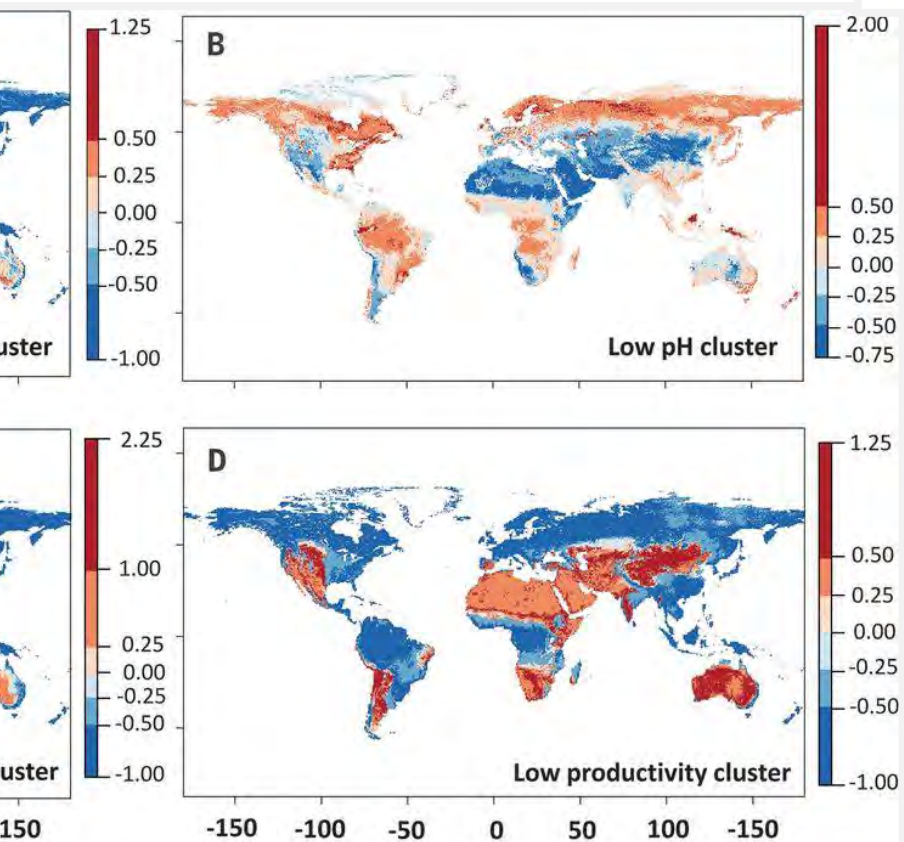
Delgado-Baquerizo et al., 2018



Nematodes per 100 g dry soil



van den Hoogen et al., 2019



Slide courtesy of A. Orgiazzi



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Soil biodiversity provides ecosystem services

