How can policy strengthen the synergies between agriculture and soil biodiversity?

Martin Banse, Martin Potthoff
Or:

How can earthworms enter the parliament?
**Beyond Nature (Jenseits der Natur)**

*Club Real*

September 08, 2019, 4.00 to 9.00 pm:
- Parliament of Organisms in the garden (Osloer Str. 107/108, 13359 Berlin-Wedding)

September 29, 2019, starting at 11.00 am:
- Day of the Garden Executive in the garden (Osloer Str. 107/108, 13359 Berlin-Wedding)

November 03, 2019, 8.00 pm:
- Palace of Justice of the People’s Government at Ballhaus Ost

**September 08 [21]: Free entrance**

**November 03: 15 [10] Euros**

**Tickets**

[>>>Deutsch](https://www.ballhausost.de/produktionen/jenseits-der-natur/)

Nature goes political! Starting on the September 08 over 200 species of organisms, living at a site on Osloer Str. 107/108 in Berlin, are granted equal political rights. **Beyond Nature (Jenseits der Natur)** turns an ecosystem into a democratic system with all inhabitants, from bacteria to vertebrates, as members of the political community. Decisions are taken by the Parliament of Organisms, where 15 human representatives fight for the issues and rights of their...
An art-performance:

- **Nature goes politics!**
- **Over 200 species of organisms, living at a site on Osloer Str. 107|108 in Berlin, are granted equal political rights.**
- **Beyond Nature (Jenseits der Natur) turns an ecosystem into a democratic system with all inhabitants, from bacteria to vertebrates, as members of the political community.**
- **Decisions are taken by the Parliament of Organisms, where 15 human representatives fight for the issues and rights of their represented species.**
- **These decisions have real consequences on the ecosystem during the »Day of the Garden Executive« and are questioned in the third part of the procedure: »The Palace of Justice« of the Organisms Republic at Ballhaus Ost.**
- **If living beings, politically invisible, unnoticed, unheard, are suddenly being heard, are being treated as individuals with political rights, what happens to our concept of »nature«?**

https://www.ballhausost.de/produktionen/jenseits-der-natur/
An Art-performance:

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- Beyond Nature (Jenseits der Natur) turns an ecosystem into a democratic system with all inhabitants, from bacteria to vertebrates, as members of the political community.
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- If living beings, politically invisible, unnoticed, unheard, are suddenly being treated as individuals with political rights, what happens to our concept of »nature«?

https://www.ballhausost.de/produktionen/jenseits-der-natur/
Extra-terrestrial – sub-terrestrial
• Looking back at yesterday’s discussion:
  – Improved soil quality and soil biodiversity is in the interest of farmers!
  – Technology helps to contribute on a improved soil biodiversity
• Does policies at national and EU level contribute and enhance to better soil diversity?
• How does it really work to get to a new CAP?
Objectives of the ‘new‘ Common Agricultural Policies

Source: DG Agri (2017)
• ‘The Future of Food and Farming’
  – Currently: Communication of the EU Commission 11/2017
• Elements of the ‘new’ CAP
  – More subsidiarity, more regional responsibility
  – Approximation of payment levels between Member States
  – Better use of research and innovation, modernisation
  – Continuation of income support, capping and degression of direct payments, redistribution
  – Risk provisioning, increase in resilience
  – Meeting social requirements
  – Strengthening environmental and climate protection (3 of 9 targets)
  – Stronger focus on objectives and results (at programme level)
Soil management

Habitat conditions

Abundance, biomass of populations
Community structure, diversity
Genetic shifts in populations

Performance of functional groups

Ecosystem functions

This scheme is a life science scheme
Soil management

Habitat conditions

Abundance, biomass of populations

Community structure, diversity

Genetic shifts in populations

Performance of functional groups

Ecosystem functions

Prices

CAP

Traditions

Attitudes
The clash of perspectives:

“wrong land use largely causes loss and degradation of fertile soils“

“modern agriculture ensures healthy and fertile soils; German soils exemplify this“
SoilMan-Conference
Braunschweig 2019

19 chapters,
2 of which contain the term soil biota
Context 1: soil as a living space; soil engineering by earthworms
Context 2: organic farming supports biota
- 6 chapters,
- 2 of which mention soil biota
- Context 1: organisms work for fertility
- Context 2: soil engineering by earthworms
How to overcome the clash of perspectives!

- Broadcast soil biota as the driver of services and intrinsic soil health.
- Elevate soil biota from a ‘biodiversity goal’ to the ‘farmer’s engineering companion’.
- Integrate soil biota into best practice suggestions and management recommendations.
- Break down adoption barriers via stakeholder involvement.
But what concerns and positions are in place

Organism concerns
Spokepersons:
  - Nature conservation associations

Farmers concerns
Spokepersons:
  - Farmers associations

public concerns
  - All citizen
But what concerns and positions are in place

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Public concerns
- All citizens
The soil biological impact

Soil threats:
- biodiversity loss
- organic matter decline
- contamination
- erosion
- landslides
- compaction
- flooding
- salinisation

Processes and functions:
- C-sequestration
- soil structure and infiltration
- decomposition
- detoxification
- pathogen repression
- repression of invasive species
- plant nutrition
- primary production

Buffering vs. restoration

Soil biota

Disturbance
But what concerns and positions are in place

Organism concerns
Spokepersons:
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Farmers concerns
Spokepersons:
- Farmers associations

ESS - bridge 2

ESS - bridge 1
Services and disservices as a basic conception for the biological impact

