Soil & Water Conservation
The Foundation for Sustainability

Growing and shifting population, economic globalization, and changing climate place ever greater demands on human communities and on earth's natural resource base. Policies at local, state, national, and international scales influence management decisions and ultimately the condition of natural resources. However, well-intentioned policies often have unintended consequences or are based on out-dated assumptions and goals. Soil, water, air, animal, plant, and human actions and processes are linked in complex ways at the landscape scale, To help illuminate these relationships and identify policy and management options, the Soil and Water Conservation Society (SWCS), an international, nonprofit organization, bridges multiple disciplines and focusing attention on critical environmental issues, including water and air quality, near coastal hypoxia, soil carbon sequestration and global climate change, bioenergy, agricultural productivity, food security, agricultural land management and wildlife habitat. Through its efforts to integrate science into policy, SWCS improves land- and resource-use decisions. A synopsis of key lessons learned from recent science and policy assessments are provided below. More information is available at www.swcs.org.

Lessons Learned:

1. New policy tools and measures are needed for managing agricultural soils

Meeting "T" Is Not Enough. Current widely used US conservation standards and planning tools--Soil Loss Tolerance (T), the Revised Universal Soil Loss Equation (RUSLE) version 2 and the Wind Erosion Equation (WEQ)--have resulted in major improvements in soil conservation. However, they do not address the full range of ecosystem services provided by soils. Soils enable not just the production of food, fiber, and fuel, but also the provision of clean water, the sequestration and long-term storage of carbon and nitrogen thus offsetting the release of greenhouse gases, the provision of wildlife habitat; and, among other services, and the temporary storage of water, mitigating the magnitude of flooding. Planning and assessment standards and tools for agricultural conservation programs and policies should reflect the multiple benefits that soils provide society beyond just the production of agricultural goods. In particular, they should (1) consider multiple production and ecological functions that soils provide, (2) evaluate multiple factors contributing to soil degradation, (3) provide standards or thresholds for managing soil to sustain its multiple production and ecological functions, and (4) result in more comprehensive, holistic management guidelines and recommendations. Soil erosion continues to be the primary cause of land degradation globally. It is caused not only by natural forces associated with wind and water, but also by tillage, irrigation, and through loss of soil from stream banks as the volume of runoff and streamflow increases due to less diverse land use patterns and more erratic weather patterns associated with global climate change.

See SWCS Special Publication 2007-001: Framework for Sustainable Soil Management Literature Review and Synthesis, available on line, and the expert panel report, Beyond T: Guiding Sustainable Soil Management. A Report of and Expert Consultation Facilitated by the SWCS. 2008. SWCS, Ankeny, IA. The studies were funded by the Wallace Genetics Foundation.

2. Conservation planning should reflect extreme weather events, not just normal weather

Planning For Extremes. Current conservation efforts on agricultural lands of the watersheds of the Great Lakes ecoregion are not keeping up with increasing pressure on the health of these systems from pollution from non point sources. More intensive and effective conservation efforts are needed to ensure the sustainability of our natural resources and ecosystems in response to the increased demands from climate change. Interventions must be implemented at the watershed or landscape scale, "focused for effect" at the most vulnerable parts of the landscape and at the most critical times of the year. More intense precipitation will cause runoff and erosion effects dominated by concentrated flow in ephemeral or permanent gullies rather than by sheet and rill erosion. Research is needed to determine what type of storm events cause conservation practices to fail and what the short- and long-term effects of that failure will be. Current conservation tools generally do not address failure or do not take into account that failure can cause greater damage than if the practice had not been in place. Improvements are needed to the technical support and assistance network, the single most important barrier to effective use of current tools and conservation systems. The report includes a detailed set of technical recommendations. Public policy should ensure a long-term commitment of people and resources to community-driven projects at the watershed scale since the more traditional approach of providing short-term, three- to five-year grants to communities will not work. Incentive programs must be better designed to direct the right incentives to the right decision maker and regulations must set performance standard at both the farm and watershed levels.

Planning for Extremes. 2006. SWCS, Ankeny, IA, workshop and report funded by the Joyce Foundation, Walter and Duncan Gordon Foundation and Natural Resources of Canada.

3. The landscape or watershed should be the unit of management planning

Managing Agricultural Landscapes for Environmental Quality. Greater resources are needed to translate knowledge of soil, water, air processes, and wildlife habitat into better agricultural and resource conservation. Effects of conservation practices at the field or farm level can be documented but those effects do not produce meaningful benefits until they are expressed at the watershed or landscape scale. Environmental quality is an aggregate phenomenon. Greater investment is needed in the tools and, more importantly, the continuing education and training of the people who will use those tools to improve the environment in agricultural landscapes. Greater coordination of research and monitoring and conservation program implementation could be achieved through a network of Landscape Research Laboratories (LRLs) designed to bring research, monitoring, and implementation together to address global food, feed, fiber, flower, and energy demands of the 21st century.