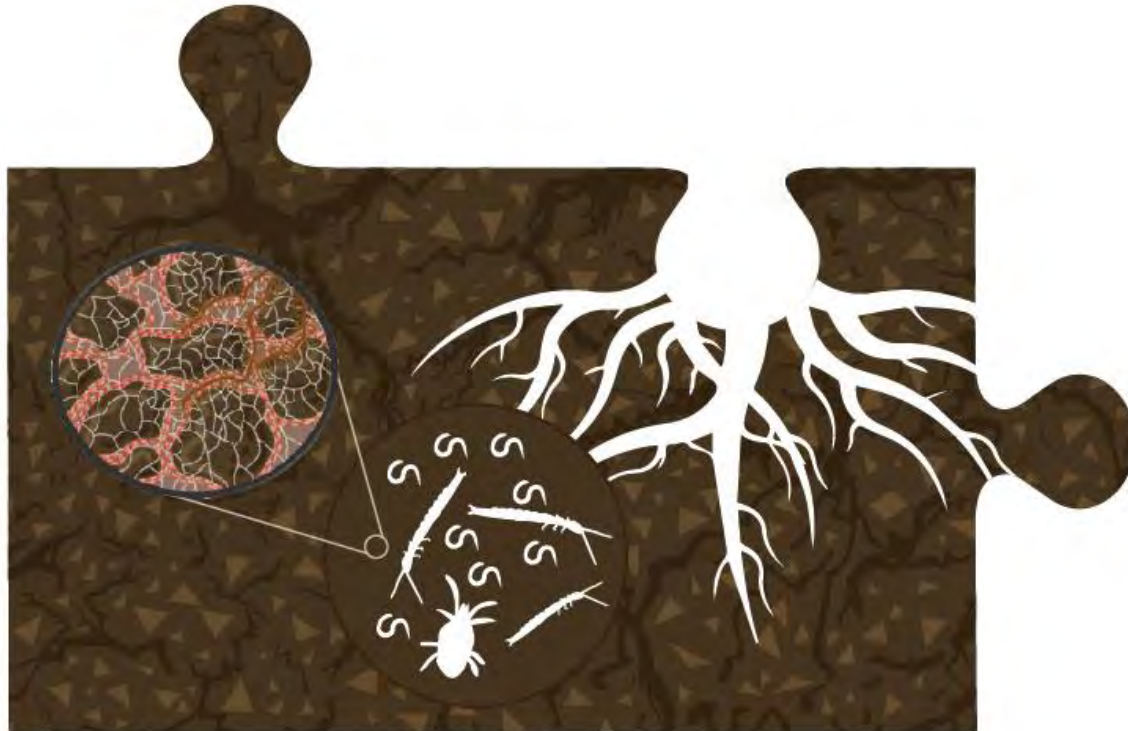


Image by : Kristin Pintauro

nutrient provision

human health and well-being

biological control

food for species above-ground

clean water

climate regulation

erosion control

We know:

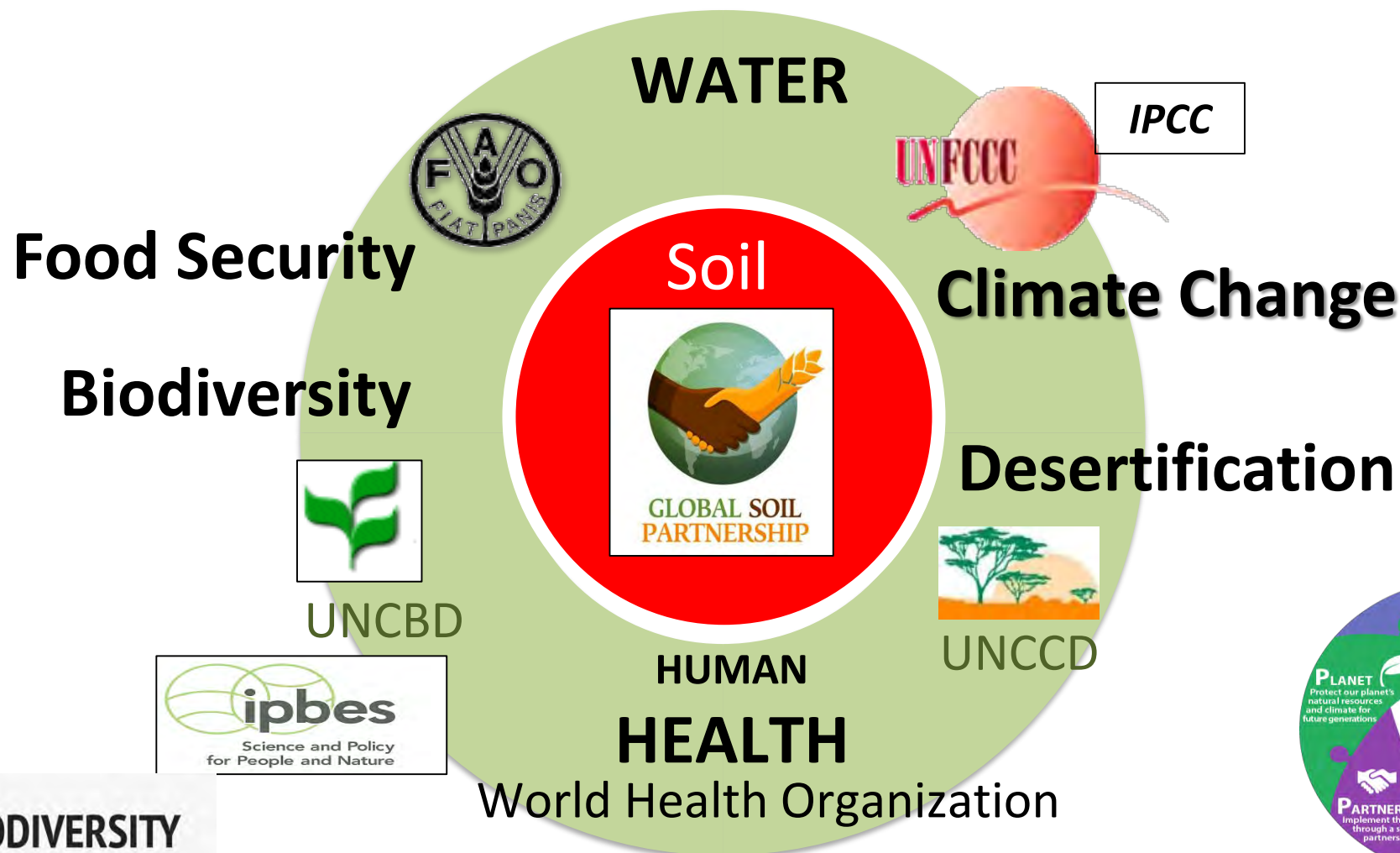
Functions: key regulators of ecosystem services

