Unearthing epistemological and metaphysical commitments:

how soil management practices shape assessments of soil health in the agricultural sciences

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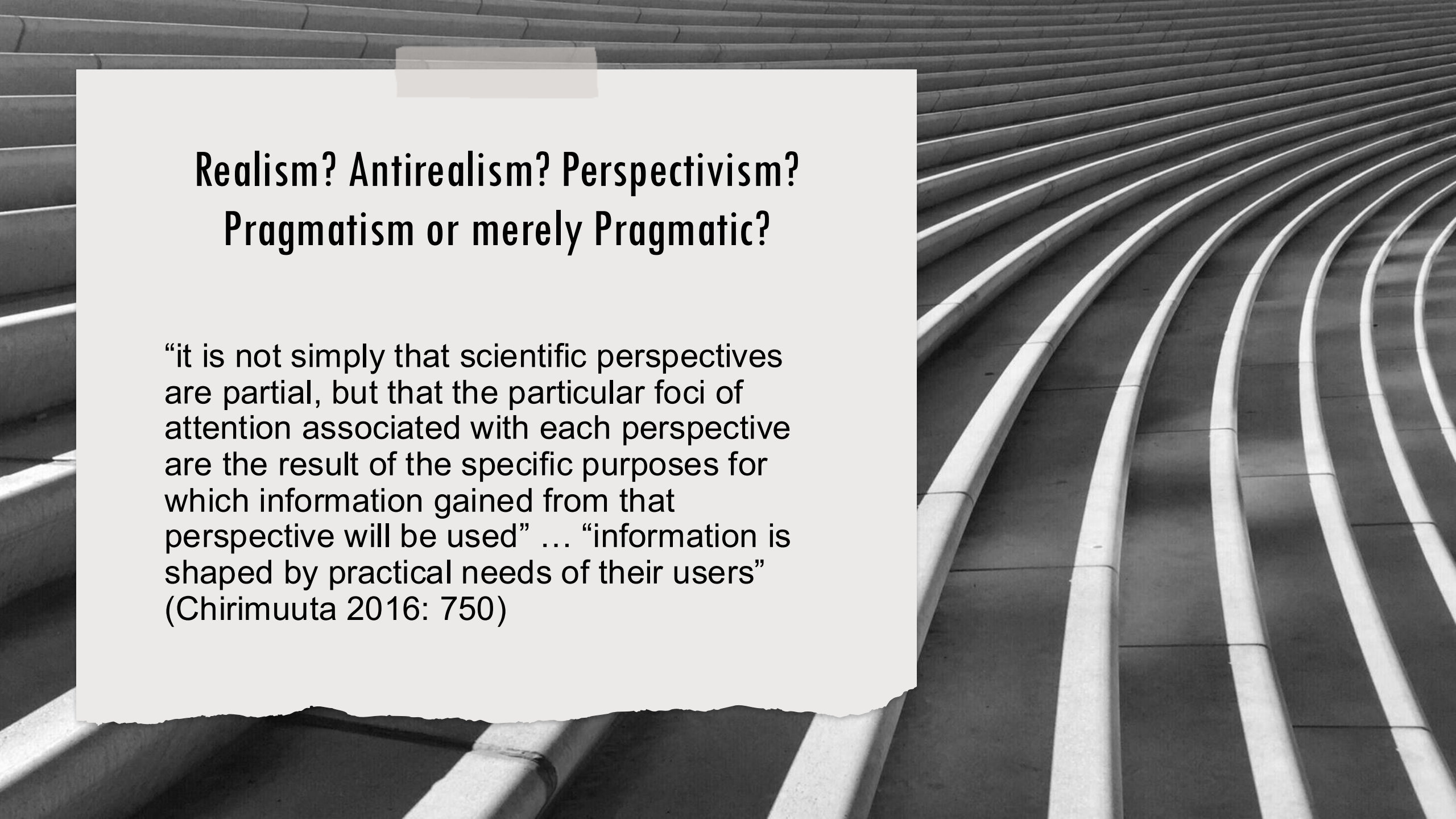
PSA2024 Pragmatist or merely pragmatic? Using pragmatism in biological practice



Realism? Antirealism? Perspectivism? Pragmatism or merely Pragmatic?

