New Hampshire, like much of the Northeast, has experienced many unusually extreme weather events recently, especially in the past three years. Near record-breaking snowfall fell in northeastern New Hampshire last winter; a tornado ripped across fifty miles of the east-central part of the state in July; and within a one-year period, two 100-year floods roared through several communities. During one of those floods, the Suncook River even flowed upstream for a time, while the course of the river was significantly altered. This year also marks the tenth anniversary of the devastating ice storm of 1998 that caused severe damage to thousands of acres of forests in the Northeast and left many communities without power for a week or more. What is happening to our weather? Climate change predictions have long been warning of the possibility of more extreme weather in the Northeast. Perhaps that time is here.

As teachers, we can take advantage of the high-profile weather events we have been experiencing. Just as weather gets our attention and interest as adults, it does the same for children. Weather provides real-time, intrinsically interesting opportunities to connect students to the science that is happening all around us.

The Day the Suncook River Flowed Upstream

By Eric Orff

For much of the night and well into the day of May 16, 2006, the Suncook River flowed upstream from the Old Mill Dam in Epsom during its highest flood stage in 100 years. In fact, the river flowed north—opposite the direction it had flowed since the Ice Age—and a half-mile section of the river, immediately upstream of the Old Mill Dam, drained.

A half-mile upstream of the dam, a breach in the river bank pulled the river into an entirely new channel and literally would suck the old riverbed dry in less than 24 hours. Below the dam, it would turn two mile-long stretches of normally rough water, with a series of falls on both sides of Bear Island, into dry riverbeds. In less than two days, two and a half miles of the Suncook River in Epsom simply disappeared.

But let’s back up to look at how quickly the Suncook River changed. Before the flood, the Suncook had been a meandering river, except for two sections that bracketed Bear Island. These stretches of river tumbled down a series of rapids and falls for most of the length of the mile-long island before rejoining at the island’s tail, making it one of the best sections of river for trout fishing in Epsom.

The Suncook sweeps past my house about three miles downstream from Bear Island. For the first time in the 26 years I have lived overlooking the river, it didn’t completely freeze that winter of 2006, at least near my house. The snowless winter and dry spring conditions practically put the river into a summer slumber stage in springtime.

Eric Orff stands atop the waterless Old Mill Dam in Epsom, the day after the avulsion.
Everything changed with a deluge of rain that started Saturday, May 13, and continued through the day. By evening, my rain gauge measured 3 1/2 inches, and our sleeping neighbor, the river, was stirring. Sunday was Mother’s Day, and flood warnings that had seemed senseless two days before were looking more ominous by the hour that morning.

The river rose rapidly. I spent much of the day in the continuing rain, helping a neighbor sandbag the floodwall he had built in 1988 to protect the lower level of his home, which sits at the river’s edge. We hurriedly topped his three-foot high wall with a layer of sandbags, working through the afternoon. On the other side of the wall, the river was growing in power. Entire trees floated past. A whole wall of a structure, with cupboards still attached, bobbed by. The rapidly rising river approached the top of the wall we were capping just as we finished one layer of sandbags. Then, in what seemed like mere minutes, the river won and poured through and over the sandbags. I was soaking wet and exhausted.

By nightfall, my rain gauge was once again full to the 4 1/2-inch level, bringing the total to 8 inches in two days. (We would get two more inches before the end of the storm.) The once-quiet river roared past my house in the darkness. On Monday morning, I awoke to a totally different river. It was higher than I had ever seen it; the cornfield and meadow below my house were flooded, and the river was filled with debris, from parts of trees to unidentified building parts. The Suncook churned all this debris in a roaring rage, seeming to spit it right at me from a hundred yards away until the 90-degree bend in the river yanked them from my view.

My view was not as astonishing, however, as what four Epsom residents would witness by late morning. Bill Yeaton, a local farmer, related to me what he and three others saw on Monday, May 15 – they watched the Suncook River change course in a matter of minutes. When Yeaton arrived at Cutter’s Pit at the end of Rhodora Drive at about 11:00 a.m., the Suncook had overflowed its bank a quarter mile above the access road to the pit, flowing through a wetland and boggy area along the edge of the old Suncook Railroad bed before converging on the access road and flowing into the pit. According to Yeaton, the flow had picked up dramatically and was becoming a raging flood. The floodwaters began to devour the bowels of the sand pit, ripping huge trees and house-sized chunks of the sand pit, washing them down the newly formed river channel. The river tore relentlessly at the earth, widening the new trough to 100 feet, then 200 feet and more, as the raging flow gained momentum. The tongue of water began devouring the sand to the north along the bed of the pit, slicing off 300-foot-wide swaths and chomping the exposed sand pit as it moved northward, within minutes creating a canyon-like cut in the bed of the once-flat sand pit.

