USDA

United States Department of Agriculture

Data and Research Needs for Soil Health Policy

Economics of Soil Health Workshop
September 22, 2015

Steven Wallander
USDA Economic Research Service

The views expressed are those of the author and should not be attributed to ERS or USDA.

The Foundations of the Economic Research

With the goal of doing policy-relevant economic research on soil health, there are four areas that determine the research scope and design.

- Policies
- Incentives
- Monitoring
- Valuation

Policies: The Research Agenda

- What are the effects (net benefits) of policies that incentivize soil health improvements?
  - Financial assistance or fiscal incentives
  - Technical assistance and Agricultural Extension
  - Research and development
- Research on the valuing of a policy-induced change in soil health serves a different purpose and uses different methods that estimates of a "total" value of soil health
  - Estimates of "total value" often fail to distinguish between private and public benefits and costs
  - Valuation is critical, but so is behavioral analysis.

Policies: Evidence

OMB has long asked federal departments to provide greater evidence of policy impacts, and since 2009 has been focused both behavioral studies and retrospective impact evaluations. While not starting from zero in soil health policy, there is a lot of work to do.

- September 15, 2015 Executive Order:

> *(a) Executive departments…are encouraged to:*
>
> *(i) identify policies, programs, and operations where applying behavioral science insights may yield substantial improvements in public welfare, program outcomes, and program cost effectiveness.*

Policies: Evidence of What?

There are many different approaches to encourage soil health improvements and measuring the impacts of those approaches. Economic research build in collaboration with program agencies can demonstrate methods to:

- Identify inputs: the policy decisions that (might) lead to improvements in soil health
- Measure outputs: the changes in on-farm practices or systems the results from policy
  - Note: It helps if program agencies have quantifiable and measurable goals for these outputs
  - Taking farmer willingness to participate in programs and adopt practices (with and without program participation) is critical
- Link outputs to biophysical and social outcomes: these are both the intermediate outcomes, such as soil health, and the final outcomes such as water quality.

Policies: Financial Assistance

Practices (Soil Conservation Resource Concern)	Acres in Obligated EQIP Contracts (2010-2012)	Total acres adopting the practice in 2012
Nutrient Management (590)	5,027,941	
Conservation Tillage (329, 345, 346, 344)	4,705,073	173,116,300
No-till (329) only	2,934,583	96,476,496
Integrated Pest Management (595)	3,035,571	
Conservation Crop Rotation (328)	2,646,531	
Cover Crop (340)	1,207,450	10,280,793

Sources: NRCS RCA Interactive Data Viewer and NASS Census of Agriculture 2012. Note total acres includes current program participants, non-participants, and former-participants.

Incentives: Policy Research Needs a "Delta."

Deciding to focus on a particular type of policy (e.g.: financial assistance) and a particular output (e.g.: practice adoption rates) is a good start. However, policy research also needs to know what sort of changes in the policy are under consideration.

- What is the "delta" by which we are considering changes in the current policy?

Incentives: Less is More is Less

- The case for offering higher incentives
  - If practices (or systems) that improve soil health have multiple public benefits, "stacking" of those benefits suggests that larger payments may be justified
- The case for offering lower incentives
  - If "additionality" is a concern and many farmers would adopt with lower payments, providing lower payments could mean enrolling more acres.

Incentives: Impure Public Goods

- Additionality and stacking are two sides of the same behavioral coin: impure public goods.
- We use various policy tools to incentivize impure public goods
  - Ranking (a version of auctions, just without biddown)
  - Really savvy county officers
- The more we know about variation in private and public benefits, the better we can make those policy tools

Monitoring: Getting to Measurement of Outcomes

While knowing how a policy impacts farmer behavior (e.g.: practice adoption) is important, it doesn't tell us about performance metrics. We need additional information the environmental outcomes.

In the shift to the soil health framework, the options for outcome-based metrics is exceedingly complex. Having a small set of preferred outcome metrics would help the research.

