Nonpoint Source
News-Notes
June 2010, #90

The Condition of the Water-Related Environment
The Control of Nonpoint Sources of Water Pollution
The Ecological Management & Restoration of Watersheds

United States Environmental Protection Agency

Notes on the National Scene

Digital Coast Helps Manage the Present and Plan for the Future

Looking for ways to better manage your coastal community and protect it from future land use change or sea level rise? The free "Digital Coast" information resource (www.csc.noaa.gov/digitalcoast) might have just what you need. Developed by the National Oceanic and Atmospheric Administration (NOAA) in partnership with several other organizations, Digital Coast is a Web-based information delivery system that provides not only data, but also the training, tools and examples needed to turn those data into information that can be used by local planners.

NOAA launched phase one of Digital Coast in 2008 and populated it with data and tools available from the NOAA Coastal Services Center. "We structured the Web site to

Volunteers "liberate" soil by removing unnecessary asphalt. See article on page 15.

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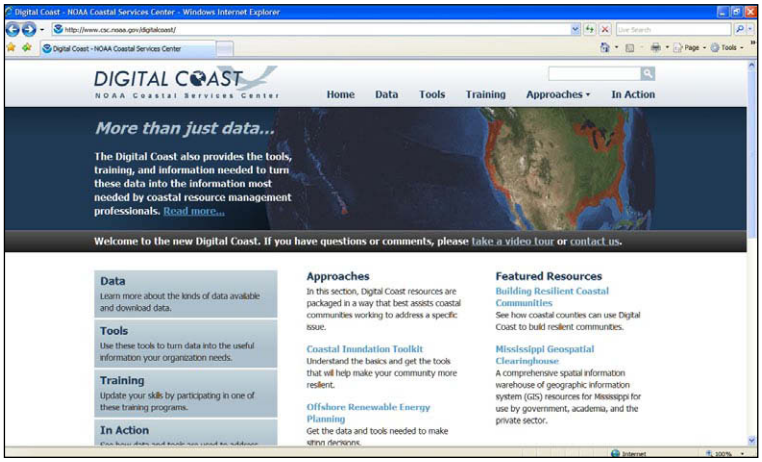
Digital Coast Helps Manage the Present and Plan for the Future (continued)

serve as an information broker," explained Josh Murphy of the NOAA Coastal Services Center. "We are trying to link people with the resources they need to manage their coastal watersheds."

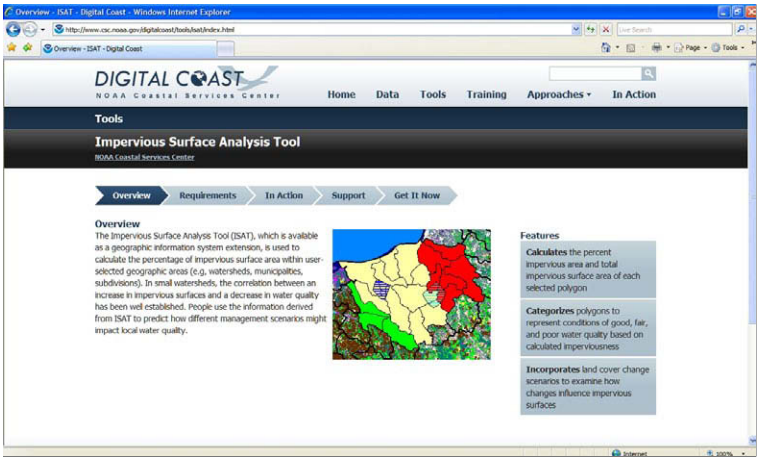
Phase two is underway and is being led by the Digital Coast Partnership Network. Current partners include the NOAA Coastal Services Center, Association of State Floodplain Managers, Coastal States Organization, National Association of Counties, National States Geographic Information Council, and The Nature Conservancy, with financial support from the Mississippi Coordinating Council on Remote Sensing and GIS. These public and private partners, who are either primary users of the system or content providers, are helping NOAA to identify, prioritize and add new components.

What Does Digital Coast Offer?

The Digital Coast Web site (www.csc.noaa.gov/digitalcoast) contains a variety of free coastal data sets and tools. Data sets are grouped by type, including orthoimagery (aerial photos), elevation, benthic (underwater) terrain, land cover, hydrography, marine boundaries and socioeconomic data. Digital Coast also provides numerous tools to help coastal managers use these and other data sets. The Web page for each tool displays a series of tabs that provide visitors with overview information, technical and data requirements for using the tool, examples of the tool in action, user support information and directions explaining how to download the tool. Tools are grouped by type:



The Digital Coast homepage (www.csc.noaa.gov/digitalcoast) offers links to coastal data, tools, training and on-the-ground examples of how coastal resource managers use the information provided.



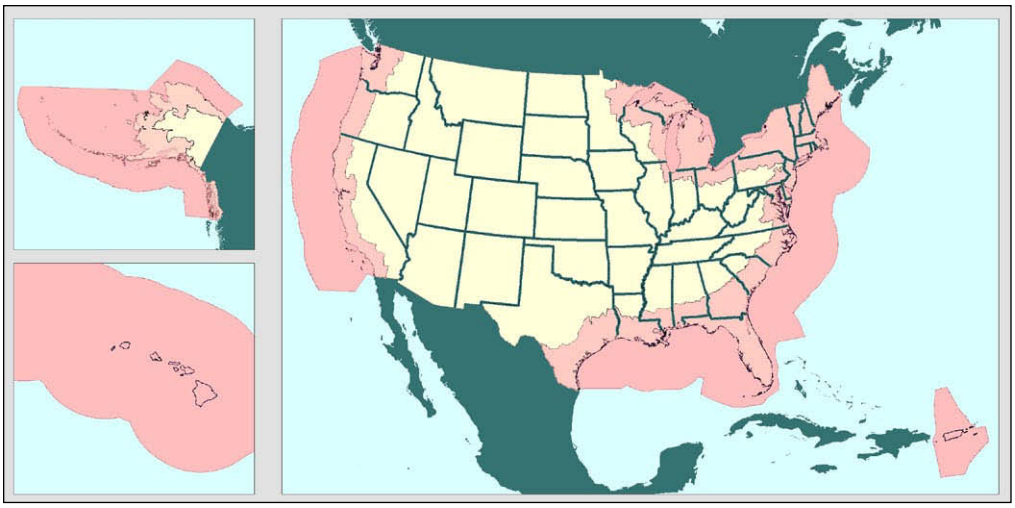
The first page of the Impervious Surface Analysis Tool (ISAT) provides a road map for using the tool, including tabs with overview information, the technical and data requirements for using ISAT, examples of ISAT in action, online ISAT help and tutorials, and how to download ISAT.

- **Analysis Tools:** These tools help users generate valuable information by pulling from existing data sources and, in some cases, using a geographical information system (GIS). For example, the Habitat Priority Planner helps to identify priority locations for conservation and restoration planning. Users can turn to the Nonpoint Source Pollution and Erosion Comparison Tool to measure runoff, nonpoint source pollution and erosion. An Impervious Surface Analysis Tool calculates the percentage of impervious surfaces for a selected geographic area. Numerous other tools look at rate of change and impacts of long-term sea level rise, coastal project management, communication of hazard-related data and modeling of benthic terrain.
- **Informational Tools:** These tools provide guidance or serve as "how to" manuals. For example, the County Snapshots tool provides local officials with a quick look at a county's demographics, infrastructure and environment within the flood zone. The Practitioner's Toolkit for Marine Conservation Agreements explains how to develop and implement a marine conservation agreement project. Other tools help users process weather data in a GIS and find weather-related Internet resources.
- **Simulation Tools:** These tools generate visual products to illustrate concepts or issues to a variety of audiences. For example, the CanVis Visual Simulation Tool enables users to add objects to images for the purpose of visualizing impacts of future management decisions (e.g., house or dock placement) or sea level rise. Similarly, the Sea Level Rise and Coastal Flood Frequency Viewer shows sea level rise scenarios and potential impacts.

- **Data Visualization Tools:** This set of tools presents dynamic views of spatial data. For example, the Legislative Atlas displays maps of ocean and coastal laws and provides access to summaries of the state and federal laws via an interactive Web application. NOAA's Coastal Change Analysis Program (C-CAP) Land Cover Atlas allows users to view regional C-CAP land cover data and explore land cover changes and trends. Other tools assist with finding topographic and bathymetric data, tracking hurricanes, looking at habitat in shallow coastal Texas waters, and visualizing coastal hazards in Long Island, New York.
- **Data Handling Tools:** These tools help users manipulate datasets. For example, tools can create soil-based thematic maps, view and use nautical and navigational charts, or handle Light Detection and Ranging (LIDAR) topographic data.

How Can Digital Coast Help You?

People will use the Web site in different ways, depending on their needs. For example, GIS technicians will directly access the data or tools they need. Others, such as town or watershed group leaders, might browse the resources available to get a sense of how they can use the information. "Coastal managers can read the 'In Action' section of the Web site to see how other people have put the tools and data to work for them," explains Murphy. "We hope people will discover that some of the tools and data sets that they already use can be connected with other resources that they didn't know existed or didn't realize they could incorporate. Digital Coast can help them find ways to generate more information using information that they already have." Digital Coast also highlights training opportunities available that can teach people how to use the resources they find.



Digital Coast data and tools are targeted to coastal waters and their associated upland watersheds (see shaded areas).

Murphy emphasizes that people living far from the coast can still benefit from Digital Coast's data and tools. "What we consider 'coastal' is much broader than some people might think," he explains. "We recognize the link between uplands and coastal environments." As shown in the map, Digital Coast includes information for major coastal watersheds—some extending hundreds of miles from the coast.

To help coastal area managers see how NOAA's Digital Coast can benefit them, the National Association of Counties recently released *Building Resilient Coastal Communities: Counties and the Digital Coast* (www.csc.noaa.gov/digitalcoast/inundation/_pdf/Issue_brief.pdf). This document describes the challenges faced by coastal communities and suggests ways that the various data and tools provided by Digital Coast can be used to overcome these challenges.

The Digital Coast Partnership is continually expanding and improving the Digital Coast Web site. The partners encourage readers to submit suggestions of other existing tools and data sets (any scale) that might be useful for coastal managers. The Digital Coast team is also developing new Web pages that will help connect people with specific tools and data that might help when managing certain high priority issues such as habitat conservation and marine planning. "We constantly strive to improve what we offer and how we present it," notes Murphy. "When we designed Digital Coast we recognized that you can't just present new data and tools and expect people to use them. It helps if you show how these resources can be applied in the real world."

Digital Coast Helps Manage the Present and Plan for the Future (continued)

Pilot Project Helps Links Resources

The Digital Coast Partnership recently completed a pilot project designed to help coastal managers use Digital Coast to address a key issue of concern—coastal inundation from sea level rise and flooding. The Partnership developed a Coastal Inundation Toolkit (featured on the Digital Coast Web site), which can help coastal communities:

- Understand the basics of coastal inundation
- Identify a county's exposure and examine potential impacts
- Map inundation to visualize potential impacts
- Assess a community's risks, vulnerability and resilience
- Communicate risk strategies to initiate change
- Discover how other communities are addressing this issue

The toolkit shows coastal managers how to tie together the different Digital Coast resources, such as the County Snapshots tool and CanVis, to assess flooding risks and begin planning for the future.

An assessment of Charleston, South Carolina shows the amount of inundation that would occur with both a 7-foot mean lower low water (MLLW) tide—the observed average of the lower low water height of each tidal day—plus an 18-inch sea level rise (SLR).

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EPA Unveils Next Generation of Tools and Practices to Combat Nonpoint Source Pollution

Watershed managers have a new resource to help them implement the most proven and cost-effective practices available to restore and protect water quality from nonpoint source pollution. On May 12, 2010, the U.S. Environmental Protection Agency (EPA) published a comprehensive land management guidance document. The document outlines implementation measures that are indicated by current scientific and technical literature to be the state-of-the-art approaches to reducing water pollution from nitrogen, phosphorus and sediment. EPA developed the guidance in response to an Executive Order signed by President Obama exactly a year before to protect and restore the Chesapeake Bay. Section 502 of the Order calls for EPA to "publish guidance for Federal land management in the Chesapeake Bay watershed describing proven, cost-effective tools and practices that reduce water pollution" (see www.epa.gov/nps/chesbay502). Many of the technical approaches and tools contained in this document are relevant to non-federal land in the Chesapeake Bay watershed as well as to other parts of the U.S.