**Driver**
- soil biota

**Process**
- biological activity (feeding)

**Function**
- nutrient release

**Service**
- plant nutrition

**Or disService**
- Nutrient loss, pollution, desease

**Self-preservation**
- Services directed to stability and sustainability

**Benefit**
- Services directed to production and use

**Soil management**
The earthworm engineering (not complete):

driver
The earthworms engineering glory (not complete):

- feeding
- burrowing
- casting

*driver*  ---  *process*
The earthworms engineering glory (not complete):

- feeding
  - trophic control
  - decomposition
  - bioturbation
  - penetration
  - aggregation
  - dispersal of microbes

- casting

- burrowing

- driver

- process

- process/function
The earthworms engineering glory (not complete):

- **feeding**
  - seed predation
  - trophic control
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- **burrowing**
  - penetration
  - aggregation
  - dispersal of microbes

- **casting**
  - weed control
  - Pathogen repression
  - Litter breakdown
  - Transport/mixing of soil
  - infiltration
  - aeration
  - soil structuring

**driver** — **process** — **process/function** — **function/service**
The earthworms engineering glory (not complete):

- **feeding**
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  - Transport/mixing of soil
  - infiltration
  - aeration
  - soil structuring
  - Carbon sequestration
  - Plant nutrition
  - soil fertility
  - Less erosion
  - Crop protection
  - less erosion
  - soil fertility
  - Plant nutrition
  - Carbon sequestration

*driver* — *process* — *process/function* — *function/service* — *Service/benefit*
How do such win-win situations look like?

- crop rotation
- fertilization
- soil cultivation
- Crop residue management

Farmers decisions
Farming system
Earthworms: How do such win-win situations look like?

- Crop rotation
- Fertilization
- Soil cultivation
- Crop residue management

Soil biota
amount and activity
Earthworms: How do such win-win situations look like?

- Crop rotation
- Fertilization
- Soil cultivation
- Crop residue management

- Disease repression
- Detoxification

Abundance and amount of earthworms

Service/function

Cf: Wolfarth et al. 2011;
Wolfarth et al. 2016
Plaas et al. 2019
Earthworms: How do such win-win situations look like?

- Crop rotation
- Fertilization
- Soil cultivation
- Crop residue management

Abundance and amount of earthworms

- Disease repression
- Plant health
- Detoxification

Service
Earthworms: How do such win-win situations look like?

The „soil biota heal the plants“ cluster
- Life science evidence is not the main driver of farmers decisions

- Ecosystem or „organism concerns“ are only one of many factors and are in need of spokespersons ..... Many spokespersons are more important than expert knowledge

- Organism concerns need to become concerns of human communities
Development paths - conceptual framework

Productivity First

Mother Earth

Depleted Soil Life

Middle of the Road

Life science evidence is not the main driver of farmers decisions

Ecosystem or „organism concerns“ are only one of many factors

Source: modified after Bengtsson (2015)
Development paths towards 2050: 4 narratives

- **Productivity first**: Yield level high, yield stability low
  Farmer uses lots of external inputs,
  soil biodiversity not taken into account in decision taking,
  negative environmental impacts, risk of system collapse

- **Mother Earth**: Yield level like current situation, yield stability high
  Soil biodiversity is an inherent part of decision taking,
  high resilience of the system + delivery of multiple ESS

- **Depleted Soil Life**: Yield level low, yield stability relatively low
  Farmer can’t benefit from natural processes
  natural resources become scarce, low input system

- **Middle of the Road**: high yield level with relatively stable yields
  Farmer strongly relies on (new) external inputs
  Tries to take advantage from natural processes,
  Continuous reorganisation of the farming system to avoid harm to
  environment and soil deterioration
The basic and simple conception of biota values in production systems is the following:

A for B = B for A

or for agricultural systems and soil biota:

soil biodiversity works for agriculture when agriculture cares about soil biodiversity

The European SoilMan – project focuses on this relation
What do we need?:

Understanding:
- Getting to know what measures support or detract soil biota and their performance.
- Getting to know the extent of impact: Who is doing what and how much?

Valuation:
- Translating the impacts of soil biota into values for production, environmental and human health and well-being. What is worth an earthworm for the people (the societies)?

Management: ideas and recommendations for soil biota supporting
- soil management measures (farm level)
- governance tools (EU, policy level)
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Identification and Quantification
Preferences, Perceptions and trade-offs
Communication and Implementation
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Soil biota driven functions and ecosystem services in land use systems – quantification and valuation

Soil biota provides services that are beneficial to the productivity and sustainability of land use systems. This session aims to discuss how land use systems affect soil biodiversity in Europe and how soil biodiversity (i.e. the performance of functional groups) feeds back to soil functions and ecosystem services. Knowledge is mounting that a sustainable intensification of land use needs to include the conservation of processes and functions run by soil biota that are essential for self-preservation considering services provided by soil biota including soil biodiversity. The joined European agricultural policy including soil and biodiversity conservation is asking for surveys throughout Europe. The strong progress in developing methods for biodiversity determination in soil and the quantification of biota specific impacts should be mirrored by the contributions. Moreover, transversal interactions with socio-economical sciences should lead to the development of tools to assess soil management as a socio-ecological issue. This session will focus on the role of soil biology in delivering soil functions in systems formed by a human, e.g. agricultural, forests or restored sites and the synergies and trade-offs that occur within the bundle of soil functions, crossing several spatial and temporal scales. Additionally we welcome contributions aiming at promotion of soil managing practices that aim to optimize the multi-functionality of soils.

Share: https://meetingorganizer.copernicus.org/EGU2020/session/35048

Convener: Martin Potthoff Q | Co-conveners: Agnieszka Józefowska Q, Florian Wichern Q

Abstract submission