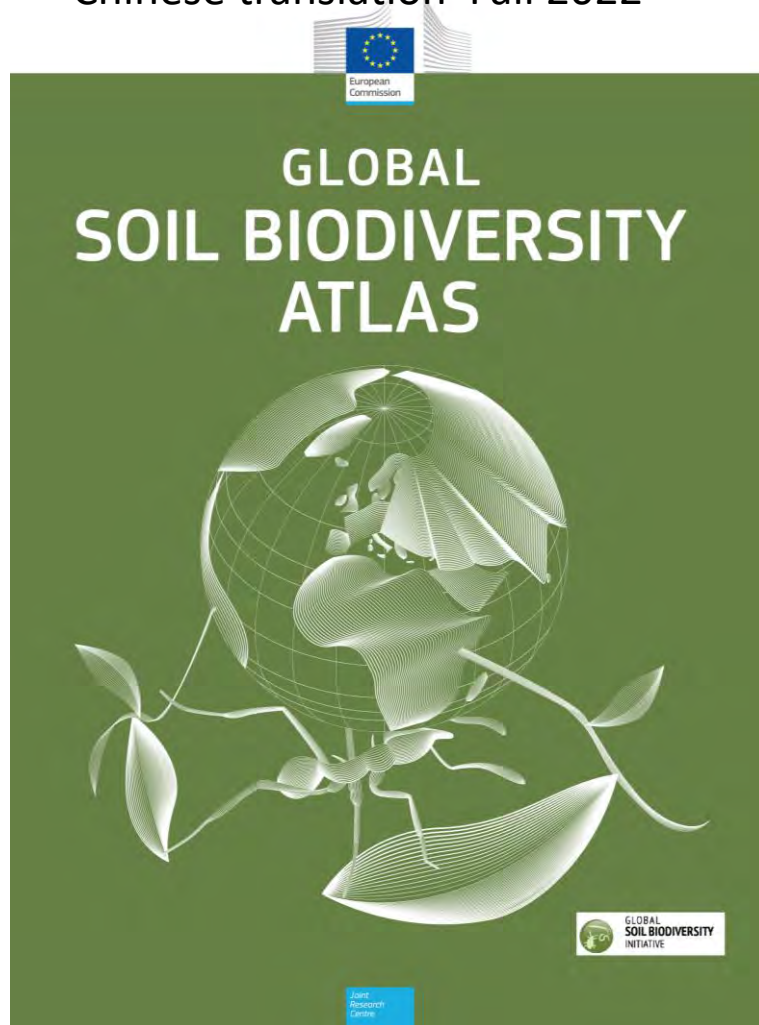
Threats – land use intensification, climate change, pollution,