It was mid-afternoon on Monday when the owner of the Old Mill, Bob Griggs, first noticed a change in the flow of water that had been pouring six feet high over the top of the dam. A huge white pine tree, sixty feet long, had been forced mostly over the dam by the powerful flows on the far side. By midnight, Griggs noticed that only a small flow was coming over the dam. When he checked at 2:00 a.m., the top of the dam was bare. The river was retreating upstream, flowing away from the upstream side of the dam face!

The next morning, the water level in front of the dam was DOWN two feet, as the river continued to flow upstream. Below the dam, the river was now waterless; a few foot-long rainbow trout flapped in the shallow pools that were left. As the day progressed, the channel immediately above the dam dropped faster. By Wednesday morning, it was nearly possible to walk across the river above, as well as below, the Old Mill Dam. The growing vortex less than a half-mile above the dam had re-channeled all the floodwaters. The Suncook River flowed upstream from the dam to reach the new river channel. By Wednesday morning, that portion of the river had vanished…while the flood raged on in its new channel. This dramatic episode was the event of the century for Epsom.
Spotlight on...

New Hampshire Friends of the Suncook River

Maintaining a healthy Suncook River watershed

In January 2001, about twenty folks from throughout the Suncook River watershed met in Barnstead to talk about developing a network of greenways within the Suncook River watershed. There was representation from conservation commissions, planning commissions, selectmen’s offices, schools, N.H. Fish and Game and UNH Cooperative Extension, as well as interested individuals and landowners. As a result of that meeting, the New Hampshire Friends of the Suncook River was born – a nonprofit charitable conservation organization whose mission is to maintain a healthy Suncook River watershed by identifying and protecting important natural resources, by forming a greenway network of voluntarily protected lands and by educating and engaging citizens in these efforts.

The Suncook River watershed has played an important role in the history of the area. Early settlers first arrived in the region in the early to mid-1700s. They came primarily from the New Hampshire seacoast communities, as well as Long Island, Rhode Island and Massachusetts. By the time the first settlers arrived, many of the Native Americans had gone north. They left behind the name for the river: “Suncook,” which is said to mean “the place where the wild goose rested” (History of Barnstead, p. 121). The settlers, like the Native Americans and the wildlife that were here prior to their arrival, used the river and its tributaries as a transportation corridor and food source, and later, as a source of power to run mills. Even today, the old rail beds of the Suncook Valley Railroad, which operated alongside the river from 1869 through 1952, can still be seen.

Of special interest to teachers is a Suncook River Watershed Curriculum, developed in 2001 primarily by Mary Fougere, a Gilmanton middle school teacher and member of the Friends of the Suncook River. Correlated to the N.H. science and math frameworks, the curriculum consists of interactive, investigative and technology-based activities. Focusing on the Suncook River, it covers many aspects of a watershed, including what a watershed is, its significance, land cover, wildlife, dams, fisheries and water quality. Support for the project came from the newly formed Friends of the Suncook River, the N.H. Department of Education and the Gilmanton School District. For further information about the curriculum and its availability, contact Mary Fougere at suncook@worldpath.net.

Climactic forces have hit the Suncook River Watershed hard for the third year in a row, with serious floods and a tornado. Despite these extreme weather events, as the Suncook River watershed continues to evolve and change, the Friends of the Suncook River will be there to monitor and appreciate it. Whether by canoe or kayak, with students or interested community members, the organization welcomes others to join their growing group and participate in their events. For more information, visit www.friendsofsuncookriver.org

RESOURCES AND WEB CONNECTIONS:

- The Disaster Center - General tornado information
  www.disastercenter.com/tornado.html

- The Disaster Center – N.H. tornadoes
  www.disastercenter.com/newhamp/tornado.html

- NOAA National Weather Service
  State-specific information
  www.weather.gov/view/states.php

- New Hampshire Weather Data
  www.nhweatherdata.com/home.html

- NH Skywarn
  The National Weather Service’s nationwide program of trained volunteer severe weather spotters.
  www.qsl.net/kb1df6/nhskywarn.html

