



# NRCS **Technology News**



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**April 2004**

“*NRCS Technology News*,” provided by Science and Technology, delivers pertinent information to our customers about new technology, products, and services available from the Soil Survey and Resource Assessment and the Science and Technology deputy areas.

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## MESSAGE FROM THE DEPUTY CHIEFS

### Partnering to Improve Water Quality in the Mississippi River Basin

Lawrence E. Clark and Maurice J. Mausbach



Lawrence Clark Maurice Mausbach

The management of watersheds in the Mississippi River Basin impacts the overall health of the Mississippi River. Managed improperly, sediments and pollutants from land are delivered into the river. This results in the loss of wildlife habitat, increased costs for treating drinking water, loss of nutrients, and more importantly, the loss of the soil resource. Taking responsibility for improving water quality at the local level not only provides benefits locally, but ultimately improves the health of the entire Mississippi River Basin. The Natural Resources Conservation Service (NRCS) is actively working to improve water quality in the Mississippi River Basin through numerous coordinated activities with a variety of partners. Some of these activities include the Lower Mississippi Valley Initiative, the Upper Mississippi River Stewardship Initiative, the Ohio River Basin Environmental Credit Trading Pilot Project, and the Agricultural Drainage Management Systems Task Force.

#### Lower Mississippi Valley Initiative

NRCS provides coordination leadership in the lower reaches of the Mississippi River through the Lower Mississippi Valley Initiative<sup>1</sup> (LMVI). The LMVI was organized by the associations of conservation districts of Arkansas, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee, in cooperation with State and local partners. The objectives of this initiative are to promote awareness that agricultural profitability and environmental stewardship are not mutually exclusive and to increase public understanding of the importance of agriculture.

#### Upper Mississippi River Stewardship Initiative

The Upper Mississippi River Stewardship Initiative<sup>2</sup> is a public-private partnership to reduce sediment and nutrient loss in the Upper Mississippi River Basin. The Initiative was developed at St. Mary's University<sup>3</sup> with input from a core development team represented by the Mississippi River Basin Alliance<sup>4</sup>, American Rivers<sup>5</sup>, the U.S. Army Corps of Engineers<sup>6</sup>, the University of Minnesota<sup>7</sup>, and NRCS. The objectives are to identify major sources of sediments and nutrients; to create basin-wide monitoring network, outreach, and coordination; to develop new solutions; and to increase and target financial and technical assistance.



View of the Upper Mississippi River.

<sup>1</sup> For more information on the Lower Mississippi Valley Initiative, visit <http://www.agctr.lsu.edu/LMVI/>.

<sup>2</sup> For more information on the Upper Mississippi River Stewardship Initiative, visit [http://www.umbsn.org/stewardship\\_legislation/](http://www.umbsn.org/stewardship_legislation/).

<sup>3</sup> Visit St. Mary's University's Web site at [http://www2.smumn.edu/ra/gis/pages/RA\\_Staff/BDrazkowski.htm](http://www2.smumn.edu/ra/gis/pages/RA_Staff/BDrazkowski.htm).

<sup>4</sup> For more information on the Mississippi River Basin Alliance, visit <http://www.mrba.org/index.htm>.

<sup>5</sup> For more information on American Rivers, visit <http://www.amrivers.org/>.

<sup>6</sup> For more information on the U.S. Army Corps of Engineers, visit <http://www.usace.army.mil/>.

<sup>7</sup> Visit the University of Minnesota's Web site at <http://www1.umn.edu/twincities/index.php>.

As part of this Initiative, the Sand County (WI) Foundation<sup>8</sup> will be working with the NRCS to expand its innovation in farmer education, outreach, and delivery in selected Midwest States that use market-based incentives to reduce nitrogen discharge from agricultural lands. The Upper Mississippi Basin Stakeholder Network, the outreach component of the Stewardship Initiative, is a network of stakeholders in Illinois, Indiana, Minnesota, Missouri, and Wisconsin. The stakeholders include farm and environmental organizations, watershed management alliances, soil and water conservation districts, landowners, tribes, and Federal and State agencies.