Biogeography

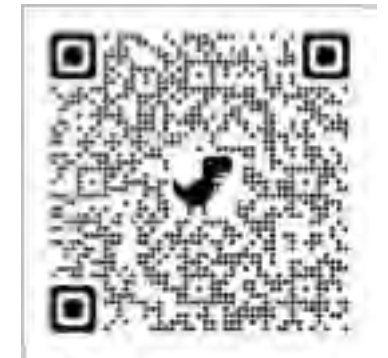
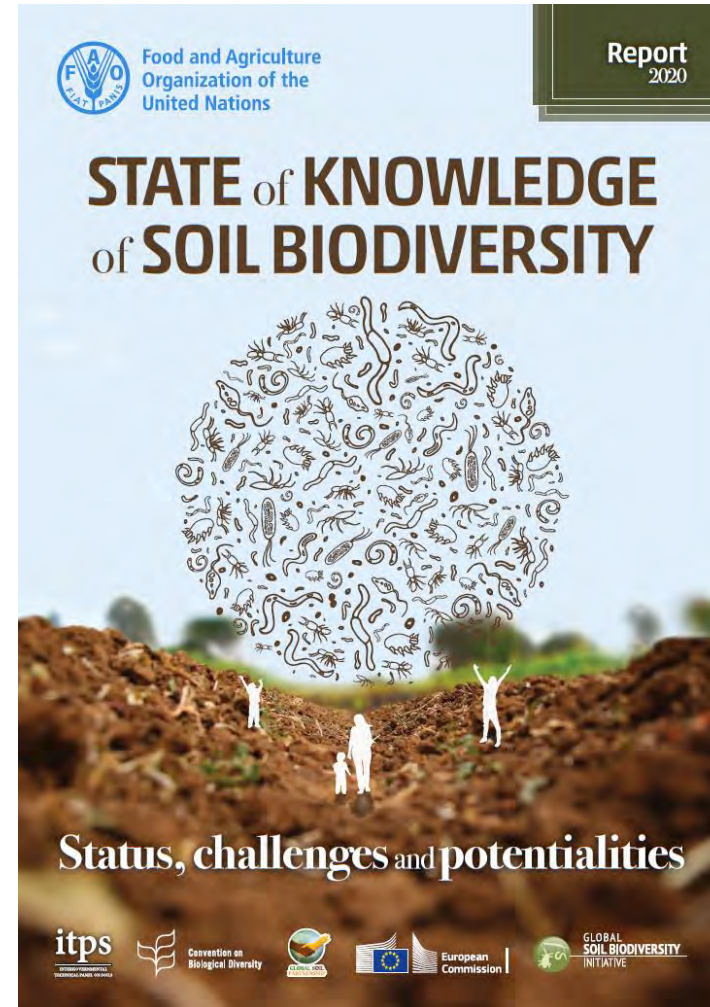
Soils are at the center of global agendas

but the life in soil is often ignored





Origazzi et al. 2016, **GSBI & European Commission**. Download free; single chapters download
globalsoilbiodiversity.org/atlas-introduction



