Theme: Environmental Dynamics and Food Systems

Pursuit: Soil as a social ecological feedback: Mapping the social and ecological processes for agroecosystem resilience in the era of climate change

Short-title: Soil as SES feedback

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Attention: Dr. Jonathan G. Kramer, Director for Interdisciplinary Science, SESYNC

RE: Response to the reviewers

We appreciate the opportunity to provide additional resources and details regarding our proposal entitled, "**Soil as a social ecological feedback: Mapping the social and ecological processes for agroecosystem resilience in the era of climate change."** We invited Erich Seamon, who is a Ph.D. student at the University of Idaho, to join as Co-PI in this effort given his expertise in data management, statistical analyses, and geospatial information systems research. Erich previously served as the Environmental Data Manager for the USDA's wheat coordinated agriculture project (CAP), from 2011-2017 (www.reacchpna.org) and is part of the data mining team with the Climate Impacts Research Consortium (the Pacific Northwest NOAA RISA). A short CV has been included for PI Seamon in an attachment to this email.

In the following sections, we share our response to reviewer comments by focusing on five major themes: 1. Novelty and scientific contribution of synthesis; 2. Data, methods, and expected outcomes; 3. Modeling and synthesis activities beyond meta-analyses; 4. Meeting activities and expert involvement; and 5. Real-world applicability of synthesis, including the Story Map interface. Below, we bring together ideas from our proposal and clarify them for the purposes of illuminating concrete plans for how we might implement this pursuit, if funded.

Response to reviewers:

1. **What is novel about the proposed project?**

The major research questions guiding this project are: Given the preliminary research evidence that soil health can act as a social-ecological feedback loop, what additional social, economic, biophysical/climatic and policy-level drivers (e.g., changes to crop insurance or conservation reserve program payments) foster the adoption of farm management practices that achieve the goal of resilient soils? And how can this soil adaptation feedback loop be leveraged to encourage greater stewardship amongst U.S. farmers, to preserve and enhance soil resources for climate resilience? Therefore, **our goal is to determine the most important factors governing the relationships driving the adoption, maintenance and increased use of soil health conservation practices.**

Overall, the modeling and synthesis activities proposed in this project will **improve our understanding of the complex processes** that are in place at human institutional as well as diverse spatial scales, which are **impacting soil health** and encouraging (or, in some instances, discouraging) **adoption of conservation practices across the United States**. This analysis will enable an improved spatial understanding of the relationships between key processes and how they influence conservation practice adoption and subsequent soil health outcomes. These findings, as illustrated in a Story Map format with relevant audiences of farmers, policy makers and researchers, will provide a narrative that is both scientifically and conceptually compelling to aid in our identification of what barriers and what facilitators exist. This work is designed to enable us to examine soil as a social-ecological feedback that will encourage greater soil stewardship in the era of anthropogenic climate change.

2. **Details regarding data, methods, and expected outcomes is needed. Concern over conservation practice data- what are relationships between how soil conservation practices vary across socio-ecological variables such type of production system (size, crop type), geography, demographics of producers etc. Touch on decision making and how we understand social as well as ecological relationships**

We will explore ecosystem services related to soil health management practices and examine relationships between biophysical and climate factors, policy factors and sociological factors (see Figure 1 from our original proposal). These relationships will be explored by examining how they influence farmers' use of soil health conservation practices or conservation farming systems, such as no-till farming, cover crops, crop rotations, and organic production systems, to list a few. These practices are known to improve soil health and to reduce erosion; however, our meta- review (see description in the following section) will be used to predict or estimate what soil health benefits (e.g., increased soil carbon, improved infiltration, reduced erosion and runoff) we can expect to see on the landscape as a consequence of the acres utilizing these practices. These relationships will be explored by using a Structural Equation Modeling (SEM) approach, although other modeling techniques (e.g., multilevel analysis) may be explored by the group during the workshops. SEM models allow researchers to examine the multi-directional relationships (path analysis) between observed as well as latent variables (e.g., measurement models) at spatial and temporal scales. The results of the SEM model can be displayed using ArcGIS to illustrate spatial dynamics and patterns (See Figure 1 for a mockup of our proposal SEM model based on predicted relationships).