### **Ohio River Basin Environmental Credit Trading Pilot Project**



*Ohio River. Photo courtesy of the Environmental Protection Agency.*

This is the first interagency effort to conduct environmental credit trading within a large watershed. The originating partners include the Environmental Protection Agency<sup>9</sup>, Ohio River Valley Water Sanitation Commission (ORSANCO)<sup>10</sup>, USDA, and the Ohio River Basin states. They are working to establish and implement voluntary market-based approaches that will improve water quality within the Ohio River Basin and reduce nutrient loads to the Gulf of Mexico. Goals of this project include improving water quality and, where possible, achieving ancillary environmental benefits through trading; leveraging investments in agriculture that increase productivity and improve environmental performance; and, where it is

determined there is capacity for trading, establishing stakeholder partnerships at the local, State and Federal levels to obtain support and resources to implement a pilot-trading program.

### **Agricultural Drainage Management Systems Task Force**

The Agricultural Drainage Management Systems (ADMS) Task Force<sup>11</sup> was founded by NRCS, the Agricultural Research Service, and university scientists interested in improving water quality through the use of improved agricultural drainage water management systems. It is an example of dedicated professionals initiating an effort from “the ground up” to address a serious problem. The primary goal of the ADMS Task Force is to develop a national effort to implement improved agricultural drainage water management practices and systems that will enhance crop production, conserve water, and reduce adverse off-site water quality and quantity impacts. Participation in this effort has been expanded to include scientists from State and Federal agencies, more university scientists from across the country, industry representatives, trade organizations, and other groups interested in improving water quality and quantity.

The list of activities is impressive. Through partnership projects such as these on the Mississippi River, the agricultural community can improve water quality through mutually acceptable practices and systems. The ultimate goal is that together, we can implement scientifically based best management practices and strategies, enabling all of us to meet environmental goals.

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<sup>8</sup> Visit the Sand County Foundation’s Web site at <http://www.sandcounty.net/>.

<sup>9</sup> Visit the Environmental Protection Agency’s Web site at <http://www.epa.gov/owow/watershed/trading/tradingfaq.html>.

<sup>10</sup> Visit the Commission’s Web site at <http://www.orsanco.org/>.

<sup>11</sup> Visit the ADMS Web site at <http://www.ag.ohio-state.edu/~usdasdru/ADMS/ADMSindex.htm>.

## CONSERVATIONIST'S CORNER

Harold L. Klaege--State Conservationist, Kansas



*Harold Klaege*

NRCS Kansas has called upon the NRCS Science and Technology Consortium for assistance many times. The following are a few examples of support the Consortium has provided.

Wetland Science Institute personnel helped Kansas develop a hydric soil indicator for the playa lakes region in western Kansas. Institute staff and Kansas soil scientists investigated multiple playa lake sites to develop a draft hydric soil indicator. The development of this indicator has increased the proficiency to identify hydric soils in western Kansas.

The Grazing Land Technology Institute (GLTI) provided training to a rangeland management specialist using the Grazing Lands application that included software to assist producers dealing with animal nutrition. This led to the use of the Nutritional Balance Analyzer (NUTBAL) computer software. The GLTI team has always been available to help the grazing land specialists improve their skills to better serve clients and also to answer questions specific to producers and their goals.



*Cattle grazing at sunset in Kansas. Photo by Jeff Vanuga.*

The Manhattan Plant Materials Center (PMC) has been instrumental in the transfer of plant materials and technology to field locations in the Kansas, Nebraska, and Oklahoma service area. The ability to integrate native legumes into Conservation Reserve Program grass monocultures was tested by Plant Materials staff in Tribune, Kansas. The PMC provided native grasses for use in buffer technology to the field offices in the Northern Great Plains. The PMC also instituted a cool-season forage grass evaluation to determine if grazing seasons could be extended in the predominately warm-season zone in Kansas and Oklahoma.

Assistance from the National Water Management Center (NWMC) has been instrumental in attending to the critical issues facing many Kansans today. NRCS Kansas is marking the 50th Anniversary of Public Law 83-566 (PL-566), the Watershed Protection and Flood Prevention Act. The State's recently reestablished Water Resources Planning (WRP) staff is addressing issues related to PL-566 flood control, watershed function, and rehabilitation of aging flood control structures with the help of the NWMC.

Historically, Kansas has been a leader in the PL-566 program. More than 1,000 small watershed dams in 62 watershed districts have been planned, with over 800 built. Planning for those dams was completed 30 to 40 years ago. The new WRP staff looked to the NWMC for guidance and expertise regarding rules and procedures for PL-566 and dam rehabilitation. In particular, the NWMC has clarified such things as the calculation of economic benefits associated with flood control dams, watershed plan supplemental procedures, and dam rehabilitation benefit/cost determinations. In addition, the NWMC provides indepth training in water resource planning.



