



Effects of Stormwater Runoff from Development

By Robert Pitt, P.E. Ph.D., University of Alabama

Most people know that urban runoff is a problem, but very few realize just how harmful it can be for rivers, lakes and streams. In order to secure better control of urban runoff, we must make the public and its officials aware of the full extent of the problems that need to be prevented when new development takes place.

Urban runoff has been found to cause significant impacts on aquatic life. The effects are obviously most severe for waters draining heavily urbanized watersheds. However, some studies have shown important aquatic life impacts even for streams in watersheds that are less than ten percent urbanized.

Most aquatic life impacts associated with urbanization are probably related to long-term problems caused by polluted sediments and food web disruption. Because ecological responses to watershed changes may take between 5 and 10 years to equilibrate, water monitoring conducted soon after disturbances or mitigation may not accurately reflect the long-term conditions that will eventually occur. The first changes due to urbanization will be to stream and groundwater hydrology, followed by fluvial morphology, then water quality, and finally the aquatic ecosystem.

Effects of Stormwater Discharges on Aquatic Life

Many studies have shown the severe detrimental effects of urban runoff on water organisms. These studies have generally examined receiving water conditions above and below a city, or by comparing two parallel streams, one urbanized and another nonurbanized. The researchers carefully selected the urbanized streams to minimize contaminant sources other than urban runoff. One study (Bay, *et al.*, 2003) investigated the water quality impacts of urban stormwater discharges to Santa Monica Bay. Surface water samples collected within the Ballona Creek (urban watershed) stormwater discharge plume were always toxic whenever the concentration of stormwater in the plume exceeded 10%.

One study (Klein) analyzed 27 small watersheds having similar physical characteristics, but having varying land uses, in the Piedmont region of Maryland. During an initial phase of the study, they found definite relationships between water quality and land use. In another study on Coyote Creek in San Jose, California, 41 stations were sampled in both urban and nonurban perennial flow stretches of the creek over three years. Short and long-term sampling techniques were used to evaluate the effects of urban runoff on water quality,



Photo courtesy of Dr. Pitt



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From the President

I

once lived near a lovely stream. I would walk to it nearly every day to enjoy the sights, smells and sounds of a place teeming with life. I looked forward to taking my children there as they grew up. Four years later, the stream was ruined and I had to protect my children *from* it.

First, silt from construction site runoff choked the stream. Next, telltale signs of gas and oil runoff from new streets appeared. The stench of sewage became common. Water quality had gone from good to terrible in a matter of months.

Like most people, I thought of “urban runoff” as only a water *quality* problem. I began to notice that flows were changing as more and more forest cover was replaced with rooftops and pavement. More frequent high flows caused the stream’s banks to begin to erode. When the streamside trees that had helped stabilize the banks finally collapsed, the process accelerated.

High flows were higher, but lows were lower. Flash runoff left little water to seep gradually to the stream in the days following rain. Also, as the watershed “hardened,” the water table dropped. Springs that provided cool, clean water in hot weather—when the stream needed it most—virtually stopped.

Then the big storm came. In a matter of hours, the channel was gouged by a torrent far greater than it could handle. The transformation of our stream from wildlife haven and community amenity to a wide, straight, hot, muddy, polluted, dangerous ditch was complete.

Techniques already existed in the 1980s that could have prevented some of the damage to my stream and greatly reduced the rest. Since then, the art, science and policy of urban runoff management have advanced tremendously. Unfortunately, even the most basic, proven techniques are still not in widespread use today.

River Network Partners have told us they want us to focus on this issue. With this *River Voices*, we begin. We look forward to working with you to reduce the effects of new development on rivers and watersheds.

Don Elder



credit: 2004 Crooked River Howetnammy Collection

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sediment properties, fish, macroinvertebrates, attached algae and rooted aquatic vegetation. These investigations found distinct differences in the taxonomic composition and relative abundance of the aquatic biota present. The non-urban sections of the creek supported a comparatively diverse assemblage of aquatic organisms including an abundance of native fishes and numerous benthic macroinvertebrate taxa. In contrast, however, the urban portions of the creek affected only by urban runoff discharges and not industrial or municipal discharges, had an aquatic community generally lacking in diversity and was dominated by pollution-

tolerant organisms such as mosquitofish and tubificid worms.

Cedar swamps in the New Jersey Pine Barrens were studied by Ehrenfeld and Schneider. They examined nineteen wetlands subjected to

varying amounts of urbanization. Typical plant species were lost and replaced by weeds and exotic plants in urban runoff affected wetlands. Increased uptakes of phosphorus and lead in the plants were found. It was concluded that the presence of stormwater runoff to the cedar swamps caused marked changes in community structure, vegetation dynamics, and plant tissue element concentrations.

Habitat Effects Caused by Stormwater Discharges

Some of the most serious effects of urban runoff are on the aquatic habitat of the receiving waters. These habitat effects are in addition to the pollutant concentration effects. Numerous researchers have found



significant sedimentation problems in urban receiving waters.

The major effects of urban sediment on the aquatic habitat include:

- silting of spawning and food production areas;
- unstable bed conditions;
- rapidly changing flows and the absence of refuge areas to protect the biota during these flow changes;
- increased water temperatures due to the removal of riparian vegetation; and
- decreased large organic debris that are important refuge areas.

Increased Flows from Urbanization

Increased flows are probably the best known example of impacts associated with urbanization. Most of the recognition has of course focused on increased flooding and associated damages. This has led to numerous attempts to control peak flows from new urban areas through the use of regulations that limit post development peak flows to pre development levels for relatively large storms. The typical response has been to use dry detention ponds. This approach is limited, and may actually increase downstream flows. In addition to the serious issue of flooding, high flows also cause detrimental ecological problems.

One study (Bhaduri, *et al.*) quantified the changes in streamflow and associated decreases in groundwater recharge associated with urbanization. The most widely addressed hydrologic effect of urbanization is the peak discharge increases that cause local flooding. However, the increase in surface runoff volume also represents a net loss in groundwater recharge. Urbanization is linked to increased variability in volume of water available for wetlands and small streams, causing “flashy” or “flood-and-drought”

DID YOU KNOW?

Polluted runoff is now widely recognized as the single largest threat to water quality in the United States.

Impacts of Development on Waterways
— NEMO, nemo.uconn.edu

conditions. In northern Ohio, urbanization at a study area was found to cause a 195% increase in the annual volume of runoff, while the expected increase in the peak flow for the local 100-yr event was only 26% for the same site. Although any increase in severe flooding is problematic and cause for concern, the much larger increase in annual runoff volume, and associated decrease in groundwater recharge, likely has a much greater effect on in-stream biological conditions.