"it is not simply that scientific perspectives are partial, but that the particular foci of attention associated with each perspective are the result of the specific purposes for which information gained from that perspective will be used" … "information is shaped by practical needs of their users" (Chirimuuta 2016: 750)

Pragmatism vs Perspectivism

-the claim ‘It works’

is purpose shaped

-Positionally-informed interestedness

-Interaction with the world

-Partiality

-ontology or metaphysics-laden

Practice-shaped kinds and the kinders and kinding activities that shape them

- “To understand natural kinds, we need to do more than consider the existence claims of natural kinds, what is or is not the source of their naturalness, and their membership conditions. We also need to be investigating the activities of people interacting with natural kinds, attending to how those activities contribute to the resulting categories, as well as why these are conceived of as natural kinds by those people using them” (see Kendig 2015).
- “Paying attention to who is using them and how these natural kinds are grounded in different ontological categorisations shifts the focus of the discussion of natural kinds from just studying putative natural kinds to also studying the activities and people who use them and value them (Kendig 2020).

. . . but for all categories in use

- To understand the categories people use, we need to consider not only the metaphysical existence claims of these categories, and their criteria for membership. We also need to be investigating the activities of people interacting with those categories, attending to how their activities contribute to them, as well as why these are conceived of as categories by those people using them.

What is soil?

"Soil management is sustainable if the supporting, provisioning, regulating, and cultural services provided by soil are maintained or enhanced without significantly impairing either the soil functions that enable those services or biodiversity.

The balance between the supporting and provisioning services for plant production and the regulating services the soil provides for water quality and availability and for atmospheric greenhouse gas composition is a particular concern" (FAO 2017: 3).

~~What is soil?~~ What is (sustainable) soil management?

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Soil Management :
"Intentional planned interactions with soil guided by underlying commitments to what soil is, what it's thought to be for, and what should be done with it" Kendig 2024.

Some underlying commitments

USDA or EPA categorizations of ‘farm’

Concepts of soil health / indicators of its assessment

Social ontologies of soil management strategies

Soil categorized in terms of functional uses

Soil classified in terms capability units

Identity as a “good farmer” and what that means


Plan for today:
1) Some soil management decisions made by farmers
2) Categorizations of farmers in virtue of their agricultural goals and economic priorities
3) Federal agency classifications of land capability relied upon.
4) How soil managing activities and categorizing practices shape soil and how soil in turn reciprocally shapes those interacting with it, as well as the future decisions about its management.

A soil management decision. . .to till or not to till:

- “We seem to be having these extremes from one year to the next. Like this year it was way too wet. Last year, it was plenty dry. The year before that, it was cold and wet, initially, and then it got too dry after that. I guess you just need to be flexible. Obviously, you can’t do anything about the rain but, . . . you . . . [can not] work your ground to death and . . . leave residue on the ground. No-tilling [farming is] what you’re going to [do to] conserve more moisture than if it’s wide open and getting baked by the sun” [Michigan farmer] (Roesch-McNally et al. 2017: 12).

“I tried to no-till and some of our soils are just really wet and heavy and they don’t warm up in the spring and I’ve just found that [with] the deep tillage, over the years, you certainly get a yield bump from the tillage because you’re loosening the soil.” [Missouri farmer] (Roesch-McNally et al. 2017: 13).

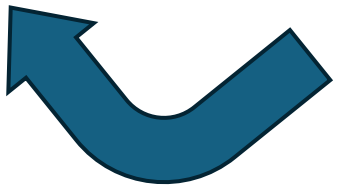
Categorizations of farmers in virtue of their agricultural goals and economic priorities

”a good farmer” (Morton et al 2017: 24)

“a conservationist” (Morton et al. 2017: 25)

“a productivist” (Morton et al 2017: 25).

