

## Supplementary material for the publication:

Title:

**Changing articulations of relevance in soil science**

**Diversity and (potential) synergy of epistemic commitments in a scientific discipline**

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- Supplementary material 1: List of analysed documents
- Supplementary material 2: Interview guideline

## Supplementary material 1: List of analysed documents

\* not available, but discussed in other literature

\*\* abstract is available

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## Supplementary material 2: Interview guideline

(This template was adapted to the respective biographies of interviewees.)

### DEVELOPMENT OF SOIL SCIENCE

How do you experience the development of soil science over time. We had the impression that it is a relatively dynamic field and were wondering what you see as broader lines of development of the field, and whether you see changes in how the field understands itself over time.

How do you experience the relationship between soil science and questions of broader relevance, or more specifically, do you currently see a transformation soil science related to questions of relevance?

- How far is this related to the broader historical development of the field? Have there been times when questions of relevance were more or less on the agenda? And if so, why?

The field of soil science has a history of embracing ever more scientific disciplines. Also currently, there are numerous calls for widening the disciplinary breadth of soil science. What fields are particularly important here at the moment?

- In your view, what role does (microbial) ecology play in soil science? Is there currently a movement to integrate it into soil science? And if yes, how relevant is that for soil science in contributing to solving global problems?

Currently there are quite some international developments, such as the *Global Soil Partnership, Year of Soils*, the formulation of the *Sustainable Development Goals (SDGs)* etc. that relate soil and soil science more strongly to global problems like climate change and hunger. How do you see the relation between these developments and academic soil science?

- Do you think that a new self-understanding of soil scientists is developing in the context of global challenges? If yes, would you describe this as a rather collective movement within soil science or is this a rather heterogeneous movement and driven by individuals?
- Who are the main actors and what do they propose?
- What role do social movements play in this regard? Are there interlinkages between social movements/international developments and academic soil sciences? (e.g., farmers' movements, *4per1000 initiative*)
- What role do policies play (e.g., *EU missions*)?

In your perception, how did such soil-related initiatives in the recent years come about? What were driving factors in your experience?

- Did soil science play a role here or did it rather jump on a bandwagon?
- From your perspective, why have soils not been included in the *Green New Deal* or the *Sustainable Development Goals*?

#### Optional questions:

- Why did you personally feel a need to write about societal aspects of soil science.
- In your role of being an editor of/president of... is it important to you to strengthen the relevance of soil sciences to global problems?

What are advantages of having new journals like *SOIL* and *Soil Security*?

- Are such journals a way of creating opportunities to value research related to relevance / complexity / inter-/transdisciplinary work more?

### EPISTEMIC SHIFTS (REQUIRED) DUE TO CONSIDERING GLOBAL PROBLEMS?

In our project we are also really interested in learning what kinds of knowledge it actually needs to contribute to solving global problems. Like: What kinds of research does it need, would research have to change in order to become more relevant.

So, in your perception: What implications does it have for the research itself when you consider global problems and want to contribute something to solving them?

### QUESTIONS

One basic issue in knowledge production is of course the choice of research questions: How do you think should soil researchers choose their research questions with an eye towards relevance?

In the past two decades, there have been several attempts to set research priorities within soil science to gain more relevance. Do you think that such priority setting is important in that it can be an important stimulus for researchers to choose their research topics and questions?

- Who is in your perception the ideal body for making such priority setting? Who would you say has enough authority or trust or power within the community to be able to set or at least propose such priorities (e.g., *International Union of Soil Science-IUSS, European Commission, ...*)?

### CONCEPTS

What kinds of concepts do you find useful in this regard and why?

- What concepts gain traction in the wider scientific community / in the policy arena and why?
  - Soil concepts: *soil health, soil security, soil functions*
  - Broader concepts related to global challenges: *Ecosystem Services, SDGs, EU missions...*
- In a couple of contributions to the debate, social science concepts such as “communities of practice” or the “policy cycle” are also used. In how far do you find it useful to use such concepts for gaining more relevance?
- Does it make a difference for the actual research carried out to work with such concepts?

### APPROACHES (METHODS & PRACTICES)

How does it look like in research practice when soil scientists aim to gain more relevance? Which practices are discussed as promising in this regard?

### COLLABORATION WITH PRACTITIONERS/FARMERS

Some commentators have said that at times there has been some kind of drawing back from working on actual problems and focusing on “academic” success. Does that match your experience?

- Studies on soil can be field or lab-based. Have there recently been broader trends towards field- or lab-based approaches? And if yes, do you think this has to do with a wish to contribute more to societal challenges?

### STANDARDISATION/INDICATORISATION/MODELLING/SIMPLIFICATION

It seems that soil scientists increasingly work with simulation models. Would you say that simulation models are an important way of making soil science more relevant for tackling global challenges?

- In discussions around this, it is often stated that soil science is often still in a process of standardising the ways in which soil characteristics and functions are measured. Is this process relevant for the way in which soil



science research is carried out? Or is this rather relevant to communicate/translate findings to the policy level?

- It is sometimes discussed that such standardisation (e.g. for models) always to some extent requires a simplification of one's own research. What are the challenges for soil scientists to engage in such activities?
- At which points do you find it necessary to "simplify" in order to become relevant?
- At which points is it rather important to open up and point to the complexities in soil?

Modelling is arguably one way of integrating different kinds of soil-related knowledge. What other ways do you see for integrating and thinking together soil-related knowledges, especially with a view towards wanting to have an impact on societal issues? (e.g., theory-building, experimental integration)

To account for the complex processes in soil, inter- and transdisciplinarity is often proposed as way of coping with these complexities and gaining more relevance. Under which conditions is it worth it to get involved in such collaborations?

- What is in your experience the right balance between focusing on the strengths of your own research focus and engaging in collaborations with others?

How do you perceive the relation between creating better understanding of fundamental processes, and creating actionable and practical knowledge?

- One tension in the debate is also whether we actually need more knowledge to solve societal problems around soils or whether we know enough to contribute something or to provide actionable knowledge. What is your perspective on this or your experiences with this?

#### ENABLING RESEARCH CONDITIONS

In many contributions to the debate, researchers in soil science also discuss in how far current research conditions support or hinder soil scientists in gaining more relevance for global problems. For example, that science is currently often planned and carried out in terms of research projects of app. 3 years and often researchers choose topics and questions of which they think that they will allow them to make a career in science, which is often high-impact publications. In our project we are also interested in what people think would be particularly favourable conditions for gaining more relevance. What kinds of organising research would support soil science to contribute to broader societal issues such as *soil health/soil security*?

- What time structure would be good for gaining relevance?
- How can contributions to tackling global issues be appreciated and valued within the scientific community and also for making a career in science?

#### PERSONAL CONTEXT

In your personal experience of moving in this field, what contributes to decisions of individual researchers to aiming for and also act upon more relevance in her or his research?

What does it ask from a researcher to really act upon the aim to become more relevant?

- Would you say that it is riskier to choose such a trajectory for one's scientific career or reputation?

If you had to give an advice to a researcher starting a career in soil sciences and wanting to have an impact, what advice would you give him/her?