Photo courtesy of Dr. Pitt

Channel Modifications due to Urban Wet Weather Flow Discharges

Changes in physical stream channel characteristics can have a significant effect on the biological health of the stream. These changes in urban streams have been mostly related to changes in the flow regime of the stream, specifically increases in peak flow rates, increased frequencies and durations of erosive flows, and channel modifications made in an attempt to accommodate increased stormwater discharges.

Much research on habitat changes and rehabilitation attempts in urban streams has occurred in the Seattle area of western Washington. Sovern and Washington described the in-stream processes associated with urbanization in this area and expressed concern that many “restoration” attempts of urban streams were destined to failure because of a lack of understanding of the actual changes occurring in streams as the watersheds changed from forested to urban land uses.

Urbanization radically affects many natural stream characteristics. Frequent high flow rates can be 10 to 100 times the predevelopment flows in urbanized areas, but the low flows in urban streams are commonly lower than the predevelopment low flows (Sovern and Washington). Thus,

the effects of urbanization on western Washington streams are dramatic, in most cases permanently changing the stream hydrologic balance by: increasing the annual water volume in the stream, increasing the volume and rate of storm flows, decreasing the low flows during dry periods, and increasing the sediment and contaminant discharges from the watershed. Once urbanization begins, the effects on stream shape are not completely reversible. Developing and maintaining quality aquatic life habitat is possible under urban conditions, but it requires human intervention and it will not be the same as for forested watersheds.

Stormwater Contamination of Sediments and Increased Sediment Discharges in Urban Streams

Many of the observed biological effects associated with urban runoff may be caused by polluted sediments and associated benthic organism impacts. As required by the Water Resources Development Act of 1992, the EPA prepared a four volume report to Congress on the incidence and severity of sediment contamination in the surface waters of the U.S. The Act defines contaminated sediment as “sediment containing chemical substances in excess of appropriate geochemical, toxicological or sediment quality criteria or measures; or

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otherwise considered to pose a threat to human health or the environment.” In the national quality survey, the EPA examined data from 65% of the 2,111 watersheds in the U.S. and identified 96 watersheds that contain areas of probable concern. In portions of these waters, benthic organisms and fish may contain chemicals at levels unsafe for regular consumption. Areas of probable concern are located in regions affected by urban and agricultural runoff, municipal and industrial waste discharges, and other contaminant sources.

The effects of large discharges of relatively uncontaminated sediment on the receiving water aquatic environment are mostly associated with poorly controlled construction sites, where 30 to 300 tons of sediment per acre per year of exposure may be lost (Pitt).

These high rates can be 20 to 2,000 times the unit area rates associated with other land uses. Unfortunately, much of this sediment reaches urban receiving waters, where massive impacts on the aquatic environment can result. Additionally, high rates of sediment loss can also be associated with later phases of urbanization, where receiving water channel banks widen to



Photo courtesy of Dr. Pitt

accommodate the increased runoff volume and frequency of high erosive flow rates. Sediment is typically listed as one of the most important pollutants causing receiving water problems in the nation’s waters.

Impacts that can be associated with suspended sediment include (Schueler):

- damages to fish gills, increasing risk of infection and disease;
- scouring of periphyton from streams (plants attached to rocks);
- loss of sensitive or threatened fish species when turbidity exceeds 25 NTU;
- shifts in fish communities toward more sediment tolerant species;
- decline in sunfish, bass, chub, and catfish when monthly turbidity exceed 100 NTU;
- reduction in sight distance for trout, with reduction in feeding efficiency;
- reduction in light penetration that causes reduction in plankton and aquatic plant growth;

Water clarity is often measured in “Nephelometric Turbidity Units”, or NTUs. As NTUs increase, clarity decreases. General and waterbody-specific clarity standards are established in terms of NTUs in most states’ water quality standards. For information on standards in your state, visit, http://rivernetwork.org/cleanwater/cwa_search.asp, where you will find River Network’s water quality standards database under “A State By State Look at the Clean Water Act.”

- reduction in filtration efficiency of zooplankton in lakes and estuaries;
- adverse impacts on aquatic insects, which are the base of the food chain;
- increased stream temperature in summer;
- increased major nutrients and metals carried by suspended sediments;
- increased probability of boating, swimming, and diving accidents due to turbidity;
- increased water treatment to meet drinking water standards;
- increased wear and tear on hydroelectric and water intake equipment;
- reduction in anglers' chances of catching fish; and
- diminished direct and indirect recreational experience of receiving waters.

Schueler also listed the impacts that can be associated with deposited sediment, such as:

- physical smothering of benthic aquatic insect community;
- reduced survival rates for fish eggs;
- destruction of fish spawning areas and redds;
- loss of trout habitat when fine sediments are deposited in spawning or riffle-runs;
- possible elimination of sensitive or threatened darters and dace from fish community;
- dissolved oxygen depletion in lakes and streams due to the increase in sediment oxygen demand;
- decline of freshwater mussels;
- reduced channel capacity, exacerbating downstream bank erosion and flooding;

- reduced flood transport capacity under bridges and through culverts;
- loss of storage and lower design life for reservoirs, impoundments and ponds;
- dredging costs to maintain navigable channels and reservoir capacity;
- spoiling of sand beaches; and
- diminished scenic and recreational value of waterways.

Summary of Urban Runoff Effects on Receiving Waters

The effects of urban runoff on receiving water aquatic organisms or other beneficial uses are very site specific.

Different land development practices create substantially different runoff flow characteristics. Different rain patterns cause different particulate washoff, transport and dilution conditions. Local perceptions of problems affect public goals and priorities for specific waters. There is also a wide variety of water types receiving urban runoff, and these waters have watersheds that are urbanized to various degrees.

The long-term aquatic life effects of urban runoff are probably more important than short-term effects associated with specific events, and are related to site specific conditions associated with dilution, size of the watershed, and size of the stream. The long-term effects are related to habitat degradation, deposition and accumulation of toxic sediments, or the inability of the aquatic organisms to adjust to repeated exposures to high concentrations of toxic materials or high flow rates.



Photo courtesy of Dr. Pitt

This article is excerpted from Dr. Pitt's research paper by the same name. The paper, in its entirety, can be found on River Network's webpage.

FACTS & FIGURES RELATED TO RUNOFF



How much development is too much? There is no simple, pat answer. As many communities have seen, just one poorly planned, poorly controlled development in the wrong place can do great harm to a stream—even if the development covers less than one percent of its watershed.

One key indicator of the potential for long-term watershed harm is the percent of watershed imperviousness. In general, impacts increase as watershed imperviousness increases. Past a certain point, even the very best planning and management practices are insufficient to prevent unacceptable harm.

