

# THE *ecological landscaper*

The Newsletter of the Ecological Landscaping Association Vol. 12, No. 2 Summer 2005

## water conservation

Fact: Human beings are 70 percent water.

### Rainwater Harvesting: A Simple Approach to Conservation

Paul Kwiatkowski

In this age of reckless consumption of resources and pollution without shame, conservation is vital. The numbers of individuals and businesses that embrace conservation are growing but America is still lagging in shifting to cleaner, more efficient enterprises, such as hybrid automobiles, wind power, and green roofs. Individuals must take it upon themselves to implement conservation strategies in their neighborhoods, communities, and places of work.

At Mount Auburn Cemetery, America's first garden cemetery, conversations, meetings, and debates have moved us toward the future as an environ-



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mentally progressive institution. We are conscious of the danger of fertilizers entering our water and we observe strict buffer zones. We have replaced artificial fertilizer with organic. Our flowerbeds use compost to increase the water-holding capacity of the soil and to replace nutrients. Less water is needed for drought-tolerant perennials than for what had been beds solely of annuals. We preserve native plants and eradicate invasives. We have replaced gas-powered vehicles with a fleet of electric. Habitat restoration projects for plants and wildlife incorporate natural remedies, such as reduction of algae using bales of barley straw in the ponds. [See Barley Straw for Clear Ponds, *TEL*, Spring 2005.] Natural solutions cause less environmental stress and cost less than chemical solutions.

Can Mount Auburn do more? Of course. Conservation opportunities are available to those willing to make the effort. Perhaps one day the remaining gasoline-powered vehicles will be replaced and green roofs will top the buildings. Right now we are working on water conservation.

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### Roundup in Water

Fran Gustman

Roundup, an herbicide created by Monsanto, is the second most commonly applied herbicide in the United States; and its use is accelerating with the planting of genetically modified (GM) crops for food and feed. While weeds die after absorbing the herbicide, Roundup-Ready (RR) crops have been modified to remain alive.

Roundup has been shown to have adverse effects on plant and animal life in water. As there are several versions of Roundup, it is imperative to read the label; it is possible that reading the label will convince you not to use it: Roundup Super Concentrate Weed & Grass Killer, the standard formulation, directs: "Do not apply directly to water, to areas where surface water is present or to intertidal areas below the high water mark. Do not contaminate water when cleaning equipment or when disposing of equipment wash water." There is one formulation, Roundup Pro Biactive, that is meant to have much reduced effects on aquatic life; it is available in the U.K., but is hard to find in the

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*"Gramma said when you come on something good, first thing to do is share it with whoever you can find; that way the good spread out where no telling it will go. Which is right."*

—*Little Tree in The Education of Little Tree, by Forrest Carter*



**The Ecological Landscaper**  
is published by the Ecological Landscaping  
Association (ELA).

Subscriptions are a benefit of  
membership in ELA.

For information about ELA, contact:

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Talk to us! We welcome comments, letters, articles, ideas, and opinions. Contact Fran Gustman, Editor, at [fgustmaneditor@juno.com](mailto:fgustmaneditor@juno.com) or 617-787-4274, with newsletter content.

Send all other ELA business, including address changes, to the Concord address above.

The ELA board meets throughout the year in various locations in eastern Massachusetts. All members are welcome. Contact us for specific dates and locations.

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Harvesting *continued*

Water consumption affects every person and business in every community. Mount Auburn's large aquifer has met the cemetery's needs for generations, but today the aged pipelines are frequently shut down to repair leaks and water pressure is inadequate in parts of the property. To conserve water, some areas are not irrigated at all, although others are still high-priority for irrigation. (Mount Auburn currently has a consumption permit allocated by the Charles River Watershed). [Paul: explain consumption permit] We have also replaced high-volume sprinklers with lower-volume sprinklers.