Managing Agricultural Landscapes for Environmental Quality: Strengthening the Science Base. M. Schnepf and C. Cox (Eds.). 2007. SWCS, Ankeny, IA 196 pp.

4. Effective conservation requires targeting

Great Lakes Clean Water. Because not all agricultural producers are good stewards, they can cause a great deal of damage in environmentally sensitive areas and/or critical watersheds. Water quality in the Great Lakes can be improved by (1) making water quality protection efforts a higher priority, (2) targeting programs at critical tributary watersheds, (3) directing conservation program funds to multi-year watershed projects, (4) using continuous sign-up for key practices in critical tributary watersheds, (5) supporting local community-driven capacity and leadership for tributary watershed restoration projects, (6) building a stronger network of technical staff and advisors to help landowners get conservation on the ground, and (7) coordinating standards, performance indicators, eligibility criteria, and regulations among local, state, and federal agencies. Government must set performance standards and motivate producers to participate in voluntary conservation programs. Critical problems include (1) small feedlots and animal feeding operations that are not being addressed by current regulatory programs, (2) failing septic systems in rural areas and failing or inadequate waste treatment facilities in small communities, and (3) degraded stream networks or poor water channel design. The stream networks are important because two-stage ditches and riparian zones can be very effective in protecting the Great Lakes ecosystem. They are difficult to implement with current USDA conservation programs because they require the participation of multiple and adjacent landowners. Crop subsidies and income support programs should require stewardship of the natural resources and protection environmental quality.

Great Lakes Clean Water: Realizing the promise of USDA conservation programs. 2007. SWCS, Ankeny, IA funded by the Joyce Foundation

5. Conservation policy and practices must adapt to climate change

Climate Change: Soil Erosion and Runoff from Cropland. Conservation policy and practices in the United States must change to accommodate impacts of climate change on soil and water resources. Precipitation patterns, particularly since 1970, have changed by a greater magnitude than had previously been estimated using global climate simulation models. This change in precipitation associated with climate variability has resulted in 4 to 95% more soil erosion and 6 to 100% more runoff at some locations. These changes in precipitation patterns can affect agricultural land in a manner disproportionate to the amount or intensity of precipitation alone. The timing of agricultural production practices can make cropland more or less vulnerable. Additional protective measures are needed to prevent the loss of the progress that has been made in reducing soil degradation and water pollution from cropland in the US.

Conservation Implications of Climate Change: Soil Erosion and Runoff from Cropland. A Report and Expert Consultation Facilitated by the SWCS. 2003. SWCS, Ankeny, IA

6. The principles of Adaptive Management should guide agricultural conservation efforts

Adaptive Management. Conservation is not just correcting past mistakes and protecting resources that we value but also adapting to new circumstances in a dynamic environment. To avoid costly mistakes resulting from poor decisions, the conservation community must use the best science, make better decisions, and demonstrate results. The principle of Adaptive Management requires that all interventions be treated as management experiments. Monitoring and assessment should be built into the planning and implementation processes and funding should reflect the associated costs. There should be a means for making results available to a wide range of users in a format interpretable to multiple disciplines. Benchmark measures should encompass not just project sites but the larger landscape and ecological process that are linked. The results of monitoring and assessment should be used to make timely adjustments to management decisions to improve outcomes.

Manale, A.P.. 2008. Steering conservation's course using adaptive management. Journal of Soil and Water Conservation 63(6):183A-184A.

7. Monitoring and assessment should be incorporated into all conservation projects to ensure better public accountability

Conservation Effects Assessment Project. Good governance requires public agencies demonstrate fiscal and programmatic accountability. In other words, the public has the right to know how funds are spent and what they have accomplished. Accountability in agricultural conservation means collecting the right information on what the effort has achieved (monitoring) and comparing the effects to established environmental goals that are linked to the ecological and economic context in which the interventions occur (evaluation). Simulations and extrapolations cannot – and must not – substitute for on-the-ground monitoring and inventory systems designed to determine if anticipated conservation and environmental benefits are being achieved. The Conservation Effects Assessment Project (CEAP) conducted under the auspices of the United States Department of Agriculture and with support through SWCS represents a good first step towards better accountability.