- Severe Weather and Forest Impacts
  Information on physical and economic impacts of severe weather on forests.
  www.forestencyclopedia.net/p/p2993

- RELATED ARTICLES:

  - Climate Impacts on Regional Forests
    www.necci.sr.unh.edu/necci-report/NERAch5.pdf

  - NWS Researchers to Study N.H. Tornado for Years

  - New England’s Changing Climate, Weather, and Air Quality
    (Chapter 2 – A Climate Primer for New England; Chapter 3 – Extreme Climatic Events in New England History)
    www.neci.sr.unh.edu/neccwaq.html
On July 24, 2008, in one hour and 20 minutes, New Hampshire experienced the epitome of the definition of extreme weather – a tornado. Touching ground in Deerfield, its turbulent winds cut a path 49.5 miles long through homes and woods, cutting through five counties and hitting the towns of Epsom, Northwood, Pittsfield, Barnstead, Alton, New Durham, Wolfeboro, Ossepe, Effingham and Freedom. Its path was up to 1/3 mile wide. By the time it was spent, it had moved across 8,400 acres, blowing down an estimated 5,900 acres of trees. Early estimates are that at least 10 million board feet of timber were downed, enough to build 600 homes.

Tragically, the storm left one woman dead and damaged approximately 150 homes. Recovery is ongoing for the people in its path. The effect on the forest will be evident for years.

Wind is a frequent occurrence in New Hampshire, but tornadoes are not. New Hampshire saw significant forest blowdown from hurricanes in 1635, 1788, 1815, 1938, 1944 and 1954. According to the Disaster Center website www.disastercenter.com/tornado.html, New Hampshire ranks 41 for its frequency of tornadoes and about the same for tornado-caused injuries and damages.

Damage from tornadoes is different than that from hurricanes and other wind events. Though covering less area than hurricanes, tornadoes can do significantly more damage from wind alone in the areas they hit. Although affecting a smaller area than a hurricane, the recent tornado affected a significantly greater area than most windstorms in the state. It whipped trees around, pushing some over with their roots attached, and snapped off others at varying heights, leaving behind jagged sentinels without crowns. The trees were felled in a mish-mash of directions.

Landowners are cleaning up and salvaging downed and damaged trees. It is dangerous work, as the tornado left many trees in positions so hazardous that experienced loggers will tackle them only with specialized heavy equipment. Because of the whipping action of the wind, the wood fibers in many trees separated. Trees with that type of damage cannot be sawn into lumber and can only be used for lower quality products, such as biomass fuel chips and firewood.

Some of the blowdown will stay where it is. The coarse woody material will provide shelter and cover for reptiles and amphibians, food for insects and for mammals eating those insects. It will eventually decay, returning nutrients to the soil. Until sufficiently rotted, the woody debris poses a fire hazard. Landowners are encouraged to remove debris along roadsides and other areas where people may inadvertently start fires. Logs touching the ground will stay sufficiently moist to minimize fire danger.

New Hampshire’s forests have been shaped through the years by wind and are remarkably resilient to it. Natural disturbance is an important element of forest succession, which is the replacement of groups of plants by others over time. Disturbed areas regenerate, likely with a higher percentage of hardwoods. The moister sites affected by the July tornado will regenerate starting next spring with red maple, red oak and birches, while the drier, sandier sites will grow birches with more white pines.

### Activities Related to Articles in This Issue

**Project Learning Tree suggests:**

Just as humans adapt to the constant changes in our lives, ecosystems are constantly adapting to unexpected disturbances, such as severe weather events. In *Nothing Succeeds Like Succession* (Activity #80), students explore stages of growth and succession over time and how disturbances create changes in the composition of an ecological community.

Change is constant and all around us. While some changes happen slowly and often go unnoticed, others are dramatic, such as the damage that occurs in severe storms. In *Did You Notice?* (Activity #95), students will explore changes in their local environment over time and summarize those changes in a timeline.

**In Our Changing World** (Activity #86), students explore patterns of change in the Earth’s global systems and connect natural resources, energy and human activities; as well as research and analyze a global environmental issue.

**Project WET suggests:**

In *Dust Bowls and Failed Leves*, students gain a greater understanding of the effects of drought, flood and other water-related events on people through literature study, research and writing.