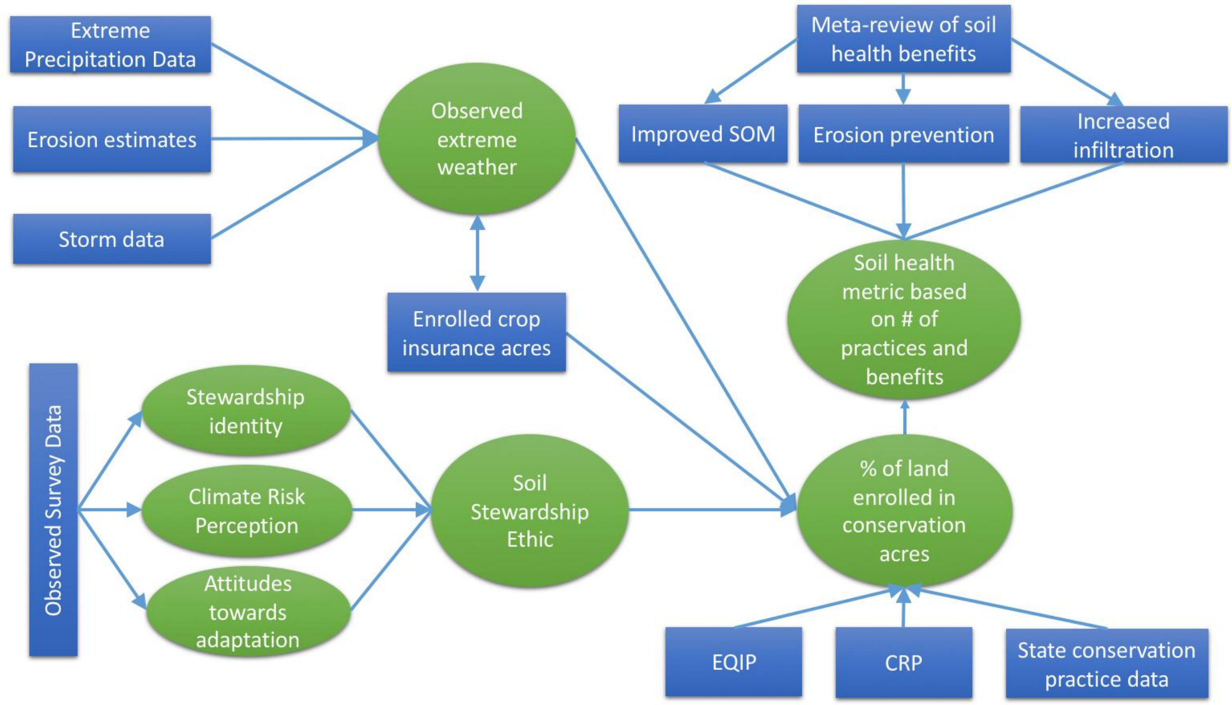

Figure 1. Structural Equation Modeling Conceptual Framework. Circles are latent variables, to be constructed using Confirmatory Factor Analysis. Squares are observed data, with arrows depicting our hypotheses about directionality and relationships that form the "path" analysis component of the data. Data scaling issues will be considered by using multi-level modeling.

To clarify our modeling approach, below we describe in more detail the data that we plan to use based on the following categories: biophysical and climate factors; conservation practice use data; policy and economic factors; and sociological factors (see Table 1). It is important to note the data sources we have access to have been collected at multiple spatial and temporal scales, therefore we will work to develop datasets that are directly comparable across scale with an effort to develop results at a finer scale, such as at the county level. Where it is not possible to align at the county level, data will be aligned at the state level.

Biophysical and climate factors:

We will utilize publicly available regional climate data sources at the state and county level that measure temperature and precipitation. We also have access to SSURGO datasets that have soils data, which includes highly erodible land and available water holding capacity estimates for soil type. The NRI database includes erosion rates at the state level as well. Initial climatological variables and derivatives will be acquired from the University of Idaho's historical GRIDMET and future scenario MACA datasets, which contain 4km gridded, downscaled layers, available at a national level. A key advantage of such gridded data allows for web-enabled spatial and temporal filtering (opendap), for dynamic use with programmatic modules such as python and R.

Table 1. Revised "table 1" from original submission. Table identifies datasets proposed for synthesis products with information about source, scale and access information.

