Iowa Learning Farms

Building a Culture of Conservation

Farmer to Farmer: Iowan to Iowan

Urban Conservation Practices

Water quality improvement: It begins with you

Have you seen any of these scenarios in your neighborhood or backyard?

- Low areas that have standing water after rainfall
- Water running down driveways and streets after it's stopped raining
- Poor quality or compacted soil that absorbs little water
- Brown spotty lawns

Improving how your land reacts to rainfall can reduce runoff and improve soil and water quality.

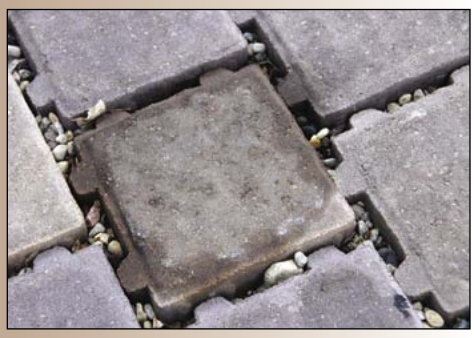
Did you know?

In most urban settings, approximately 55 percent of rainwater becomes surface runoff. This can negatively impact water quality as sediment and unseen pollutants, such as lawn fertilizers and chemicals, may be free to move with urban runoff. Extensive surface runoff during and after high intensity rainfall events can increase the likelihood of local and downstream flooding. Conservation measures help to capture and infiltrate stormwater, reducing a property's contribution to water quality degradation, flashy stream flows and localized flooding.

Newly-installed rain garden in Okoboji, Iowa.

Curb-cuts along a street in Okoboji allow runoff to be absorbed by the rain garden.

Porous pavement looks like regular asphalt without the tiny rocks.



Modular pavers allow rainwater to go between the cracks instead of running into the storm sewer.

What can you do to help lessen urban runoff?

In your yard...

Rainwater harvesting is the practice of collecting rainwater for future use, lessening the amount of surface runoff being directed to storm sewers. Rain barrels can collect some of the rain falling on the roof of your home or garage. The captured water can then be used later to water plants and trees, lawns, or even wash cars (best done on the grass rather than on the driveway).

Bioretention cells or rain gardens utilize strategic landscaping to capture runoff, giving it the opportunity to infiltrate into the soil rather than move directly to city stormwater systems. Rain gardens use native plants that have deep root systems and can uptake a significant amount of water, while creating more pathways for surface water to move to lower levels in the soil. The gardens can be engineered with layers of sand and rock to encourage infiltration and storage.

Rain gardens have greatly reduced urban runoff and improved water quality in Okoboji. Cut-outs in the curbs of 3,300 feet of the city's streets direct water to 15 different rain gardens which capture and treat stormwater before it is able to run off into the lake. Okoboji was the first city in Iowa to implement an ordinance requiring all new/expanding construction to install systems that address stormwater.

Soil quality restoration boosts infiltration potential and increases the amount of water that soil can hold, thereby reducing surface runoff and creating a greener, healthier lawn environment. When topsoil is compacted (or sometimes completely removed) and covered with sod, pore spaces and pathways for water to infiltrate can be reduced or destroyed. The mats of grass cover a nearly impenetrable layer of soil, leading to shallow rooting and forcing excess rainwater to run off onto sidewalks, streets and into stormwater systems.

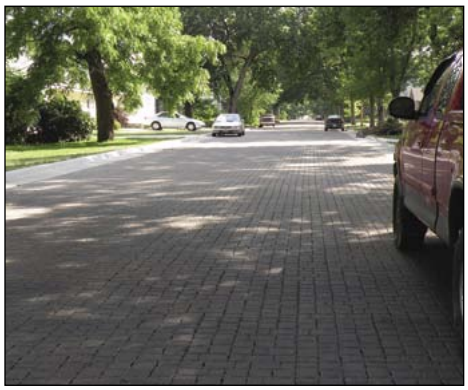
Improving soil quality often begins with aeration. Differing methods exist, ranging from do-it-yourself tools, to equipment rentals, to professional aeration services that will do the work for you. Once the lawn is aerated, compost is applied to incorporate nutrient-rich organic matter. This creates an environment that promotes water infiltration and storage, increased microbial activity, deeper rooting of grasses and plants, better soil structure and overall improved soil quality. Through such improvements, soil function is restored, the need for frequent watering is lessened and water bills are reduced.

Driveways, sidewalks, streets and patios...