What is that point? It depends...on the type of development, the type of watershed, the type of stream, the sensitivity of local aquatic life, and many other factors. About a decade ago many experts began to try to define a sort of “watershed sustainability line” in terms of percent imperviousness. As the following sample statements show, their opinions have varied. As times goes on and post development monitoring continues, many experts are lowering their estimates of the “sustainability threshold.” Virtually everyone now agrees that significant adverse effects are virtually unavoidable if imperviousness increases much past ten percent. Some place the threshold for unacceptable, irreversible harm lower.

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[In context of different types of impervious surfaces] As it happens, the transport component now often exceeds the rooftop component, in terms of total impervious area created. For example, transport-related imperviousness comprised 63% to 70% of total impervious cover at the site in 11 residential, multifamily and commercial areas where it had actually been measured (City of Olympia, 1994). This phenomenon is observed most often in suburban areas, and reflects the recent ascendancy of the automobile in both our culture and landscape.

– *The Importance of Imperviousness*
Center for Watershed Protection
www.cwp.org

Many studies are finding a direct relationship between the intensity of development in an area—as indicated by the amount of impervious surfaces—and the degree of degradation of its streams. These studies suggest that aquatic biological systems begin to degrade at impervious levels of 12% to 15%, or at even lower levels for particularly sensitive streams. As the percentage of imperviousness climbs above these levels, degradation tends to increase accordingly.

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...even relatively low levels of impervious cover (5 to 10%) are capable of increasing the peak discharge rate by a factor of 5 to 10 for storms smaller than the one year return storm.

– *The Importance of Imperviousness*
Center for Watershed Protection
www.cwp.org

STRATEGIES & APPROACHES

Development Runoff and Political Action

By Betsy Otto, *American Rivers*

What can local activists do to attack the impacts of new development runoff through advocacy and political action? Here are a few political strategies and basic actions that local river and watershed groups can undertake to make a difference.

1) Phase II stormwater National Pollutant Discharge Elimination System (NPDES) permits. As of March, 2003 many small communities and facilities, such as hospitals and universities, are now considered small municipal separate storm sewer systems (MS4), and must obtain general permits under the Phase II NPDES stormwater program. (Check your state water pollution control agency to find out what entities are regulated, or see cfpub.epa.gov/npdes/stormwater/smms4.cfm for more information on who's covered. Large and medium sized municipalities—those >100,000 population—are already issued individual permits under the Phase I NPDES stormwater program.) Phase II MS4s must engage in activities in six categories to reduce stormwater impacts, including construction site stormwater runoff control, and post-construction stormwater management in new development and redevelopment. (For more information on what's required in these two areas, see EPA facts sheets: cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm and cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm.) Steps activists can take:

- **Check your local MS4's permit and stormwater management plan.**
 - ~ Do they comply with all Clean Water Act (CWA) requirements, including water quality standards, anti-degradation requirements, and Total

Maximum Daily Loads (TMDLs)?

- ~ Do they include both nonstructural Best Management Practices (BMPs) (e.g., stream buffers, disconnected imperviousness) and structural BMPs (e.g., vegetated swales and rain gardens) in ways that will reduce stormwater to the “maximum extent practicable”—the required standard under the Phase II program?
 - ~ Are MS4s actually doing what they say they'll do in their general permit and stormwater management plan?
- Can you push your state legislature and implementing agency to require **stricter performance standards** for what constitutes the “maximum extent practicable?” For example, New Jersey's Phase II stormwater program requires that 100% of pre-development groundwater recharge be maintained, 95% of total suspended solids (TSS) be removed, and 300-ft. buffers be established along all high-value streams, such as drinking water sources and trout streams. (For more information see www.njstormwater.org.)
 - Phase II requires developers to obtain a general construction permit for construction projects of one acre or larger. At the same time, MS4s must also implement their own program to **ensure that construction site erosion is controlled.** Is your community setting even more stringent requirements than the state's general construction permit, as allowed under Phase II? Are the cumulative impacts of site erosion on parcels less than one acre in size being managed, as required? Are the best low-impact development and green infrastructure techniques being applied (e.g. minimizing clearing, preserving natural vegetation, grading and

Numerous strategies exist for local watershed groups wishing to proactively and constructively work with developers, public officials and others to ensure that best management practices and innovative stormwater management practices are implemented. In this article we look at four such strategies: political, legal, technical and outreach. The best strategy—or combination of strategies—will depend upon numerous factors, including:

- *the type of watershed,*
- *the type of development,*
- *existing rules and/regulations,*
- *organization's mission, and*
- *organization's resources.*

Political...

replanting disturbed areas)? (For more information on requirements and techniques see cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm).

2) Clean Water State Revolving Funds (SRF).

The Clean Water SRF program is the largest single financer of clean water infrastructure projects. Less than 1% supports stormwater infrastructure, and virtually no funding goes to decentralized, on-site stormwater controls, though we know they are most cost-effective and better for streams and groundwater aquifers. Steps activists can take:

- Meet with state SRF program staff and ask what they are doing to respond to Congress' FY'03 and '04 SRF appropriations directive that states: "...up to \$75,000,000 shall be available for loans, including interest-free loans...to municipal, inter-municipal, interstate, or State agencies or nonprofit entities for projects that provide treatment for or that minimize sewage or stormwater discharges using one or more approaches which include, but are not limited to, decentralized or distributed stormwater controls, decentralized wastewater treatment, low-impact development practices, conservation easements, stream buffers, or wetlands restoration;..."
- Work with local Phase II MS4s to apply for SRF funding for innovative, nonstructural BMP projects. Point out to state SRF staff how these projects do more to meet environmental review requirements. (For more information on the SRF program, see p. 108-113 of River Network's *The Clean Water Act: An Owner's Manual*. For more information on how SRF funds can be accessed for wet weather projects, see www.epa.gov/OWM/cwfinance/cwsrf/wetweather.pdf.)
- Encourage state agencies to adopt

innovative SRF funding programs that leverage conventional "pipes and pumps" infrastructure to pay for stream restoration and stormwater management projects similar to those in Ohio, Oregon and Iowa. (For more information, see www.epa.gov/OWM/cwfinance/cwsrf/ohio_wrrsp.pdf, and www.deq.state.or.us/wq/wqgrant/PressReleases/CityofPortlandPR.pdf.)

3) Push for additional sources of stormwater funding.