Monitoring: Picking a Metric

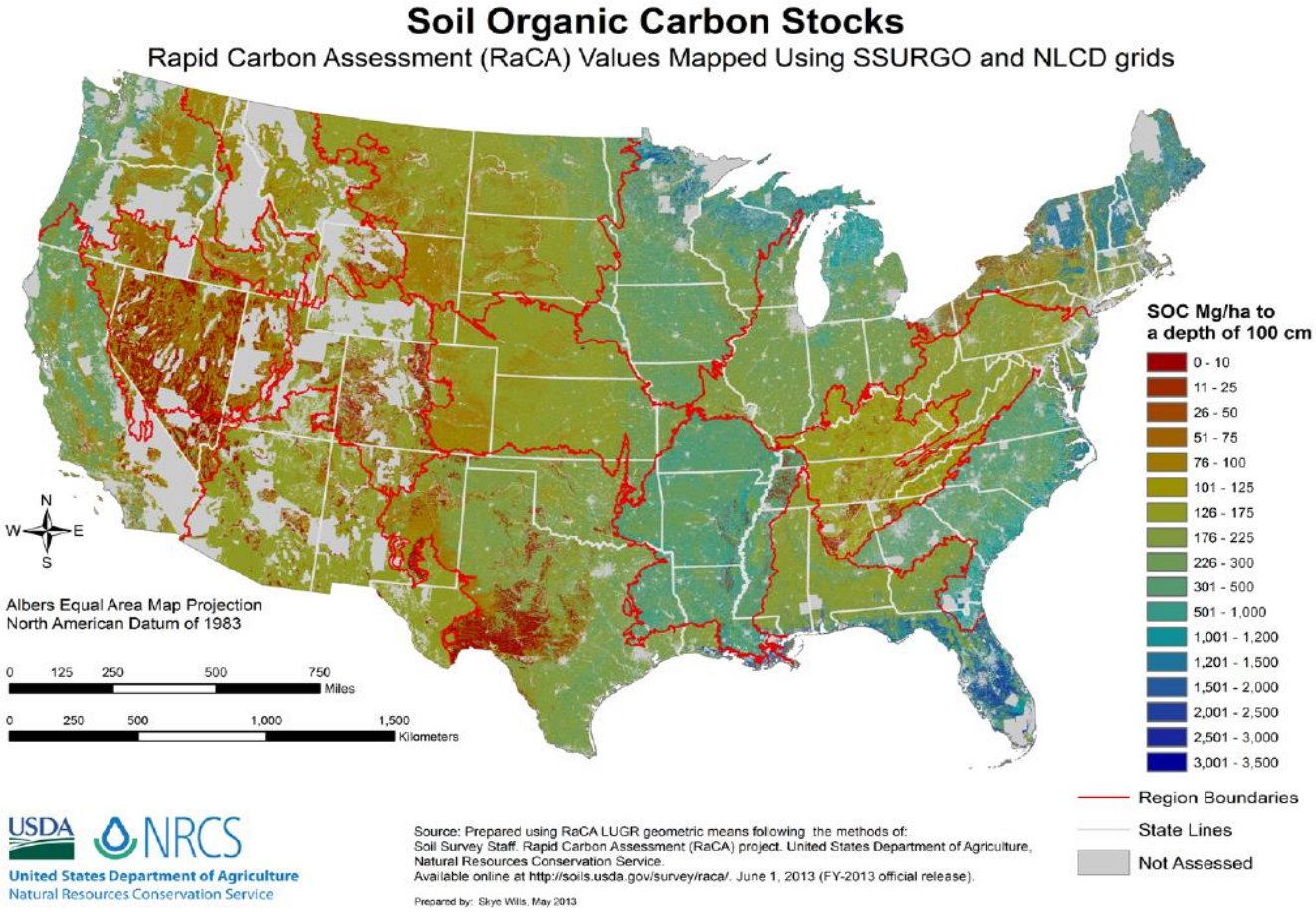
- Criteria that matter for physical science
  - Comprehensive: Fully explains the phenomenon
  - Precise: Not be too noisy
  - No measurement bias: Very accurate
- Criteria that matter for economics
  - No effect bias: Accurate at capturing changes
  - Sample size: Noisy data might not be too bad
  - Monitoring population: Needs to include non-participants in program (e.g.: CEAP, ARMS, NRI, but with monitors, or SCAN or RaCA on different sample)

Monitoring: A Proposed Metric

Of the many different soil health metrics, it would help economics research if there was one metric that could be the primary focus in the near term. In needs to be relatively low cost to monitor and have established links to at least some outputs (practices or production systems) and some outcomes (public goods). Ideally it would be a good proxy for other important attributes of health soil.

Example: soil carbon or soil organic matter.

Monitoring: Soil Carbon (Estimates)



Monitoring: Soil Carbon (Measurements)

- National and regional analysis: Monitoring by NRCS
  - SCAN (Soil Climate Analysis Network)
  - RaCA (Rapid Carbon Assessment)
- Challenge: Linking monitoring to field-level and farm-level economic data
- Potential solution: Monitoring by the farmers
  - Program participants could monitor soil carbon before and after practices
  - Non-participants could also monitor
  - The needs for accuracy and precision in measurement and for statistical controls depend upon the research question

Monitoring: Self-monitoring isn't (too) New of an Idea for Working Lands

Monitoring Practices	Acres in 2012	Program
Monitor Key Grazing Areas (PLT-02)	9,953,590	CSP
Monitoring Pastures Using NUTBAL PRO (ANM-17)	4,714,685	CSP
Tissue Tests for N-management (WQL-04)	4,649,557	CSP
Edge of Field Water Quality Monitoring (201 and 202)	(In the thousands of acres monitoring by a few hundred installations since 2010.)	EQIP