Porous pavement systems can be used on streets, parking lots, driveways, patios and recreational areas like walking trails, reducing surface runoff that otherwise moves directly to water bodies through storm sewers or by overland flow. Porous paving systems include modular concrete pavers, articulating concrete blocks/mats, porous asphalt and porous concrete. In each case, the hard surface material is installed over an infiltration and storage bed consisting of varying sizes and layers of rock. This makes a very stable substrate while maintaining 40 percent void space for water to flow through. This void space ensures that the surface layer can drain freely, keeping these systems free from seasonal issues related to freezing and thawing. Vacuuming may be necessary to restore porosity if sediment happens to clog open pore spaces. Porous paving systems

can carry a higher up-front cost per square foot in comparison to conventional concrete or asphalt. Modular permeable paving systems range from $10-20 per square foot installed; costs vary by site and installation depth. In general, costs are approximately 20 percent higher than conventional impervious concrete systems. At the development level, installation costs can be lower than conventional options because porous systems can reduce costs associated with expansion of stormwater systems and additional land needed for retention ponds. The longer life expectancy (20-40 years) of permeable systems also helps to offset the initial installation costs.

Porous paving systems offer a multitude of benefits: reducing annual runoff volume by over 80 percent, removing 65-85 percent of undissolved nutrients, and removing up to 95 percent of sediment in runoff. These systems can also reduce the potential for hydroplaning, increase skid resistance, encourage melting and prevent ice formation, reduce roadway noise, and absorb/store less heat.



Permeable paving systems have been successfully installed in urban centers across Iowa. Charles City installed over 30 city blocks of modular pavers on residential streets near the Cedar River. A number of other cities, including Ames, Arnolds Park, Cedar Rapids, Cedar Falls, Decorah, Des Moines, Dubuque, Iowa City and West Union have also installed similar porous paving systems to help reduce urban runoff.

Bioswales help retain water during rain events and keep it from overwhelming stormwater systems. Utilizing low points in the landscape that are natural collection points, bioswales can be installed in parking lots, street medians or placed strategically in residential/commercial areas to capture rainfall running off impervious surfaces. Native landscaping combines beauty and functionality by improving aesthetics and increasing the potential for water to infiltrate into the soil.

Stormwater wetlands serve to capture and temporarily store water on a larger scale than bioswales. Stormwater wetlands are designed to capture and treat urban runoff before it can be deposited directly to streams and lakes. Natural biological processes filter and remove pollutants from the water as it moves through these wetlands. Like their smaller counterpart, these wetlands also bring an element of native Iowa back onto the landscape, bringing natural beauty and increased bird and wildlife habitat to urban areas. Contrary to popular belief, functioning wetlands actually reduce mosquito numbers as they provide essential habitat for frogs, dragonflies, damselflies and other predators.

A stormwater wetland in Polk County

Scoop the Poop!

Pet waste can be a big issue in urban environments; when not picked up and disposed of, this waste contributes to water quality degradation. A day's worth of dog droppings can contain billions of fecal coliform bacteria. Rain water carries pet waste into storm drains, streams, and rivers, contributing excess bacteria and nutrients to these water bodies. Do your part and scoop the poop! Biodegradable pet waste bags are an inexpensive and environmentally-friendly option.

Green roofs feature living plants grown in a porous media that is installed over a drainage system. The living roof system conserves energy by adding an extra layer of insulation and transforming heat from the sun into evaporative cooling through photosynthesis. Green roofs can help to reduce the urban heat island effect—the difference in temperature between urban and rural areas. The plants reduce runoff volume by water uptake and also protect roof systems from damaging UV radiation. In addition, the living plants are able to buffer acid rain, filter rainfall of nitrates and other contaminants, as well as filter carbon dioxide and pollutants from the air. A diverse array of plants may be used in green roof systems: grasses, succulents and sedums, chives and mountain garlic, and even several varieties of vegetables.

Get Started Today

Caring about soil and water quality is the first step to finding a solution and this involves us all—rural and urban residents alike. Research ways you and your community can reduce your impact on the environment.

Urban Conservation Resources

www.iowaagriculture.gov/FieldServices/urbanConservation.asp
www.rainscapingiowa.org/
www.iowastormwater.org/
www.ia.nrcs.usda.gov/news/brochures/urbanfactsheets.html
http://cfpub.epa.gov/npdes/stormwatermonth.cfm
www.stormwatercenter.net/
http://www.iowaeconomicdevelopment.com/community/resources/greenroofs.aspx
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=137&minmeasure=5

Iowa Rain Garden Design and Installation Manual:
http://www.iowaagriculture.gov/press/pdfs/RainGardenManual.pdf

Soil Quality: http://www.iowaagriculture.gov/FieldServices/pdf/SoilQualityBrochure.pdf

For more information

For further information or technical assistance, contact your local Soil and Water Conservation District or the Iowa Department of Agriculture and Land Stewardship's Urban Conservation Program.

Iowa Learning Farms
219A Davidson Hall
Iowa State University
Ames, Iowa 50011-3080
ilf@iastate.edu

www.extension.iastate.edu/ilf

Iowa Learning Farms is funded by the Iowa Department of Agriculture and Land Stewardship through the Integrated Farm and Livestock Demonstration Program, in collaboration with Iowa Department of Natural Resources (USEPA Section 319), Natural Resources Conservation Service, Conservation Districts of Iowa, Iowa State University Extension and Outreach, Leopold Center for Sustainable Agriculture, and Iowa Farm Bureau Federation and the Iowa Water Center.