Globalsoilbiodiversity.org



Food and Agriculture
Organization of the
United Nations

Launch of the International Network on Soil Biodiversity

in the framework of the
Global Soil Biodiversity Observatory

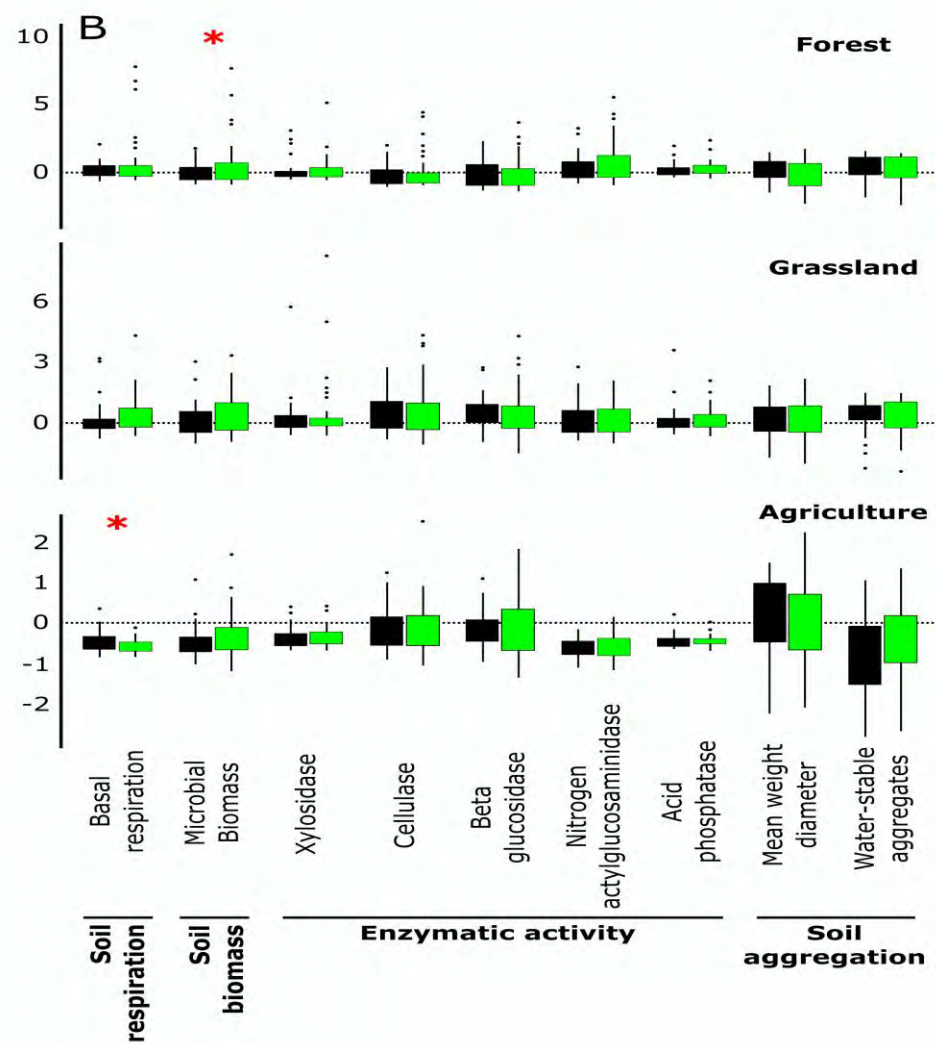
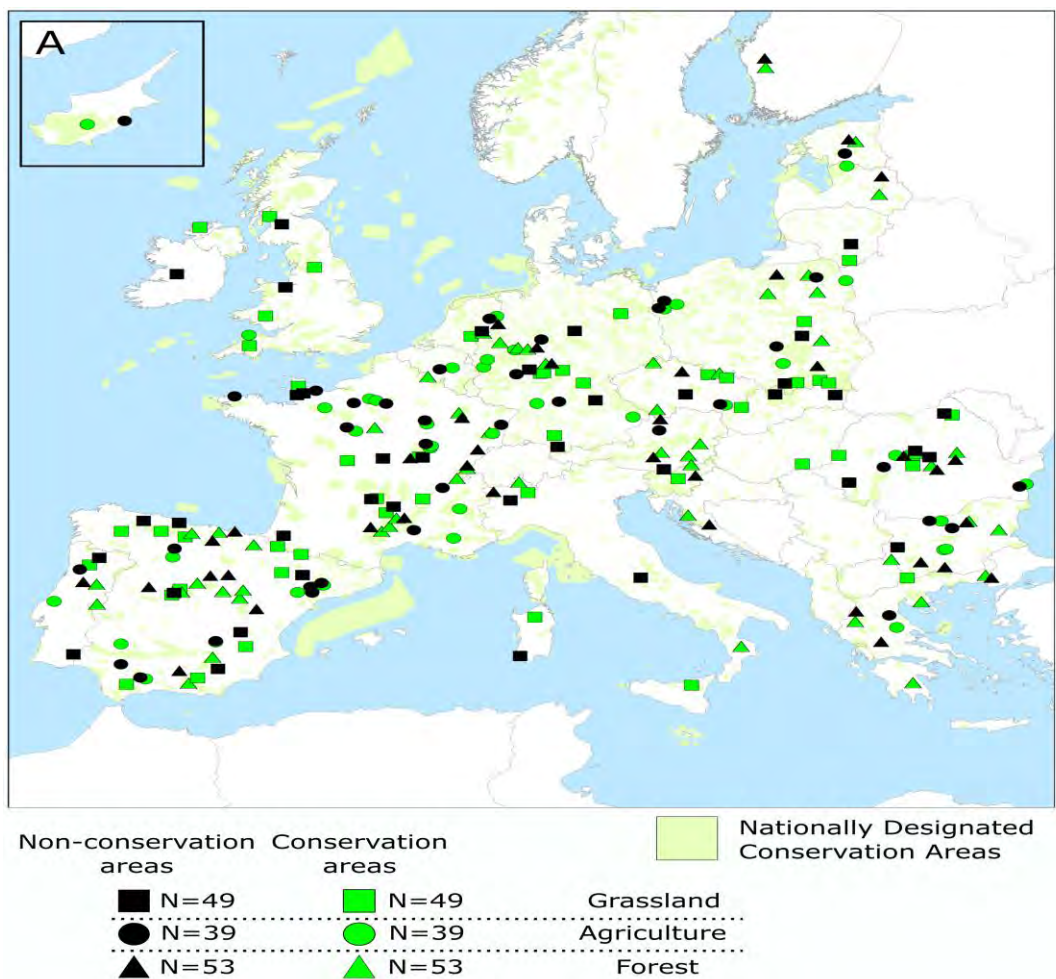
3rd December 2021 | 14:00 CET