“a soil stewardship ethic” (Roesch-McNally 2017: 3)



J.G. Arbuckle Jr., L.S. Prokopy, T. Haigh, J. Hobbs, T. Knoot, C. Knutson, A. Loy, A.S. Mase, J. McGuire, L.W. Morton, J. Tyndall, M. Widhalm

Climate change beliefs, concerns, and attitudes toward adaptation and mitigation among farmers in the Midwestern United States

Clim. Change, 117 (2013), pp. 943-950,

Table 3. Principal component analysis of US Corn Belt farmer perceptions of farmer identities[a] (n = 4378).

The good farmer…..	Productivist	Conservationist
Has the most up-to-date equipment	0.770	−0.016
Has the highest yields per acre	0.737	0.013
Gets their crops planted first	0.727	−0.052
Has the highest profit per acre	0.692	0.133
Uses the latest seed and chemical technology	0.596	0.333
Cronbach α = 0.76		
Thinks beyond their own farm to the social and ecological health of their watershed	−0.001	0.793
Manages for both profitability and minimization of environmental impact	0.053	0.788
Minimizes nutrient runoff into waterways	0.033	0.787
Minimizes soil erosion	0.046	0.774
Maintains or increases soil organic matter	0.140	0.758
Considers the health of streams that run through or along their land to be their responsibility	−0.029	0.750
Puts long-term conservation of farm resources before short-term profits	0.010	0.729
Minimizes the use of pesticides	0.099	0.615
Manages their farm operation to reduce income volatility	0.305	0.557
Cronbach α = 0.90		

a The question was: *People have different opinions about what makes a “good farmer.” Please rate the importance of the following items.* Answer options were on a five point scale from *Not at All Important, Not Really Important, Somewhat Important, Important* and *Very Important.*

United States Department of Agriculture Land-Capability Classification

Class III soils: those with “severe limitations that reduce the choice of plants or require special conservation practices, or both…limitations of class III soils restrict the amount of cultivation: timing of planting, tillage… resulting from 1) moderately steep slopes; 2) high susceptibility to water or wind erosion”, and

Class IV soils as those with “very severe limitations…requir[ing] very careful management [and limited] as a result of 1) steep slopes, 2) severe susceptibility to water or wind erosion, 3) severe effects of past erosion” (Klingebiel & Montgomery 1961: 8).

TABLE 1.—Relationship of soil-mapping unit to capability classification

Soil-mapping unit	Capability unit	Capability subclass	Capability class
A soil mapping unit is a portion of the landscape that has similar characteristics and qualities and whose limits are fixed by precise definitions. Within the cartographic limitations and considering the purpose for which the map is made, the soil mapping unit is the unit about which the greatest number of precise statements and predictions can be made. The soil mapping units provide the most detailed soils information. The basic mapping units are the basis for all interpretive groupings of soils. They furnish the information needed for developing capability units, forest site groupings, crop suitability groupings, range site groupings, engineering groupings, and other interpretive groupings. The most specific management practices and estimated yields are related to the individual mapping unit.	A capability unit is a grouping of one or more individual soil mapping units having similar potentials and continuing limitations or hazards. The soils in a capability unit are sufficiently uniform to (a) produce similar kinds of cultivated crops and pasture plants with similar management practices, (b) require similar conservation treatment and management under the same kind and condition of vegetative cover, (c) have comparable potential productivity. The capability unit condenses and simplifies soils information for planning individual tracts of land, field by field. Capability units with the class and subclass furnish information about the degree of limitation, kind of conservation problems and the management practices needed.	Subclasses are groups of capability units which have the same major conservation problem, such as— e—Erosion and runoff. w—Excess water. s—Root-zone limitations. c—Climatic limitations. The capability subclass provides information as to the kind of conservation problem or limitations involved. The class and subclass together provide the map user information about both the degree of limitation and kind of problem involved for broad program planning, conservation need studies, and similar purposes.	Capability classes are groups of capability subclasses or capability units that have the same relative degree of hazard or limitation. The risks of soil damage or limitation in use become progressively greater from class I to class VIII. The capability classes are useful as a means of introducing the map user to the more detailed information on the soil map. The classes show the location, amount, and general suitability of the soils for agricultural use. Only information concerning general agricultural limitations in soil use are obtained at the capability class level.