Implementation Measures Will Reduce Nonpoint Source Pollution

The guidance document provides information pertaining to all the major categories and subcategories of nonpoint source pollution that are relevant to the Chesapeake Bay, including agriculture, urban and suburban development, hydromodification, decentralized wastewater treatment (septic systems and their alternatives), forestry and riparian areas. The guidance document addresses each major category in a separate chapter. Each chapter outlines a series of recommended implementation measures designed to reduce nutrient and sediment nonpoint source pollution from that category and presents relevant research results and the expected costs of implementing the measures.

The main categories/chapters include:

- **Agriculture**—implementation measures address source control and avoidance in cropland agriculture and animal agriculture, cropland in-field control, and cropland edge-of-field trapping and treatment.
- **Urban and suburban runoff**—implementation measures address stormwater runoff, pollution prevention, runoff treatment and turf management.
- **Forestry**—implementation measures address pre-harvest planning, streamside management areas, forest roads, timber harvesting, site preparation, fire management, revegetating disturbed areas, chemical management and wetlands.
- **Riparian area management**—implementation measures address restoring and reestablishing riparian forest buffers and protecting and maintaining riparian areas.
- **Decentralized wastewater treatment systems**—implementation measures address reducing nitrogen from septic systems and their alternatives using improved technology and enhanced system management.
- **Hydromodification**—implementation measures address protecting streambanks and shorelines from erosion, controlling upland sources of sediment and nutrients at dams, restoring in-stream and riparian habitat function, reducing pollutant sources through operational and design management, and restoring stream and shoreline physical characteristics.

Document Incorporates Latest Science

The guidance document builds on previously published technical documents that explored the effectiveness and costs of various measures and practices to address nonpoint source pollution (see www.epa.gov/nps/pubs.html). However, this guidance differs from past documents in two significant ways. First, it focuses to a considerable extent on newer, more effective approaches to controlling some of the most significant aspects of nonpoint source pollution in the Chesapeake Bay watershed. It also focuses on implementing the "next generation tools and actions" that reflect, in the words of the Executive Order, "a renewed commitment to controlling pollution from all sources as well as protecting and restoring habitat and living resources, conserving lands, and improving management of natural resources, all of which contribute to improved water quality and ecosystem health."

The document features several tools and actions that go beyond the previously published nonpoint source guidance documents, including:

1. **Nutrient Management**. The document significantly expands on practices and actions that control the delivery of nutrients and sediment from agriculture by employing a whole-farm nutrient management planning approach from source control and avoidance, in-field control, and edge-of-field trapping and treatment. This strategy is summed up by the phrase "Avoid, Control, and Trap," or ACT. EPA developed the practices and actions presented in the guidance document using the most recent, state-of-the-art literature in nutrient management planning. The document provides information on achieving reduced nutrient losses from both livestock production on animal feeding operations and croplands.
2. **Control of Urban Runoff and Stormwater**. EPA recognizes and emphasizes that hydrology is the principal driver of water quality impairments in developed and developing areas. Therefore, EPA establishes in the guidance document a primary focus on the goal of maintaining and restoring predevelopment hydrology to the maximum extent technically feasible. The guidance presents background information, data, examples and resources that demonstrate how practitioners can achieve that goal by implementing low impact development (LID) and other green infrastructure techniques that infiltrate, evapotranspire and use rainwater on-site. The guidance document includes implementation measures that can help reduce and control urban runoff and stormwater.

EPA Unveils Next Generation of Tools and Practices to Combat Nonpoint Source Pollution (continued)

3. **Turf Management**. At 3.8 million acres, the total cultivated area for turf makes it the number one crop grown in the Chesapeake Bay watershed. A significant portion of the turf is grown in a manner that includes high inputs of fertilizers. Thus, turf management practices can, at present, contribute a substantial amount of nutrients to the Chesapeake Bay. Within the urban runoff chapter, the guidance document includes implementation measures that can help reduce nutrient runoff from turf.
4. **Decentralized Wastewater Treatment Systems**. The guidance document emphasizes reducing nitrogen from decentralized systems—taking advantage of the availability of rapidly advancing nutrient-removal wastewater treatment technology. The document uses the term decentralized systems rather than onsite systems, reflecting the technical, feasibility and management advantages of cluster treatment systems that treat effluent from multiple lots at nearby off-site locations. The guidance document recommends implementation measures that can help reduce nitrogen from decentralized systems.

Guidance is Relevant Nationwide

Much of the information provided in EPA's new guidance document is relevant to other areas of the U.S. Many of the nutrient and sediment sources in the Chesapeake Bay watershed are similar to sources in other watersheds around the country. Hence, many of the practices needed to protect and restore the Chesapeake Bay are the same as or similar to those used in other large-scale, multistate watersheds in the country. Therefore, practitioners outside the Chesapeake Bay watershed may find the new guidance document useful as they develop and implement their own watershed plans and strategies to address nutrient and sediment pollution from nonpoint sources.

Final Strategy to Restore Bay Released

On May 12, 2010, EPA released its final strategy document outlining its plan for restoring and protecting the Chesapeake Bay. Developed in response to President Obama's Executive Order 13508, the strategy contains a comprehensive package of federal initiatives to restore clean water, conserve treasured places, protect fish and wildlife, and adapt to the impacts of climate change. These objectives will be accomplished by empowering local efforts, making decisions based on science, and forging a new era of federal leadership and accountability. Close collaboration of efforts with the six states in the Chesapeake Bay watershed and the District of Columbia will also be critical.

To restore clean water, EPA will create a framework for performance and accountability to guide federal and state pollution control programs, and expand regulatory tools to reduce pollution from Concentrated Animal Feeding Operations and urban and suburban runoff. The U.S. Department of Agriculture will intensively target voluntary conservation incentives at high priority areas. New emphasis is also placed on improving stormwater management on federal land and reducing polluted runoff from transportation infrastructure. Federal agencies have developed a suite of accountability and transparency measures, including ChesapeakeStat, a publicly accessible online tool that will identify restoration projects, funding and progress.

On May 11, 2010, EPA announced that it reached settlement with the Chesapeake Bay Foundation and others to resolve a lawsuit filed in January 2009 which claimed that EPA had failed to take adequate measures to protect and restore the Chesapeake Bay. The settlement agreement tracks much of the comprehensive suite of strong regulatory and other actions that EPA has initiated or pledged to take under the Obama administration to restore water quality in the Chesapeake Bay and its tributaries. Many of the commitments in the settlement agreement are reflected in EPA's new Chesapeake Bay strategy. For more information on the strategy, see http://executiveorder.chesapeakebay.net.

[For more information, see www.epa.gov/nps/chesbay502 or contact Katie Flahive, USEPA, 1200 Pennsylvania Avenue, N.W., Mail Code 4503T, Washington, DC 20460. Phone: (202) 566-1206; e-mail: flahive.katie@epa.gov]

EPA Clarifies Appalachian Mountaintop Removal Permitting Requirements

Mountaintop coal mining is a modern form of surface coal mining that uses explosives to access coal seams, generating large volumes of waste that bury adjacent streams and can degrade water quality downstream. Multiple federal agencies, including the U.S. Environmental Protection Agency (EPA), have joined forces to significantly reduce the harmful environmental consequences

EPA Clarifies Appalachian Mountaintop Removal Permitting Requirements (continued)

of Appalachian surface coal mining operations, while ensuring that future mining remains consistent with federal law.

Recently, EPA, in coordination with other federal and state regulatory agencies, issued a set of actions to further clarify and strengthen environmental permitting requirements for Appalachian mountaintop removal and other surface coal mining projects. This new set of guidelines sets clear benchmarks for preventing significant and irreversible damage to Appalachian watersheds at risk from mining activity.

In a statement introducing the new guidelines, EPA Administrator Lisa P. Jackson noted that "The people of Appalachia shouldn't have to choose between a clean, healthy environment in which to raise their families and the jobs they need to support them. That's why EPA is providing even greater clarity on the direction the agency is taking to confront pollution from mountain top removal."

EPA's New Actions

One of the actions set forth by EPA is to provide comprehensive guidance to its regional offices that have permitting responsibility in Appalachian states. The new guidance clarifies existing requirements of the Clean Water Act section 402 and 404 permitting programs that apply to pollution from surface coal mining operations in streams and wetlands. EPA is also making public two scientific reports prepared by its Office of Research and Development. One of the reports summarizes the aquatic impacts of mountaintop mining and valley fills. The other established a scientific benchmark for unacceptable levels of conductivity (a measure of water pollution from mining practices) that threaten aquatic life in surface waters. Lastly, EPA is creating a permit tracking Web site so that the public can determine the status of mining permits subject to the EPA-U.S. Army Corps of Engineers Enhanced Coordination Procedure (ECP). EPA's mine-related information can be found at www.epa.gov/wetlands/guidance/mining.html.

EPA is soliciting public comments on the new guidance through December 1, 2010. However, the guidance has been effective as of April 1, 2010 on an interim basis. EPA will decide whether to modify the guidance after considering public comments and the results of EPA's Science Advisory Board technical review of the scientific reports.

EPA's ECP Review Status

Issue #88 of *Nonpoint Source News-Notes* includes an article describing the mountaintop coal mining process and introducing the ECP (see www.epa.gov/NewsNotes/pdf/88issue.pdf). As part of the ECP, on September 30, 2009, EPA released a list of 79 permit applications that would require further coordination between the Corps, the mining company and EPA before the permit could be approved. EPA determined that all 79 permits on the list showed the potential to violate one or more of the requirements in the Clean Water Act section 404(b)(1) guidelines. As part of that effort, EPA has initiated its ECP review of these 79 permit applications. The complete list and the status of the ECP review process may be viewed at www.epa.gov/wetlands/guidance/mining-projects.html.

Report Highlights Magnitude of Marine Trash Trouble

From cigarette butts to plastic bags, our litter—and lots of it—is on the move. One day in the fall of 2009, volunteers from around the globe removed and recorded 7.4 million pounds of trash from the world's oceans and waterways. Organized by the nonprofit Ocean Conservancy, the annual International Coastal Cleanup Day provides a global snapshot of the marine debris problem facing wildlife, economies and marine ecosystems. The results of the 2009 cleanup are detailed in a newly released Ocean Conservancy report, *From Our Hands to the Sea, Around the Globe, and Through Time*.

The 2009 Cleanup report, available at www.oceanconservancy.org, examines the phenomenon of trash travelling to and through the ocean, and the resulting impacts worldwide. After analyzing data collected by its volunteers, the Ocean Conservancy estimates that 60 to 80 percent of marine

litter starts out on land. Water and wind help transport litter hundreds of miles to the ocean. Once in the ocean, currents and winds move the marine debris around the globe.

Volunteers Remove and Catalogue Trash

On September 19, 2009, nearly 500,000 volunteers from around the world spent a few hours removing trash and debris from beaches, lakes and rivers—and they kept track of every piece of trash they found. Ocean Conservancy uses that information to produce an annual country-by-country, state-by-state index of the problem of marine debris. Volunteers removed and recorded 7.4 million pounds of trash in 108 countries, including in 45 states and the District of Columbia in the U.S. These numbers are up slightly from 2008, when 400,000 volunteers removed 6.8 million pounds of debris in 100 countries, including in 42 states and the District of Columbia in the U.S.

Two volunteers pick up trash on South Padre Island, Texas as part of the 2009 International Coastal Cleanup Day *(Photo by Joe Baraban/Aurora).*

Volunteers record the debris they find on standardized data cards. The cards include a list of the most common marine debris items, along with space to add any unusual finds. For example, in 2009, volunteers noted finding go-karts, a gumball machine and a swimsuit-wearing mannequin. Local coordinators ensure that the data reach Ocean Conservancy, which compiles and analyzes the information. A new online data entry system streamlines the process and minimizes transcription errors. Thanks to its detailed cataloguing system, the Ocean Conservancy can gain a better understanding of what sources might contribute the most trash—and from where. Overall, the cleanup yielded 10.2 million pieces of trash worldwide, 8.2 million of which fell into ten main categories (see chart). The composition of the trash varies considerably by region. For example, smoking-related activities account for 37.2 percent of marine debris in North America, compared to only 8 percent in Central America. For complete details, download the report at www.oceanconservancy.org (see "Our Work" and click on "Marine Debris").

