

## Improving conservation planning for extreme events

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**T**here is growing evidence that the climate of the Great Lakes region is changing in ways that are likely to increase nonpoint source pollution from agricultural watersheds. Climate models suggest these changes are likely to continue and potentially intensify in the future.

The Soil and Water Conservation Society held a workshop in November 2006 to (1) evaluate the scope and magnitude of the conservation challenges and environmental threats posed to the Great Lakes ecosystem by upward trends in the amounts and intensities of precipitation

and (2) recommend improvements to conservation tools, approaches, and policies to meet those challenges and to manage those threats.

Workshop participants were particularly concerned that increased probability and severity of erosion, runoff, and pollution were occurring at the same time that demands on our soil, water, and agricultural watersheds are increasing. Demand for food, fiber, land, and water are increasing with population, and the emphasis on increasing production of energy from biomass will dramatically intensify the demands placed on soil, water, and agricultural resources. More intensive and effective conservation efforts are already needed to ensure that we meet these increased demands while sustaining our natural resources and ecosystems. Climate change will multiply the challenges conservationists face.

Participants were concerned that current conservation efforts are not keeping up with increasing pressure on agricultural watersheds. They thought that climate change could spark a “downward spiral” caused by self-reinforcing changes in soil erosion, hydrologic cycles, and aquatic ecosystems. They worried that risks are likely to increase from climatic, demographic, and food and energy production stresses, making the status quo level of conservation on agricultural landscapes progressively less protective.

Workshop participants recommended as a first priority to make better use of current conservation tools, systems, and programs. Four opportunities are particularly promising:

1. Focus more attention in planning and program implementation processes on currently well-understood practices that reduce damage from concentrated water flow.
2. Focus more attention in planning and program implementation processes on protecting or repairing stream and riparian corridors.
3. Use current models and monitoring systems to identify high-risk and high-

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value tributary watersheds that would benefit from focused conservation efforts.

4. Update climatic parameters used in conservation tools and planning approaches to include the most recent data and ensure that routine and periodic updates are completed in the future.

Action to take advantage of the first three opportunities is urgently needed to address existing threats to the Great Lakes under the current climate regime. The likelihood of increasing frequency, intensity, and magnitude of severe storms makes action on these three opportunities even more urgent.

The single most important barrier to more effective use of current tools and conservation systems is a technical support and assistance network that is weak and growing weaker. Inadequate technical support and assistance networks will cause lasting damage to our efforts to respond to current challenges, let alone the growing challenge created by climate change.

Workshop participants also stressed the need for better monitoring systems. Managing the risks of severe storms requires monitoring systems that can detect such events in the context of long-term time series and document their effects at appropriate temporal and spatial scales. A research and development effort should be mounted to develop and deploy affordable monitoring systems and technologies and

to establish and maintain a regional data warehouse that will provide conservationists with the information needed for effective adaptive management.

Conservation planning inherently involves making decisions about what level of probability and severity of damage to natural resources or the environment is acceptable, and what combination of practices and activities is sufficient to keep the probability and severity of damage at or below that acceptable level. The need for an explicitly risk-based approach to planning is made more urgent by the increased probability of more frequent and more severe storm events.

Planning tools designed to develop recommendations for conservation efforts at field, farm, and watershed scales can and should be developed that are capable of predicting and reporting the probability of damage from a particular storm event as well as from annual precipitation. Those tools should be able to be tailored to specific times of the year. Workshop participants were clear that all factors in a changing climate must be considered when doing risk-based assessments, planning, and implementation.

The ultimate goal of risk-based conservation planning and implementation should be to increase the capacity of agricultural landscapes to resist and recover from severe events. Greater resistance and resilience in agricultural landscapes is best achieved through conservation systems

composed of multiple and mutually-reinforcing practices and activities implemented at various scales. Conservation tillage, for example, must be backed up with grassed waterways, contour grass strips, filter strips, riparian buffers, and other appropriate and feasible measures on a particular farm in a particular watershed. This layered or multitiered approach to conservation builds in redundancy that helps resist the effect of an infrequent but potentially damaging severe event.