- “the history of conservation in Ethiopia clearly indicates that imported technologies, have, in most cases, failed to win the acceptance of farmers. These non-indigenous soil conservation technologies failed…[because of] their demand for a huge labour force for their construction and maintenance, that they put large areas of land out of production, encourage the spread of weeds, provide shelter for rodents, etc… [and] a [conventional] treatment-oriented scheme assumes construction of the recommended measures by machines, the realities of the northern Ethiopian highlands dictate that they be carried out by manual labour” (Belay Tegene 2003: 29-30)

Weber-making in the Northern Ethiopian Highlands: Sustainable soil management and normative category-making

- “the owner [of the terrace] is expected to collect stones and put them at different places of the farm field [prior to] construction [...] the owner also prepares food and drinks to serve the [debo]. Before the group starts to construct the terrace, some ritual activities are conducted to ensure the longevity of the terrace” (Assefa and Bork 2014, 937).
- “a person who does not maintain or construct terraces on his farmland is considered a lazy farmer [... and] the community may fine or cast out the person from social interaction” (Assefa and Bork 2014, 940).

Revising Klingebiel & Montgomery's Land-Capability Classification

Class III soils: those with "severe limitations that reduce the choice of plants…limitations of class III soils restrict the amount of cultivation: timing of planting, tillage… resulting from 1) moderately steep slopes; 2) high susceptibility to water or wind erosion",and Class IV soils as those with "very severe limitations…as a result of 1) steep slopes, 2) severe susceptibility to water or wind erosion, 3) severe effects of past erosion" (Klingebiel & Montgomery 1961: 8).

*Unless agroecologically-responsive conservation practices are devised and maintained.

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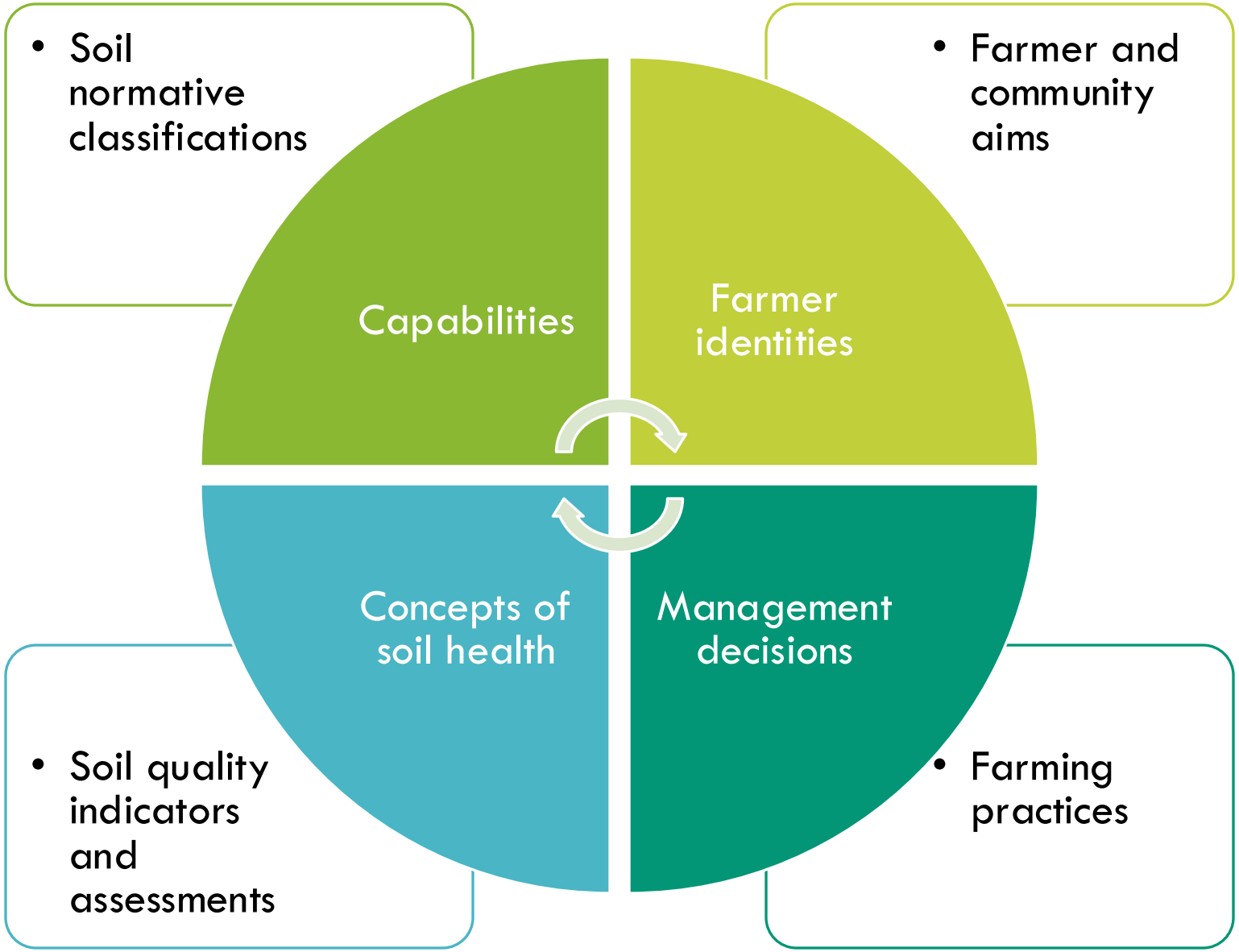
Epistemological and metaphysical commitments that shape soil management decisions and practices:

