

Soil health as an integrative concept: Farmer adaptation and on-farm resiliency

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Introduction

Improving soil health will have a measurable impact on reducing vulnerability associated with global climate change, particularly in the U.S. Corn Belt. This poster explores the emergent themes related to soil health and responses to weather variability using data from in-depth interviews with Corn Belt farmers. This research effort also examines motivations for conservation practice adoption (e.g., cover crops, reduced tillage, diversification) and how soil health and erosion prevention act as motivations for action and as well as management goals. Existing literature on farmers and soil health has largely focused on how farmers assess soil health parameters but does not investigate their motivations for improving soil health nor does it examine their perception of the role of soil health in reducing the vulnerability of corn-based cropping systems to extreme weather events.

Methods

Qualitative data were collected using semi-structured in-depth interviews with farmers across nine Corn Belt states with a total of 159 farmer participants. These farmers were large-scale corn and soybean farmers. Participants were purposively recruited through the land grant extension network in each study state. Such farmers were recruited because they tend to be more conservation-oriented and are typically early adopters of key conservation practices. Transcripts of recorded interviews were analyzed using a hierarchical axial coding procedure using the NVivo 10 Software.

Research Questions

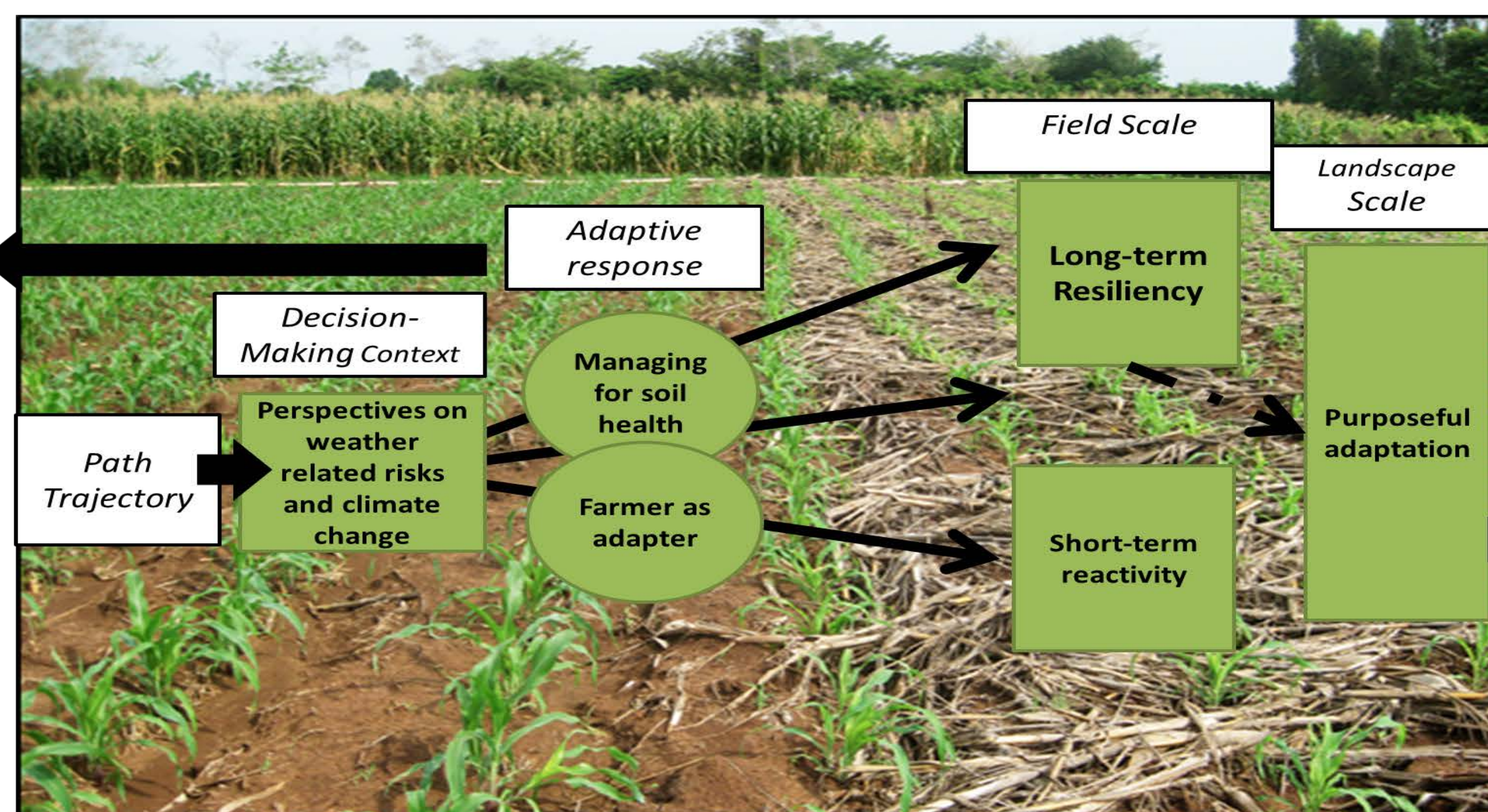
- What motivates farmers to manage for soil health?
- What do farmers factor when assessing soil health?
- How do farmers approach conservation decision-making in relationship to improving soil health and/or reducing climate related risks?
- Is there a connection between soil health management and reducing weather related risk?

Data-driven conceptual framework: Soil Health for Resiliency

Adaptive Response:

Farmers used a number of practices to mitigate weather related risks, particularly recent drought & extreme rain events:

- Changes in tillage (increasing and decreasing tillage)
- Changes to the timing of mgt. practices
- Different hybrid varieties
- Changes to rotations, cover crops
- Increased tile drainage &/or irrigation
- Use of crop insurance



Soil Health for Greater Resilience:

Building soil health as a resiliency tool emerged as a concept that many, but not all, farmer participants articulated as important for longer-term thinking about their management goals and strategies, as evidenced in direct quotes from farmers:

"So, it's just everything we can do to try to promote saving soil for the future. Cause, otherwise, we're not going to have ... How are we going to feed people?" (IA Farmer)

"Well, I guess the long-term goal is sustainability and how can we improve the tilth of the[soil]...to where it has the long-term benefits not only for this generation but generations..." (MO Farmer)

Using tillage as an example, farmers are altering their practices dependent on weather variability and these changes can be short-term strategies for addressing extreme weather or longer-term strategies for building resiliency as illustrated by direct quotes from farmer interviews,

"... in a drought, with the reduced tillage, we will see a benefit [increased soil moisture]...when we don't have sufficient water." (MN farmer)

Conversely, a farmer from MO discusses using more tillage in a wet year,
"This spring when it was wet, we had to do a little tillage to get out there and get to the ground."

Conclusion and Recommendations

Farmers adapt, this is what they do and yet there is a distinction between short-term responses to increased weather variability and purposeful adaptation to climate change. Soil health might serve as an integrative concept linking short-term coping with long-term adaptation strategies. The soil health conversation, as a driver for increased conservation adoption, can be a strategy for engaging farmers in the discussion of adaptation to weather extremes and building on-farm resilience. Further work is needed to better understand how farmers assess and purposefully build soil health and prevent erosion. Additionally, from a biogeophysical perspective, more analyses of how effective these strategies are in terms of measurable improvements to soil health and water quality are needed.

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