In *Nature Rules!*, students use visual evidence of water-related natural disasters to inspire newspaper reports. *The Thunderstorm* has students simulate the sounds of a thunderstorm through an aerobic activity and generate precipitation maps through a mock monitoring network.

**Project WILD suggests:**

Students recognize that humans and wildlife share environments and experience some of the same natural phenomena when they go on a simulated field trip in *Stormy Weather*.

In *Puddle Wonders!,* students observe the water that accumulates in puddles and have the opportunity to sharpen their math skills by measuring the depth, area and volume of puddles.

In *Silt: A Dirty Word,* students create a model to simulate changes to a stream and its water flow when silt and/or sand are added to the system.
Tree Recovery – After the Ice Storm

By: Walter C. Shortle and Kevin T. Smith, USDA Forest Service, Durham, NH

Ice storms are a fact of life in parts of many forests. They usually hit a relatively small area where the elevation and exposure are just right (or just wrong enough) to promote a thick coating of heavy ice. The weight of the ice and accompanying winds snap stems and pull out branches.

In January 1998, an ice storm of unusual extent and severity occurred in the Northeast, causing extensive forest damage. An initial survey of 22,000 trees across the region found that about 80% of the trees had lost less than half their crowns through breakage (low-injury) and about 20% had lost more than half their crowns (high-injury), leaving wood and bark exposed to infection.

Researchers wanted to learn what the lasting impact would be on tree health and wood quality for trees that initially survived the storm.

To evaluate response to the storm in high and low-injury trees, researchers tagged more than 500 trees at six locations within the storm footprint in Vermont, New Hampshire and Maine. Tagged trees were 9-18 inches in diameter and included sugar and red maple, yellow and paper birch, American beech and white ash. They were evaluated over time for survival and stem growth. To test their ability to close new wounds, a 3/8-inch hole, two inches deep, was drilled into the trees, four feet above ground. The trees’ responses to the new, uniform injury were studied.

Researchers found that after 5 years, all low-injury trees survived, while survival rates for high-injury trees were at least 90% for all species except white birch, which experienced only 55% survival. Close examination of the dead birch trees showed that they had advanced root disease before the storm. Trees that had lost roots because of disease, as well as losing branches to ice, survived only a few years. Trees that had healthy roots survived considerable crown loss.

In low-injury trees, researchers found no reduction in tree-ring width after three years of recovery. During the same period, high-injury trees experienced 20-70% growth reduction, with the least for white ash and the most for white birch.

The drill-hole tests of wound closure showed that white ash closed the hole most quickly and had minimal wood degradation. All paper birch failed to close the hole; bark died around the hole, and wood was open to decay and insect attack as a result. Other tree species varied, with low-injury trees having better closure and less degradation than high-injury trees.

Researchers learned that tree damage from the storm was strongly related to tree health before the storm, the ability to sprout new branches and rebuild tree crowns and the ability to close new wounds. Ice storms are natural occurrences of northeastern forests. Trees that are healthy are more likely to survive storms and recover quickly.

Storm Runoff Threatens Rivers and Lakes

By Barbara McMillan, DES Watershed Outreach Coordinator

Extreme storms can damage homes and communities through flooding, high winds and soil erosion. While it’s easy to see fallen trees, flooded streets and washed-out riverbanks, there can also be hidden damage to rivers and lakes.

Through the natural water cycle, rain falls to the ground and flows across the land, soaks into the ground, or is taken up by plant roots. The water that flows across the land eventually finds its way to a river or lake. A disruption or change in the movement of water on the surface can seriously degrade water quality.

When a town or neighborhood expands, plants and trees are replaced with roads, rooftops, driveways and parking areas. Rain that falls on these surfaces can no longer soak into the ground, resulting in increased water flowing over the land. Often there is not enough vegetation to slow the flow of water. Developed areas generate a greater amount of overland flow, delivering water to rivers and lakes in a shorter amount of time. Substances on paved surfaces, such as dirt, automobile fluids, road salt, pet waste and fertilizers, are carried along with the water.

RUNOFF continued on page 8
A Forest For Every Classroom

The Forest for Every Classroom program is a yearlong professional development opportunity for middle and high school teachers interested in building the knowledge and skills to transform classroom teaching into effective and exciting place-based education. Participants will develop or modify their own curriculum unit to increase student literacy skills, as well as foster student understanding of and appreciation for the forested lands in their communities. The program begins in May 2009 at the Hubbard Brook Experimental Forest in Woodstock, N.H. Participants will meet four times during the year to gain experience and knowledge of the forest in all seasons. Graduate credit is available from Plymouth State University. For more information visit www.nhplt.org or contact Sara Head at 603-226-0160.