Communities have complained that Phase II stormwater regulations are an unfunded mandate. And the truth is there is little dedicated funding to help communities implement these important efforts. Steps activists can take:

- Tell your members of Congress to support funding to mitigate stormwater runoff from existing roads in the upcoming transportation bill. (*Note: nearly \$1 billion in funding is included in the U.S. Senate transportation bill for this purpose, but not in the U.S. House bill. For more information, see www.amrivers.org/transportationbilltakesastepforwardoncleanwater.html.*)
- Contact your Senators and Congressional representative(s) and let them know that there is a general need for more federal funding to help local communities implement Phase II programs to manage stormwater runoff.
- Urge your state government to provide more funding to local communities to develop good stormwater management ordinances and grants or loans to install nonstructural BMPs on municipal parks and other lands.
- Encourage your local community to establish a stormwater utility or other

funding mechanism to fund a strong municipal stormwater management program.

Controlling Runoff from New Development

By Sally Bethea, Upper Chattahoochee Riverkeeper

Stormwater runoff, including soil erosion, accounts for 80% of the pollution in the nation's waterways, according to the U.S. EPA. In 1987, the federal Clean Water Act was amended to focus federal regulatory attention on curtailing polluted runoff from new development. Excessive silt and sediment chokes the life out of streams, degrades water quality, decreases flood storage capacity and increases the cost of drinking water.

In metropolitan Atlanta, much of which drains into the Chattahoochee River, the large number of construction sites—combined with the lack of qualified inspectors, insufficient education of personnel and the lack of priority afforded by some officials—has made erosion control a daunting task for all involved. Complaints about the lack of enforcement of erosion control laws have flooded Upper Chattahoochee Riverkeeper's (UCR) Hotline for our entire 10-year history.

Here are some basics to consider when determining if a legal approach is the best approach for you to pursue:

EDUCATE: With research projects, media attention and workshops for citizens, local governments and developers, UCR has worked endlessly to educate the community on the problems associated with this type of water pollution and to highlight best practices. We have also lobbied the state legislature to secure much-needed funds for enforcement and education related to land disturbance activities.

In the past four years, UCR staff has trained more than 1,000 citizens on ways to evaluate and document runoff problems from new development. We have provided "soil watch kits" that include a BMP field guide, report cards, form letters to government agencies, tips on photographing and who-to-call lists. Ten years of working to minimize construction runoff has taught us that resolving these water pollution problems takes creativity and the willingness to use all available tools.

DOCUMENT: When UCR finds construction sites where there is a clear failure to design, install or maintain BMPs, or stay out of protected stream buffers, we document the potential violations with photographs without trespassing on private property and take detailed notes of our observations. We then contact the appropriate local or state agency and hold them responsible by urging them to investigate and enforce the law. Sometimes, we involve the media as well.

LITIGATE: After years of litigation over Georgia's implementation of federal regulations to control pollution from construction activities, an agreement was reached in August 2003 and a new legal tool—citizen suits—became available to groups such as UCR. Now, discharges associated with the clearing, grading, and/or excavation of one acre or more of land must be covered by a general NPDES permit that requires best management practices (BMPs) for erosion and sediment control, maintenance, water quality sampling and final stabilization.

If the government agency fails to move aggressively to stop the violations, UCR considers taking legal action. We can do this because we have "standing"; in other words, we have members whose use and enjoyment of the Chattahoochee is affected by polluted runoff from uncontrolled land

disturbance activities. We then file a 60-day notice of intent to sue, but must make sure that the violations are on-going. If the problems are remedied before the 60 day period ends, the legal action cannot be pursued.

So You Couldn't Stop the Development...Now What?

by Hye Yeong Kwon, *Center for Watershed Protection*

Believe it or not, even if the decision to go forward on a development has already been made, it may not be too late to get your two cents in about how the site is developed. A developer may be willing to entertain a couple of innovative ideas, especially if it saves time and money. Here is a taste of the model development principles (adapted from *Better Site Design* (1998) by the Center for Watershed Protection) that developers can implement on the site to save them money, reduce storm water runoff, make sites more attractive and most importantly do the right thing.

One forewarning, however—you may want to check your local development codes and ordinances to make sure that these practices are allowed. Development is usually dictated by local codes that will vary by community. Upon research, you may find that it's actually the codes that are the most onerous parts of implementing more environmentally sensitive site practices.

1) Utilize open space designs.

Reasoning: Also known as cluster design or environmentally sensitive development, open space designs aim to minimize impermeable surfaces, reduce total construction costs, conserve natural areas and provide community recreational space.

Reality: Many believe that reduced lot sizes are not as marketable as larger lots. However, many studies show that open space

designs are highly desirable and have economic advantages for the developer and homeowner.

2) Reduce street width.

Reasoning: Excessive street widths increase the amount of asphalt on the ground, having the undesired effects of reducing infiltration of rainwater and increasing stormwater runoff.

Reality: Invariably somebody will argue that narrow streets are less safe and closer houses are unattractive. In fact, excessive street widths have been shown to decrease pedestrian safety (CWP, 2004). Instead of more pavement, what about using more trees and other natural features to provide beautiful buffers between homes?

3) Manage stormwater quality and quantity.

Reasoning: stormwater runoff can represent a significant threat to the quality of surface water, ground water, and wetlands. In addition, many communities are required to ensure that these impacts are mitigated.

Reality: Many communities still utilize outdated stormwater treatment practices or do not maximize their ability to capture stormwater. There are numerous innovative stormwater treatment practices that can remove pollutants from runoff and in some cases increase groundwater recharge.

For additional information, check out the Center for Watershed Protection website, www.cwp.org, which contain sample codes and ordinances, as well as information on a better site design roundtable process that encourages changes to local codes and ordinances to permit these innovative designs. This website also contains tools and technical information behind the few tidbits listed above. Good luck getting the developer to adopt some of these practices!

Outreach...

Speaking Out

Publicity and Driving Change

By George S. Hawkins, Executive Director
Stony Brook-Millstone Watershed

Bulldozers are coming, the hillside is to be cleared and the river is at risk. Your research demonstrates that the project is poorly planned and will cause harm to a popular stream. Here are a few common sense tips to help promote your cause.

1) Know it matters. For municipal, county and even state officials, ten letters and ten phone calls represent an avalanche of public opinion. All politicians respond to their constituents, and most want to be friendly to the environment. With good publicity you can win!

2) Get the facts straight. Many justifiable advocacy efforts have been undermined when an opponent exposes one or two factual mistakes and challenges the credibility of the group and your efforts. Be resolute about collecting and relating the facts accurately.

3) Create a compelling message. Environmental issues are complicated—in science, law and policy. Yet, the public needs to hear a compelling, short and simple rendition of the issue, repeatedly. Limit your message to a few sentences, maybe 15-30 seconds of speech. Stick to this message with the media.