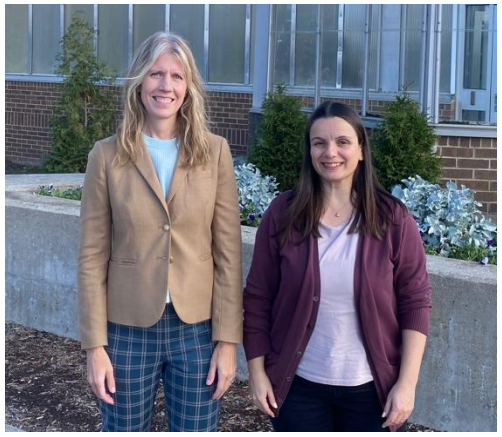
1. Local and regional ecological, environmental and climate knowledge
2. Farmer and community identities as good farmer or good farming community, values and goals and aspirations for soil condition
3. Federal agency land capability classifications
4. Concepts of soil health and what are conceived of as soil health indicators
5. Local and Indigenous community expertise of soil management
6. Soil that is the result of previous soil management decisions
7. Soil that is the subject of current management decision-making


• Soil normative classifications
• Farmer and community aims
Capabilities
Farmer identities
Concepts of soil health
Management decisions
• Soil quality indicators and assessments
• Farming practices

A Perspectivist Practice-shaped Pragmatism (PPP):

What works is indexed to interestedness and interaction (and is always partial)

1. Soil management decisions rely on an interplay of different social epistemologies and social ontologies in conceiving of both what soil is and how it should be managed
2. Studying the interplay of these and the impacts of different soil management practices reveals not only how soil is made and remade but how soil, in turn, shapes the communities managing it.
3. Making pragmatic choices (not just those of soil management) relies on the use of implicit and explicit normative categories. Unearthing these provides the means by which to make sense of these pragmatic choices by indexing how and why they work—and for whom do they work.



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Comments or questions?
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- Research presented here is supported by the National Science Foundation grant #2240749: “Epistemic and Ethical Functions of Categories in the Agricultural Science” PI: Kendig
- Thanks to my NSF research team: Paul Thompson, Özlem Yilmaz Silverman, Doug Buhler, Krista Isaacs, Gretel van Wieren, Dale Rozeboom, Renee Wallace.