Correlations to the new N.H. Math and Social Studies Frameworks Available Soon!


Ice Fishing Instruction Skills Training

Training opportunity for teachers to learn ice-fishing instruction skills to take students outdoors as part of winter ecology unit. Ice fishing instructor training, December 6, 9 a.m. – 4 p.m., at N.H. Fish and Game headquarters in Concord; or January 10, 9 a.m. – 4 p.m., at Fish and Game’s Region 1 office in Lancaster. For more information or to register for classes, contact Karina Walsh at 603-271-3212 or at karina.r.walsh@wildlife.nh.gov.

Wildlife Action Grants Available

Deadline: February 1, 2009

Teachers interested in starting wildlife habitat projects can apply to the Homes for Wildlife Action Grant Program at N.H. Fish and Game for start-up funds. Mini-grants of up to $300 ($600 with matching funds) for projects enabling students and educators to enhance habitat for people and wildlife. For proposal packet, contact Marilyn Wyzga, Public Affairs, N.H. Fish and Game Department, 11 Hazen Drive, Concord, NH 03301; email marilyn.wyzga@wildlife.nh.gov; or call 603-271-3211. This will be the only chance to apply during the 2008-2009 school year. Grants are funded through the sale of conservation license plates.

Weather in the Classroom Training

Educators seeking to enhance their teaching of weather in the classroom have an exciting resource available to them. DataStreme Atmosphere is a nationally implemented teacher-enhancement project of the American Meteorological Society (AMS) that consists of a 13-week course, primarily internet-based, that focuses on weather. Routinely offered to teachers in New Hampshire, the course is taught by educators and professional meteorologists. Teachers learn meteorological basics by using a textbook, an investigative manual and a website with current weather maps and data. Upon completion of the course, teachers are prepared to teach about weather in the classroom and to introduce students to a wide array of electronically available current weather data.

For more information about DataStreme Atmosphere, visit www.ametsoc.org/amedu/datastreme. For information about the next session of the course in New Hampshire or for a printed application, contact Marsha Rich, an AMS Atmospheric Education Resource Agent, at marshr@aol.com or (603) 798-4267.

Do you have an idea for a topic the WEB should address? If so, please contact Erin Hollingsworth at (603) 226-0160 or info@nhplt.org.

Wonders of Wildlife

Introduce your grade 3-6 students to the wildlife resources of New Hampshire through a series of active education programs. A New Hampshire Fish and Game Wonders of Wildlife docent will come to your elementary school classroom to present one of four interactive programs: Habits and Habitats; Endangered Species; Pond Ecology; and Wetlands. Scheduling now through February 25, 2009, for spring presentations. Programs are free of charge. For a program request form, visit www.wildlife.state.nh.us/Education/ed_Wonders_of_Wildlife.htm.

SAVE THE DATE

NH Project WET will be offering a workshop in cooperation with Ducks Unlimited at the Massabesic Audubon Center in Auburn, N.H., on March 28, 2009. Stay tuned for more details or contact Alicia Carlson at alicia.carlson@des.nh.gov for more information.
When you shape a landscape to create a schoolyard habitat, you want it to do more than survive; you want it to thrive. Any landscape will be hard-pressed to sustain the force of a flood, but it will better resist erosion and filter even heavy rains when you apply an approach called Integrated Landscaping. This approach supports a wide variety of naturally occurring ecological services including: filtering pollutants from air and water, preventing soil erosion, creating microclimates that buffer temperature extremes, soaking up rain and snowmelt water to reduce runoff, and moderating climate by producing shade and sunlight. The following excerpt from the recently published Integrated Landscaping: Following Nature’s Lead, explains the first 5 of the 10 key principles. The final 5 will be printed in the next issue of WEB News.

Ten Natural Principles to Guide Your Landscaping Practices

Integrated Landscaping uses local ecosystems as models, studying the fundamental processes of nature and applying them to the landscapes we create around our homes, workplaces, and public spaces. The following principles inherent in natural systems serve as both a framework and a justification for mimicking nature in our landscaping practices.

