From soil monitoring to steering of soil functions

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SoilProS

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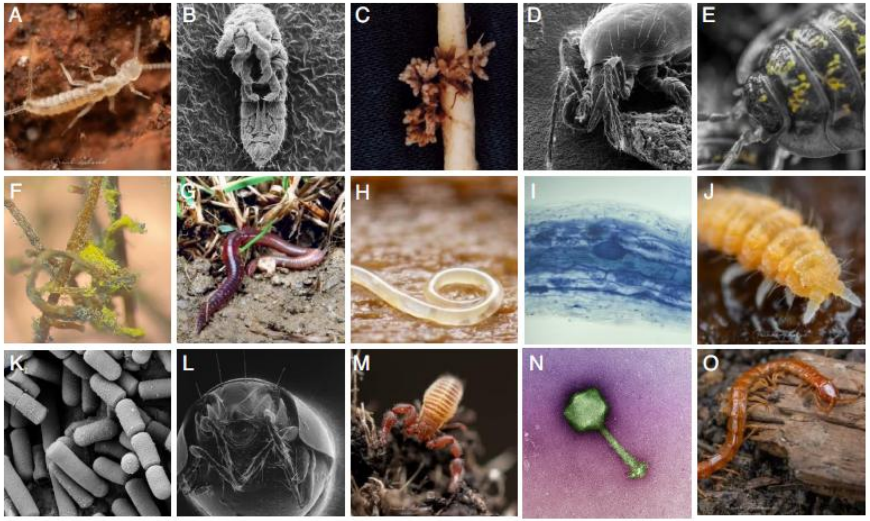
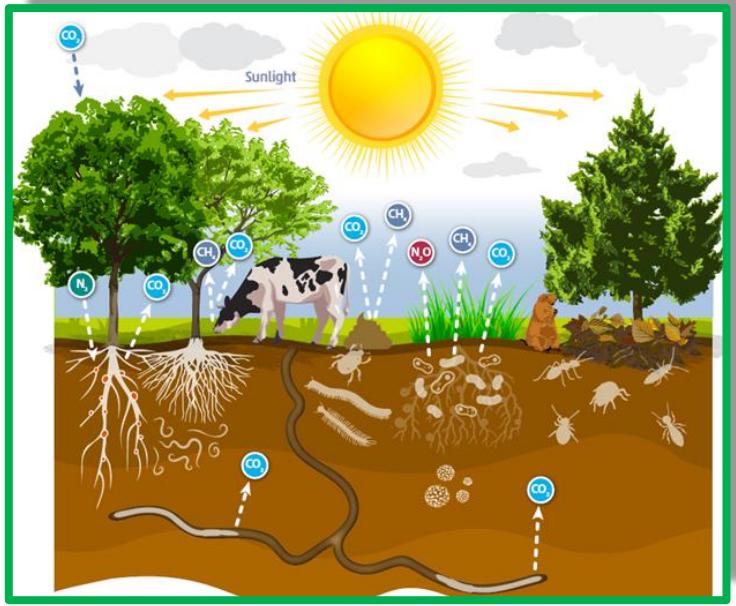
NETHERLANDS INSTITUTE OF ECOLOGY