TOP TEN MARINE DEBRIS ITEMS

RANK	DEBRIS ITEM	NUMBER OF DEBRIS ITEMS	PERCENTAGE OF TOTAL DEBRIS ITEMS
1	CIGARETTES/CIGARETTE FILTERS	2,189,252	21%
2	BAGS (PLASTIC)	1,126,774	11%
3	FOOD WRAPPERS/CONTAINERS	943,233	9%
4	CAPS, LIDS	912,246	9%
5	BEVERAGE BOTTLES (PLASTIC)	883,737	9%
6	CUPS, PLATES, FORKS, KNIVES, SPOONS	512,517	5%
7	BEVERAGE BOTTLES (GLASS)	459,531	4%
8	BEVERAGE CANS	457,631	4%
9	STRAWS, STIRRERS	412,940	4%
10	BAGS (PAPER)	331,476	3%
	TOP TEN TOTAL DEBRIS ITEMS	8,229,337	80%
	TOTAL DEBRIS ITEMS WORLDWIDE	10,239,538	100%

Volunteers collected 10.2 million marine debris items worldwide in 2009. Eighty percent of the items fell into 10 main categories, noted here *(Source: Ocean Conservancy/International Coastal Cleanup 2009).*

Information Spurs Action

The Ocean Conservancy hopes that the report's findings will spur the global community into action. "Momentum is building. There is a growing understanding of the significant impact trash has on wildlife, the economy and the productivity and resiliency of our ocean," said Vikki Spruill, President and CEO of Ocean Conservancy. "The data generated by hundreds of thousands of dedicated volunteers around the world provide us with a global snapshot of the trash in our ocean, but cleanups alone cannot solve the problem—it's time to stop marine debris at the source. From design to disposal, we all have a role to play: corporations can reduce packaging, governments can enact strong marine debris policies, and each of us can choose re-usable items, recycle when possible and put trash in its place."

According to the Ocean Conservancy, marine debris is one of the most widespread pollution problems we face, with plastics making up approximately three-quarters of all trash floating in the ocean. Birds, fish and other

Report Highlights Magnitude of Marine Trash Trouble (continued)

wildlife can easily mistake smaller debris for food, choking the animals, or blocking the digestive system. For instance, when sea turtles confuse a plastic bag for a jellyfish,the consequences are deadly. Whales and dolphins can face a similar fate by ingesting larger items. Ropes, old fishing gear, and other larger debris items can pose an entanglement danger to wildlife, damage sensitive ocean habitats like coral reefs, and interfere with maritime safety and navigation. "Eliminating the threat of marine debris will help improve the ocean's resilience. Our ocean is our life-support system, and when we trash our ocean we are trashing our own health and well-being," concluded Spruill.

The next International Coastal Cleanup will be held on September 25th, 2010. To register, see www.oceanconservancy.org.

[For more information, contact Tim McHugh, Media Relations Manager, Ocean Conservancy, 1300 19th Street, NW (8th Floor), Washington, DC 20036. Phone: 202-351-0492; E-mail: tmchugh@oceanconservancy.org]

EPA Office of Water Targets Efforts in 2010

In January 2010, U.S. Environmental Protection Agency (EPA) Administrator Lisa Jackson issued a memorandum to all EPA employees outlining the seven top priorities around which she wants to focus the work of the agency. These priorities include (1) taking action on climate change, (2) improving air quality, (3) assuring the safety of chemicals, (4) cleaning up our communities, (5) protecting America's waters, (6) expanding the conversation on environmentalism and working for environmental justice, and (7) building strong state and tribal partnerships. In response, Peter Silva, Assistant Administrator for EPA's Office of Water (OW), issued a memorandum highlighting specific ways OW will focus its efforts to work towards meeting the water-related priorities.

OW will focus on improving water resources to maintain sustainable communities. The nation's water resources are the lifeblood of communities, supporting the economy and our way of life. For communities to be sustainable, rural and urban water resources must be sustainable and safe for drinking and recreation. EPA is working with its partners to help communities and utilities continue to provide clean water to their residents by improving financing, management and use of innovative solutions such as green infrastructure and expansion of the WaterSense program. OW will expand its efforts to use science-based standards to protect groundwater and surface water resources and public water systems. OW recently launched an Urban Waters initiative to help communities—especially disadvantaged communities and those with environmental justice challenges—access, restore and benefit from their urban waters and surrounding land.

EPA OW promotes protecting healthy watersheds for the benefit of people and the environment.

OW will also focus on promoting healthy watersheds for the benefit of people and the environment—by focusing on key geographic areas, strengthening protection for water, and improving watershed-based approaches. OW is leading efforts to restore and protect the nation's largest watersheds through programs such as the Great Lakes Restoration Initiative, the Chesapeake Bay Executive Order and Strategy, the Gulf of Mexico Hypoxia Action Plan, the federal California Bay-Delta Workplan (addressing the San Francisco Bay estuary and the Sacramento/San Joaquin River Delta), and the National Ocean Policy. Through innovative, collaborative approaches across federal, state and local governmental organizations, and with robust use of its existing statutory authority, EPA is striving to make these programs more effective. See EPA's Healthy Watersheds Initiative Web site (www.epa.gov/healthywatersheds) for more details.

EPA and its partners aim to enhance protection of water resources by strengthening criteria and revising regulations. Some examples include revising the stormwater rule, updating effluent guideline limitations for the steam electric sector and construction and development sector, taking action to reduce the harmful environmental consequences of mountaintop mining, and strengthening protection for wetlands and other waters of the United States.

EPA Office of Water Targets Efforts in 2010 (continued)

OW will work to improve the way existing tools such as water quality standards, protection of downstream uses, permits and total maximum daily loads are used to protect and restore watersheds; explore how innovative tools such as trading and other market-based approaches to watershed protection can be applied; and enhance efforts to prevent water quality impairments in healthy watersheds. For more information on OW programs, see www.epa.gov/ow.

Notes from the States, Tribes, and Localities

LID Competition Invigorates Development Community to Design for Houston's Future

A recent low impact development (LID) competition in Texas prompted local developers and project design companies to take a closer look at the costs and benefits of incorporating LID elements into construction projects. What they found surprised many of them—and will make it more likely that their future projects will contain LID elements.

In 2009 the Houston Land/Water Sustainability Forum (Forum) launched the Low Impact Development Design Competition. Founded in 2007, the Forum works to enhance, enable and integrate sustainable use of land and water for the Houston area's continued growth and economic vitality. Its membership is a "who's who" of Houston's development community stakeholders including architects, city and county employees, developers, engineers and contractors.

The Forum initiated the competition to generate interest in LID. "We saw the writing on the wall. We could continue with business as usual and eventually be forced to change our development methods," said the Forum's Steering Committee Chair, Robert Adair. "Or we could take the initiative to explore new methods, learn about them and take the leadership role in driving change. We have a vested interest in achieving success, and those of us in the design and development community are in the best position to determine what works and what doesn't."

The LID Design Competition challenged Houston's design community to create LID designs for three local projects: a green roadway, an urban redevelopment site and a suburban residential development site. Teams were required to have a minimum of three licensed participants, including at least one civil engineer, one architect and one landscape architect. Teams had three different projects to choose from and site-specific information was provided for each. Each winning team received a $15,000 cash prize.

Twenty-two teams entered the competition representing 48 firms and a total of 225 design professionals. Most of the participants did not have any previous experience designing or implementing LID, so they had to learn as they went along. Consequently, the educational value of the competition was enormous. The design goals for the competition included:

- Achieve post-development hydrographs that were below the pre-development 5-, 10- and 100-year storm events
- Remove at least 80 percent of total suspended solids (TSS) from the first inch of precipitation
- Use decentralized, small-scale landscape features and LID integrated management practices
- Minimize impervious surfaces

Competition Generated Winning Designs

Judging took place in two stages. In the first stage, five expert judges reviewed all 22 projects submitted and selected 9 finalists. The finalists then presented their designs to a jury panel composed largely of top local developers and political leadership with no LID experience. By reviewing the competition submissions, which included cost savings and stormwater runoff reduction information, the jury members were exposed to the practical and aesthetic benefits of using LID, making this an educational and motivating experience for them as well. The three types of projects and the ultimate winning designs included:

(1) Green Roadway: The project goal was to expand a two-lane, mile-long section of Independence Parkway to four lanes. The winning design incorporated the use of bioswales, rain gardens and inward-sloping roadways to control stormwater runoff (Figure 1). It also included an underground cistern and solar-powered drip irrigation. The design projected:

- 13 percent reduction in construction cost per mile
- 9 percent reduction in maintenance costs
- Approximately 70 percent reduction in peak discharge
- 84 percent TSS removal
- 68 percent metal removal
- 30 percent pathogen removal

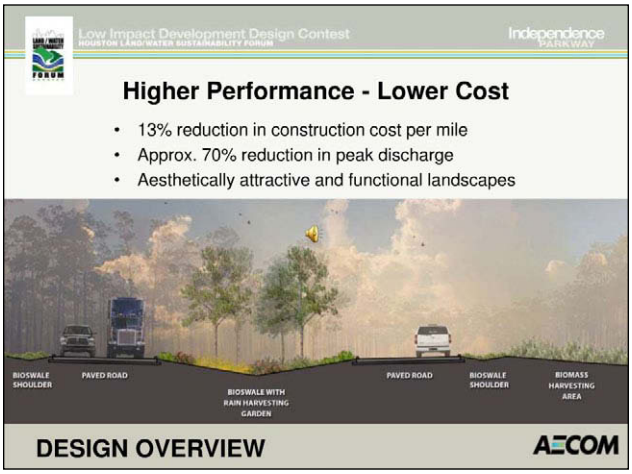


Figure 1. This graphic shows the winning design concept for the green roadway project.

(2) Urban Redevelopment: The project goal was to create a pedestrian promenade in a redeveloping section of downtown Houston. The Bastrop Promenade would be a six-block, pedestrian promenade that is centered around a new professional soccer stadium, complete with residences, shopping and restaurants. The winning design incorporated the use of rain gardens, pervious paving and bioswales into a mixed-use development (Figure 2). The LID design cost was approximately $40,000 less than a conventional design and reduced the peak stormwater flow by about half.

(3) Suburban Residential: The project goal was to create Ventana Lakes, a new square-mile development in Harris County. The winning design required few or no variances and incorporated native plant rain gardens throughout the development, without placing any of those features on the individual lots (Figure 3). The LID design increased the number of amenity lots (those with water access or other special features) within the development from the standard 30 percent to a whopping 71 percent. The winning design is projected to reduce the 100-year stormwater discharge by 52 percent and cost $5 million less overall.

"All of the participating teams walked away with new information and an appreciation for the cost and aesthetic benefits of LID," observes Dov Weitman, Chief of EPA's Nonpoint Source Control Branch and a member of the judging panel. "Some company CEOs/managers had initially agreed to participate in the competition, but did not expect the process to change the way they do business. After the work was done, their staff came to them to show the cost savings and aesthetic benefits. That was a real wake-up call. Several company representatives told me that they have already

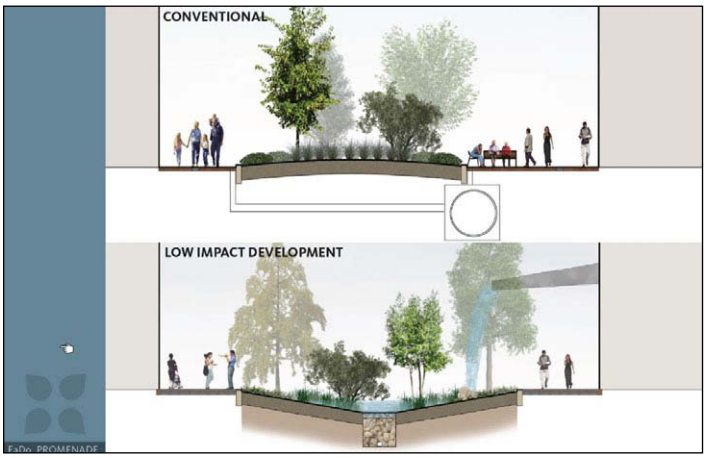


Figure 2. This graphic from the winner of the urban redevelopment design category shows how a conventional vegetated area (top) compares with a low impact option (bottom).

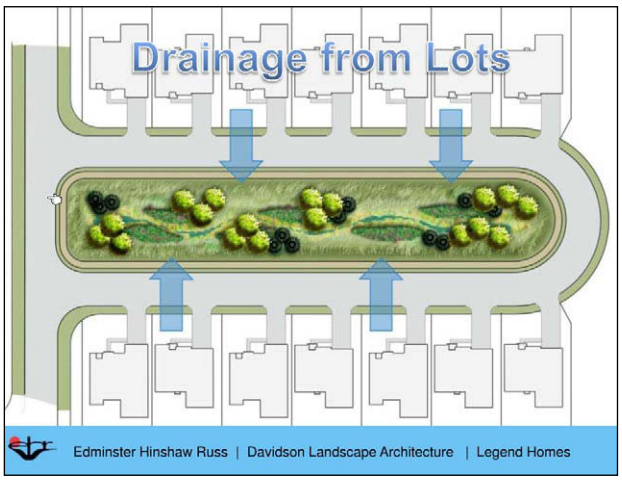


Figure 3. This graphic shows one of the winning elements of the suburban residential project design.

begun to promote future projects based on LID to their clients," he adds. The Forum has posted each submission presentation at www.houstonlwsforum.org/LowImpactDevelopmentDesignCompetition2009-2010.html. Many of the submissions include cost comparisons between LID and conventional stormwater solutions applied in the three different real-life projects.