In March of 2004, I was allotted \$400 to set up a rainwater harvesting system at the greenhouse. A larger water storage system was to be considered, if I could demonstrate success. My idea was basic: to attach rain barrels to the gutter system of the head house [what is this?] structure connected to the greenhouses.

I purchased eight 44-gallon, heavy-duty trash barrels, 10 feet of one-inch polyvinyl chloride (PVC) pipes and elbows, mosquito netting, metal screws, caulking, a one-inch circular drill bit, and a quarter-horsepower sump pump.

[Paul, I rewrote some of this to clarify. Did I leave anything out?] To prevent unwanted substances from entering the barrels from the roof, I set up a device to divert the first flush of rainwater. I fastened an empty quart oil bottle/ can? (triple rinsed and bleached) inside each gutter elbow with metal screws and sealed them with caulking; the

bottom of each bottle was cut and bent up into a flap. PVC piping fit snugly into the opening of the bottle and was secured with screws. The pipe led from the bottle into a hole drilled in the lid of a rain barrel. The idea was that the first flow of storm water would run out the bottom of the drainpipe, but as the water pressure strengthened, it would overpower the flap and run through the PVC pipe and into the barrel.

I connected overflow rain barrels with pipe. Netting covered the end of the last overflow pipe to deny mosquitoes access to the water for breeding. When all the rain barrels were filled, the water would release to the ground.

The system worked. Water from the barrels was transferred to 100-gallon tanks on Toros [Paul, what is a Toro? A tractor?] and used to irrigate the annuals. Rainwater was also mixed with horticultural oil in a 500-gallon tank for use by the arborists.

It was soon obvious that more water storage was needed. I scrambled to salvage two 100-gallon tanks and two GEM electric car trunks. That was still not enough. I began soliciting donations, contacting juice and sauce manufacturers and distributors and all the local recycling companies. In July, User Friendly Recycling of West Bridgewater, Massachusetts, donated nine 55-gallon barrels. All had been triple rinsed, but I bleached them as a precaution.

In September, I heard on NPR that Wal-Mart was making donations to community projects. (<http://www.walmartfoundation.org/wmstore/goodworks/scripts/index.jsp>). In response to a letter,

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**Job listings.** The Cambridge Climate Calendar lists a large selection of job openings of environmental interest. To subscribe, email [CambClim-Cal-subscribe@topica.com](mailto:CambClim-Cal-subscribe@topica.com). To read on-line, go to: <http://www.tufts.edu/tie/tci/Calendar.html>. Click on Resources at the left of the screen.

Harvesting *continued*

the Wal-Mart in Methuen, Massachusetts, sent \$75, with which I purchased a drill, drill bits, hacksaw, blades, hose, and extension cord. Home Depot in Watertown, Mount Auburn supplied seven heavy-duty barrels and ten feet of PVC pipe, almost \$300 worth of materials. Six 55-gallon barrels for \$10 each came from a salvage company.

Water storage capacity is now nearly 2,000 gallons. In 2004, the rainwater harvesting system collected 7,118 gallons of water, which helped maintain the many beds of annuals on family lots and garden beds. My goal for 2005 is to water all the gardens that I care for with collected rainwater.

In the spring of 2005, after disconnecting and storing the system for the winter, I increased the water flow through the gutters by connecting the downspouts directly to the barrels. Instead of using quart bottles with diverter flaps, I replaced the gutter elbows and fashioned a flap, attached with stainless steel ties. I drilled release holes and connected another gutter elbow to channel the water directly to the rain barrels. In a rain, the barrels now fill extremely quickly and less water is lost.