	Data/Indicator	Source	Scale	Access
Biophysical, Climate and Conservation Practice Data	Regional climate data (precipitation, temperature, humidity, solar radiation, wind speed, derivative values, such as ET)	-National Oceanic Atmospheric Administration (NOAA) -Multivariate Adaptive Constructed Analogs (MACA) Datasets, University of Idaho -Historical GRIDMET data from University of Idaho	State and county-level	Publicly available
	Soils data (e.g. highly erodible land regions, available water holding capacity)	USDA Soil Survey Geographic Database (SSURGO)	Spatial dataset continuously available across the United States	Publicly available
	Stream runoff/stream temperature	USGS https://water.usgs.gov/nsip/	Historical data observations available nationwide for 16,286 sites	Publicly available
	Groundwater levels	USGS https://waterdata.usgs.gov/nwis/gw	Historical data observations available nationwide for 4,013 sites	Publicly available
	Soil Moisture/SWE gridded data, derived from downscaled climate using variable infiltration capacity (VIC) modeling	University of Washington	4km/pixel, available for the United States, 1979-current	Not currently publicly available, data validation in progress
	No-Till & Cover Crops	2012 Agricultural Census	State level (can be converted into percent of cropped acres)	Publicly available
	Perennial crops	USDA-NASS	Such as hay or alfalfa, available at state level	Publicly available
	Erosion	2012 Natural Resources Inventory (NRI) database	State level (erosion rate)	Publicly available
	Total Cropland and Pasture	2012 Natural Resources Inventory (NRI) database	State level, total acres	Publicly available

Policy and Economic Data	Conservation funding (e.g., Conservation Reserve Program)	2012 Natural Resources Inventory (NRI) database	State level, total acres	Publicly available
	NRCS Environmental Quality Incentives Program (Cropland Soil Quality Practices including information on tillage, crop rotations and nutrient management)	NRCS database	State level, total acres	Publicly available
	Crop insurance	USDA Risk Management Agency (RMA) and Farm Service Agency (FSA)	County level, sorted by crop, insurance payout, and source of payout (i.e. flood or drought)	Publicly available
Sociological Data	-Farmer attitudes/beliefs: -Identity/soil health ethic, -Attitudes towards conservation and climate adaptation -Risk perception and experiences with extreme weather	Farmer interview and survey data from REACCH, and Sustainable Corn/U2U projects and subject area meta-analyses (see Prokopy et al 2008)	U.S. Corn Belt and Inland Pacific Northwest	Publicly available (partial)- PI/collaborators have access to survey information
	Meta-review and database of U.S. farmer soil and water conservation practice adoption	Collaborator Dr. J. Arbuckle and Dr. Linda Prokopy lead developers	U.S., State and other	Publicly available (partial)- PI/Collaborators have access to database and products

Conservation practice variables:

USDA-NASS, via the Agricultural Census data, has data available on the use of certain conservation practices that imply soil health improvements. These include the use of no-till and cover crops as well as the use of perennial crops. The NRI database also has data on agroforestry including the use of alley cropping and hedgerows. NRCS also has a database on the acreage enrolled in Environmental Quality Incentives Program with a program area that explicitly looks at Cropland Soil Quality Practices including information on tillage, crop rotations and nutrient management. We may also be able to include other practices, although access to complete data on these may be harder to obtain; however, some of these include rotational grazing, integrated crop and livestock operations, diverse crop rotations, and other in-field soil conservation best management practices.

Policy factors:

We will explore policy and economic data describing the current use of key agricultural conservation practices being implemented at a landscape scale, which include measures such as enrollment in Conservation Reserve Program (CRP) acreage (acres) and EQIP enrollment in Soil Quality Practices. Additionally, another variable of interest is crop insurance payouts, examined via the Risk Management Agency (RMA) and Farm Service Agency (FSA) crop loss data. These data enable us to assess relationships between crop insurance reliance and whether this incentivizes or disincentives the use of conservation practices as farmers are able to insure crops and buffer the impacts from extreme and variable weather events that are known to impact soil resources and often drive erosion. We have access to NRI database information on Conservation Reserve Program (CRP) acreage enrolled as well as NRCS data on enrolled acres of Cropland Soil Quality Practices. We also have access to USDA Risk Management Agency (RMA) and FSA databases the describe crop loss acreage and crop loss causes across multiple years at a county level.

Sociological factors:

Background information on conservation attitudes and use and adoption of conservation practices are available from peer reviewed meta-analyses which have identified a set of key variables that help explain conservation practice adoption (e.g., Knowler and Duncan 2007; Prokopy et al. 2008; Baumgart-Getz et al. 2012) among farmers. Additionally, the PI's and collaborators have access to in-depth survey and interview data specifically conducted with farmers in the Midwest and Inland Pacific Northwest on a suite of behavioral and attitudinal questions. Much of this survey work was conducted in the U.S. Corn Belt and was supported via the NIFA funded Sustainable Corn (www.sustainablecorn.org) project, as well as NIFA funded project focused on inland Pacific Northwest wheat farmers where two surveys were collected as part of the Regional Approaches to Climate Change in Pacific Northwest Agriculture (REACCH) (www.reacchpna.org). Additionally, collaborator Dr. J. Arbuckle is one of the lead authors on the development of a *separate* but relevant meta-review and analysis of research on

U.S. farmer soil and water conservation practice adoption[1]. A major product of the research will be a publicly available database, to be published in 2018, which will (1) facilitate literature reviews by dependent variables (e.g., cover crop adoption) and type of predictor variables (e.g., attitudes, identity) and (2) contain statistics that will allow other researchers to conduct meta-analyses (e.g., regression and correlation coefficients) which have been aggregated at various spatial scales (i.e., state, county, watershed, multi-state). We plan to use data from this publicly available database in our modeling efforts, to the extent possible, in addition to the survey data we explain above.