Conservation Effects Assessment Project: Preliminary Findings. 2005. SWCS, Ankeny, IA Conservation Provisions of the 2007 Farm Bill: Opportunities to Inform Debate. 2005. SWCS, Ankeny, IA Conservation Effects Assessment Project: Final Report. 2006. SWCS, Ankeny, IA CEAP: The Conservation Effects Assessment Project Special Issue. Journal of Soil and Water Conservation. Vol. 63 (6) Nov. – Dec. 2008. SWCS, Ankeny, IA

The special issue of the Journal of Soil and Water Conservation provides a comprehensive overview of the science, technology, and information that are emerging from CEAP research effort. Collectively these efforts will help answer the question "What should we do next year?" rather than "What did we do last year?" This will then enable the CEAP to become an integral part strategic resource management and to provide the science-base for adaptive management of conservation programs. CEAP: The Conservation Effects Assessment Project Special Issue. Journal of Soil and Water Conservation. Vol. 63 (6) Nov. – Dec. 2008. SWCS, Ankeny, IA

8. New policies and strategies are needed to ensure that bioenergy is produced sustainably

Sustainable Bioenergy from Agricultural Landscapes. The increasing demand for and investment in bioenergy and new bioproducts creates new challenges and opportunities for the sustainability of soil and water conservation. Simply producing more feedstocks or directing more animal manure into methane digesters is not the answer, especially considering that our climate is changing and past conservation programs, policies, and strategies may are not sufficient. A new vision and strategy is needed for merging the science and art of sustainable land use to inform policymakers, entrepreneurs, land managers, and the public regarding where and how bioenergy feedstocks and sources can be produced in a sustainable manner. Building on the scientific capabilities of natural resource research and the conservation communities will lead to more sustainable agricultural landscapes that protect soil, water, and air resources while also increasing the viability of farm families, enhancing wildlife habitat, and increasing the resiliency of our landscapes to the surprises of climate change. The benefits extend beyond energy independence, security or carbon markets. SWCS can provide the leadership over the next year to ensure that natural resource conservation is an integral part of the energy policy and programs of various levels of government.

Lal, R.. 2004. Is crop residue a waste? Journal of Soil and Water Conservation 2004 59(6):136A-139A.

Jean L. Steiner. 2008. Answers and analysis needed to guide the use of biofuels as a renewable energy source. Journal of Soil and Water Conservation 2008 63(1):7A.

Jane M-F Johnson, J. M-F, D. Reicosky, Allmaras, R. Archer, D. and W. Wilhelm. 2006. A matter of balance: Conservation and renewable energy. Journal of Soil and Water Conservation 61(4):120A-125A.

9. Grassland Environments must be managed differently to bring about sustainability

Farming with Grass. Sustainably managing grassland environments requires incorporation of ecological principles and accounting for environmental services and costs related to agricultural production practices and landscape management systems. Agricultural policy and practice should be fundamentally redesigned to maintain or increase production from agricultural grasslands, mitigate past environmental damage, provide healthier foods (particularly to children and the poor), and increase opportunities in rural areas. Achieving sustainable agricultural landscapes in grassland environments is a broad, perhaps audacious goal, yet the need for change is undeniable. Today's agriculture and food systems are deeply rooted in the era of cheap energy, an assumption of static climate, and the ability of entities to "externalize" environmental and social costs. Disarray in global financial systems has led to more open discussion of rights and responsibilities of individuals and corporations as well as the role of government in economic systems. With growing world population, increased demand on water supplies, increased vulnerability to climate extremes, and low global food stocks, it is time to rethink how to provide secure and resilient food systems and enhanced economic opportunities in rural communities. While the pressures are diverse and great, times of change present opportunities to reassess options and choose new directions. A new vision for agriculture address four grand challenges: achieving sustainable bioenergy production, adapting to and mitigating global climate change, improving water quality and availability, and ensuring food security–are interrelated and must be addressed systematically, so that today's solutions do not create tomorrow's problems. Past policies have favored a few commodity crops, and disfavored producers of grasses and other perennial crops. Perennial species, incorporated into diverse agricultural systems, have great potential to enhance resilience against uncertain climate and market conditions. By developing on-farm and rural enterprises, agriculture can help revitalize communities and provide healthy, local food options.

Steiner, J.L. and A. J. Franzluebbers. Farming with grass—for people, for profit, for production, for protection. Journal of Soil and Water Conservation 2009 64(2):75A-80A; and Farming with Grass: Achieving Sustainable Mixed Agricultural Landscapes. A. J. Franzluebbers[ed.] 2009. SWCS, Ankeny, IA. http://www.swcs.org/en/publications/farming_with_grass/