By May 24 of this year, nearly 3,800 gallons of rainwater had been collected. Collecting rainwater has been a simple and successful conservation ef-

fort at Mt. Auburn. ☼

*Paul Kwiatkowski attended Evergreen State College in Olympia, WA, and joined the Horticulture Department at Mount Auburn in 1999. He currently works in the greenhouse, designs perennial gardens, and, work on ecological problems like pond habitat restoration and irrigation.*

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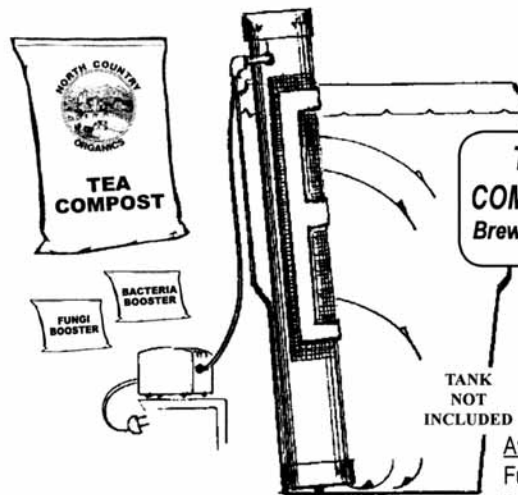
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**Roundup** continued from p. 1

U.S. Of course, run-off and absorption affect the ground water, ponds and streams, as well as use of an herbicide directly in water.

A study by Assistant Professor of Biology Rick Relyea, of the University of Pittsburgh, found that Roundup is lethal to amphibians. Relyea examined how a typical pond community of 25 species, including crustaceans, insects, snails, and tadpoles, would respond to the addition of four pesticides used at the manufacturers' recommended doses: Sevin (carbaryl), malathion, Roundup, and 2,4-D. The initial purpose of the experiment was to measure the effect that Roundup would have on frogs by killing their food source, algae; however, the amount of algae actually increased because most of the frogs died. Roundup caused a 70% decline in amphibian biodiversity and an 86% decline in the total mass of tadpoles. Leopard frog tadpoles and gray tree frog tadpoles were completely eliminated and wood frog tadpoles and toad tadpoles were nearly eliminated. One species of frog, spring peepers, was unaffected.

Apparently the surfactant, the substance that allows a product to penetrate the waxy surfaces of plants, is more poisonous in Roundup than glyphosate, the active ingredient. Roundup's surfactant includes polyoxyethylene alkylamine, a polyalkoxylate. Other herbicides were shown to have surfactants that are less dangerous; 2,4-D, another herbicide, had no effect on tadpoles.

Most polyalkoxylated surfactants are contaminated with 1,4-dioxane, a carcinogenic known to damage the liver, kidney, brain and lungs, said David H. Monroe, an industrial and environmental toxicologist, in a letter to the National Campaign Against the Misuse of Pesticides (NCAMP) (October 16, 1989). According to Monroe, Vision, another of Monsanto's glyphosate formulations, was found to have 350 ppm 1,4-dioxane. ☼

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*Fran Gustman is editor of The Ecological Landscaper, HortResources Newsletter, and Greenscapes, a water conservation e-newsletter. She is garden columnist for the Allston-Brighton TAB and principal of Urban Gardens in Boston.*

### More information on Roundup

**•ingredients**

<http://www.naturescountrystore.com/roundup/page2.html>

**•glyphosate bioavailability and/or bioaccumulation**

<http://www.gmwatch.org/archive2.asp?arcid=49330>

**•Northwest Coalition for Alternative to Pesticides**

<http://www.pesticide.org/default.htm>

**•nitrogen runoff and risk to amphibians**

<http://ehp.niehs.nih.gov/docs/1999/107p799-803rouse/abstract.html>

**•press release University of Pittsburgh Medical Center**

[http://www.eurekalert.org/pub\\_releases/2005-04/uopm-rhl040105.php](http://www.eurekalert.org/pub_releases/2005-04/uopm-rhl040105.php)

**• Rick A. Relyea, "The Impact of Insecticides and Herbicides on the Biodiversity and Productivity of Aquatic Communities," *Ecological Applications*, April 4, 2005**  
—fg

If you missed the 2005 ELA Winter Conference & Eco-Marketplace, attend it vicariously! Buy the proceedings book — a thick compilation of speaker handouts — for \$18 (includes postage). Send check, payable to ELA, with mailing address to: ELA, 60 Thoreau St., #252, Concord, MA 01742.