The best use of these survey data, and meta-review database, will be to use these observations of farmers to develop latent constructs that could be included in the SEMs to help explain the sociological factors that influence decision making. For instance, the key latent constructs conceptualized thus far are related to farmer's attitudes and beliefs regarding conservation practices and adoption and/or use of key conservation practices such as no-till, crop rotations, cover crops, etc. Additional survey questions measure stewardship ethics while others explore attitudes towards conservation practices as climate adaptation strategies. Finally, risk perceptions and experiences with extreme and variable weather, which have an impact on soil resources, have been shown to explain farmers use and adoption of conservation practices that preserve and enhance soil resources. These factors help explain behavioral intentions and match with a broader understanding about what motivates farmers' use of soil conservation practices, particularly as they relate to actions taken to respond to more variable and extreme weather due to climate change. The survey data were collected so as to be spatially explicit (see Loy et al. 2013 and Seamon et al. 2017). The data can be assessed at the state level while sampling occurred at the watershed level (see HUC 6 descriptions in Loy et al., 2013) and at the agroecological zone (see description in Seamon et al., 2017).

Limitations in data and analyses:

There will be challenges with conducting this level of research at the national-level due to the differing levels of availability of data, as well as the mismatch of data collected at various spatial and temporal scales across social and biophysical boundaries. Therefore, we propose developing a limited number of regional models to elucidate concepts more concretely based on the conceptual framework we have outlined. We intend to focus on the Inland Northwest and the U.S. Corn Belt as our preliminary case study regions due to the presence of multi-scalar data (e.g., state, county, and watershed) that includes survey data available on farmers' perspectives on global climate change and soil health best management practices.

Data sharing:

[1] This work builds on previous work that has reviewed BMP adoption by: (1) reviewing all adoption studies (peer-reviewed literature, theses/dissertations, and grey literature) published between 1982 and 2017, (2) examining advances in this field of study such as the growth of qualitative research with farmers, and (3) focusing on both barriers to and motivations for adoption. Papers were identified through database literature searches and snowball sampling from the reference sections of each reviewed paper. The project investigators employ vote-count meta-analysis methods to identify patterns and trends in the literature.

The computational requirements for this proposal will rely on ArcGIS and the Story Map architecture for developing final outputs. Other analytical software, such as R, will be used to assist in exposing outputs in an open-source manner. For example, a developed soil heath Story Map may contain datasets that were previously transformed to facilitate regional or temporally-specific analysis. In this instance, the analytics which transformed the included datasets will be exposed as R functions, and included in an R package. The R modeling and data manipulation code will be stored in github in a shared, open repository, and used as a collaborative medium for workshop attendee access on a limited capacity. This will allow attendees to follow modeling efforts between workshops, and to engage with the team as needed.

3. How will the analytical activities go beyond meta-analysis?

We appreciate the reviewer comments and concerns about this element of the project. It should first be noted that the meta-review was meant as a "step one" that would inform the main aspects of the synthesis, which is to link biophysical, economic/policy and sociological data in a spatially explicit manner to assess hotspots or gaps in conservation and identify barriers to adoption. The idea of the meta-review arose out of our deep understanding of the literature on soil health indicators and specific conservation practices typically associated with biophysical improvements. As a result, we understand, but may not have articulated, that while a great deal of research has been done to quantitatively summarize specific practices and their impact on specific soil health indicators, there has not been a synthesis of this work that would help identify which practices are most beneficial in general, and how different environmental conditions impact these benefits. We plan to focus the meta-review around the Soil Health Institute's "Tier 1" indicators of soil health, which include organic matter, crop yields, erosion, runoff, infiltration and nitrate loss. For example, it is generally accepted by the community of conservation agriculture practitioners and researchers that practices such as no-till and cover crops benefit soil health. However, there are many other farming methods that we understand to have received lesser focus from a policy and research standpoint, and that other methods could hold equal or greater potential to improve soil health in different environments. These practices, methods or systems include but are not limited to crop rotations, incorporating perennial crops or plants, organic farming methods, agroforestry systems, and integrated crop and livestock systems.