4) Organize and Build Rapports. Build a coalition by engaging concerned neighbors, local groups and even local officials. Working together will help distribute the workload, bring greater knowledge to the group and improve the likelihood of getting your concerns addressed. Meet regularly, stick to an agenda and assign responsibilities for editorials, publicity, websites and visits to key officials.

5) Create a Fact Sheet. Start with a catchy title, include contact information, testimonials and pictures when possible and explain the issue with more detail. Remember the five W's: Who, What, Where, When and Why. The Fact Sheet should emphasize how the public benefits, and connect the issue to national issues if possible.

6) Communication Needs. To be effective and efficient you need to rely on emails, a listserv and a website. Your websites should combine short compelling statements, full-color pictures, access to graphic details, jargon-free explanations, calendars of upcoming events and instructions for joining the effort.

7) Cultivate the media. When you are prepared, seek out the press. Don't highlight the importance of your organization or self, but do highlight the importance of the issue. Maintain contacts, provide updates, and provide pictures and interesting people and places for interviews and visits. Local media is always looking for content, and their larger brethren always love a good story. What's yours?

To protect the rivers and streams you need to reach a wide audience. People need to know why they should care, and need to be able to tell decision makers what they want. Organize, prepare and market your message. Then, you can save the river, watershed, forest and meadow!

The Stony Brook-Millstone Watershed Association published a 30-page pocket guide to enable citizens to speak out effectively at public meetings. A 2-page summary of the guide can be viewed at: www.thewatershed.org/managing_resources.php. Click on "Citizens Guides."

Voices from the Field

You read it in the newspaper; perhaps heard it on the radio or at a community meeting. Or maybe you even drove by the field that now hosts a slew of construction equipment. All signs indicate that a new development is headed to a watershed near you. But fear not, for watershed organizations across the country are successfully informing developers—via education, negotiation and even sometimes the gentle nudge of a regulation—that new practices and technologies are available to decrease the negative impacts on a nearby waterbody. Here’s a look at what some of River Network Partners are doing.

IT DOESN'T TAKE A VILLAGE

We worked on preventing a development by forming a group, working with a lawyer, and citing master plan and other documents. These documents provided guidance on not creating a “separate village” (which is what this large, gated development would have done). Citizens donated time and money to the cause.

**Upper Merrimack River
Local Advisory Committee (NH)**

BUILDING BRIDGES

From 1999-2002, Prescott Creeks and the Public Works Department at the City of Prescott, Arizona worked closely together to reduce the impact of the construction-related loss of native vegetation. Upon completion of the bridge and road construction through the Watson Woods Riparian Preserve, Prescott Creeks planned and implemented a revegetation project funded by the City.

Prescott Creeks (AZ)
www.PrescottCreeks.org



NOT IN OUR FLOODPLAIN

The banks of the Napa River are being rejuvenated as a result of an enlightened flood control project that emphasizes restoration and preservation before development. The restoration of the Oxbow Preserve, a 12 acre peninsula in the middle of town, is one of the best examples of such efforts.

Friends of the Napa River (CA)

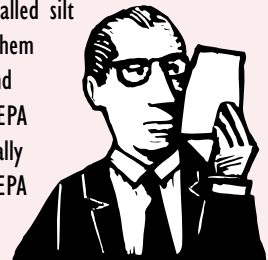
MAHALO FOR REMOVING YOUR SEDIMENT

The Hanalei National Wildlife Refuge will soon install cement baffles to reduce sediment coming from taro lo'i into the river. The baffles are being paid for with the Hanalei Watershed Hui's EPA Watershed Initiative Grant. Labor for installation contributed by the US Fish and Wildlife Service and farmers who lease the land.

Hanalei Watershed Hui (HI)

EXCUSE ME SIR, BUT YOUR FENCE IS DOWN

Illinois has a Citizens Pollution Complaint Form that can be mailed or electronically sent. I use digital pictures and full descriptions to report any downed and improperly maintained or installed silt fences. I call the developer first to allow them the chance to fix it. If they do not respond within two days, I send the form to the IEPA and to the developer. The developer normally takes care of it quickly, even before the IEPA responds. I haven't gotten any hate mail yet either.



Poplar Creek Watershed Planning Committee (IL)

AN INTERSTATE RUNS THROUGH IT

Friends of Mill Creek and the Marion Soil and Water Conservation District provided extensive input to the City of Salem regarding the proposed Salem Regional Employment Center just east of I-5 in the mid Willamette Valley. Part of this project site is located in the Mill Creek 100 year floodplain; other sections include extensive delineated but degraded wetlands.

While the potential for negative watershed impacts was clear, discussions with project staff and public testimony helped channel the project's design in more sustainable directions. The current project design retains all wetlands mitigation on site (restoring wildlife habitat) rather exporting it out of the watershed.

Stormwater runoff will be routed through bioswales before leaving the site, and the mitigation wetlands will offset any lost floodwater storage capacity. Friends of Mill Creek members are promoting pervious surfaces at this site for sidewalks, paths and parking lots.

Friends of Mill Creek (OR)

GOING ALL NATURAL

The Milwaukee Metropolitan Sewerage District (MMSD) has purchased 143 acres of land to protect it from development and guard against future flooding in the region. Acquired under MMSD's innovative flood management program, the Conservation Plan, the 143 acres are a combination of five separate properties in the Village of Germantown.

The Conservation Plan complements MMSD's engineered flood management projects by acquiring undeveloped privately owned properties from willing sellers. Property purchased through the program will forever remain open space and naturally hold water in critical areas expected to have major growth over the next 20 years. Natural water storage is provided through the maintenance of existing wetlands and restoration of previously drained wetlands.

MMSD's Conservation Plan is run by The Conservation Fund (TCF), a national nonprofit organization dedicated to protecting America's land and water legacy—its natural, cultural, and historic heritage—for current and future generations.

Milwaukee Metropolitan Sewerage District (WI)
www.mmsd.com



IF YOU BUILD IT, WE WILL COME

The USRWA is being invited to all pre-construction meetings for new developments in the Village of Mount Horeb, WI. I get to give a 15-20 minute PowerPoint presentation on why stormwater/erosion control is important. So far, I think it's returning good results. We're also encouraging the village (with the help of the WDNR) into letting us host a workshop for all contractors/builders who want to build in the village (slated for winter 2004/2005). We plan to expand this program (both PCM and workshop activities) to the entire watershed over the next 3-4 years (quicker if we can).

Upper Sugar River Watershed Association (WI)



BE AWARE, BE VERY AWARE

Our County Commissioners adopted E&S Control regulations in 1999, and over the past five years our program has become very well known and accepted. Developers/contractors are better educated on why they must implement certain practices on a timely basis. These same developers/contractors are now aware of watershed groups, citizen action groups and even more familiar with the SWCD office, which allows for many different (but effective) relationships to be developed that all work toward protecting the watershed.