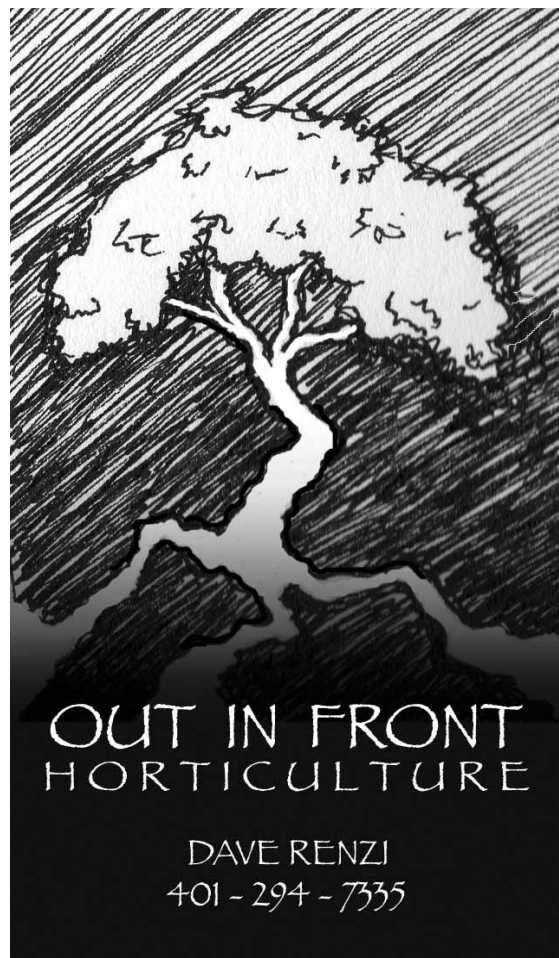
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## Rain barrels

Fran Gustman

The rain barrel is an old-fashioned, simple, and effective home water supply. A rain barrel hooks up to the downspout of a house. The barrel may be fitted with a spigot towards the bottom to which to attach a hose. It can be equipped with overflow devices and can even be connected to additional barrels to catch the wealth of free water in a storm. A barrel with a tightly fitting cover will keep it from becoming a site for mosquito breeding. Low water pressure to the hose is improved by raising the barrel on blocks.

But, first, check what is on your roof. Water collected from roofs may be polluted from tarring materials or asbestos shingles. *World Press*, July 1999, warned that "this water often contains dissolved herbicides that were added to roofing materials to prevent vegetation from growing" and that in farming areas chemicals from evaporated crop sprays may be highly concentrated in the first rain after a dry spell.

Many types of rain barrels are offered on the web. Prices range from about \$70 to \$220. Local municipalities also sell barrels very reasonably. The City of Newton, Massachusetts, was selling them for \$62 in April as part of its conservation effort. Newton gets its barrels from New England Rain Barrel Company, which sells them for \$85 ([www.nerainbarrel.com](http://www.nerainbarrel.com) or 1-877-977-3135). ☼

### Measuring rainfall by the gallon

One inch of rainfall per 1,000 square feet is approximately 600 gallons of water.

To calculate how much rain lands on your roof:

- Measure the outside walls, including the overhang.
- Multiply length x width and divide by 1000.
- Multiply the result by 600 and then by the average number of inches per year
- Go to <http://countrystudies.us/united-states/weather> to learn the average monthly rainfall for a location.
- Example. The house is 60' x 30' or 1800 sq. feet: Divide by 1000. Multiply the result, 1.8, by 600 gallons: 1,080 gallons. Since Boston averages 3.1 inches of rain in June, multiply 3.1 x 1080 gallons — a cache of 3,348 gallons of water. Add up the rainfall for the year yields 41.7 inches, or over 45,000 gallons per year.