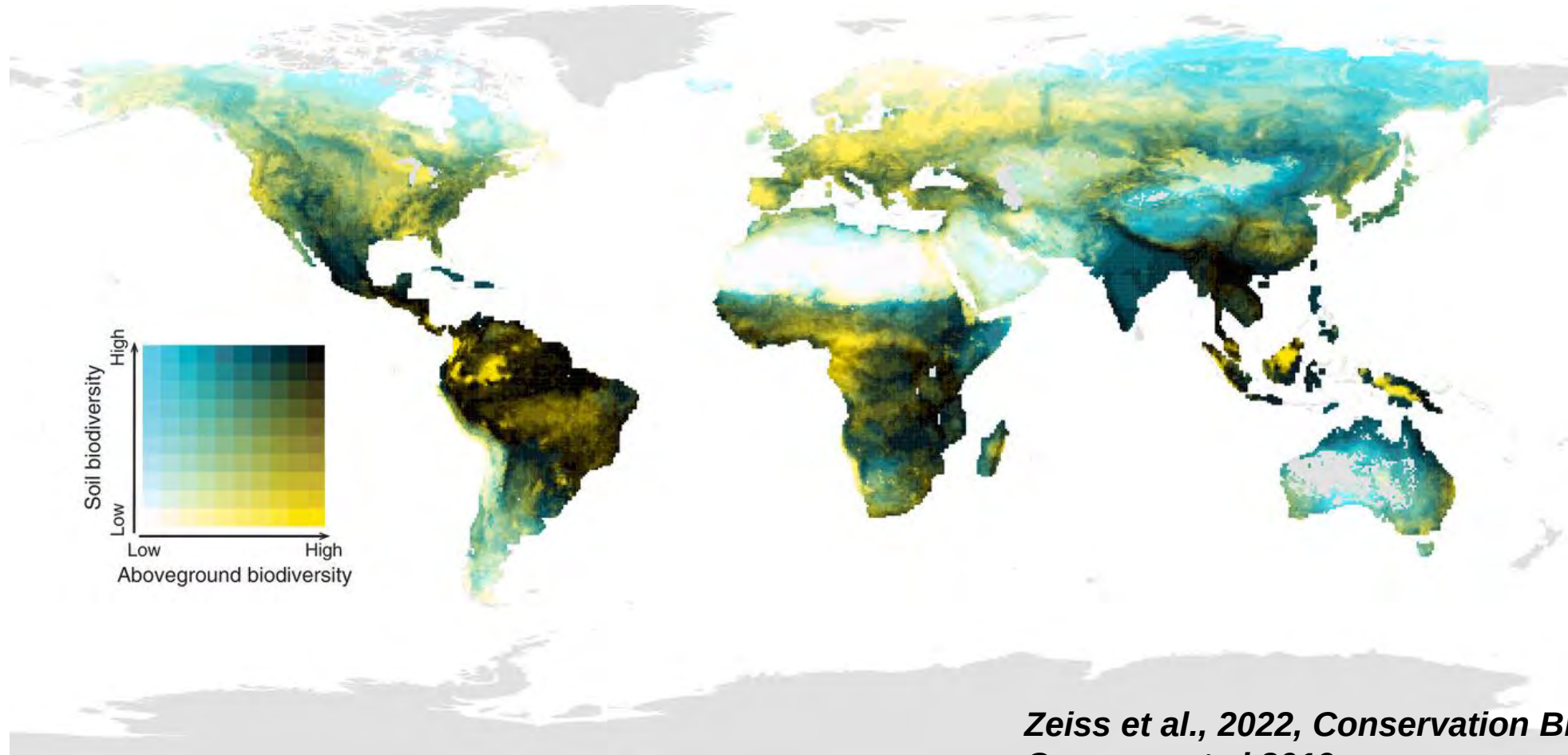
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A SCIENTIFIC EFFORT