Soil is a living entity



Anthony et al 2023. PNAS 120(33):e2304663120

59% of biodiversity is in soil



FAO, ITPS, GSBI, SCBD and EC. 2020. https://doi.org/10.4060/cb1928en

Interventions/steering

Towards steering

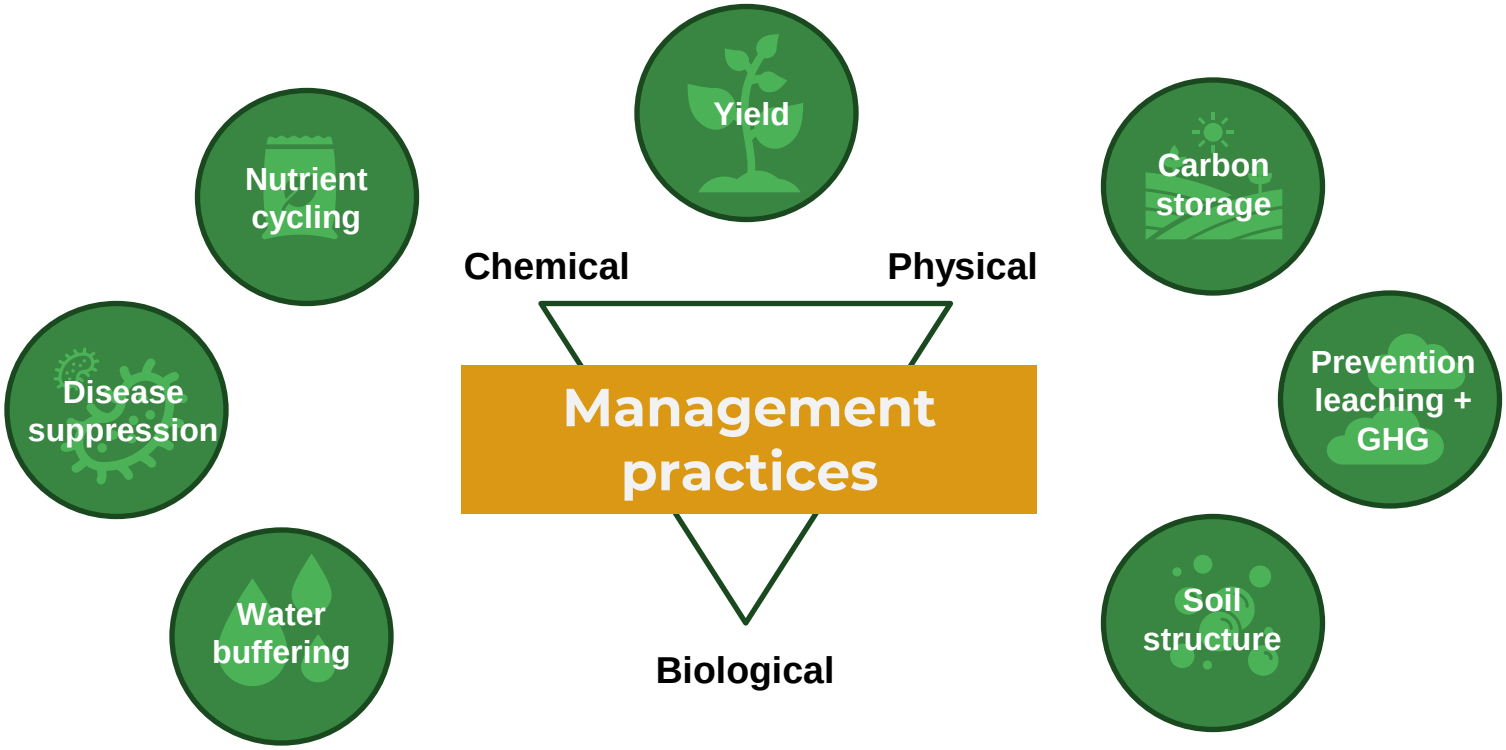
SoilProS

NWO

Chemical **Physical**

Towards steering

Soil biodiversity & soil functions



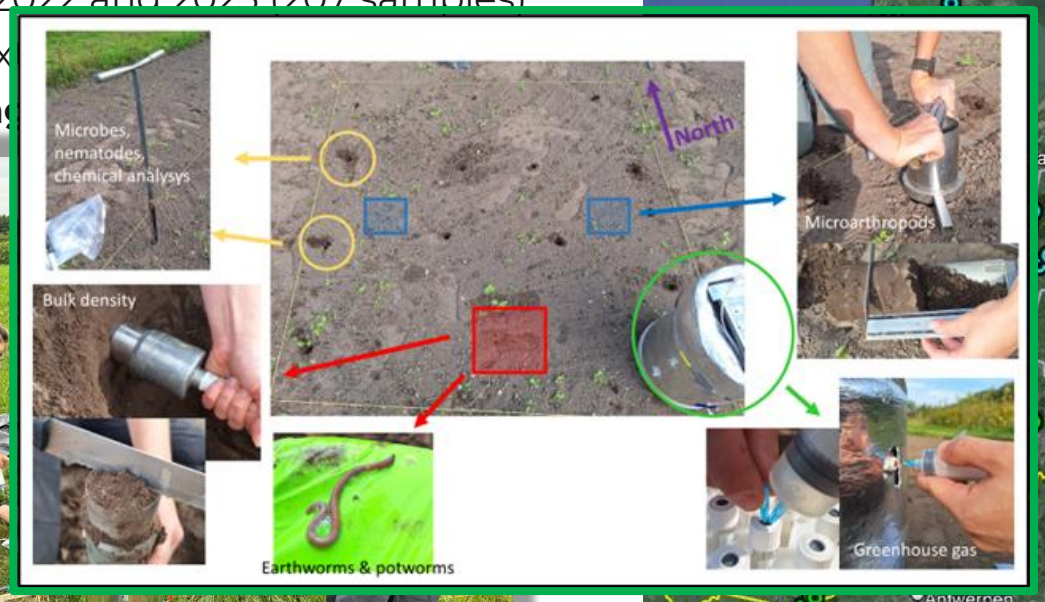
Monitoring

Sampling sites

-**965** samples in the Netherlands over 2021, 2022 and 2023 (207 samples)