<http://rainbarrelguide.com>: how to calculate the amount of water that can be collected off a roof, how big a collection system is needed, and how to figure the current use of water from water bills. —fg

## 2005 SUMMER MEETING & TRADE SHOW



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## ela news

**ELA ballot.** Members should have received the ELA ballot for the 2005-2006 Board of Directors and officers via postal service in June, along with the announcement of the co-hosted Summer Meeting & Trade Show. If you have not received the ballot, please call 617-436-5838, leaving your name and address with your request.

## gleanings

**Low impact development (LID).** [www.psat.wa.gov](http://www.psat.wa.gov).

The *Low Impact Development Technical Guidance Manual for Puget Sound* contains detailed guidance on how to design, construct, and maintain low impact development practices to protect water quality and wildlife habitat from the adverse effects of development and stormwater runoff. It provides professionals with site assessment and design methods and findings from national and international research and monitoring.

**Townboard.org.** Calendar of workshops, conferences, events, and family programs geared towards issues such as smart growth, resource protection and sustainability.—Bob Levite

**Ivory-billed woodpecker.** Until Feb. 11, 2004, the ivory-billed woodpecker, the largest in North America, was thought extinct, possibly as a result of extensive log-

## Rain Gardens

Janice Cook

**R**ain garden: the name alone is a creative *tour de force*. And, it wasn't dreamed up by a PR firm or to sell gardening apparatus. The name was brainstormed by Larry Coffman and his fellow workers at the Department of Environmental Resources, Prince George's County, Maryland. They were working on stormwater retention to reduce flooding and to settle out sediments, a serious and worthy problem, but "bio-water retention zone" was not catchy. They needed a grabber. Rain garden. It's almost poetic.

Large or small, commercial or residential, when life gives you lemons... make a rain garden. The rain garden soaks up runoff, filtering and settling contaminants. Slowing the water allows it to soak in, sustaining plants and replenishing aquifers.

One of the pluses of a rain garden is its adaptability to any site: a city lot or a ten-acre prairie, a new subdivision or a wetland. A properly engineered highway rain garden can cut down on runoff and flooding problems for the whole area, saving tax money. In an urban environment where the gutters are not allowed to empty into the sewage system, a rain garden will save the base-

ment of a house on a small city lot from its own roof runoff. In exurbia, the property can be engineered to establish a large rain garden — call it a wetland, if it's large enough. My town's park district began building rain gardens before we had heard the term. Most of the park is now an ephemeral wetland. One pond is large enough for canoeing. Not bad for a government bureaucracy.

It takes a bold and savvy gardener to turn a soggy lawn into a rain garden. The turf gods will watch as you cut away the lawn, roll out plastic tubing to redirect the water, and plant some bodacious plants right in the middle of the yard. By planting in rings, with the plants that survive the most water toward the center, you can soak up that water in a colorful way.

Rain gardens aren't maintenance-free. No mowing is required, but weeds move in. In the Midwest, don't plant cattails; they will come by themselves and will need removing or they may take over. Also beware notorious purple loosestrife (*Lythrum salicaria*) (all across the U.S.), reed canary grass (*Phalaris arundinacea*), and phragmites (common reed, *Phragmites australis*), the gangs ever ready to take over new neighborhoods. Check the invasives plants lists of the USDA (<http://www.usna.usda.gov/Gardens/invasives.html>) to learn what is a prob-

Continued p. 7

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### **ELA's Guide to Healthy Landscape**

The first volume in ELA's *Guide to Healthy Landscape* series, "From the Ground Up: Site and Soil Preparation," is a fine training aid for employees or an educational gift for an enthusiastic customer. Topics are: managing soil fertility, the importance of the soil food web, protecting site features, managing invasives, and much more. Features are line illustrations, glossary, and a list of resources and organizations. Cost (includes postage and handling) is \$25 members, \$30 non-members (in MA add 5% sales tax). Inquire about quantity discounts. Send order with payment: Attn.: Guide Order, ELA, 60 Thoreau St., #252, Concord, MA 01742.