The meta-review would inform our understanding of knowledge gaps that will be critical to the larger synthesis project outlined by our proposal. In a rigorous and quantitative way, it will help us understand which practices have been more frequently studied than others as well as which soil health indicators are better understood from the published literature. This will help further inform which additional data we might include in our structural equation modeling, and what trends that we might look for. For example, this will help us understand the following types of questions: Is no-till more successful in dry environments and does this impact where it is most widely adopted? Are cover crops more successful in wetter environments and does this impact where they are most widely adopted? Or, are there other factors that influence adoption such as agronomic considerations (such as tradeoffs associated with crop yields) associated with regional cropping systems, or economics or policy considerations?

4. **Expand your discussions of meeting activities, and participant expertise and contributions.**

We currently have 11 confirmed collaborators with the rest of participants tentatively interested. We anticipate 2.5 days of workshop activities with travel on either side of that for a total of three meetings over the course of two years. At the moment, all confirmed participants are residents of U.S. or Puerto Rico and thus anticipate that all participant travel will be domestic. We propose tentative meeting times, which have been revised since our first proposal submission, which would include the first meeting to occur in the fall of 2018, with the other two meetings occurring in 2019 during spring and fall. Given the need to coordinate 15 collaborators, this timeline is tentative although general enough to allow the team flexibility in setting up exact meeting times.

We envision that the three workshops will build on each other but have distinct emphases. Figure 2 that illustrates the iterative process of the workshops. The three workshops will focus on this iterative feedback loop with emphasis on different aspects of the project during each of the three meetings. Between workshops, the team will leverage online collaboration tools to extend and modify outcomes outlined below:

Meeting 1: During the first meeting, emphasis will be on initial group collaboration, and providing feedback on and revisions to the SEM modeling effort (a beta version will be developed prior to the meeting so we have something to work with). The team will initially discuss whether we have all the requisite datasets, and assess whether model construction, model design and framework adequately represent the relationships of interest as we tease out this notion of soil acting as a social-ecological feedback loop.

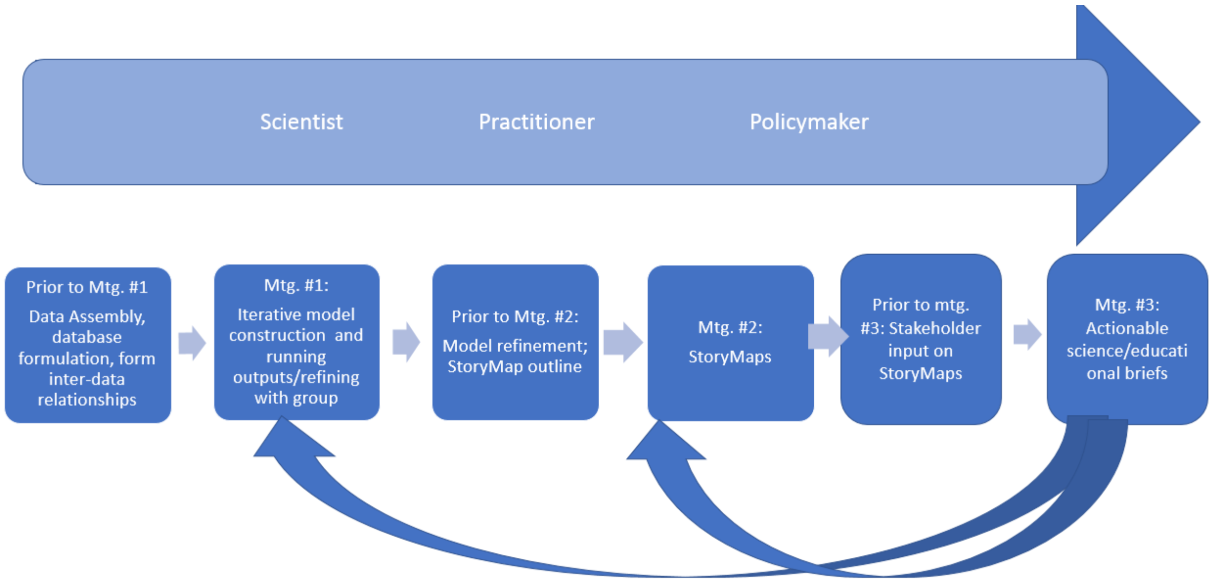

Figure 2. Iterative developmental process to guide meeting organization and focus.