-broad tex

manag



Reference/benchmark

Management intensity

grassland

Chemicals

mowing

Plowing

manure

Natural

Extensive

Farmers questionnaire

Conventional

intensity

Intensive

Chemical fertilizers/ pesticides

Plowing/ tillage

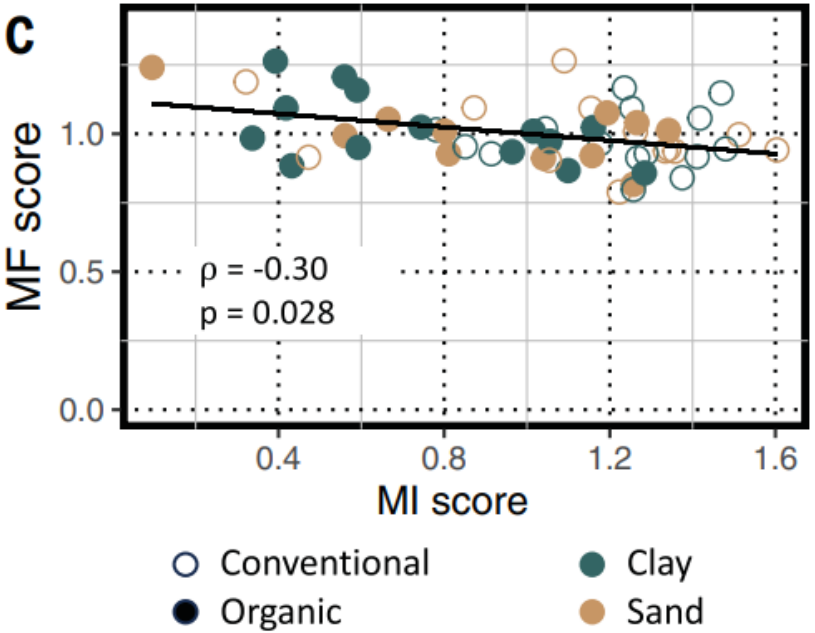
weeding

arable field

(grains, maize, potato, beets, vegetables)