Rain gardens *continued*

lem in your area. A bit of due diligence and weeding ought to do it.

As there are native plants adapted to every habitat, so there are plants for rain gardens. I'm not going to list them as lists tend to trip themselves up by being too locally specific. Rain gardens can be adapted to desert wadis, woodlands, open prairie potholes, or roadside ditches. Do some homework, check out the local native plants nurseries, and choose plants that will do well under your conditions. And, if they don't, do more research and try again.

I don't know of any chat rooms for turf withdrawal, but plenty of sites can give you support on rain gardens, ecological gardening, or native plants. The garden itself will provide moral support year round.

And, you will get wildlife: butterflies, native bees, and flies, amphibians and reptiles — even fish in a large wetland. Birds will come and go. If the food supply is varied and large enough, they may even stay.

Not a bad trade-off for lemons. ☼

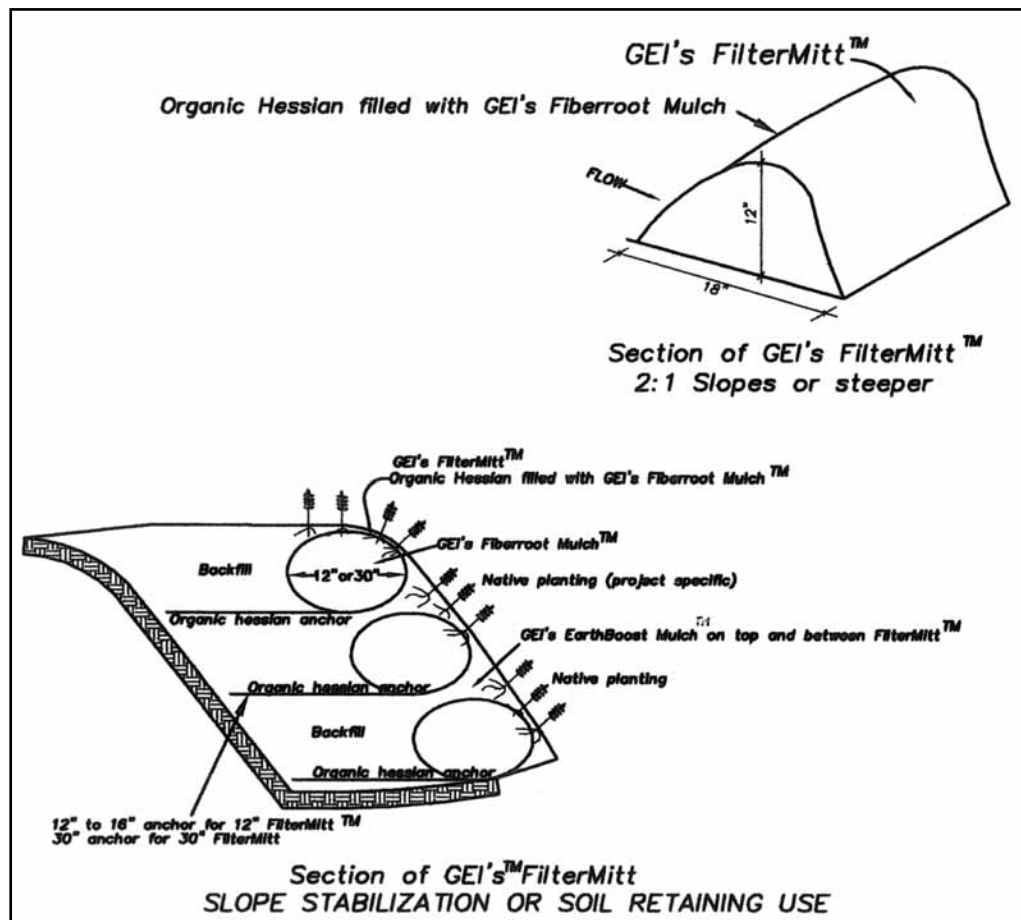
Janice Cook, an urban naturalist in Illinois, may be reached at [djcookwiring@earthlink.net](mailto:djcookwiring@earthlink.net).