Protected Areas in Europe are not protecting soil biodiversity functions

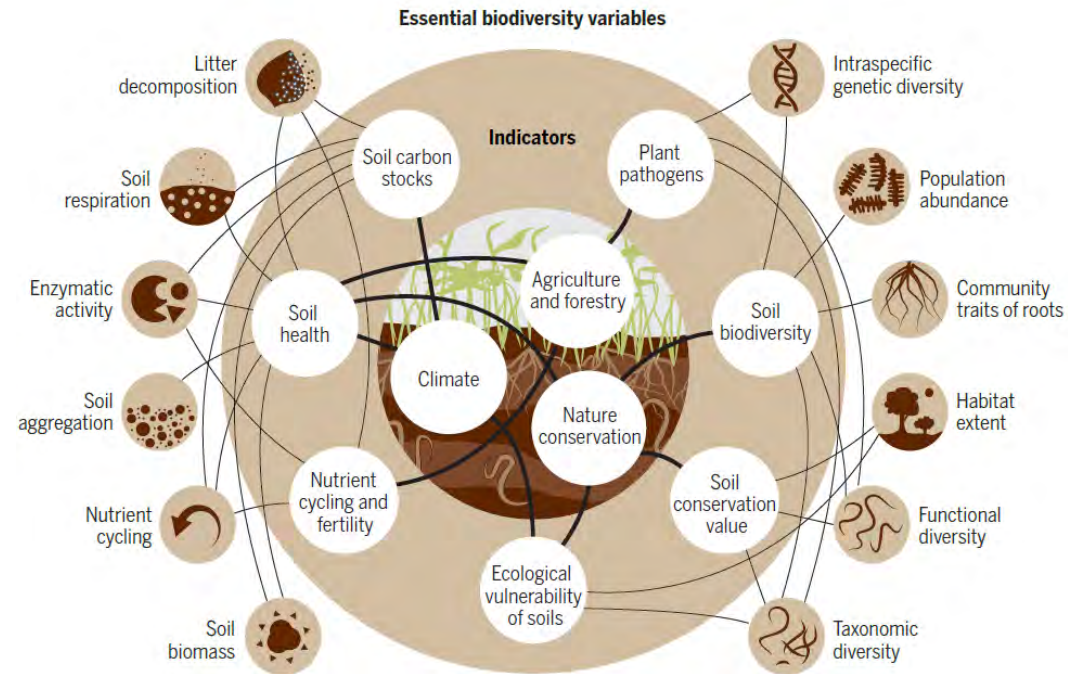


Policies for protection aboveground do not appear to protect soil biodiversity



Zeiss et al., 2022, Conservation Biology
Cameron et al. 2019

Soil BON



Soil BON Co-Leads



Dr. Carlos Guerra



Dr. Diana Wall

POLICY FORUM



BIODIVERSITY

Tracking, targeting, and conserving soil biodiversity

A monitoring and indicator system can inform policy

By Carlos A. Guerra, Richard D. Bardgett, Lucrezia Caon, Thomas W. Crowther, Manuel Delgado-Baquerizo, Luca Montanarella, Laetitia M. Navarro, Alberto Orgiazzi, Brajesh K. Singh, Leho Tedersoo, Ronald Vargas-Rojas, Maria J. I. Briones, François Buscot, Erin K. Cameron, Simone Cesarz, Antonis Chatzinotas, Don A. Cowan, Ika Djukic, Johan van den Hoogen, Anika Lehmann, Fernando T. Maestre, César Marín, Thomas Reitz, Matthias C. Rillig, Linnea C. Smith, Franciska T. de Vries, Alexandra Weigelt, Diana H. Wall, Nico Eisenhauer

Moving Global Soil Biodiversity & Health to Policy

Convene disciplines on Soil Biodiversity and Human, plant, animal pests and health