Between meetings 1 and 2: Efforts will be made to work on two manuscripts outlined in our pursuit proposal: 1. Meta-review linking soil health outcomes to conservation practices and 2. Summary of the structural equation modeling and spatial analysis based on an integration of multiple factors outlined above. Additionally, during this time, we will work to revise the model based on the group discussion as there may be additional editing that will need to be done. For example, input information from workshop attendees may enable more effective modeling outputs, by including additional datasets, refining modeling parameters, or extending/limiting spatial and/or temporal extents. This engagement will be supported by online team interaction between workshops using collaboration tools (website, social media).

Meeting 2: The second meeting will focus on review and evaluation of modeling results that were refined during Meeting 1 and between meetings; however, the focus will move towards creating the narrative content within the Story Map structure. We will emphasize the development of a publicly facing website using a Story Map framework which would be used as an online educational and visualization tool. The Story Map also allows for the integration of regional case studies already developed via various conservation networks (e.g., National Association of Conservation District Soil Health Champions and NRCS Soil Health leaders). The Story Map refinement process will also include identifying differing visualization/data pathways of information for scientists, farmers/practitioners and policymakers, all based on the common SEM modeling outputs.

Between meeting 2 and 3: The draft Story Map would be reviewed by relevant stakeholders before being finalized.[2] Feedback will also be used to further refine the final products and identify research gaps that could be used to formulate future grant proposals, including Story Map pathways flows (scientist/practitioner/policymaker), and mechanisms for how Story Map outputs will be presented to users (maps, data tables, narrative outputs). We would harness the networks among the pursuit collaborators, particularly Jen Moore-Kucera and NRCS, Tom Driscoll with National Farmers Union, Stefan Gailans with Practical Farmers of Iowa, Tabitha Brown with Latah Soil and Water Conservation District, and Gabrielle Roesch-McNally, Rachel Schattman and Nora Alvarez-Berrios with the Climate Hubs. However, each collaborator we have invited has a broad network of stakeholders who would be asked to provide feedback on this resource.

Meeting 3: The third meeting will focus on actionable science, where we incorporate and discuss stakeholder feedback in order to improve the Story Map so that it has relevance for scientists, practitioners and policymakers. We are also interested in telling the story about what factors are driving soil health practice use and whether we can harness soil as a social ecological feedback to improve and enhance conservation practice use on the landscape. During this meeting we will also work on the pursuit product of using the Story Map tool to develop short (1-2 page) educational briefs based on the synthesis results that provide insight into how policy incentives could be modified to better encourage soil conservation practices. This would be informed by and distributed via our network of policy-oriented organizations (e.g., National Farmers Union, National Sustainable Agriculture Coalition and Union of Concerned Scientists). During this meeting we will also finalize a "how to" document geared toward teams of scientists interested in following a similar protocol to integrate diverse data, that would include sample R code and step by step instructions for downloading and processing the same datasets. The coding repositories would additionally be refined for final public release.

Breakout Groups:

During the first meeting, participants will break out into three-four working groups that will be revisited during the course of the pursuit depending on the emphasis of the meeting (Table 2).

[2] Practical Farmers of Iowa, National Farmers Union, regional Conservation District partners (e.g., Latah Soil and Water Conservation District in Idaho and Benton Soil and Water Conservation District in Oregon), the Stockholm Resilience Center and the North American Climate Smart Agricultural Alliance. PI's and pursuit collaborators have relationships with these organizations as well as other pertinent organizations that arise during workshop discussions.

Table 2. Collaborators are grouped into committees based on their expertise and/or interests. Groups are draft at this stage and are subject to change.

Committee	Collaborators
Biophysical/climate relationships	Andrea Basche (lead PI) Stefan Gailans Dave Huggins Jen Moore-Kucera Stephen Machado Kate Tully Teresa Matteson
Modeling	Erich Seamon (lead PI) Nora Alvarez-Berrios Andrea Basche
Social-Political relationships	Gabrielle Roesch-McNally (lead PI) J. Arbuckle Tabitha Brown Laura Lengnick Rachel Schattman
Stakeholder engagement/actionable science	Gabrielle Roesch-McNally (lead PI)/or other collaborator Andrea Basche Stefan Gailans Tabitha Brown Tom Driscoll Jen Moore-Kucera Laura Lengnick Teresa Matteson

5. **How are the intended outcomes actionable and who might be the end-users? Further explanation regarding the utility of Story Maps is also needed. The Story Map tool is an interesting approach, but the approach seems largely to build a tool and analysis without the input of end users. More direct work to ensure the engagement of policy makers within the formal scope of the proposal would improve the prospects for actionable science.**

Overall, the modeling/synthesis proposed in this project will help us understand the processes that are actually improving soil health and driving adoption of the most important conservation practices across the United States. We also propose working with our collaborators, particularly between meetings 2 and 3 to gain specific stakeholder input on the Story Map website leveraging existing relationships as described in the section above.