Gleanings *continued*

ging. The first recent sighting took place in the Cache River National Wildlife Refuge in Arkansas. 15 sightings have been made since. Information at: [www.ivorybill.org](http://www.ivorybill.org).

**Right to Sue For Pesticide Harm.** The Supreme Court ruled on April 27 that citizens damaged by pesticides have the right to sue companies, saying that federal pesticide law does not offer adequate protection from "manufacturers of poisonous substances." Dow Chemical Company had argued that, because its products are registered by EPA, chemical manufacturers should be shielded from litigation. See decision at [www.supremecourtus.gov/opinions](http://www.supremecourtus.gov/opinions) — Jay Feldman, Beyond Pesticides/NCAMP

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## Readings on water conservation

- Dr. Edgar Garbisch and Suzanne McIninch. *Propagation of Wetland Plants: Herbaceous Plants, Shrubs and Trees*. Environmental Concern Inc., 2005. 350 pages. \$54.95 + \$8.00 S&H, [www.wetland.org](http://www.wetland.org) or 410-745-9620. In 1972, Garbisch started the first U.S. wholesale wetland plant nursery. The book covers 100 species, with illustrations, tables containing flowering periods, seed ripeness indicators, and collection times.
- The Ecological Landscaper: Water*, Fall 2002
- Greenscapes* [www.nsrwa.org/greenscapes/](http://www.nsrwa.org/greenscapes/) newsletter. Free electronic newsletter covers water conservation.
- “Rainy-Day Gardens,” *The American Gardener*, March/April 2003, features Lorrie Otto, who mobilized the forces against DDT
- “Painting a Garden,” Lorrie Otto, *Wildflower Magazine*, 18(3):10-13.
- History of rain gardening: [www.raingardens.org](http://www.raingardens.org)
- Harvesting the Rain: Rain Gardens of West Michigan* <http://www.raingardens.org/Index.php>. Stormwater education, instructions for creating rain gardens and making rain barrels.
- City of Maplewood, MN, *Rainwater Gardens* <http://www.maplewoodmn.gov/office.com/index>. 15-page rainwater garden planting and care guide,

list of recommended plants.

- University of Arizona, *Harvesting Rainwater for Landscape Use* <http://ag.arizona.edu/pubs/water/az1052/harvest.html>. Rainwater conservation in an arid region.
- University of Wisconsin-Extension, *Rain Gardens* <http://clean-water.uwex.edu/pubs/raingarden>. Designing and building rain gardens on residential lots.
- Center for Watershed Protection, *How to Build and Install a RainBarrel* [http://www.cwp.org/Community\\_Watersheds/brochure.pdf](http://www.cwp.org/Community_Watersheds/brochure.pdf). Brief, illustrated brochure.
- Collecting and Utilizing Rainfall Runoff* <http://avenue.org/tjswcd/rooftop%20manual.pdf>. For the home owner.
- LID Sustainable School Projects, Teacher Section <http://www.lowimpactdevelopment.org/school/teacher1.html>. Information for educators on installing rain gardens and rain barrels with their students.
- Andrea Cooper, Smart Growth Coordinator, 617-626-1222, MA Office of Coastal Zone Management (Boston) and Executive Office of Environmental Affairs (Boston):  
<http://www.mass.gov/envir/lid/>,  
<http://www.mass.gov/czm/http://comm-pres.env.state.ma.us/index.asp>



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