1. Diverse forms of life live and work together interdependently.

In natural systems plants are always found living together with animals. Plants growing in conditions that suit them well respond by producing abundant flowers, fruit, and dense vegetative growth. Pollen and nectar-feeders, birds, and other animals, driven by a desire to eat, or looking for nesting and shelter, are attracted to such resources, finding their niches within the multiple layers of vegetation and soils provided by the natural ecosystem. In turn, flowers get pollinated, seeds dispersed, and genes passed on. Feathers, hairs, and scat fall to the ground and decompose as animals move around, contributing to soil fertility.

2. Soils are covered and protected from the impacts of excessive wind, sun and rain.

In natural systems, soils are typically covered and protected, with layers of vegetation serving as the first line of defense. Canopy layers influence the amount of hot, drying sun reaching the ground. They also break falling rain into smaller and smaller droplets. Plant litter – leaves, twigs, fruit husks and nut hulls – derived from the vegetative layers above, slowly decomposes on the landscape floor. Humus, the final stages of organic decay, remains in the soil layer where it serves as a reservoir of plant nutrients and a source of energy for essential biomechanical exchanges, and reduced soil pathogens, among other important functions. Drying winds and air currents are slowed and sometimes humidified as they pass through layers of vegetation and litter. The canopy, litter layer and humus all protect the underlying soil from wind, sun and hard rain.

3. Rainfall is filtered, conserved, and available when needed.

Natural systems allow rainwater, already reduced to fine sprays by multiple-canopy layers, to sink slowly into the ground. After being transformed into thin films of water by the litter layers, water moves through the topsoil. Humus absorbs moisture and helps form an elaborate crumb structure of aggregated soil particles. These aggregates are full of aeration and drainage channels, accentuated by a network of pathways created by earthworms, invertebrates, and burrowing animals. Healthy amounts of continuously decomposing roots also create underground channels for water and air. Rainwater is full of oxygen, essential for plant growth, microbial processes, and all other chemical processes requiring oxidation. All these interdependent factors and actions make a porous, well-developed soil that retains water, making it available to the multitude of simultaneous processes when needed.

4. Soil organisms are fed by the cycling and recycling of nutrients.

In natural systems, a great variety of decomposing organisms consume organic matter as a food source, leaving behind humus, the stable remnant of decaying organic material. Sources of organic material come from plant litter. What comes out of the earth – fallen leaves, stems, flowers, fruits, bark, all made with solar energy captured from sunlight through photosynthesis – returns to the earth to nourish another generation of plants. Organic matter improves the soil by allowing microorganisms to multiply. Larger organisms enter the picture. They all eat, grow, reproduce and die, cycling and recycling nutrients into the developing food web. Through these and other complex processes, organic matter is converted to simple inorganic forms that can be taken up by plants.

5. Humus holds fertility reserves within the upper layers of soil.

In the Northeast, plant litter doesn’t accumulate but breaks down quickly with the help of decomposers, such as earthworms and microorganisms. The volume of soil organic matter is maintained at the highest practical level, typically about 5% of the overall soil composition, by leaving seasonal litter on, applying mulches, and inviting in a diversity of life. The more organic matter left by humans to enter back into the system, the healthier and more diverse the soil life and structure becomes over time. The end product of organic-matter decay – humus – acts as a reservoir of plant nutrients, held in the soil until needed.

RUNOFF continued from page 5

The negative impact of development on water flow is compounded by severe storms. High winds down trees that would normally provide a filter between developments and rivers or lakes. Uprooted trees can no longer hold soil together or provide a canopy to soften the impact of heavy rains on exposed soils. Heavy rains fill storm drain systems, diverting water runoff. Flooding cuts riverbanks and carries eroded soil into rivers and lakes, increasing sedimentation and degrading habitat for plants and wildlife. Factor in runoff from roofs, roads, parking lots and structures, and the flooding intensifies, causing even more damage.

Fortunately, there are ways to minimize impacts to rivers and lakes from severe storms. Natural water flow and plants are the best defenses. Communities can require environmentally sensitive site planning for new development and provide residents with information about managing their yards to minimize flood impact. Good site design includes having trees and other plants in parking lots to enable surface water to soak into the ground, and using new types of pavements that are water permeable. Additionally, roof gutter downspouts should be directed toward vegetated areas or rain barrels. Home and business owners can plant recessed rain gardens that help slow the flow of water on their properties.