Valuation: Choosing which Benefits to Value

- Private benefits
  - Risk management, drought vulnerability
    - Soil moisture capacity, clearly related to soil carbon/organic matter
  - Reduced inputs (more related to soil nutrients)
  - Land values (soil type or suitability rating)
- Public benefits
  - Soil carbon
    - Additionality is a major challenge. Permanence less so.
  - Productivity
    - Whether this is a public good depends on the context

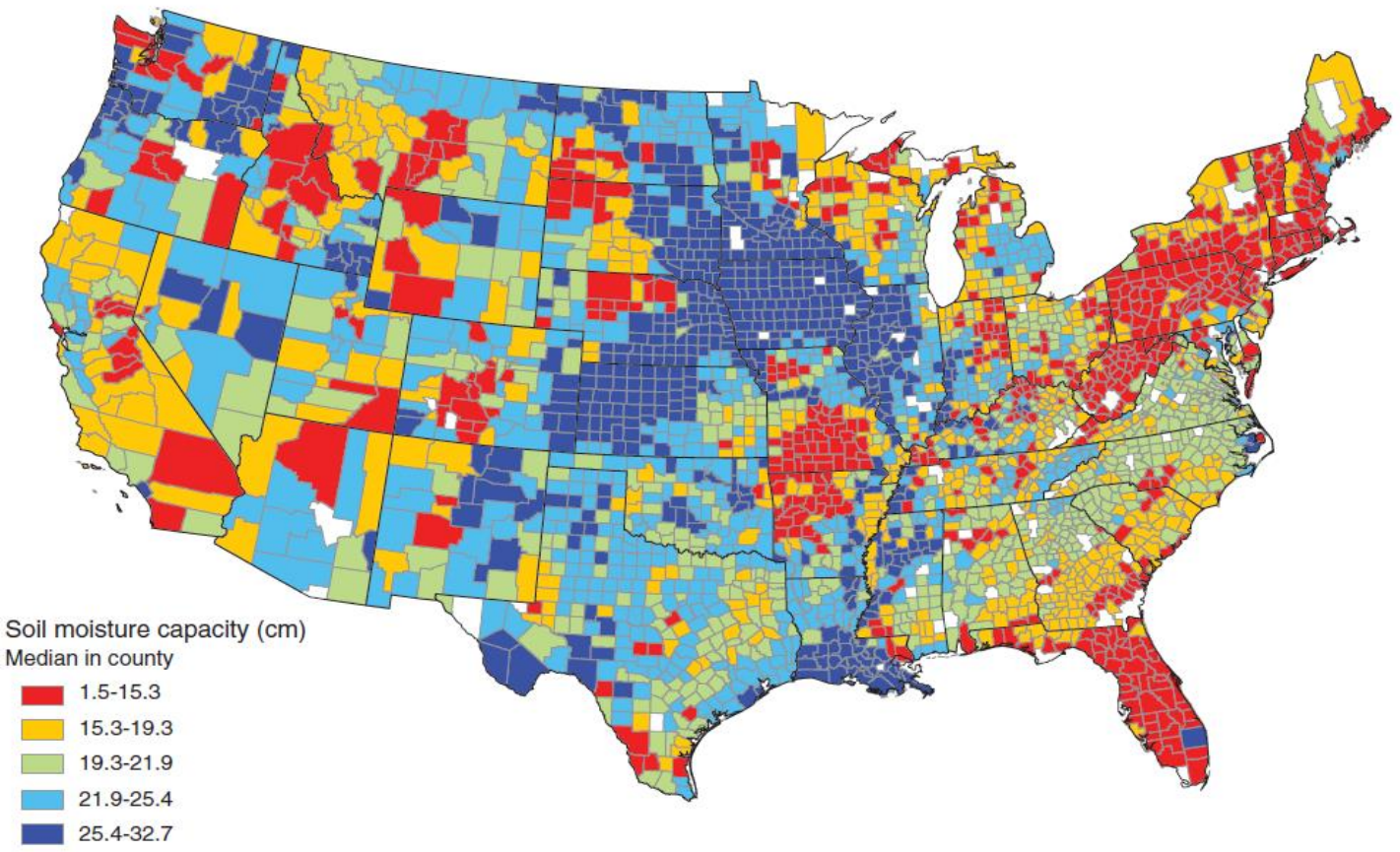
Valuation: Why Bother?

There are two important reasons for research to focus on valuation.

- Providing evidence on the net benefits of federal policy requires estimates of the public benefits and costs.
- Setting proper incentives in financial assistance programs requires knowledge on both the private and public benefits.

Valuation: Water Storage Capacity Baselines Give a Place to Start

Median water storage capacity in the top 150 centimeters of the soil profile, by county



Conclusion

- Soil health economic research needs:
  - Clear policy focus with measurable goals
  - Distinction between public and private benefits
  - Sufficient monitoring data
  - Final goods to value, both private and public

Contact Information:

  - Steven Wallander, Economic Research Service
  - swallander@ers.usda.gov