*Black Vermillion PL-566 Watershed Project in Kansas. Photo by Jeff Vanuga.*

The NWMC staff assisted the hydraulic engineer with the following models: the Hydrologic Engineering Center – River Analysis System (HEC-RAS), the Natural Resources Conservation Service (NRCS) TR-20 model, and the NRCS SITES model. The NWMC can help set up and calibrate the models as well as show users how to apply the output for different planning alternatives. For example, in developing a breach inundation map for dam sites, NWMC suggested using the modeled inundation elevation to build a flood-proofing wall rather than relocating a residence.

The NRCS Science and Technology Consortium provides consistency with rules and procedures, training opportunities for staff, and timely and thorough responses to inquiries. By providing this professional guidance, the Science and Technology Consortium has bolstered the ability of NRCS Kansas staff to provide our customers with the best possible technical assistance available.

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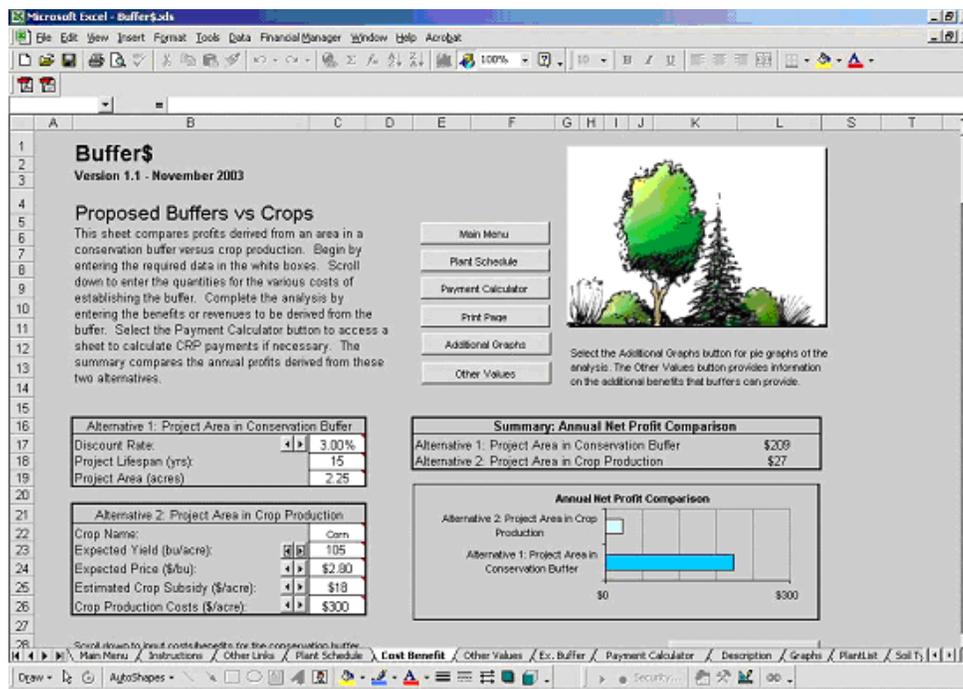
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## **NEW PRODUCTS AND SERVICES**

### **#1 Buffer\$ Pay!**

*Do buffers pay with conservation programs? Can landowners earn income on buffers after cost-share programs are completed? Does removing an existing buffer make economic sense?*

Answering these questions is now easy with a new tool called Buffer\$, a simple spreadsheet-based application to assist landowners and planners in analyzing the cost-benefits of conservation buffers. Developed by the USDA National Agroforestry Center (NAC) with input from NRCS personnel, Buffer\$ can calculate potential income from a buffer using cost-share programs, growing agroforestry specialty products, and incorporating other income opportunities. To aid in decisionmaking, this tool can compare the potential income generated from a buffer alternative to a cropping alternative.



The four basic steps to calculate the cost-benefits of a buffer system follow:

1. Select the plant material used in the buffer design using drop-down menus.
2. Input the costs for establishing and maintaining the buffer. Default costs are provided if local costs are not readily available.
3. Use the payment calculator to determine the economic benefits from enrolling in the Continuous Conservation Reserve Program (CCRP).
4. Input basic crop data (e.g., yield and price per bushel) to compare the buffer alternative to a crop alternative.