Monitoring of Soil Related Policies –

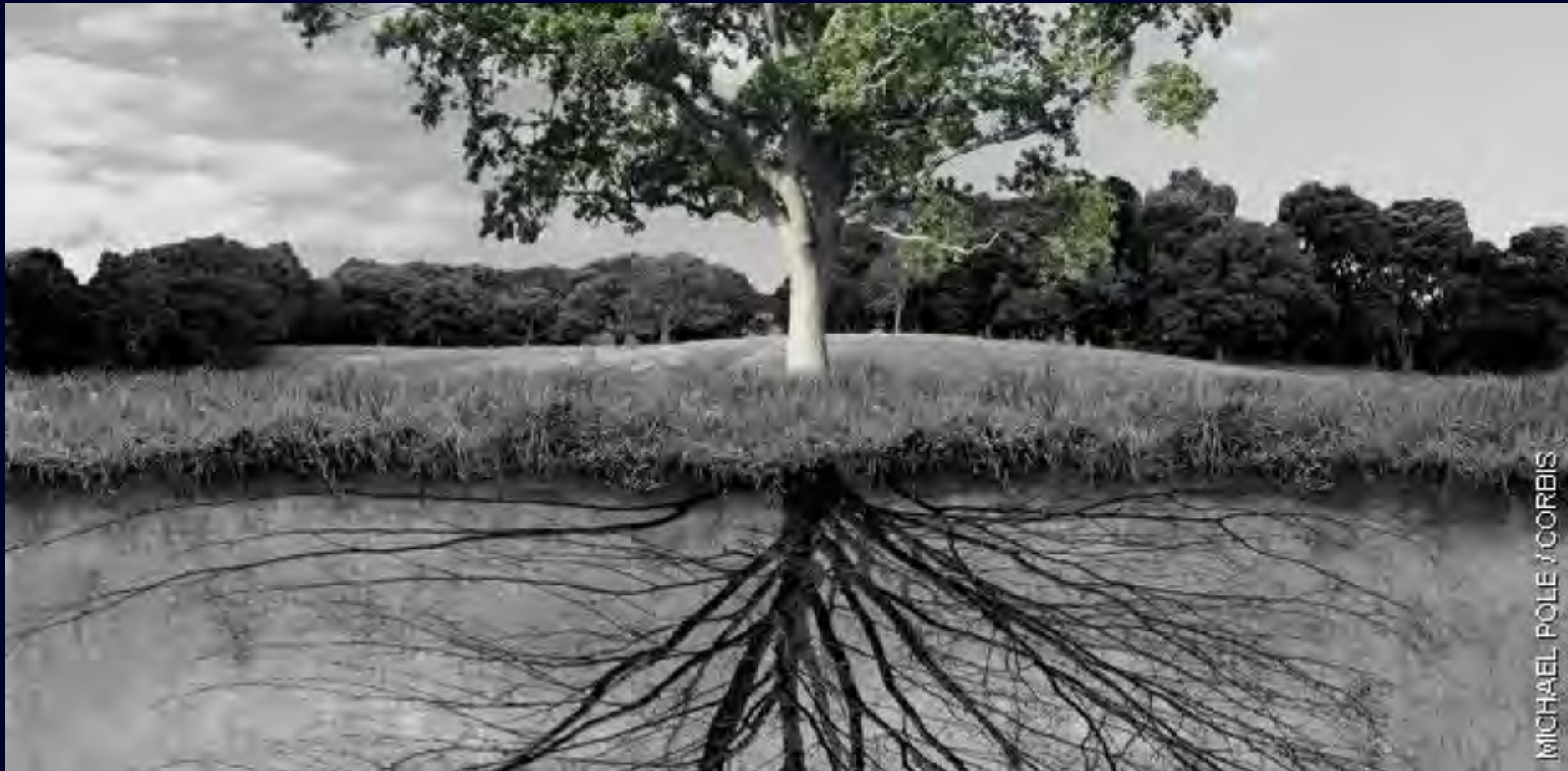
- A Dashboard of multiple indicators on soil biodiversity
- to feed a growing population
- to protect the environment and ecosystem processes
- to increase human health worldwide

Add soil biodiversity as a target to the CBD Framework

Education & training

Data integration

Soil biodiversity sustains the biodiversity we see



Moving Global Soil Biodiversity & Human Health to Policy

Independent Scientific Body to
Support Research



Monitoring of Soil Related Policies
- A Dashboard of indicators

EU

Global Soil & *BIODIVERSITY*
Monitoring & Support

EU - LUCAS
Global - **Soil BON** FAO

Provide evidence- based solutions
platform for synthesizing this data



Data Accessibility

EU, GBIF

Soil *Biodiversity* as a Nature-Based Solution