The team will include USDA personnel from both NRCS and the Climate Hubs whose missions include technical transfer of information and increased adoption of soil health stewardship and climate resilience practices. The team also includes representatives who work on state and federal agriculture policy as well as individuals who work directly with farmers and who conduct participatory, on–farm research, as well as non-profit partners. Through discussions in our second meeting, the vision of creating a story map aimed at a more general audience will be shaped by the expertise of these agency personnel and policy experts. As a result, actionable outcomes from project could include:

- NRCS collaborator, Jen Moore Kucera, will co-develop products in such a way that they can be utilized to improve existing training courses currently implemented by NRCS for all conservation planners and to inform NRCS program managers' communication between field staff and producers. Additionally, NRCS could link the Story Map project in with other efforts they are using to promote soil health stewards via NRCS Soil Health Profiles.
- Climate Hub collaborators, Gabrielle Roesch-McNally, Rachel Schattman and Nora Alvarez-Berrios, will use this information to shape communication and outreach on soil health and to inform Department of Agriculture agencies across NRCS, FSA, RMA, FS, ARS, etc. These agencies would all be interested in the Story Map for a variety of programmatic reasons and may be able to capitalize on the findings to improve program delivery, crop insurance practices, and other land manager outreach to guide climate resilience strategies.
- Educational briefs developed during the third meeting could be shared with policymakers and other USDA agencies. Efforts would also be made to link these efforts with the Soil Health Institute and their National Soil Health Action plan.

We propose, within the development of the Story Map and associated R modeling framework, to host these services on an interactive, collaboration-based website with a tentative title: "The geography of soil health stewardship: Lessons we can grow with." This interactive website would serve as an educational tool, as well as providing background material for educational briefings that highlight educational and policy interventions that could guide soil resilience-building strategies for the future.

The Story Map tool (see mockups illustrated in Figure 2 and 3) will elucidate what the drivers are influencing improvements in soil health stewardship while also illustrating barriers by synthesizing SEM modeling results with social science data and soil stewardship stories, providing an interactive narrative that is spatially explicit, while also sharing a story of soil health and soil degradation occurring on the landscape. Our hope would be to have aspects/layers of the story map that will be more relevant to different stakeholder groups, including scientists, practitioners and policymakers with regional as well as national value. The Story Map will be based on layers of data from the modeling work done to connect biophysical/climate data with policy/economic and sociological data, coupled with relevant conservation practice use data and soil health impacts.