Using an example from Nebraska, a riparian forest buffer and filter strip are proposed for 2.25 acres in Otoe County on Haynie soils, which are subject to frequent flooding. After inputting the necessary information, Buffer\$ calculated that the buffer will provide a net return of \$209 annually from CCRP, in contrast to \$27 from corn grown on the same tract of land. After the contract period is completed, the buffer system can still yield significant returns for the landowner. In this same scenario, the landowner planted one row of curly willow, a species used in the floral industry, using nonprogram funds. After the contract period, the landowner is able to harvest the willows for an annual net benefit of \$230. The mature buffer also provides prime wildlife habitat, and the landowner can sell hunting leases for an annual net return of \$700. The annual net income of \$930 greatly exceeds the crop income, demonstrating the post-program value of buffers.



*An NRCS field staff member planning a conservation initiative with a dairy farmer.*

Buffer\$ uses NRCS state average costs for installation and maintenance budgets and county soil rental rates for calculating CCRP payments. To customize the tool for your area, state average costs and county soil rental rates, available from your local NRCS office, can easily be entered into the program. Buffer\$ can be downloaded from the NAC's Web site <http://www.unl.edu/nac/conservation/>. It requires Microsoft Excel to run. A compact disc with the Buffer\$ can also be requested by contacting NAC.

Funding for this tool was provided through the USDA NAC, the University of Missouri Center for Agroforestry, the Agricultural Research Service, and the U.S. Environmental Protection Agency.

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## #2 Symbols for Unknown Plants Developed

A list of symbols for unknown plants has been generated by the National Plant Data Center. This list consists of symbols (beginning with the numeral 2) that have been standardized across agencies (NRCS, U.S. Forest Service, U.S. Geological Survey, Bureau of Land Management, etc.) to represent “unknowns” in plant transects and inventories. These symbols are useful to field staff involved in the Natural Resources Inventory, grazing lands survey, and other inventories when a plant cannot be identified to species or genus, but should be recorded.

This new list contains over one hundred “unknowns” ranging from 2FA=annual forb or 2LTR=litter to 2SDBD=shrub, deciduous, broadleaf, dicot. The list of these symbols is maintained by the National Plant Data Center and is available in the PLANTS download area on the PLANTS homepage at <http://plants.usda.gov>.

For more information, contact:

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*Perennial monocot forb. Photo courtesy of the National Plant Data Center.*

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## TECHNOLOGICAL ADVANCES

### #3 National Soil Survey Center Tests XRF Meter

Scientists at the National Soil Survey Center (NSSC) tested a portable X ray fluorescence (XRF) meter as potential new technology for field soil surveys in urban and industrial areas. The suitability of portable XRF meters to supplement current laboratory methods to measure trace element contents in soils was evaluated. Trace element contents have long been important for accurate soil mapping in urban and industrial areas and for soil survey interpretations. Recent requests from state soils staffs have included soil contents of lead (Pb), arsenic (As), and selenium (Se).



*Example of a portable XRF meter with attachments for direct field soil sampling or analysis of prepared soil samples. Photo by Joyce Scheyer.*

This technology is useful in soil surveys for four major reasons:

- The rapid growth in urban soil surveys is expected to strain the current capacity for metal analysis at the Soil Survey Laboratory.
- Screening sites in the field before extensive sampling can lead to savings up to 60 percent on equipment and personnel and to reduced mapping time.
- Safety can be increased at urban sampling sites if soils are screened before employees are exposed to contaminated materials.
- Cooperators, such as the U. S. Environmental Protection Agency (including the Lead-Safe Yard Program), already use portable XRF meters in the field to identify sites with high risk from metals in soil and paint residue.

It is recommended that NRCS soil scientists and conservationists in urban areas attend the available training on portable XRF meters to increase their awareness and skill with tools used by cooperators. These general vendor training sessions can be followed by local onsite workshops and joint sampling trips for field training coordinated by NSSC scientists.

Portable XRF meters are affordable new technology for NRCS. These XRF meters can increase the safety and efficiency of soil surveys in urban and industrial areas while supplementing existing laboratory resources.

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## TECHNOLOGY TRANSFER

### #4 NRCS Assists El Salvador with Horizontal Wells Project

*Horizontal Wells: Inexpensive, Small-scale Technology to Improve Access to Rural Water Supplies in El Salvador* is a new project funded by a 3-year Scientific Cooperative Research Program Grant from the Foreign Agricultural Service, USDA. The recipient of the grant is John Moore of Science and Technology's Conservation Engineering Division. The use of in-channel infiltration galleries and off-channel storage structures is being promoted. These galleries and structures will develop small-scale drip-irrigation water supply systems to strengthen the capability of subsistence farmers to generate cash crops during the dry season. Moore is working in cooperation with CARE El Salvador, a non-profit, non-government organization (NGO), the U.S. Agency for International Development (USAID), and a consortium of other local NGOs with expertise in conservation and rural development.