Reference/benchmark

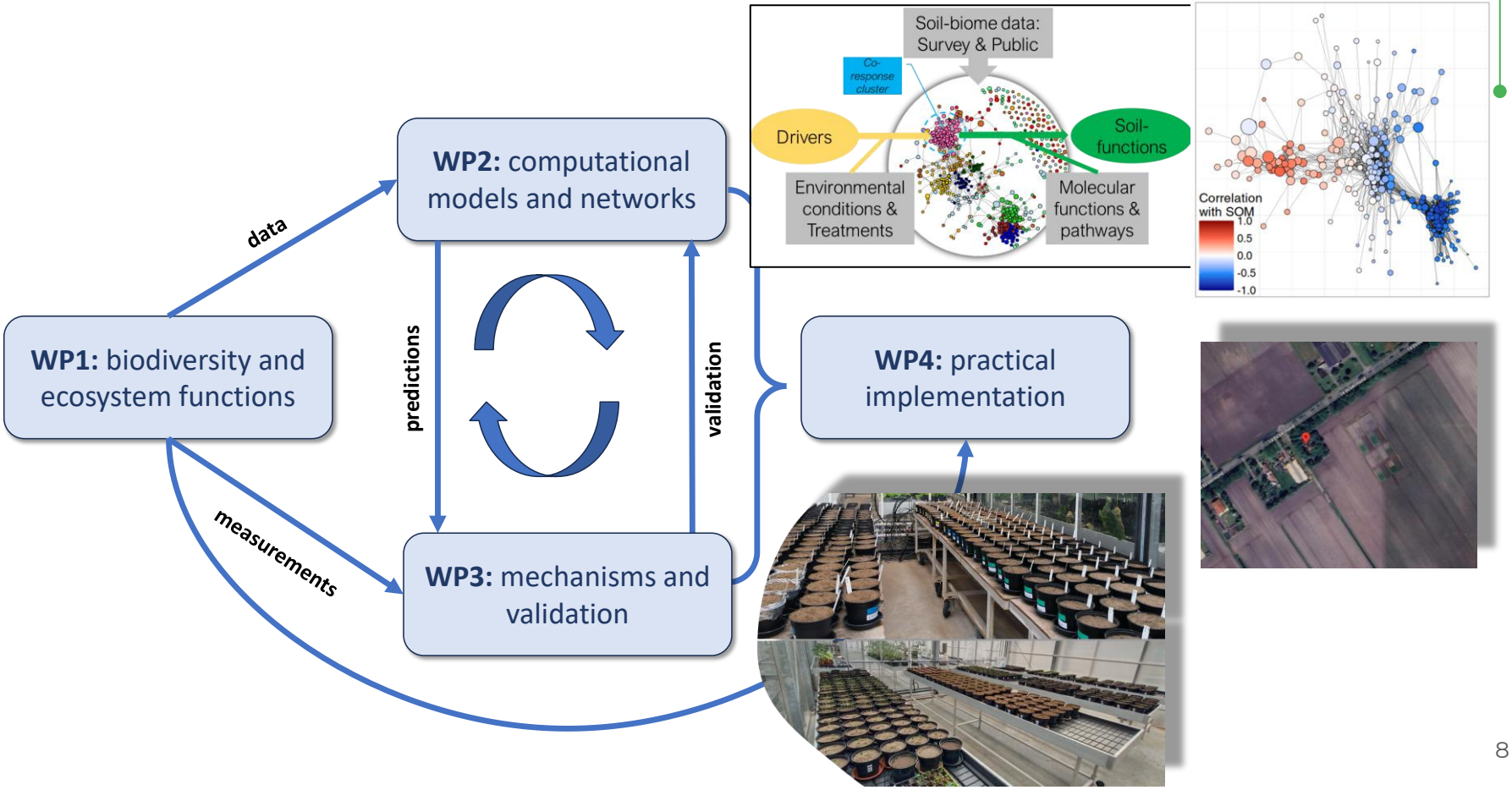
59 conventional and organic farms in NL



Van Rijssel et al 2025. Science 388:410-415.

Management intensity lowers soil functioning

AI/ML prediction/intervention

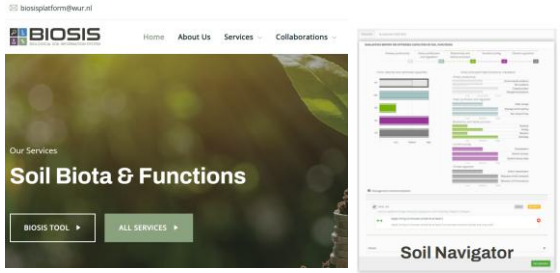


Machine learning needs data

Ahold Delhaize

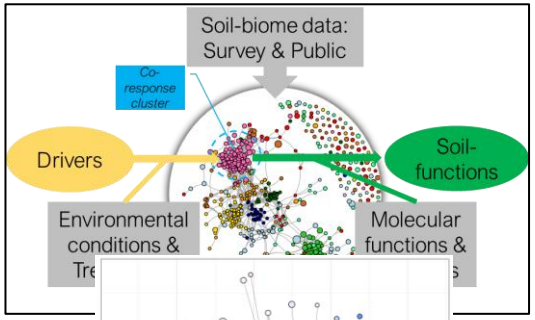
Google

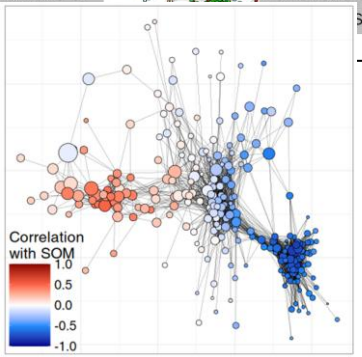
Customers/users/ patients all subject to interventions/steering Using big data



https://biosisplatform.eu/

Steering soil health/functioning needs soil medical chart or customer card data: monitoring





Co-creation/multidisciplinarity

FrieslandCampina nip
nourishing by nature

WAGENINGEN
UNIVERSITY & RESEARCH

Utrecht University

HLB
Farming the Future

Kekkilä BVB

Vitens

ndbouw,
lkwaliteit

has hogeschool

Rijkswaterstaat
Ministry of Infrastructure and Water Management

BARENBRUG

Stichting Aardbei Onderzoek

ROYAL Eijkelkamp
Meet the difference

royal agrifirm group

syngenta

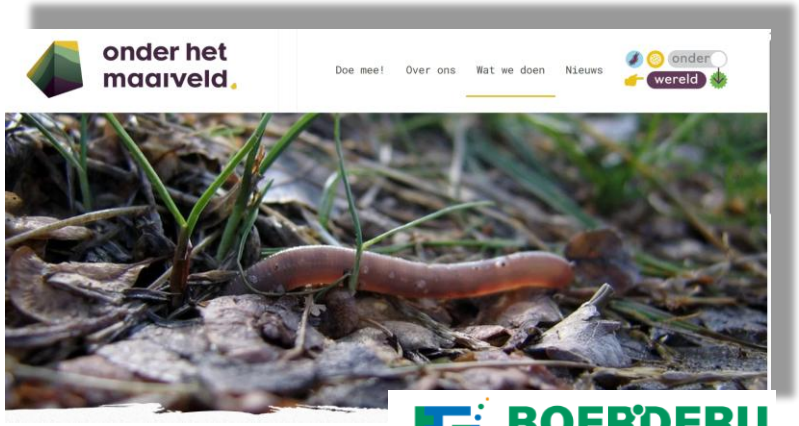
IBED Institute for Biodiversity and Ecosystem Dynamics