LID Design Competition Guides the Future of Houston Development

The Houston LID competition has had far reaching benefits for both the city and the development community. Like many communities across the United States, Houston's ordinances need to be updated to incorporate LID practices. The enthusiasm and interest generated by the competition prompted the Forum, the City of Houston, and Harris County to plan to develop LID guidelines during the summer of 2010. The hope is that developers that follow these new guidelines will be able to implement the specified LID practices without the need for variances. "Nobody wants to re-write the code now," notes Adair. "Houston is new to LID. We want to gain some local experience with LID, get a few lessons learned under our belts, and then consider amending the code for LID in a year or two."

News of the competition's success is spreading quickly. The Forum and the competition finalists have received numerous requests to share what they've learned, both within Texas and in other states. "Houston's development community is energized and mobilized as a result of the Design Competition," says Adair. "Houston is a town of doers that are open to trying new ways of conducting business. We are primed to step out of the conventional design box and adopt practices that will take Houston in a sustainable direction." The property owners for each of the competition projects are currently meeting with the finalists and will likely incorporate elements from different submissions into a final plan for each site.

Adair and Weitman see the potential for similar competitions to be staged in other large cities. "This process can be replicated anywhere: New York City, Los Angeles, Boston, Miami—you name it. It's a simple yet amazing idea," says Weitman. Plus, a competition spurs developers to seek out information about the cost and aesthetic benefits of LID—and be creative in applying it, he adds. "It's a way to encourage the industry to convince itself!" To learn more about the Sustainability Forum and the LID Design Competition, visit www.houstonlwsforum.org.

[For more information, contact Robert Adair, 1930 Aldine Western Rd., Houston, TX 77038. Phone: 832- 456-1000; E-mail: adair@ecosvs.com]

StreamBank Tool Offers Promising Approach to Restoring Streams

Is your stream restoration project mired in paperwork, held up by permits, or stymied by a lack of funding? Does it take years to complete a relatively simple project? These and other similar problems prompted Oregon's Freshwater Trust to develop StreamBank, a Web-based platform that streamlines the stream restoration process. The nonprofit group created software that helps users access funding, identify and acquire necessary permits, and conduct follow-up monitoring and reporting for simple stream restoration projects. By automating the process, StreamBank saves time and money while accelerating environmental improvements. Although currently applicable only for the state of Oregon, The Freshwater Trust is working to expand StreamBank's reach—first through the Pacific Northwest, and then into other regions of the United States.

Volunteers plant seedlings along an Oregon stream.

StreamBank Assesses Proposed Projects

The Freshwater Trust is a statewide nonprofit organization headquartered in Portland, Oregon (see box on the next page). Using private grant funds, the group developed StreamBank in 2007 as an automated, interactive Web-based decision program to help people increase the number of stream restoration projects funded and implemented while reducing the workload required to do so.

StreamBank Tool Offers Promising Approach to Restoring Streams (continued)

"StreamBank is like Turbo Tax for stream restoration," explains Alan Horton, Managing Director of The Freshwater Trust. "People input the necessary information and then the program largely takes over."

How does it work? StreamBank leads a restoration project representative—often a staff member of a watershed group or local soil and water conservation district—through a series of Web screens. First, the representative enters basic information about the proposed project, including the location (using Google Earth to pinpoint it) and type of project (riparian planting, invasive weed removal, etc.). At this point, StreamBank begins working behind the scenes. StreamBank checks data contained in numerous customized Geographic Information System (GIS) layers. These layers include information such as:

- Location of the state's impaired waters
- Areas where funding is available (including any restrictions)
- Endangered species habitat
- Areas that are subject to existing watershed or ecosystem recovery plans.

The Freshwater Trust

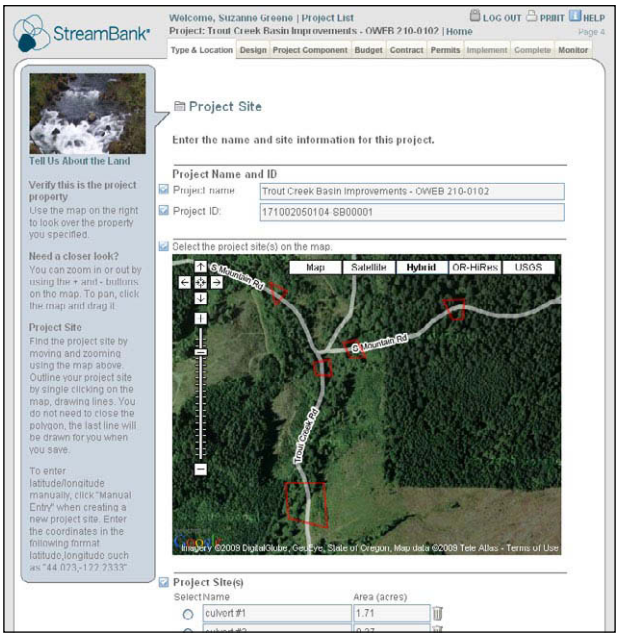
The Freshwater Trust was established in 2009 through a merger of Oregon Trout and Oregon Water Trust. Founded in 1983 by a group of fly fishing conservationists, Oregon Trout's goal was to work to protect and restore native fish and their ecosystems. Oregon Water Trust was founded in 1993 to work cooperatively with water users to keep more water in landowners' rivers and streams. The Freshwater Trust continues to support these efforts along with the StreamBank program and environmental education. For more information, see www.thefreshwatertrust.org.

The program refers to these layers as it assesses and scores proposed projects using a number of computer algorithms. The score helps determine if the project can be matched with existing funding sources. If so, the project is automatically accepted into the Streambank system and moves ahead into the funding matching stage.

"StreamBank is ideal for simple, straightforward restoration projects," explains Horton. "The tool's prioritization matrix automatically determines if a proposed project meets necessary requirements for funding—saving people from having to spend time conducting reviews. If StreamBank's analysis gives a project the green light, the project can be moved on through the process."

StreamBank Overcomes Funding Obstacles

StreamBank removes one of the largest obstacles to stream restoration—acquiring funding in a timely manner. Typically, funding agencies and organizations carry out their own separate processes for awarding funds, with different timeframes and requirements for submitting proposals, awarding grants and reporting. Because restoration professionals have to look to numerous funding sources and balance different requirements and timeframes, projects can be delayed significantly.



StreamBank uses Google Earth to allow the user to select restoration project location(s).

StreamBank makes the funding process much easier for funders and project representatives. "StreamBank is designed to function as a sole funder for restoration projects, with the intent of having multiple pots of money from different sources available that, together, can automate matching requirements and meet the full funding needs of a project," explains Suzanne Greene, StreamBank Manager. The goal of The Freshwater Trust is to engage multiple government agencies, foundations, and private companies who will provide funds and be assured that the funds will be used to support stream restoration projects that meet specific biological, administrative and project design criteria. The funders save time and effort, and are assured that they are supporting projects that make a difference and meet their requirements. Qualified projects processed through StreamBank are matched directly to available funding sources that support all stages of the project, including planning, implementation, monitoring and reporting.

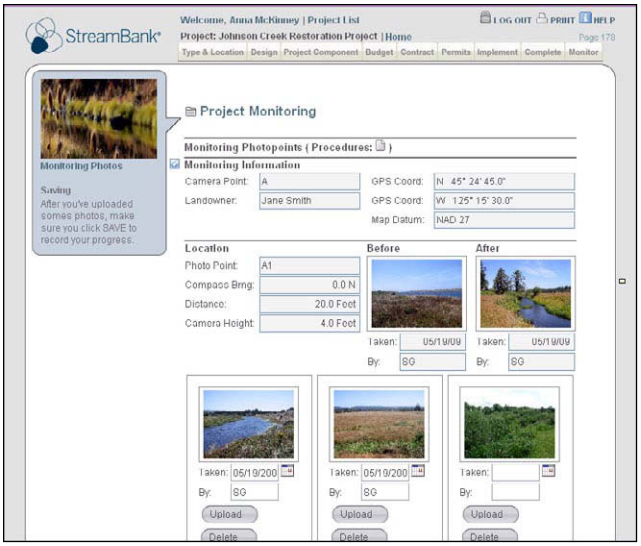
The Freshwater Trust has spent the past few years building its case that StreamBank is an ideal way to identify and fund simple restoration projects. In 2007, several private funding sources (The Freshwater Trust members, the Jubitz Family Foundation and Meyer Memorial Trust) supported the software development and initial testing on three stream restoration projects. In 2008, these and other private sources (including Bandon Dunes Golf Resort and the Bella Vista Foundation) provided another $569,000 to support a large-scale pilot StreamBank project. These funds supported 17 successful stream restoration projects processed through StreamBank. Information about each of these projects is included in *StreamBank Case Study 2008*, available at www.thefreshwatertrust.org/publications.

"Our pilot program allowed us to show potential funding sources that StreamBank can be applied successfully and efficiently," notes Horton. In fact, The Freshwater Trust found that using StreamBank to complete the pilot projects required, on average, 70 percent less time than if they had been implemented through a traditional grant and permitting cycle.

In 2009, the U.S. Environmental Protection Agency (EPA) agreed to allow the Oregon Department of Environmental Quality (ODEQ) to funnel $60,000 of its Clean Water Act section 319 funds through StreamBank. The Freshwater Trust matched the award 1:1 with private foundation grant money. The combination of funds supported three restoration projects. Pleased with the results, EPA has committed a comparable amount for 2010. Based on past success, The Freshwater Trust anticipates that, over the long-term, ODEQ will consider distributing more of its section 319 funding through StreamBank. The Freshwater Trust is currently working with the Oregon Watershed Enhancement Board and the U.S. Department of Agriculture to secure additional public funding for StreamBank.

StreamBank Eases Reporting

StreamBank reduces the paperwork trail, saving time and ensuring greater consistency between projects. It populates and automatically forwards necessary permit applications to the relevant agencies. "We designed StreamBank to make traversing the regulatory process as easy as possible," explains Horton. Ultimately, The Freshwater Trust hopes to work with federal and state agencies to develop "general permits" that will bypass some of the usual required paperwork for simple restoration projects that meet pre-established criteria. "Government agencies establish rules to keep bad things from happening, not to keep good things from happening," Horton adds. "We are exploring ways to make it easier to implement simple projects that will benefit ecosystem health."



The monitoring section of StreamBank allows the user to save photographs to document a project's progress.

StreamBank simplifies the reporting process by synthesizing funder requirements and project outcomes into a reporting template. StreamBank also establishes a project budget, creates a request for proposals (RFPs) for contractors, and generates a schedule for reporting, monitoring and data input (which will vary depending on the requirements outlined by the funding organization). The system remains in contact with the project representative over time, sending emails with reminders about deadlines for data and reports. Moreover, because StreamBank ensures funding for all stages of the approved project, the restoration project representative will receive adequate compensation for time spent on monitoring, reporting and entering data—long after the on-the-ground portion of the project has been completed.

StreamBank Provides for Data Gathering

As noted earlier, StreamBank requires that all projects include monitoring for project effectiveness—and includes the funding to do so. Depending on the type of project and the requirements outlined by the funding organization, long-term monitoring requirements might range from three to ten years after the project is implemented. Data collection and reporting will be standardized

across all StreamBank projects, allowing users to compare water quality between waterbodies as well as within one waterbody. All data will be submitted through StreamBank and stored in a database that will be made available to agencies, restoration professionals and possibly the general public in the future. The Freshwater Trust is still considering a number of data access methods, and expects to have something in place by 2012.

StreamBank Offers a Glimpse of the Future

The Freshwater Trust is very pleased with the results of the pilot projects and is looking forward to expanding the program's reach. "We are getting better at knowing where to find the data we need as we expand into new areas," explains Horton. "Plus, government agencies are releasing more and more shapefiles [data layers for GIS use]. We have completed StreamBank coverage for most of Oregon and expect to have StreamBank ready to operate throughout the Pacific Northwest by 2012."

StreamBank is designed for use with projects in rural areas where eight common types of restoration practices are usually implemented: riparian fencing, riparian replanting, removing invasive weeds, off-channel watering, restoring fish passage, restoring side channels, installing large woody debris and adding engineered log jams. "We may incorporate more complex practices over time as we expand the program's applicability," adds Horton. The Freshwater Trust is currently adding a stormwater module into StreamBank to apply in areas with more impervious surfaces present. The group has also been working with the Willamette Partnership to see if StreamBank can be used to quantify ecosystem improvements, or "uplift," as credits that could be traded on the open market (see box at left).