The systems consist of three main components: the infiltration gallery, the delivery pipes, and an excavated, off-channel reservoir. Two pilot systems have been constructed thus far. USAID has committed \$1.5 million this year to invest in another 50 such systems in targeted watersheds in El Salvador. Given the initial success of these demonstration projects, USAID anticipates that many other cooperating farmers will be able to obtain private funding for future development.



*El Cerrito reservoir in El Salvador.*

The system has many attractive advantages. It is environmentally unobtrusive, the stream channel is restored to its original grade, and only a few hundred cubic meters of water are removed. Excess water is conveyed safely back to the channel. Being off-channel, the reservoir is not subject to catastrophic damage related to flooding, earthquakes, or sedimentation. Initial cost is low (about \$20,000) and should amortize in about 3 years. The system is gravity driven and requires minimal maintenance. It is well-suited to mountainous micro-watersheds at elevations higher than natural springs and to areas where underground water is unavailable for conventional drilled or dug wells. The systems also have potential to supply water for domestic animals, especially cattle and chickens. For favorable sites, small-scale hydroelectric generation is feasible to provide additional revenue in the wet season.

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## TRAINING

### #5 Discover Your Strengths with *The Leader in You* on May 18



*Marcus Buckingham*

*The Leader in You* 2004 spring satellite seminar series will conclude with “Now, Discover Your Strengths,” featuring author Marcus Buckingham. This seminar will air on Tuesday, May 18, 2004, from 11:00 a.m. to 12:30 p.m. e.t. Satellite coordinates for this seminar will be posted on the my.NRCS employee Intranet Web site and e-mailed to partner contacts as soon as they are available.

Using ideas from his recent book, *Now, Discover Your Strengths*, Marcus discusses how individuals, by discovering their personal strengths, can become better managers and employees. Techniques are provided for better on-the-job performance by partnering specific employee strengths with the “right fit” for each individual.

In addition, don't forget to join us on April 2 from 12 to 2 p.m. e.t. for “Leaders at All Levels” with Laree Kiely. Within 30 days after the live seminars, tapes of the presentations are available for loan from the Social Sciences Institute's lending library. Tapes of 39 previous seminars are available for loan to staff and directors of NRCS, NACD, and NASCA.



*Laree Kiely*

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## MEETINGS

### #6 Symposium Held on Riparian Ecosystems in Transition

A symposium entitled, *Ribbons of Life in the Heartland: Riparian Ecosystems in Transition*, was recently held in conjunction with the Midwest Fish and Wildlife Conference. Symposium sponsors included the Natural Resources Conservation Service's Wildlife Habitat Management Institute (WHMI) and the Iowa State Office; The Wildlife Society's North Central Section; and American Fisheries Society's North Central Division, Rivers and Streams Committee. About 1,000 people attended, including NRCS biologists from all of the Midwestern States.

The goals for the symposium included the following:

- increase awareness of issues and activities in riparian areas in the Midwestern States
- raise the level of understanding of riparian ecosystem processes
- facilitate the development of partnerships that contribute to improved management of riparian systems in the Midwestern States
- identify solutions to the challenges presented by riparian ecosystems with general applicability to Midwestern ecosystems

The symposium covered subjects including USDA conservation initiatives, water quality and wildlife issues related to buffers, conservation of biodiversity, riparian management tools, and landowner success stories.

NRCS played a lead role in the development and conduct of the riparian symposium. Bill Hohman (wildlife biologist, WHMI) served as symposium co-chair. Jim Ayen (state resource conservationist, NRCS-IA) and Pat Graham (state biologist, NRCS-MO) participated on the planning committee. Ayen and Graham also organized and moderated paper sessions entitled *USDA Riparian Conservation Initiatives in the Midwest* and *Landowners Making a Difference in Riparian Restoration and Management*.



*Tony Thompson, a corn and soybean farmer from southern Minnesota, was part of a landowner panel at the “Ribbons of Life in the Heartland: Riparian Ecosystems in Transition” symposium. He explained the wildlife and water quality values of the conservation buffer he established around his wetland.*

Riparian systems are a focus area for the NRCS and its conservation partners in the Midwest. Consequently, the WHMI has actively pursued collaborations and training opportunities. These efforts contribute towards an improved understanding of riparian processes, as well as development/application of new technology that enables NRCS field staffs to more effectively plan, implement, and manage riparian systems.

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