UNIVERSITY OF TWENTE.

wij•land

aESTI
Impact Rewarded

Public awareness and literacy



BOERDERIJ van de Toekomst

NATIONALE POSTCODE LOTERIJ

NCSE National Centre for Soil Ecology

>40.000 in NL.
Prizes at Filmfestivals Rotterdan, Praque Science Fest, New York film festival

Take in messages

Getting soil “healthy” will require interventions and/or adjusted management to steer soil life/functioning.

AI/ML approaches will be crucial desinging interventions/management

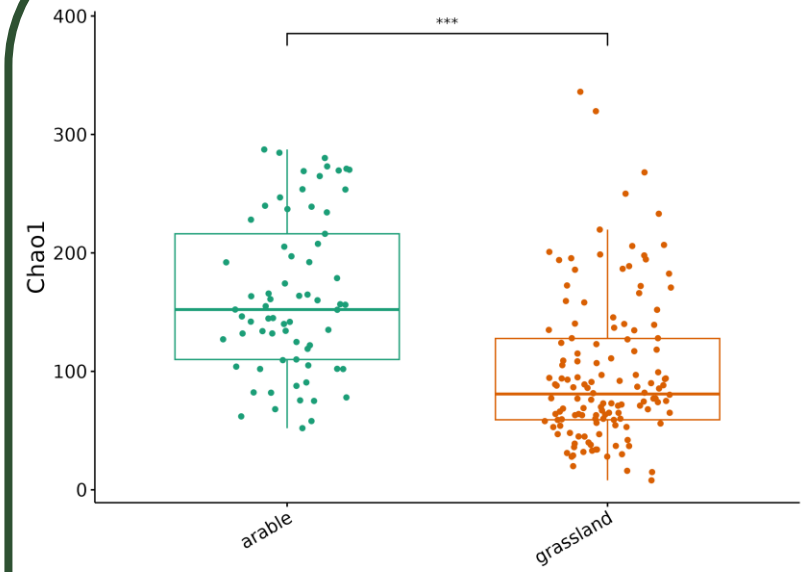
Context (soil type, history, mangement etc) dependency will require local reference systems and data.

Data=soil monitoring is a prerequisite for the above

Thanks for your attention and to the whole SoilProS team!

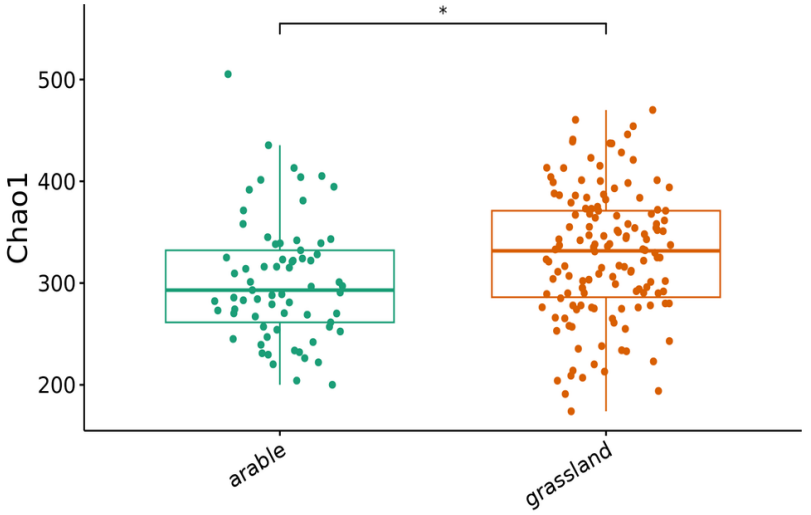
Biodiversity of nitrifying and methanotrophic communities in agricultural soils

N - cycle



Arable soils indicate a higher diversity of **bacterial nitrifying communities** → bioindicator of arable fileds

Methane uptake



Grassland soils indicate a higher diversity of **methanotrophs** → diverse methanotrophs as bioindicator of more natural system