The Freshwater Trust is also creating a platform to allow people to use StreamBank as a watershed planning and project priority tool. "Using this platform, a landowner or restoration professional can identify a potential project site and view the priorities for that area, as well as funding available to complete projects," notes Greene. "The planning platform will provide the user with up-to-date information, such as priority management actions and the balance of funding available for specific project types from various private and public sources." Greene anticipates that the platform will be in place by summer 2011.

As StreamBank becomes more widely used, Horton expects to see projects translate into water quality improvements. "Individually, these simple restoration projects don't have big impacts. But, if you implement numerous projects the cumulative benefit can be huge—especially if you do so across a single watershed." For that reason, Horton hopes to one day be able to expand StreamBank to other regions of the United States that already have large-scale coordinated restoration efforts underway, particularly the Mississippi River, Chesapeake Bay and Long Island Sound watersheds.

[For more information, see www.thefreshwatertrust.org/conservation/streambank or contact Alan Horton, Managing Director, The Freshwater Trust, 65 SW Yamhill Street, Suite 200, Portland, OR 97204. Phone: 503-222-9091 ext. 22; E-mail: alan@thefreshwatertrust.org.]

StreamBank Could Calculate Ecosystem Uplift Credits

In 2009, the Willamette Partnership gathered non-government organizations, state and federal regulatory agencies, and others to develop accounting methodologies for salmonid habitat, water quality (temperature), wetlands function and upland prairie function that translate ecological uplift from restoration projects into units of measure that could be traded in an ecosystem services marketplace. The Freshwater Trust participated in this process and applied methodologies for salmonid habitat and temperature to three of its StreamBank pilot projects. The process showed that StreamBank could be modified with an operational calculator to allow a stream restoration project manager to assess the potential ecological uplift and credit generation prior to implementing the project. The project could then be adjusted to achieve the maximum possible uplift and credits. For more information, see willamettepartnership.org.

Over-paved? Group Reduces Impervious Surfaces in Portland

In Portland, Oregon, a volunteer group is leading an effort to remove unnecessary asphalt and concrete areas and replace them with gardens and natural areas. "Depaving" contributes to Portland's ongoing efforts to manage stormwater runoff by reducing impervious surfaces and creating more vegetated areas that absorb rainfall and intercept surface runoff (see box on the next page). Launched in 2007, Depave (www.depave.org) has quickly gained momentum throughout Portland—expanding from one major event in 2008 to six in 2009.

The idea for Depave began after Arif Khan bought a home in northeast Portland in 2001. His new back yard was completely covered by asphalt and concrete. He wanted a garden, so he rented a jack hammer and learned how to use it. Now he has three fruit trees and an assortment of herbs, vegetables, flowers, berries and native plants in what was once a lifeless area covered by pavement. Around the same time, Khan helped his friend Kasandra Griffin completely remove a garage at her home in another part of town. The two were inspired by the transformations in their back yards, and wanted to share the joy and the benefits of depaving with others. They officially started Depave in 2007. For fiscal sponsorship, they partnered with Portland's City Repair Project, a nonprofit group that "educates and inspires communities and individuals to creatively transform the places where they live" (see http://cityrepair.org).

Depave was created to inspire and promote the removal of unnecessary concrete and asphalt from urban areas. They conduct actual depaving events at real sites, but they see educating the public as the larger goal. "Try not to pave so many things, for a start," says Khan. "And if something is already paved, don't assume pavement is forever. Anybody can do this." Demand for information and education has been high. "As far as I know we are the only group in the country whose sole mission is to remove unnecessary pavement," notes Khan. "I created a Web site to provide information to people who want to remove pavement themselves—and they just keep asking for more… more advice, more stories and more pictures. There's obviously great enthusiasm for this idea around the country."

From Planning to Action

Depave has completed at least 10 depaving projects since 2007, with many additional projects planned for 2010. The group removed 30,000 square feet of pavement in 2009 alone. The group provides an online survey form through which Portland residents may propose particular sites for depaving (see http://depave.org/blog/how-to-depave). The form asks about the location, the dimensions of the site, the type and thickness of the pavement, the property owner's support of the project, the site's rainwater drainage and visibility, and the intended use of the depaved area.

Volunteers cut pavement in front of Portland's Vestal School, the site of a future community garden.

Portland is a Leader in Stormwater Management

Portland receives an average of 37 inches of rainfall per year, which results in approximately 10 billion gallons of stormwater runoff annually. For decades, this stormwater runoff mixed with untreated sewage in Portland's undersized combined sewer system, and overflows of untreated stormwater and sewage flowed straight into local waterways. Portland began a comprehensive program to address its CSO problem in 1991, implementing projects ranging from large-scale infrastructure (such as big storage pipes) to small-scale stormwater retention projects (such as rain gardens and vegetated planters). (For more information, see Portland's Sustainable Stormwater Management Web site at www.portlandonline.com/BES/index.cfm?c=34598.) *Nonpoint Source News-Notes* published an article detailing Portland's innovative "Green Street" stormwater projects in its May 2006 issue, available at www.epa.gov/newsnotes/pdf/78issue.pdf.

Depaving Basics

To help would-be depavers far and near, Depave produced a primer: *How to Depave: Your Guide to Freeing Your Soil*. (http://depave.org/blog/wp-content/uploads/2009/04/brochure_4.27.pdf). The guide provides information about

- Planning, including developing site plans, estimating the amount of pavement to be removed, alerting neighbors, getting permits, reusing and disposing of pavement, and identifying possible contamination issues;
- Selecting tools and considering safety;
- Breaking pavement using both conventional and natural techniques; and
- Restoring and rehabilitating soil options, including removing and replacing soil, adding raised beds, loosening soil and using phytoremediation to treat contaminated soil.

Depave is also developing a "post-depaving" guide to help people explore what they could do with their land after they depave it. Although only currently available in electronic form, Depave is currently seeking funding to print hard copies of its guides for distributing to watershed groups and the general public in Portland and beyond.

Depave volunteer leaders review the submitted surveys and visit the sites to assess them. "We consider a number of factors when selecting sites," explains Khan, "including a site's potential public benefit, whether another group or entity is willing to assume management responsibility for it once the pavement is removed, and the costs. Then we do as many projects as we can afford."

After Depave selects a site, it sets a date for pavement removal. A week or two before the official workday, a few Depave volunteer staff members use a rented concrete cutter to cut the pavement into a grid of 3-foot by 5-foot squares. "We don't use power tools on the volunteer workday for safety reasons," Khan explains. "Plus, cutting the pavement ahead of time makes it easier for volunteers of all ages to help remove it." To remove the pavement, volunteers descend on the site with crow bars and shovels. Chunks of pavement are placed into drop boxes, which are hauled to a recycling facility. Depave strives to make each workday a true community-building event by including food, live music and performance artists. Volunteers have said that the hard days of dirty work are their favorite days of the year—the modern-day equivalent of a community barn-raising, except that the result is a "liberated" patch of dirt.

After the main workday, Depave's involvement varies by project. Often, Depave or the owner has a contractor come in to remove the gravel that was under the pavement and add topsoil and organic matter to the underlying soil. Then, the landowner or another group takes over and transforms the depaved area into a flower or vegetable garden, rain garden or other natural space. For example, at Holy Redeemer Church and Catholic School, more than 50 volunteers helped depave 3,000 square feet of the church parking lot in October 2009. The church is now using the space to capture roof runoff in two new pocket bioswales, and is installing a community garden and education space for its school.

Volunteers remove pavement at Vestal School.

At another 2009 event, more than 100 people turned out on a hot day in August to help remove 15,000 square feet of blacktop at Vestal School. Volunteers from Depave, Vestal School and Friends of Portland Community Gardens worked to remove the pavement and then turned the project over to Vestal School and the Friends of Portland Community Gardens. The partners transformed the site into a large community garden (see http://vestalcommunitygarden.blogspot.com), which officially "opened for growing" in March 2010. The 2009 Vestal School depaving project builds on a similar project at Vestal the previous year, when the Vestal School parents and students removed approximately 15,000 square feet of blacktop and created a soccer field, school arboretum and sitting area. The Vestal School projects were funded primarily by

Drop boxes full of asphalt await transport to a local recycling facility.

The depaved area at Vestal School is transformed into a new community garden.

Over-paved? Group Reduces Impervious Surfaces in Portland (continued)

grants from the East Multnomah Soil and Water Conservation District's Partners in Conservation program and the Portland Bureau of Environmental Services' Community Watershed Stewardship program. At approximately 30,000 square feet removed, Vestal School holds the record for Portland's single largest community-driven re-greening effort. To see pictures from all of Depave's recent projects, go to http://picasaweb.google.com/DepavePDX.

Program Operation

Because Depave is strictly volunteer-operated, the primary costs for projects are equipment rental and asphalt hauling. The depavers report, with mixed emotion, that asphalt is a highly recyclable product, and the results of their labor will likely be part of a new paving project somewhere else. In 2009, Depave expected to pay $150 to $180 per 10 cubic yard drop box for asphalt hauling, and a bit more for gravel.

Khan notes "We have provided our tools to homeowners who wish to break up concrete at private residences." People can usually find uses for broken concrete, or "urbanite," as it is often called, he adds. "They use it for retaining walls, pavers, and foundations. In the past, I have gotten rid of it for free by placing Craigslist ads telling people where to pick it up."

Depave receives funding from numerous sources. Depending on the site, sometimes the landowner contributes money to offset the cost to remove the pavement. Portland's Bureau of Environmental Services has provided more than $16,400 to support Depave's efforts to remove impervious surfaces in the city, particularly in priority areas where stormwater runoff enters overtaxed storm sewers. The East Multnomah Soil and Water Conservation District has provided $15,000 through its Partners in Conservation grant program. Building on these successes, Depave applied for and recently received an Environmental Justice Small Grant from the U.S Environmental Protection Agency to support pavement removal in urban Portland where communities have limited access to green space.

The local government in Portland recognizes the benefits that the depaving process offers. In fact, city councilwoman Amanda Fritz and Portland mayor Sam Adams both participate in depaving events. "I think this helps reflect the extent to which the wider community supports and partners with us on this work," notes Ted Labbe, a Depave organizer.

Spreading the Word

Khan sees the depaving concept as something that others could easily adapt to reduce stormwater runoff and improve communities. In fact, Depave is planning to host a national depaving conference in Portland in September 2011, targeted at watershed groups, public agencies, municipalities and others involved with stormwater reduction, watershed restoration and environmental protection. He hopes to share information about what has worked and what hasn't, learn from others doing similar work around the country, and discuss ways to facilitate depaving on a wider scale.

[For more information, contact Arif Khan with Depave. E-mail: arif@depave.org; Web: www.depave.org.]

Disposable Bag Fee Prompts Shoppers to Change Habits

The District of Columbia (Washington, DC) is now among the nation's leaders in efforts to reduce the number of disposable plastic bags that end up as litter in waterways. Beginning in January 2010, all businesses that sell food or alcohol in the District of Columbia are required to charge five cents for each disposable paper or plastic bag sold at the register. The effort appears to be influencing people's bag use—businesses report that disposable bag use dropped by up to 80 percent in the first month after the fee went into effect.

The City Council originally passed the bag fee as part of the Anacostia River Clean Up and Protection Act of 2009. The Act banned the use of non-recyclable plastic bags and imposed a five-cent fee on paper and recyclable plastic bags used for most food items. For each disposable bag sold, a business keeps one cent. Businesses that offer a five cent discount to people supplying their own disposable or reusable bags may keep two cents for each disposable bag sold. The remaining fee

goes into the Anacostia River Cleanup and Protection Fund to support efforts to clean and protect the Anacostia River and other impaired waterways in the District of Columbia.

What Prompted the Fee?

In 2008 the Anacostia Watershed Society, under contract by the District Department of the Environment, completed a systematic assessment of the types and sources of trash in the Anacostia River watershed. The study revealed that plastic bags make up a significant percentage of the trash—21 percent of the trash in the Anacostia River and 47 percent of the trash in tributary streams. The study's authors suggested that plastic bags are found at higher numbers in tributary streams because brush and vegetation tend to snag bags. The study showed that other items commonly found as trash include Styrofoam products, snack wrappers (potato chip and candy bar packaging), and bottles and cans. Collectively, these items make up 85 percent of the trash found in the Anacostia River and its tributaries.

