

## **The Soil Management Assessment Framework: Potential Applications for NRCS.**

Soil Management Assessment Framework (SMAF) is an expert system for soil quality (SQ) evaluations developed by USDA NRCS and ARS (Andrews et al., 2004; peer-reviewed journal article attached.) The SMAF has three main steps: Indicator Selection; Indicator Interpretation; and Integration into a single soil quality index value. The Indicator Selection step consists of a database-driven decision tool for choosing soil properties appropriate to the site in question. It considers management goals, climate, inherent soil properties, and assessment goals as criteria for selection. The second step, Interpretation, examines the performance of soil-mediated ecosystem services, such as nutrient cycling, water partitioning, and filtering & buffering of contaminants. This step considers the environmental context in which the soil property is measured to give an accurate assessment of soil function with respect to the inherent capability of the soil. These first two steps, Selection and Interpretation, can be used independently. The third step, Integration, which offers a numerical rating of overall soil quality, requires the Interpretation step to be completed before calculating an index value. Research and validation of the tool show that it is a robust and comprehensive tool for assessment of soil quality (Andrews et al., 2004; Cambardella et al., 2005; Wienhold et al., 2006; Karlen et al., 2006 – Full citations or reprints available upon request).

In its current form, SMAF requires direct sampling and laboratory analyses of soil. Further, several of the recommended analyses are not readily available at commercial soil test labs. As such, it is not feasible for use as a requirement for participation in the Conservation Security Program. However, it may be a reasonable soil quality enhancement option where partnerships exist with ARS labs or universities.

Currently, the NRCS Soil Quality National Technology Development Team has collaborative several projects aimed at further development of this tool.

- National Soil Quality Assessment Project (NSQAP) - This subcomponent of the national-level CEAP aims to provide a predictive version of SMAF (no direct soil measures required)
- Soil Quality Watershed Study - This subcomponent of the ARS CEAP Benchmark Watershed will add new indicators and further calibrate and validate the tool.
- On-line and CD version development - This NRCS-ARS collaboration will make the current tool more user-friendly.
- Tool Comparison of SMAF, SCI and a practice-based SQ tool for organic and no-till systems. This NRCS, university and ARS collaboration will further validate the tool.

Applications of the tool include (relevant projects in parentheses):

- A performance measure for soil quality (NSQAP)
- A soil quality indicator for the NRI (NSQAP)
- Increased utility of current tool for use by researchers and test labs (SQ Watershed, Tool Comparison)
- Tools for SQ analysis of soil test data for use by TSPs, advisors, and innovative farmers; program enhancement options (Online & CD)
- Indicator Selection and Interpretations for use in the new Soil Survey Dynamic Soil Properties Inventory (project in planning stages, not listed above)

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