We cannot meet today's challenges—particularly the off-farm effects on water quality and aquatic ecosystems—without dealing effectively with concentrated flow. Among the most troubling effects of increased precipitation intensity on runoff and soil erosion will be beginning to shift the dominant processes causing damage from sheet and rill erosion to concentrated flow erosion in ephemeral or permanent gullies. Developing and implementing tools to enable conservationists to predict and manage the risks created by concentrated flow should receive high priority for adapting to a climate regime with increased probabilities of severe storms.

Workshop participants indicated that they want to better understand at what point and under what kind of storm events conservation practices begin to fail and what the consequences are. Current tools do not address failure, or, if they do, the assumption is that failure causes no further damage than the amount that would have

been experienced if the practice was not in place. Experience, however, indicates that, in some cases, practice failure may result in greater damage than would have occurred if the practice had not been in place.

Working at the watershed or landscape scale is the only way to deal with the off-site effects in agricultural watersheds. Conservationists have to connect the dots—make sure our work on farms adds up and that the sum of our efforts is greater than the parts.

Working at the watershed scale opens up opportunities to plan and implement different strategies that complement and increase the benefits of in-field practices. Strategies to restore wetlands, repair stream channels, and enhance riparian corridors are best implemented at the watershed scale and will reinforce the benefits of work at the farm scale if the efforts are effectively targeted and coordinated.

The most compelling advantage of working at the watershed scale is the ability to “focus for effect” to direct conservation efforts at the most vulnerable parts of the landscape and during the most vulnerable times of the year. Workshop participants were particularly optimistic about the opportunity to manage risk associated with watershed-scale erosion and sediment loading through improved targeting because advances in information technology are making such targeting easier, more affordable, and more accessible to conservationists, producers, and policymakers.

Participants also recommended that we maximize the communication value of new targeting tools and models to help citizens better understand the causes and effects of environmental problems in their watershed and thereby to inform and communicate problem identification and decision making. The social and economic implications of the consequences of severe storms and of alternative risk management options need to be made clear, as do the physical and ecological consequences.

Participants discussed the need for programmatic and policy changes that

will require more long-term attention to support risk-based assessment, planning, and implementation of conservation efforts to improve the health of the Great Lakes ecosystem.

Public policy must ensure a long-term commitment of people and resources to community-driven projects at the watershed scale. The more traditional approach of providing short-term, three- to five-year grants to communities will not work. Sustained effort and support must be available to build the local infrastructure—leadership, technical support, and monitoring systems—essential to making effective adaptive management possible. Innovative funding systems need to be developed and tested to provide sustained support to community-driven watershed projects.

More effective conservation assessment and planning tools will accomplish little, according to workshop participants, unless we find effective ways to increase the use and implementation of conservation systems and to target implementation at the most critical portions of farms and watersheds. Conservation programs must take into account the realities of current farm structure and land tenure. Landowners, producers, and increasingly farm management consultants are joint decision makers when it comes to implementing conservation practices and systems. Incentives programs must become more adept at directing the right incentives to the right decision maker.

The opportunity to develop regulatory systems that are innovative and well suited for agriculture is great. One of the most important roles for regulation is to set performance standards both at the farm and watershed levels. To the maximum extent possible, regulations should be based on performance rather than practice standards. Regulations should clearly tell producers what they need to accomplish, but producers and their technical advisors should have the flexibility to determine how to accomplish it.

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## ACKNOWLEDGEMENTS

The conclusions and recommendations presented here were developed during a Soil and Water Conservation Society workshop held in Milwaukee, Wisconsin, November 1–3, 2006. This article was adapted from *Planning for Extremes*, a Soil and Water Conservation Society special report sponsored by the Joyce Foundation, Walter and Duncan Gordon Foundation, and Natural Resources Canada.

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