The study report included an implementation strategy designed to address the trash problem within five years (by 2013). The multi-pronged strategy includes both legislative changes and increases in best management practices such as installing grates over storm sewers and increasing street sweeping efforts. The report suggested that the District take legislative actions to reduce the number of plastic bags; foam cups, clamshells and plates; and beverage bottles and cans. For more information on the study and implementation strategy, see http://ddoe.dc.gov/ddoe/cwp/view,a,1209,q,499180.asp.

How Did the District Prepare Residents?

The District City Council passed the law in June 2009 establishing the 5 cent fee on disposable paper and plastic bags for most items. Beginning in November 2009, DDOE and its partners began working to educate residents about the upcoming fee, which would go into effect on January 1, 2010. DDOE mailed information to businesses and advertised the program on television, radio and transit (buses and trains). DDOE developed a Web site for the fee program that includes a frequently asked questions section, ready-to-print leaflets and window posters, more information about the Anacostia River clean-up effort, and fee-related legislative information.

To ease the transition, especially for seniors and low-income residents, numerous watershed partners began distributing reusable grocery bags for free. DDOE is partnering with CVS Pharmacy to distribute 112,000 reusable bags at schools, CVS stores and government offices. The Anacostia Watershed Society and Giant Food of Landover, Maryland are offering up to 250,000 reusable bags to customers who purchase groceries in District of Columbia Giant Food stores.

DDOE asked businesses to display this poster beginning in late 2009.

Is the Fee Program Working?

Initial results indicate that the fee program is significantly decreasing people's use of disposable plastic bags. The District's Chief Financial Officer noted that in 2009 District residents used approximately 270 million disposable bags, or about 22.5 million bags per month. The January 2010 report shows that fewer than 3 million disposable bags were purchased in January, providing almost $150,000 for the Anacostia River Cleanup and Restoration Fund.

Notes on Education

Green Roof Garden Serves as Living Laboratory

The Chicago Botanic Garden's new green roof garden serves as an information-gathering venture as well as an environmentally friendly building design. The Garden opened its new 38,000-square-foot Daniel F. and Ada L. Rice Plant Conservation Science Center in September 2009 to provide laboratories and teaching facilities for more than 200 scientists, land managers, students and interns. An integral part of this research is the facility's 16,000-square-foot green roof garden, where scientists will not only monitor how the green roof performs, but also experiment with growing types of plants not typically used on green roofs. Any runoff from the green roof is captured and treated by a rainwater glen that surrounds the Plant Science Center.

A Unique Living Laboratory

The green roof garden is divided into two main areas, each accessible via public viewing decks. The south roof supports plants that are native to North America. The north roof includes a mix of plants currently accepted as good choices for green roof plants, plus exotic and native plants that the garden design team believes have good potential for green roof use (because they have shallow roots, are sun-loving and drought tolerant, and can withstand windy conditions). The green roof now supports 38,000 different plants from 200 taxa.

This view of the north roof shows a variety of planting beds. Poles support monitoring equipment placed throughout the roof. *(Chicago Botanic Garden photos by Robin Carlson)*

The planting beds are constructed of several layers, beginning with a waterproofing layer, two layers of hard foam insulation, a root barrier fabric, a drainage tile to allow water to drain away from the roots, a filter fabric to keep the growing media from clogging the drainage holes, and growing media as the top layer. The semi-intensive media is a gravel-like soilless mix formulated specifically for roof gardens. It is lighter weight and more porous than soil, allowing water to drain quickly, thus reducing the weight load on the roof.

"Very few institutions conduct comparative trials of ornamental plants for landscape use, and fewer still conduct trials of plants for innovative rooftop gardening," explains Richard Hawke with the Chicago Botanic Garden. "The green roof garden will allow scientists to determine which plants are best suited to growing in this extreme environment." The living laboratory is equipped to monitor soil moisture, wind and light levels, and temperatures inside the building and in the various layers of the plantings. Scientists are monitoring plant health, aesthetics, and survivorship of plants and will be able to recommend plants that are low-maintenance, absorb water and nutrients from rainfall (lessening runoff into storm sewers), and cool the building below (lessening energy use), while providing an aesthetically pleasing retreat. According to Hawke, the trials will be among the most comprehensive rooftop plant evaluation program in the country. When available, results will be reported on the Plant Science Center's green roof garden Web site (www.chicagobotanic.org/research/building/green_roof.php).

Rainwater Glen Serves as a Bonus Feature

The Plant Science Center is surrounded by a large rainwater glen that captures and treats runoff from parking lots and the green roof. Because the area is underlain by clay soils, runoff water does not percolate readily into the soil as it would in a typical rain garden. Instead, the rainwater glen is designed with a moist-bottom swale where plants preferring consistent "wet feet" will grow. The Rainwater Glen will function like a river's floodplain—detaining stormwater runoff and encouraging infiltration. The public can view the rainwater glen from a 40-foot long gently sloping bridge that leads to the Plant Science Center entrance.

Green Roof Garden Serves as Living Laboratory (continued)

Videos Invite You to See the Gardens Close-up

The Chicago Botanic Garden offers numerous videos about the Plant Science Center's green roof garden and rainwater glen through its Garden Blog Web site (www.chicagobotanic.org/grow). Be sure to check out:

The rainwater glen wraps around the Plant Science Center. *(Chicago Botanic Garden photos by Robin Carlson)*

- Sustainable features of the Plant Science Center (www.youtube.com/watch?v=Io6pw8XGoA4)
- Selecting and evaluating green roof garden plants (www.youtube.com/watch?v=vfa6lRXG2Pk)
- Underlying components of the green roof (www.youtube.com/watch?v=WfeSE0jt-QU)
- First look at the planting of the green roof (www.youtube.com/watch?v=vW7vvsLyscs)
- Rainwater glen with Bob Kirschner (www.youtube.com/watch?v=uOyPwSG0ors)

The Plant Science Center provides an opportunity for the public to see a green roof up-close. More than 1,600 people flocked to the new Science Center during its opening week, and the number of daily visitors remained high throughout the fall months. With the arrival of spring, both the visitors and the plants are emerging from their winter hibernation.

[For more information, contact staff at the Chicago Botanic Garden, 1000 Lake Cook Road, Glencoe, IL 60022. Phone: 847-835-5440; Web site: www.chicagobotanic.org]

Read about Wetlands This Summer

Looking for some summer reading material for your family? The U.S. Environmental Protection Agency's (EPA's) Wetlands Division offers a comprehensive online wetland reading list for children, teenagers and young adults. Themes in the books help readers learn about the roles that wetlands play in our environment and the significant benefits they provide—improved water quality, increased water storage and supply, reduced flood and storm surge risk, and critical habitat for plants, fish and wildlife.

Children take water samples in a wetland.

Available at www.epa.gov/wetlands/science/readlist.html, the EPA's Wetlands Reading List is an annotated list of printed material that can supplement teachers' lesson plans and provide students with suggestions for independent reading on wetlands. The list includes more than 100 books of all types—fiction, non-fiction and picture books. Entries are listed alphabetically by grade level: primary (pre-kindergarten to grade 2), elementary (grades 3 to 5), intermediate (grades 6 to 8) and secondary (grades 9 to 12). Most books in the list include a citation, a short summary of the book and a comment section that explains its significance to wetlands. The books should be available at your local public library, a school library, an environmental education center, a book store or through an online book seller.

The following lists include just a short sample of the books included on EPA's Wetlands Reading List:

Primary Level (Pre-Kindergarten through Grade 2)

- Box Turtle at Long Pond, by William T. George
- Come Out, Muskrats, by Jim Arnosky
- Common Frog, by Oxford Scientific Films
- Dragonflies, by Cynthia Overbeck

Read about Wetlands This Summer (continued)

- Fish Eyes, by Lois Ehleert

Elementary Level (Grades 3 through 5)

- Animals and Plants That Trap, by Philip Goldstein
- Animals of the Ponds and Streams, by Julie Becker
- Beaver Valley, by Walter D. Edmonds
- Dragonflies, by Hilda Simon
- Explore a Spooky Swamp, by Wendy W. Cortesi

Intermediate Level (Grades 6 through 8)

- Estuaries, Where Rivers Meet the Sea, by Laurence Pringle
- Everglades Country, by Patricia Lauber
- Exploring the Great Swamp, by George Laycock
- Look What I Found, by Marshal T. Case
- Misty of Chincoteague, by Marguerite Henry

Secondary Level (Grades 9 through 12)

- Adopting a Stream: A Northwest Handbook, by Steve Yates
- The Adventures of Huckleberry Finn, by Mark Twain
- Amazon: The Flooded Forest, by Michael Goulding
- Beautiful Swimmers, by William W. Warner
- The Birder's Handbook, A Field Guide to the Natural History of North American Birds, by Paul R. Erlich, David S. Dobkin, and Darryl Wheye

Reviews and Announcements

Acid Rain Blog Launched

EPA recently launched some daily blogs to help keep the public informed about acid rain issues. Sulfur dioxide and nitrogen oxide emissions have been reduced by more than 60 percent since 1995; however, acid rain continues to negatively affect people and our environment. EPA is sharing acid rain information in a new and interactive way through its "Whatever happened to Acid Rain?" and "Acid Rain and Cap and Trade" blogs. The blogs can be accessed using Facebook (www.facebook.com/EPAairmarkets) and Twitter (www.twitter.com/EPAairmarkets).

Canada Bans Use of Weed-and-Feed Products

In February 2010, Health Canada's Pest Management Regulatory Agency (PMRA) announced a phase-out of all pesticide and fertilizer combination products by December 2012. While more than half of Canada has already banned combination products, this is the first significant federal action on the issue. After consulting with the provinces, experts and registrants, the PMRA concluded that fertilizer-pesticide combination products for lawn and turf uses do not support the goals of best practices for pest management in turf. Combining the products removes the flexibility of applying pesticide as a spot application. PMRA noted that the amount of fertilizer and pesticide applied should be based on need. Fertilizer should only be used if the turf will benefit from additional nutrients, and pesticide should only be used as a broadcast treatment if the pest densities are sufficiently high across the area to be treated. As pest infestations are typically patchy, spot applications of pesticides to those areas are most often sufficient to ensure adequate control in turf. For more information, see www.hc-sc.gc.ca/cps-spc/pubs/pest/_decisions/rev2010-01/index-eng.php.

Climate Change Report Released

In December 2009, the U.S. Department of Agriculture, in cooperation with the University Corporation for Atmospheric Research and the U.S. Global Change Research Program (USGCRP), released *The Effects of Climate Change on U.S. Ecosystems* (see www.usda.gov/img/content/EffectsofClimateChangeonUSEcosystem.pdf). The report provides an accessible summary of findings contained in a U.S. scientific assessment project commissioned by the USGCRP and released in May 2008. The authors added new information that provides additional detail on the original findings. Based on a wealth of source and review literature, the report concludes that climate change is already affecting U.S. agriculture, land resources, water resources and biodiversity, and will continue to do so. The report identifies the effects climate is having and is expected to have on natural resources and ecosystem services in the U.S. over the next several decades.

Document Identifies Smart Growth Essentials

In November 2009, EPA's Smart Growth Office released a new resource—*Essential Smart Growth Fixes for Urban and Suburban Zoning Codes* (www.epa.gov/smartgrowth/pdf/2009_essential_fixes.pdf). This document identifies and suggests solutions for the most common code and ordinance barriers faced by governments as they try to implement smart growth techniques.

E-Handbook for Managing Decentralized Wastewater Treatment Systems Updated

The EPA Office of Wastewater Management recently expanded its *Handbook for Managing Onsite and Clustered (Decentralized) Wastewater Treatment Systems* with the addition of an "E-Handbook." The E-Handbook features resource guides containing detailed information on the 13 management program elements featured in the existing management handbook: public education, planning, performance, site evaluation, design, construction/installation, operation/maintenance, inspections/monitoring, residuals management, training/certification, financial assistance, inventory/recordkeeping, and compliance assurance. The E-Handbook focuses on individual and clustered wastewater systems that discharge to the soil, but the information can also be applied to small systems that discharge to surface waters through federal or state National Pollutant Discharge Elimination System permit programs. The E-Handbook is intended for health departments, wastewater system management entities, local governments, and others involved in managing multiple individual or clustered treatment systems. Each resource guide contains detailed information on each program element topic and links to other resources, case studies and examples of successful management programs. The resource guides in the E-Handbook can be accessed via Web links in the current Management Handbook posted at www.epa.gov/owm/onsite.