Lake County Soil & Water Conservation District (OH)
www.lakecountyohio.org/soil



GET REAL!

Our Resource, Environmental, and Land (REAL) Planning methodology has resulted in changed zoning and helped spur smart growth efforts in a number of towns. Besides REAL planning, CRWA also promotes the use of infrastructure to direct growth; things like “spot sewerage” and the creation of density zones where housing bounties are used to acquire development rights to agricultural and forest land. Then there’s stuff like transportation-oriented development, use of state and federal funding mechanisms like the SRF. This stuff takes some pretty serious forethought, however. It is, to my way of thinking, the antithesis of “preventing” a proposed development, and it is generally far more effective.

As for stormwater, we’re employing the SmartStorm system to capture runoff, recharge or reuse it, reduce land set asides for swales and detention ponds and generally come close to zeroing out the impact of development, existing or new, on rainwater.

Charles River Watershed Association (MA)
www.crwa.org

BOBbing FOR WATER QUALITY

The Cumberland River Compact and the Building Outside the Box Committee are working through an EPA funded Watershed Initiative Grant to bring sustainable building practices to 3 demonstration sites in the Cumberland River Basin; one urban, one suburban and one rural site; each within a 303(d) listed impaired stream subwatershed. In cooperation with local developers on two housing development sites, CRC and BOB are working to upgrade these developments to a higher standard that protects water quality. In the rural site, BOB will retrofit a farm campus and demonstrate agricultural practices to protect water quality. The BOB partners are facilitating a site re-design process that brings in better site design principles, state of the art erosion control practices, and high performance home construction criteria that will protect impaired streams, conserve water resources, and serve as a model for replication across the Basin. Examples of the practices to be employed include reduced width of streets and sidewalks, shared or dual track driveways, vegetated islands in cul-de-sacs, use of pervious concrete or pervious pavers, and minimizing the foot print of the houses. Rainfall is being diverted from the sewer system into rain gardens or rain barrels for irrigation use later. These improved practices will slow and filter rainfall runoff thereby protecting nearby streams from both pollutants and volume runoff that scours streambanks. The project is also tracking the economics of the project to demonstrate it’s cost effectiveness for future developments.



I’LL DRINK TO THAT

We helped pass a local ordinance in a drinking water reservoir watershed, which restricts impervious cover to under 5%, which to our knowledge is the strictest in the nation.

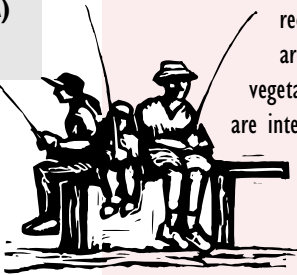
Cook Inlet Keeper (AK)

DISHONORABLE DISCHARGE

In 2002, the NJDEP approved permits for a proposed 518-unit townhouse development in the Borough of Riverdale. The permits allowed TCR Northeast Properties to discharge stormwater from the proposed project into a tributary of the Pequannock River. Based on Coalition comments, some changes were made to the original plans, but not enough to provide adequate protection. Although new rules governing stormwater management had been recently proposed by the NJDEP, their adoption would come much too late to alter the design of the Riverdale project. Subsequently, the Coalition issued a legal challenge to the permit approvals, represented by the Rutgers Environmental Law Clinic. The developer responded by working with the Coalition to revise stormwater management on the site. The new design addressed water quality concerns by disconnecting and

recharging roof runoff, planting trees within and around detention basins, and discharging basins to vegetated swales up to 250-feet in length. These measures are intended to reduce the temperature and improve the quality of the stormwater runoff. TCR Northeast Properties also provided funding for future monitoring to keep tabs on potential impacts.

Pequannock River Coalition (NJ)
www.pequannockriver.org



Cumberland River Compact (TN)

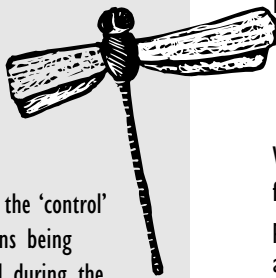
NEIGHBORHOOD WATCH

In 1997, the Connecticut DEP launched the Jordan Cove Urban Watershed Project, to scientifically evaluate the effectiveness of watershed technologies designed to control nonpoint source pollution and improve our understanding of nonpoint source pollution. The Jordan Cove Project is one of 30 nationwide funded by EPA under its National Monitoring Program (§319). The Jordan Cove Subdivision Project monitors runoff from three subdivisions to assess the effects of construction and urban development. The three sites are:

- An established subdivision with 43 houses;
- A subdivision built with generally accepted construction practices; and
- A subdivision being built using Best Management Practices (BMPs).

The study uses the established watershed as the 'control' watershed, with the two remaining subdivisions being paired as test watersheds. Data was collected during the 18 month construction phase and a long-term, post-implementation monitoring phase of seven to eight years.

Jordan Cover Urban Watershed Project (CT)



CAN'T WE ALL GET A LAWN?

The Lamoille County Natural Resources Conservation District received funding from the Lake Champlain Basin to conduct a Lamoille County Phosphorus Education Project. One of the deliverables included a lawn demonstration site. The District worked with the Vermont ANR Water Quality/Stormwater Division to design and install a bioretention garden, a stormwater technique that meets the new commercial development zoning adopted by our town that went into effect this summer.

Using volunteer labor from Upward Bound, an academic "camp" with a community service component, we built a berm and prepared/planted the garden bed. The idea is that the runoff from the roof is retained in the garden by the berm to allow infiltration/transpiration rather than the water just running across the surface of the lawn, and it is working great!

We didn't work with the developers, but we did work with the family business who also happens to manage/own a large bulk of property in our town. The site is a brand new building that sits along a very well traveled road, and is labeled as a Stormwater Demonstration Project and was featured in our local paper.

Lamoille County Conservation District & Nature Center (VT)

PUT THAT IN YOUR PIPE

I have convinced developers in the past that by installing infiltration galleries in the bottom of stormwater detention facilities, they can reduce the size of the pipes required to discharge to nearby streams and make a more useable area for recreation that is not a breeding ground for mosquitoes or a mud hole for kids. These infiltration galleries return incidental and smaller event storm flows back into the groundwater table, which treats the water similar to a septic system. The NPDES II regulations are now just coming on-line which will require this type of treatment, but up until now it has been voluntary.