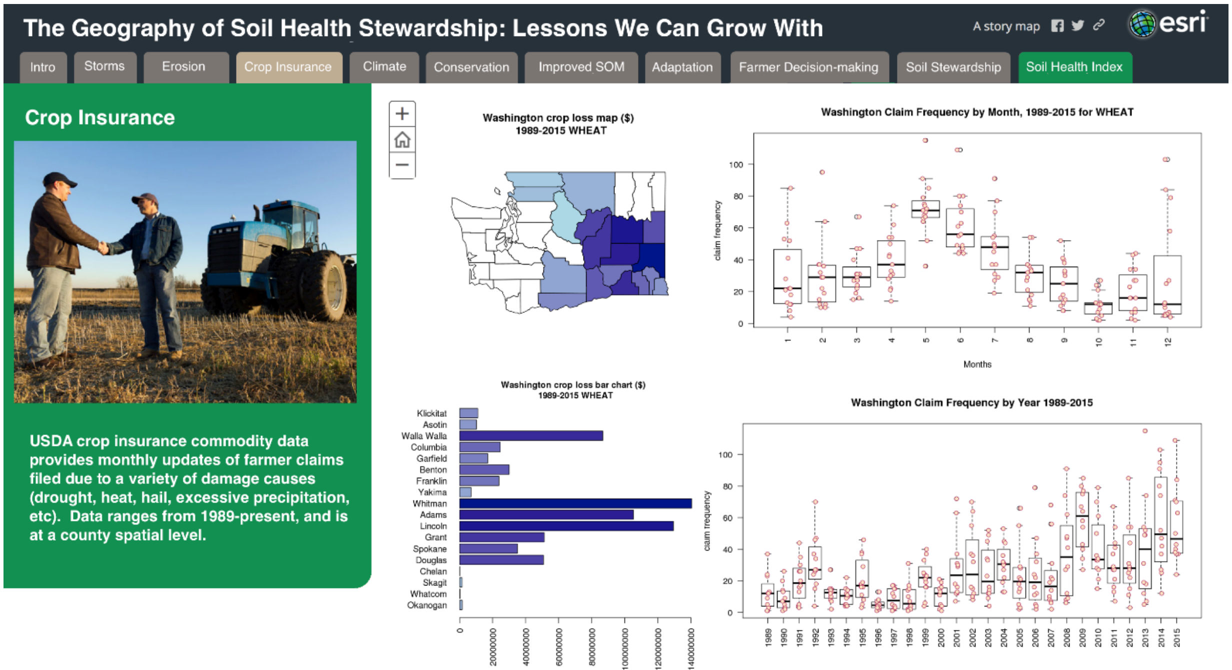

Figure 3. Story Map Mockup illustrating crop insurance data for Washington State. This provides an example of what our Story Map interface might look like.

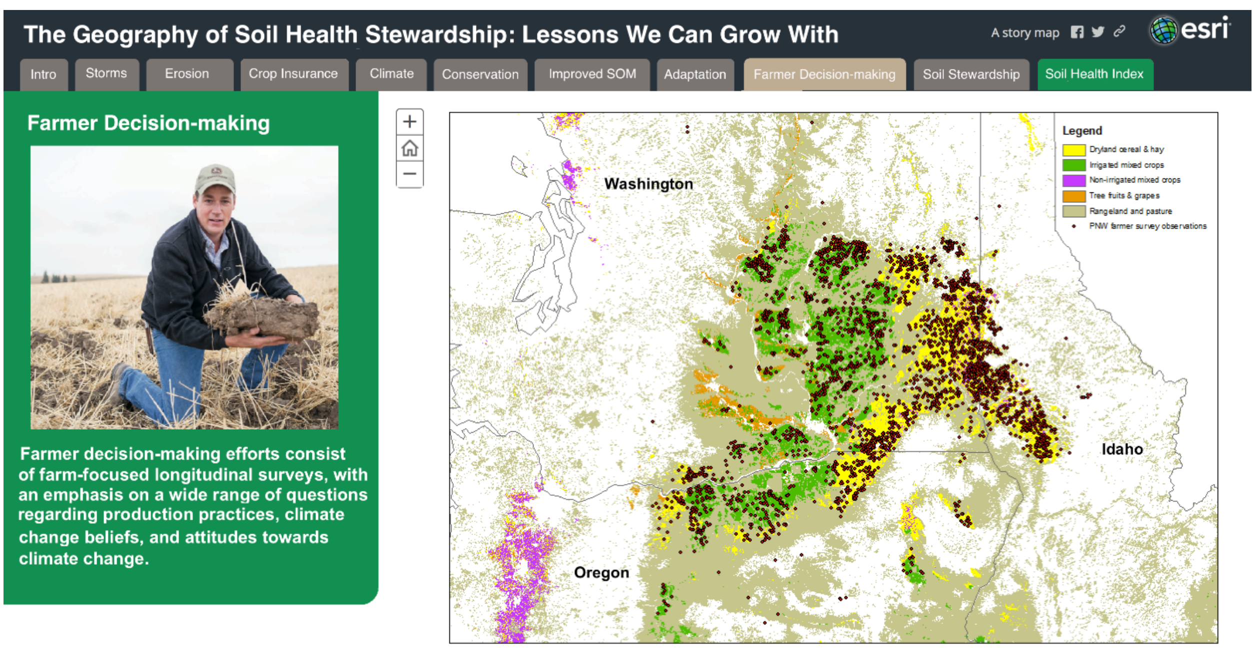

Figure 4. Story Map mockup illustrating survey responses for respondents from the REACCH project (see Seamon et al. 2017). This provides an example of what our Story Map interface might look like.

The Story Map will thus tell a story about how we can enable greater adoption, maintenance and enhancement of soil health building strategies by linking disparate datasets and novel modeling techniques and presenting the results at meaningful spatial scales. The Story Map will also include qualitative data on soil health stewardship. These data exist for a larger portion of the U.S. based on research conducted by collaborator Laura Lengnick in farmer interviews she has conducted (see Lengnick 2015), as well as across many NRCS regions that highlight soil stewards as leaders in conservation practice use and adoption. Additionally, in-depth interviews with Corn Belt farmers provided the impetus for this pursuit (Roesch-McNally et al. 2017) and will also be available for subsequent analyses.

References:

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