EPA Climate Reports Available Online

The EPA Office of Water has issued the *National Water Program Climate Change Strategy 2009 Progress Report*. The report summarizes the climate change accomplishments of the National Water Program through 2009. The report is available at www.epa.gov/ow/climatechange/implementation.html. In addition, EPA's Climate Ready Estuaries program recently issued its 2009 Progress Report, describing ongoing efforts to assist coastal communities in preparing for the impacts of climate change. This report, available at www.epa.gov/cre/downloads/2009-CRE-Progress-Report.pdf, features the activities of each of the program's 11 partners and key lessons learned in the adaptation/planning process.

EPA Guidance Helps Federal Facilities Better Manage Stormwater

In December 2009 EPA issued new guidance to help federal agencies minimize the impact of federal development projects on nearby water bodies as required by Section 438 of the Energy Independence and Security Act of 2007. That law requires that "The sponsor of any development or redevelopment project involving a federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to

maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow." The guidance provides technical information on low impact development practices and recommends methodologies for determining pre-development hydrology and techniques for estimating approaches that will achieve that level of on-site control. Federal agencies can comply using a variety of stormwater management practices, including reducing impervious surfaces, using vegetative practices, using permeable pavements and installing green roofs. These same approaches may be used to similar effect in the development and redevelopment of non-federal facilities. For more information on the guidance, see www.epa.gov/owow/nps/lid/section438.

EPA Releases Handbook for Clean Water Act Section 319 Tribal Program

EPA's Office of Wetlands, Oceans, and Watersheds recently released the *Handbook for Developing and Managing Tribal Nonpoint Source Pollution Programs under Section 319 of the Clean Water Act*. Currently, 159 tribes have approved nonpoint source programs. EPA developed the Handbook to support the continued growth and sophistication of Tribal participation in the Clean Water Act section 319 program. The Handbook explains the role of both EPA and the Tribes in working together to help solve water quality problems caused by nonpoint source pollution. All aspects of the grants funding process are clearly explained, demonstrating how Tribes can use section 319 program funds to implement programs and projects to reduce pollution and restore water quality. It also provides a great deal of useful technical information regarding nonpoint source pollution; how to develop and assess available data to develop a plan of action; and how to implement activities to solve the problem. The Handbook is posted on the Tribal Nonpoint Source Web site at www.epa.gov/nps/tribal.

EPA Study to Address Hydraulic Fracturing

EPA announced that it will conduct a comprehensive research study to investigate the potential adverse impact that hydraulic fracturing may have on public health and ground and surface water quality. Hydraulic fracturing is a process that drills vertical and horizontal cracks underground that help withdraw gas or oil, from coalbeds, shale and other geological formations. While each site is unique, the process generally involves vertical and horizontal drilling, taking water from the ground, injecting fracturing fluids and sands into the formation, withdrawing gas, and separating and managing the leftover waters. EPA is in the very early stages of designing a hydraulic fracturing research program. To guide the development of the study plan, the agency is seeking suggestions and comments from the EPA Science Advisory Board (SAB)—an independent, external federal advisory committee. For more information on hydraulic fracturing see www.epa.gov/ogwdw000/uic/wells_hydrofrac.html.

EPA Targets Mercury in Gold Production

On April 16, 2010, EPA announced in the Federal Register that it is proposing to cut emissions from gold ore processing and production facilities, the sixth largest source of mercury air emissions in the United States. Mercury is a toxic metal that can damage children's developing brains and nervous systems. EPA's proposal would reduce annual mercury emissions to about 1,390 pounds a year—a 73 percent reduction from 2007 levels. This action will build on reductions from Nevada's successful program for controlling mercury emissions from precious metal mining. Approximately 20 facilities in the United States extract gold from ore and would be subject to the proposed rule. Some facilities in Nevada already are making significant progress toward the proposed reductions under that state's program. Mercury emitted to the air eventually settles in water, where it can change into methylmercury, which builds up in ocean and freshwater fish and can be highly toxic to humans who eat the fish. For more information see www.epa.gov/ttn/oarpg/new.html.

EPA Web Tools Inform the Public about Clean Water Enforcement

EPA recently launched new Web tools, data and interactive maps to inform the public about serious Clean Water Act violations in their communities. The new resource provides interactive information from EPA's 2008 Annual Noncompliance Report, which pertains to about 40,000 permitted Clean Water Act dischargers across the country. The report lists state-by-state summary data of violations and enforcement responses taken by the states for smaller facilities (see www.epa-echo.gov/echo/ancr/us).

Fact Sheet Presents Use of Green Infrastructure in Arid Areas

In May 2010, EPA released a new fact sheet describing the benefits of using green infrastructure in arid and semi-arid regions. Available at www.epa.gov/npdes/pubs/arid_climates_casestudy.pdf, the publication describes efforts by forward-thinking communities in water-limited regions to use green infrastructure as a cost-effective way to conserve water and manage stormwater.

Forest Service Offers Web-based Climate Change Short Course

The Forest Service's Climate Change Resource Center now offers a free online short course, "Adapting to Climate Change: A Short Course for Land Managers." The self-paced course provides an up-to-date synthesis of scientific and technical information, and can help resource managers and decision-makers plan for future climate-driven uncertainties. It includes video lectures, interactive quizzes, literature citations and links to additional resources. Land managers may also order the course materials on DVD. For more information, see www.fs.fed.us/ccrc/hjar.

Forest Service Releases Report on Forests and Drinking Water

In 2009 the Forest Service released *Forests, Water and People: Drinking water supply and forest lands in the Northeast and Midwest United States*, a report that shows the geographic connection between forests, water, and people—sometimes called the "forest-to-faucet" connection—and demonstrates the importance of private forests for protecting surface drinking water quality. Developed in partnership with the Northeastern Area State and Private Forestry, U.S. Department of Agriculture and the University of Massachusetts Forest to Faucet Partnership, the analysis used a geographic information system-based process and a series of maps to create a watershed condition index based on physical and biological attributes. Using a multi-step process, the partners then used the index to compare 540 watersheds across 20 states and the District of Columbia based on their ability to produce clean water. The study also quantified the magnitude and scope of forest-dependent drinking water supplies, and their dependence on private forests. It also identified watersheds that are threatened by land use change or are in need of management to sustain and improve forests that protect water supplies. The final maps and data display development pressure on private forests in watersheds important for drinking water. To view the report and maps, see http://na.fs.fed.us/watershed/fwp_preview.shtm.

Forest Service Software Quantifies the Benefits of Trees

The USDA Forest Service's i-Tree software suite (see www.itreetools.org) provides tools to analyze the benefits of urban and community forests. The i-Tree software helps communities of all sizes strengthen their urban forest management and advocacy efforts by quantifying the environmental services that trees provide and the structure of the urban forest. Communities, nonprofit organizations, consultants, volunteers and students have used i-Tree to report on the urban forest at all scales—some of these case studies are featured on the Web site. Developed by the Forest Service and numerous cooperators, i-Tree is in the public domain and available by request through the Web site.

Freshwater Invertebrate Flash Card Sets Released

McDonald & Woodward Publishing recently released four new educational resources based on J. Reese Voshell's book *A Guide to Common Freshwater Invertebrates of North America*. The resources include the *QuickGuide to Major Groups of Freshwater Invertebrates* (a double-sided laminated brochure available for $5.95) and three sets of *Flash Cards of Common Freshwater Invertebrates of North America* (three sets of 32 two-sided waterproof cards at $39.95 each). The first flash card set covers the major classes and orders of freshwater invertebrates, and would be best suited for teaching biology and ecology at the K–12 levels, for interpretation and outreach activities, and for biomonitoring of freshwater streams and ponds. The second and third flash card sets address the taxa at the family level and therefore provide more detail. These sets would be most useful for teaching the principles of biology and ecology at advanced high school and college levels; for training instructors who would be conducting interpretation or outreach activities; and for biomonitoring carried out by experienced citizen volunteers, agency personnel and professional scientists. For more information, see www.mwpubco.com/environmentaleducation.htm.

Handbook Highlights Psychology of Sustainable Behavior

Dr. Christie Manning with the Minnesota Pollution Control Agency recently released *The Psychology of Sustainable Behavior: Tips for empowering people to take environmentally positive action*, available for free download at www.pca.state.mn.us/oea/publications/p-ee1-01.pdf. The handbook introduces readers to research-based tips from psychology to help support personal, community and workplace efforts to empower sustainability. The handbook begins with an overview of the psychology of sustainable behavior, providing a short background on this field of study. The handbook then describes how the tips from psychology fit into sustainability campaigns and explains how individual sustainability contributes to broader social and policy change.

National Water Program Conference Proceedings Online

The conference proceedings for the 2010 Land Grant and Sea Grant National Water Conference, held in Hilton Head, South Carolina on February 21–25, 2010 are now online at www.usawaterquality.org/conferences/2010. Slide presentations, posters and other conference documents are available for download.

New Rapid Detection Method for Bacteria Developed

Engineers from the UCLA Henry Samueli School of Engineering and Applied Science have developed a new in-field method for analyzing bacteria concentrations in marine water and freshwater in less than one hour. The new rapid method represents a field-portable alternative to more expensive procedures, particularly where larger-scale, expensive equipment is not readily accessible. To decrease the time to determine results, the researchers outfitted a portable kit to test samples for bacterial concentrations. The process uses magnetic beads conjugated to specific antibodies that identify and bind fecal bacteria such as *E. coli* and *Enterococcus*. After a few filtration and isolation steps, the sample organisms are lysed (broken down) and treated with an enzyme that catalyzes a light-emitting reaction. The scientists can then determine bacterial concentrations by measuring the amount of light released. The process is called covalently linked immunomagnetic separation/adenosine triphosphate quantification technique (Cov-IMS/ATP). For more information, see http://sites.google.com/site/jennyjaygroup/beach-research/imsatp or www.newsroom.ucla.edu/portal/ucla/ucla-engineers-developed-faster-154426.aspx.

New Stormwater Management Manual Online

The University of Minnesota and St. Anthony Falls Laboratory recently launched an online manual describing how to measure the performance of and maintain stormwater treatment practices. The manual, *Stormwater Treatment: Assessment and Maintenance*, builds on the knowledge and experience of engineers, researchers, faculty, consultants, watershed districts and many others.

Available at http://stormwaterbook.safl.umn.edu, the manual creates guidelines for assessing performance, reporting results, and scheduling maintenance which allows for comparison of practices across geography, stormwater treatment practice type, season and watershed.

Online Tool Generates Outreach Materials

The Source Water Collaborative, a group of federal, state and local partners working to protect America's drinking water, recently released a toolkit called "Your Water. Your Decision." Using this interactive, online toolkit, you can create a customized drinking water outreach guide targeted at your local policymakers. In just a few minutes, the tool will generate a printable document that emphasizes your local or regional drinking water issues, lists available local and state resources, and includes concrete steps that local officials can take to protect source water. To get started, visit www.yourwateryourdecision.org.

Restore America's Estuaries Releases Report

Restore America's Estuaries, a nonprofit coalition of 11 conservation groups across the United States, recently published *Hope for Coastal Habitats: People, Partnerships and Projects Making a Difference*. This 32-page document presents 12 stories about innovative ways people are working to protect rivers, marshes, wetlands and other coastal water resources. To download the report, go to www.estuaries.org/reports.

River Network Releases Clean Water Act Report

River Network, a nonprofit group, recently released Phase 1 of a three-phase review of how Clean Water Act program areas are addressed in the Intermountain West (Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, and New Mexico). This review will allow river advocates to compare their state's strengths and weaknesses with other states, prioritize the issues that will provide the greatest results for clean and healthy rivers, and better advocate for protections within their own states. For more information, see www.rivernetwork.org/cwwpolicyanalysis.

Stormwater Workshop Summary Released

EPA recently released a summary report on its Regional Science Workshop on Stormwater Management, held in Edison, NJ on October 20–22, 2009. This workshop brought together science experts from within and outside EPA to identify ongoing research and research needs relevant to stormwater management across EPA Regions 1, 2 and 3. For more information, see www.epa.gov/nrmrl/pubs/600r09157/600r09157.pdf.

Study Reinforces Concerns about Safety of Atrazine

In an article in the April 16, 2010, issue of *Proceedings of the National Academy of Sciences*, University of California, Berkeley, developmental endocrinologist Tyrone B. Hayes and his colleagues report that atrazine at levels often found in the environment demasculinizes tadpoles and turns them into hermaphrodites (exhibiting both male and female sexual characteristics). The herbicide also lowers levels of the male hormone testosterone in sexually mature male frogs by a factor of 10, to levels lower than those in normal female frogs. The findings come at a time when the EPA is re-evaluating allowable levels of atrazine in drinking water, which stand today at 3 parts per billion (ppb). The research team concluded that atrazine affects the sexual development of frogs at concentrations of 0.1 ppb and higher. At these low concentrations, as many as 16 percent of the animals had higher than normal numbers of gonads or had both male and female organs (testes and ovaries). No control animal had such abnormalities. In follow-up field surveys, Hayes discovered that many atrazine-contaminated ponds in the Midwest contain native leopard frogs with the same abnormalities. For more information, see www.berkeley.edu/news/media/releases/2010/03/01_frogs.shtml.