North Fork River Improvement Association (CO)



ROLL OUT THE BARREL

Putting its trademark slogan "the path to clean water begins in your own backyard" into action, RiverSides Stewardship Alliance of Toronto, Ontario is encouraging residential developers in the Greater Toronto Area to keep roof runoff out of storm sewer systems by installing RainBarrels and other low impact best practices for new home construction. This project enhancement of RiverSides' *5 Things You Can Do For Your River* campaign, includes *The Home Owner's Guide to Rainfall* brochure. This guide educates home owners about the connection of their home to their local river by setting and reinforcing good housekeeping standards for the maintenance of their RiverSafe RainBarrels and other lot level best practices to reduce or eliminate nonpoint polluted stormwater runoff.

RiverSides Stewardship Alliance (ON)

CASE STUDY

Tualatin River Watershed ~ Oregon Sustainable Development

by Sheri Wantland
Public Involvement
Coordinator
Clean Water Services

www.cleanwaterservices.org

In Oregon's Tualatin River Watershed south of Portland, the lead agency for water resources management is Clean Water Services, the regional sanitary sewer and stormwater utility which serves nearly 500,000 residents of fast-growing urban Washington County. Its mission is to protect water resources through innovative wastewater treatment services, water quality and stream enhancement projects, fish habitat protection, flood management projects and more, driven by the Clean Water Act and more recently the Endangered Species Act.



LEEDS™
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Studies show the Tualatin River is cleaner than it has been in decades, due to strong partnerships with local, state and federal jurisdictions, robust public participation, and citizen activism. Clean Water Services helped establish and gives ongoing support to the Tualatin River Watershed Council and more than a dozen stream friends groups.

Although it is not a land use authority, Clean Water Services sets and enforces regulations that protect the Tualatin River and urban tributaries from development, primarily through Design and Construction Standards that protect water quality

sensitive areas, specify standards for water quality facilities and stream buffers, and spell out the Erosion Prevention and Sediment Control rules for development.

When Clean Water's management team began planning two new building complexes, they seized the opportunity to walk the water quality talk and build showcases for sustainable development. Its new Administrative Building Complex qualifies for the U. S. Green Building Council's prestigious LEED™ (Leadership in Energy and Environmental Design) Gold certification.

The new Field Operations Facility was designed as a showcase for stormwater management innovations, and has an effective impervious area of nearly zero. Runoff flow rates and quality are being monitored, documented and analyzed. Interpretative signs at the facility provide a self-guided tour for visitors to learn how the building and landscape design protects downstream creeks and wetlands by dispersing stormwater at its source, allowing the water to be infiltrated and detained on the site.

How stream advocates and volunteers can help promote sustainable development

Stream advocates can help promote environmentally-sensitive development in their communities and watersheds.

- Get involved in local planning efforts and code revisions.
- Find out how local land use authorities and stormwater utilities are protecting water resources.
- Ask the city or county development services staff to provide and explain the development regulations related to streams, lakes, wetlands and other water resources.



Top left:
Field
Operation's
staff pose
under their
new ecoroof

Top right:
Top view of
ecoroof

Bottom:
Street swale

- Participate in land use decisions, respond to public notices and attend hearings for land use applications.
- Call, write and email policymakers and let them know your concerns for water resources.
- Attend public meetings and testify when land use and environmental policies are under discussion.
- Research sustainable development in other communities and assess what your community might need to do.
- Serve on or participate in advisory committees, task forces, workshops and other public meetings and events where the future of your community is planned.
- Support efforts to protect clean water and improve sustainable development.



Each city, county and region has public, private and nonprofit organizations that are working for water quality and healthy watersheds. By working together, we can leverage our social and political capital to better protect natural resources. Clean Water Services and its water resources management partners depend upon the knowledge, insights and passion of environmental advocates to support and strengthen their efforts to protect and enhance the Tualatin River Watershed.

cont. on page 20

DID YOU KNOW?

Clustering not only provides direct open space and water protection, but if properly designed, it can greatly reduce impervious surfaces such as sidewalks, driveways and road lengths. A review of several cluster designs shows imperviousness can be reduced anywhere from 15% to 50% compared to conventional designs.

Addressing Imperviousness In Plans, Site Design and Land Use Regulations
— NEMO, nemo.uconn.edu

Sustainable Development, cont.

cont. from page 19

Tualatin River Watershed Site Examples

The following, excerpted from *The Rain Runs Through It*, provides examples of design strategies that manage stormwater on-site and allow rain to be absorbed into the ground. Effective impervious area (the amount of surface land that directly flows to a stream or wetland), has been significantly reduced through thoughtful planning and design and the use of innovative products in new residential and commercial developments.

Un-paving the way to cheaper development and maintenance costs

Located in southwest Portland, the Lucky Labrador Public House reduced its stormwater impact to the Tualatin River by installing Uni-Stone® pavers in its parking lot. Gary Geist, project manager, wanted to do the right thing to protect the Tualatin and the Willamette Rivers. “When I found out we could speed up the permitting process and pay no extra system development charges, I was ready to go! It’s been rock solid. It looks cool, like a cobblestone which fits aesthetically with the older, renovated building. The cost was definitely more expensive to install, but when we looked at the engineering and long term maintenance costs, it was worth it. Once it’s in, it’s done.”

The booklet *Slow the Flow—Designing the urban environment to protect urban watersheds* details the design, costs, advantages and limitation of the Field Operations Facility’s innovations. Other public and private sites with porous pavement and softscaping in the Tualatin Basin are featured in a brochure, *The Rain Runs Through It*. Both publications can be viewed at www.CleanWaterServices.org. It is hoped that the new complexes will encourage sustainable development and on site stormwater management.

Porous driveways and creative swales increase lot density

Project manager, Ron Motsch, is proud of the stormwater swale in the second phase of the new development built in 2004. “I consider myself a pretty ‘green’ guy, always interested in the state of the art.”

The varied terrain in the second phase made a traditional detention pond difficult. Instead, a design that incorporated porous concrete driveways and vegetated swales fit the fill perfectly. As an added bonus, the design provided enough space to increase the number of lots from six to eight. The fact that they could get two more developable lots if they used porous concrete was a huge incentive.

The City also liked the idea. Recalled an engineer, “We approved a more traditional detention pond approach to phase one. The developers came to us with the porous driveway idea which helped drive a more profitable and innovative design for [the second phase].”



Resources & References

ONLINE PUBLICATIONS

The Journal for Surface Water Quality Professionals contains information on NPDES Phase II compliance, TMDLs and any other issues related to surface water quality. Read the current issue or download past issues.

www.forester.net/sw.html

The New York State Stormwater Management Design Manual provides designers with a general overview on how to size, design, select and locate stormwater management practices at a development site to comply with State stormwater performance standards.

www.dec.state.ny.us/website/dow/toolbox/swmanual/

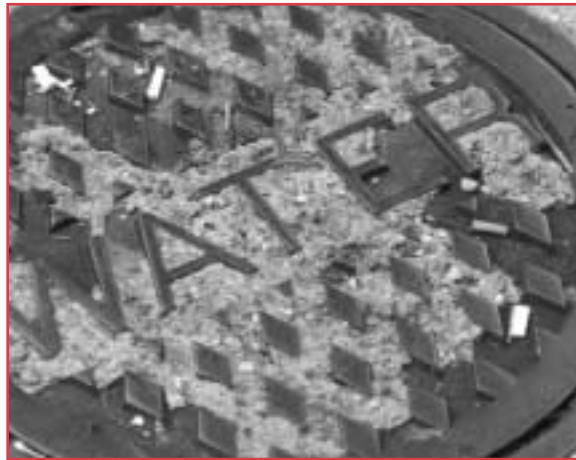
Volume 1: Stormwater Policy Guidebook of the Georgia Stormwater Management Manual is a policy document designed to provide guidance on the basic principles of effective stormwater management for Georgia communities.

Volume 2: Technical Handbook is a technical engineering handbook for implementing stormwater management measures for new development and redevelopment.

www.georgiastormwater.com/

Stormwater Practices for Cold Climates explores some of the challenges of cold climates, such as freezing temperatures and high runoff during snowmelt events, and their influence on the effectiveness of traditional stormwater practice designs. Included are descriptions on modifications that can be made to traditional practices to make them more effective in these environments. Combined files are approximately 43 pages, not including appendices.

www.cwp.org/cold-climates.htm



Stormwater Strategies: Community Response to

Pollution Runoff. This May 1999 report from the Natural Resources Defense Council documents some of the most effective strategies being employed by communities around the country to control urban runoff pollution. The collection of 100 case studies compiled and evaluated here is intended to serve as a guide for local decisionmakers, municipal officials and environmental activists; it is also a resource for citizens concerned about the quality of their local environment. www.nrdc.org/water/pollution/storm/stoinx.asp

US EPA's NPDES Site contains technical and regulatory information about the NPDES stormwater program. It is organized according to the three types of regulated stormwater discharges (construction, industrial and municipal) and provides a link to Stormwater Month outreach materials: Information specific to the Phase I and Phase II stormwater regulations is also available.

cfpub2.epa.gov/npdes/home.cfm?program_id=6

USGS: The Effects of Urbanization on Water Quality is a review of water quality issues as they relate to urbanization.

ga.water.usgs.gov/edu/urbanquality.html

cont. on page 22

cont. from page 21 **DATABASES**

The International Stormwater Best Management Practices Database provides access to BMP performance data in a standardized format for roughly 200 BMP studies conducted over the past fifteen years. The database may be searched and/or downloaded on this website, and is also available on CD-ROM.

www.bmpdatabase.org/

The National Stormwater Quality Database (NSQD, version 1.1) is a collection and evaluation of stormwater data from a representative number of NPDES (National Pollutant Discharge Elimination System) MS4 (municipal separate storm sewer system) stormwater permit holders. The initial version of this database, the National Stormwater Quality Database (NSQD, version 1.1) is currently being completed.

unix.eng.ua.edu/~rpitt/Research/ms4/Paper/Mainms4paper.html

ORGANIZATIONS

The Center for Watershed Protection has developed and disseminated a multi-disciplinary strategy to watershed protection that encompasses watershed planning, watershed restoration, stormwater management, watershed research, better site design, education and outreach and watershed training.

www.cwp.org

Construction Industry Compliance Assistance Center is your source for plain language explanations of environmental rules for the construction industry. This information is provided free of charge by the National Center for Manufacturing Sciences; numerous helpful links provided.

www.cicacenter.org/or-stormwater.html

The Low Impact Development Center is a nonprofit organization dedicated to the advancement of Low Impact Development technology. Low Impact Development is a new, comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds.

Lowimpactdevelopment.org



NEMO – Nonpoint Education for Municipal Officials: is an educational program for local land use officials that addresses the relationship of land use to natural resource protection.

nemo.uconn.edu/index.htm

River Network has developed a training module on the federal stormwater permitting programs (municipal, construction and industrial) and is evaluating how different states are trying to implement these programs. Power point presentations, trainings and individual consultation on state-specific compliance and enforcement efforts and particular problems in your watershed are available. Contact Gayle Killiam, Clean Water Act Program Director, 503/542-8387; gkilliam@rivernetwork.org.

www.rivernetwork.org

Stormwater Managers Resource Center is designed specifically for stormwater practitioners, local government officials and others that need technical assistance on stormwater management issues. Created and maintained by the Center for Watershed Protection, the SMRC has everything you need to know about stormwater in a single site.

www.stormwatercenter.net/

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- **Access our River Source Information Center with the 1-800 hotline:** Let us help you research a particular issue and put you in touch with the necessary contacts and resources through one-on-one consultations.
- **Log onto our Partner-only website:** Browse the updated postings of funding sources, upcoming events and trainings, and download river clipart.
- **Receive the myriad of Partner benefits,** including subscriptions to *River Voices* and *River Fundraising Alert*, a copy of the *Directory of Funding Sources for River and Watershed Conservation Organizations*, and a copy of either *Starting Up: A Handbook for New River and Watershed Organizations* or *How to Save a River...*and more!



www.rivernetwork.org

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Card# _____ Exp. Date _____

Signature/Name on card: _____

You will receive your initial set of Partner materials, including your choice of: (check one)

How to Save a River

Starting Up: A Handbook for New River and Watershed Organizations

River Talk!

Listening to Watersheds

Testing the Waters

Please make your check payable to River Network and return this form to:

River Network, 520 SW 6th Ave., Suite 1130, Ptld., OR 97204-1511 Phone: 503/241-3506

River Network works to support you and your needs. We provide training and technical assistance to our Partner groups.

River Network does not promote legislation or represent your organization in legal matters.



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Nominate Your River Hero!



River Heroes

*Celebrating Rivers and
Those Who Protect Them*

*Honoring those who provide
the river conservation movement
with leadership and inspiration.*

2005 River Heroes Awards Banquet

River Network is seeking nominations for individuals to be honored at the 2005 River Heroes Awards Banquet. Awards will be presented on May 23, 2005 at the 6th Annual River Rally in Keystone, Colorado.

Nomination material and criteria can be found online at: www.rivernetwork.org or by contacting Katherine Luscher at 503/ 542-8384; kluscher@rivernetwork.org.

**Nomination
packets must
be postmarked
by February 11,
2005.**