USDA Awards Funds to Maintain Healthy Watersheds

In January 2010, the USDA's National Institute of Food and Agriculture (NIFA) awarded more than $4 million to conduct research aimed at improving and maintaining healthy watershed habitat and water supplies. The grants are awarded through NIFA's Agriculture and Food Research Initiative Water and Watersheds competitive grants program. The program seeks to reduce pathogens, hormones, and pharmaceuticals in waters derived from agricultural and rural watersheds, while also maintaining adequate water supplies for agricultural crop and livestock production and rural use. In the past five years, the program has awarded more than $24.2 million in grants. For more information, see www.nifa.usda.gov/fo/waterandwatershedsafri.cfm.

USDA Posts Agricultural Field Nutrient Loss Database

The USDA recently released its "Measured Annual Nutrient loads from AGricultural Environments" (MANAGE) database for public use (see www.ars.usda.gov/spa/manage-nutrient). The database provides (1) measured nutrient load and concentration data and corresponding watershed characteristics from numerous field-scale studies; (2) readily accessible, easily queried information to support water quality management, modeling and future research design; and (3) a platform allowing user input of additional project-specific data.

USGS Studies Highlight Contaminant Transport to Wells

New U.S. Geological Survey (USGS) groundwater studies explain what, when and how contaminants may reach public water supply wells. A wells' vulnerability to contamination varies because of differences in three factors: the general chemistry of the aquifer, groundwater age, and direct paths within aquifer systems that allow water and contaminants to reach a well. The USGS tracked the movement of contaminants in groundwater and in public water supply wells in four aquifers in California, Connecticut, Nebraska and Florida. The importance of each factor differs among the various aquifer settings, depending upon natural geology and local aquifer conditions, as well as human activities related to land use and well construction and operation. Findings in the four different aquifer systems can be applied to similar aquifer settings and wells throughout the United States. For more information, see the fact sheets and video podcast at http://oh.water.usgs.gov/tanc/NAWQATANC.htm.

Washington Stormwater Research Report Available

The Water Environment Research Foundation recently released *Flow Control and Water Quality Treatment Performance of a Residential Low Impact Development Pilot Project in Western Washington*. This report, available at www.ndwrcdp.org/publications/04DEC11SG.pdf, documents the results from one of the first low impact development (LID) monitoring efforts in the Puget Sound region. Funded in part by the USEPA, it is one of a few projects nationally to evaluate the performance of LID practices when integrated into a residential stormwater management system. LID practices used in the project design include bioretention swales, pervious concrete, compost amended soils and surface flow dispersion.

Watershed Science Bulletin Launched

The Association for Watershed Professionals recently launched the *Watershed Science Bulletin*, a new peer-reviewed journal that will be published semiannually beginning in fall 2010. Each issue of the Bulletin revolves around a central theme related to watershed and stormwater management, and engages readers with information on the latest policies, research, case studies, and technologies related to that theme. For more information, see www.awsps.org.

Web Forum Discussed Protecting Water

In March 2010, EPA held a two week-long open forum online to seek public input on how the agency can better protect and improve the health of our waters. EPA used the feedback received to shape the discussion at EPA's Coming Together for Clean Water conference held in April 2010, where EPA engaged approximately 100 executive- and local-level water leaders on the agency's clean water agenda. To view the discussion, see http://blog.epa.gov/waterforum.

Recent and Relevant Periodical Articles

Funding Stormwater Efforts

By Margaret Buranen (www.stormh2o.com/march-april-2010/funding-stormwater-projects.aspx)

This article, featured in the March/April 2010 issue of *Stormwater* magazine, summarizes some green infrastructure projects funded by the American Recovery and Reinvestment Act (ARRA) of 2009. Many are demonstration projects designed to get maximum visibility for educational purposes, such as green roofs on public buildings and permeable pavement in downtown areas.

Greenseams Effort Passes 2,000 Acres of Natural Buffers

By Don Behm (www.jsonline.com/news/80035912.html)

This article, featured in the December 24, 2009 issue of Milwaukee's *Journal Sentinel*, discusses the Milwaukee Metropolitan Sewerage District's effort to purchase flood-prone lowlands and preserve them in their natural state. The "Greenseams" program is creating ribbons of natural areas throughout the Milwaukee area.

Leaf Pack: Breaking New Ground by Studying Bugs

By David C. Richardson (www.stormh2o.com/january-february-2010/leaf-pack-bugs.aspx)

This article, published in the January/February 2010 issue of *Stormwater*, discussed one school's use of the "Leaf Pack" program, which focuses on the macroinvertebrates that colonize the leaf litter on the streambed. Developed by educators at the Stroud Water Research Center in Pennsylvania, the program helps to evaluate the ecological condition of streams. The school has incorporated its study of the leaf pack into a much wider education and restoration project.

Reaching Out to Improve Stormwater in New Jersey

By Lisa Auermuller (www.csc.noaa.gov/magazine/2010/02/article1.html)

This article, featured in the March/April 2010 issue of *Coastal Services* magazine, details an example of multiple partners pooling resources to comply with New Jersey's strict stormwater runoff rules. Local governments jointly provided funding support to the Jacques Cousteau National Estuarine Research Reserve, which in turn developed resources for all the governments to use, including a Coastal Training Program, a model ordinance, educational handouts, an "Adopt-A-Storm Drain" program, a stormwater newsletter and more.

Rising Water Temperatures Found in U.S. Streams and Rivers

By Science Daily (www.sciencedaily.com/releases/2010/04/100406101444.htm)

This article, featured in the April 7, 2010 online edition of *Science Daily*, highlights recent research showing that water temperatures are increasing in many streams and rivers throughout the United States. A team of hydrologists and ecologists analyzed historical records from 40 sites and found that annual mean water temperatures increased by 0.02-0.14°F (0.009-0.077°C) per year. Long-term increases in stream water temperatures were typically correlated with increases in air temperatures, and rates of warming were most rapid in urbanized areas.

Urban Water Management

By multiple authors (www.swhydro.arizona.edu/archive/V9_N1)

The January/February 2010 issue of *Southwest Hydrology* highlights Urban Water Management. Articles address groundwater recharge and water quality in an urban setting, using drywells to manage stormwater, permeable pavement, and sustainable urban water management, among other topics.

Web Sites Worth a Bookmark

Environmental Education and Training Partnership (www.eetap.org)

The Environmental Education and Training Partnership's (EETAP's) Web site delivers environmental education training, services and resources to education professionals across the U.S. The site offers environmental education guidelines, standards, and accreditation and certification information. EETAP's site features sections on cultural diversity and environmental literacy, and offers EETAP bulletins, articles and study reports.

EPA's Nonpoint Source Pollution Home Page (www.epa.gov/nps)

The U.S. Environmental Protection Agency (EPA) recently revised its nonpoint source pollution (NPS) homepage. Visitors can find basic information about NPS pollution—where it comes from, how it affects the environment, and ways that we can control it. The home page offers a "quick finder" to connect visitors to other NPS pollution-related topics such as total maximum daily loads and watershed planning. Visitors can easily access NPS pollution-related discussion boards, newsletters and events listings.

EPA's Rulemaking Gateway (www.epa.gov/rulemaking)

EPA's new online Rulemaking Gateway serves as a portal to EPA's priority rules, providing citizens with earlier and more concise information about agency regulations. Rulemaking Gateway complements www.regulations.gov, the federal government's main portal for tracking rules from all federal agencies, by providing brief overviews of specific EPA rules (e.g., Clean Water Act) and additional ways to search rules based on the phases they are in (e.g., pre-proposal, proposal), the topics they relate to (e.g., air, water), and the impacts they might have (e.g., impacts on small businesses or environmental justice). The new Web site offers a distilled "snapshot" of a rule, with just enough information for a citizen to determine his or her interest in the rule. The individual then can use Rulemaking Gateway links to Regulations.gov and to other EPA sources where comprehensive information is available.

Guide to Cigarette Litter Prevention (http://preventcigarettelitter.org)

This site provides information about smoking-related litter, why it occurs, and its costs to our economy and environment. After educating the reader about the problem, the site offers strategies that you can use in your community to reduce cigarette litter. Keep American Beautiful developed this resource with funding from Phillip Morris USA.

LandVote (www.tpl.org/tier2_kad.cfm?folder_id=2386)

This Web site serves as a portal for the Trust For Public Land's online conservation finances database. The database provides information about state and local governments' efforts to raise public funds in support of land conservation through ballot measures. Complete with easily accessible maps, tables and graphs detailing conservation ballot measures by state, finance mechanism, and jurisdiction type, the database allows for customizable queries and research requests.

Calendar

For an updated events calendar, see www.epa.gov/newsnotes/calendar.htm.

June 2010

6/20–23	*American Society of Agricultural and Biological Engineers Annual International Meeting*, Pittsburgh, PA. For more information, see www.asabemeetings.org.
6/20 23	*Urban Environmental Pollution*, Boston, USA. For more information, see www.uep2010.com.
6/20–24	*American Water Works Association (AWWA) 2010 Annual Conference and Exposition*, Chicago, IL. For more information, see www.awwa.org/ACE10.
6/21–25	*Training Course for Mitigation Banking and In-lieu Fee Program Interagency Review Teams*, Shepherdstown, WV. For more information, see www.conservationfund.org/course/training_course_mitigation_banking.
6/27–30	*Association of Natural Resource Extension Professionals 7th Biennial Conference—Opportunities for Extension in a Changing Environment: Lessons from the Last Frontier*, Fairbanks, AK. For more information, see www.anrep.org/conferences/2010.
6/27–7/1	*9th Federal Interagency Sedimentation Conference and 4th Federal Interagency Hydrologic Modeling Conference*, Las Vegas, NV. For more information, see www.jfic2010.org.
6/26–7/1	*Society of Wetland Scientists: Peaks to Playas*, Salt Lake City, UT. For more information, see www.sws.org/2010_meeting.
6/29–30	*Bioretention Summit: Ask the Researcher*, Raleigh, NC. For more information, see www.bae.ncsu.edu/stormwater/training/bioretention_summit.html.

July 2010

7/12–16	*Short Course: Stream Restoration Principles*, Park City, UT. For more information, see https://cnr.usu.edu/streamrestoration.
7/13–15	*2010 University Council on Water Resources Annual Conference—HydroFutures: Water Science, Technology and Communities*, Seattle, WA. For more information, see http://ucowr.siu.edu.
7/15–16	*Bioretention Summit: Ask the Researcher*, Annapolis, MD. For more information, see www.bae.ncsu.edu/stormwater/training/bioretention_summit.html.
7/18–21	*65th Soil and Water Conservation Society International Annual Conference—Ecosystem Services: Applications for Conservation Science, Policy and Practice*, St. Louis, MO. For more information, see www.swcs.org/en/conferences/2010_annual_conference.
7/29–30	*Managing Wet Weather with Green Infrastructure*, Fayetteville, AR. For more information, see http://cfpub.epa.gov/npdes/greeninfrastructure/gitrainings.cfm.

August 2010

8/1–5	*StormCon 2010*, San Antonio, TX. For more information, see www.stormcon.com.
8/3–6	*GIS Tools for Strategic Conservation Planning*, Shepherdstown, WV. For more information, see www.conservationfund.org/node/670.
8/9–13	*Short Course: Geomorphology and Sediment Transport in Channel Design*, Park City, UT. For more information, see https://cnr.usu.edu/streamrestoration.
8/18	*Webcast: Permeable Pavement Design, Installation and Maintenance*, hosted by the Center for Watershed Protection. For more information, see www.cwp.org/webcasts/2010_webcast_flyer.pdf.
8/23–27	*Watershed 2010: Innovations in Watershed Management under Land Use and Climate Change*, Madison, WI. For more information, see http://content.asce.org/conferences/watershedmanagement2010.
8/30–9/1	*American Water Resources Association Summer Specialty Conference: Tropical Hydrology and Sustainable Water Resources in a Changing Environment*, San Juan, Puerto Rico. For more information, see www.awra.org.

Contribute to Nonpoint Source News-Notes

Do you have an article or idea to share? Want to ask a question or need more information? Please contact NPS News-Notes, c/o Don Waye, by mail at U.S. EPA, Mail Code 4503-T, 1200 Pennsylvania Ave., NW, Washington, DC 20460, by phone at 202-566-1170, or by e-mail at waye.don@epa.gov.

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