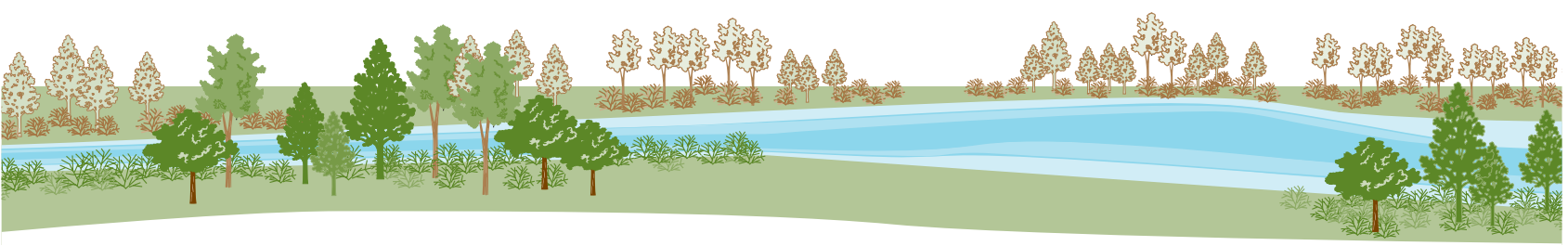
GREEN SPACES CLEAN WATERS

Landscaping ideas that improve water quality along the Mississippi River



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This booklet is for people who care about having clean water for themselves, their children and the environment. Clean water is worth a lot. For example, we will pay $1.20 for a pint of bottled water, which equals $9.60 a gallon. That's more than four times as expensive as a gallon of gas! Read on to see how you can make a difference in our water quality.

CONTENTS

Why the water quality of the Mississippi matters

Mississippi river skyline, Minneapolis, MN

Our bodies are made up of 98% water. If the water in our body becomes contaminated because of what we put into our system, we get sick. Rivers are no different. Polluted water flowing into a river from streams, storm sewers, wetlands, parking lots and even our yards, will make the river sick, killing fish, plant life and waterfowl.

This book outlines landscaping ideas to help you, the private landowner, protect and restore the health of the Mississippi River as it runs through our neighborhoods here in Minneapolis and further downstream where our neighbors depend on the river for quality water, wildlife, recreation and scenery. To keep our river healthy and our drinking water clean, businesses, industries and individuals must take action to minimize pollution. Together, we can make a difference!

A raindrop falling in Lake Itasca, Minnesota would arrive at the Gulf of Mexico in about 90 days. - National Park Service, Mississippi National River and Recreation Area

The Mighty Mississippi

There is no river as powerful as the Mississippi. It is about 2,350 miles long, making it the third longest river in the world. It's hard to imagine that the Mississippi River actually starts as a trickle from Lake Itasca in northern Minnesota.

The Mississippi River is home to abundant wildlife. Forty percent of the nation's migratory birds, 241 species of fishes and 39 species of mussels depend on the river and the surrounding landscape for food and cover. People depend on the river too. Minneapolis and more than 50 other cities draw their drinking water from the river.

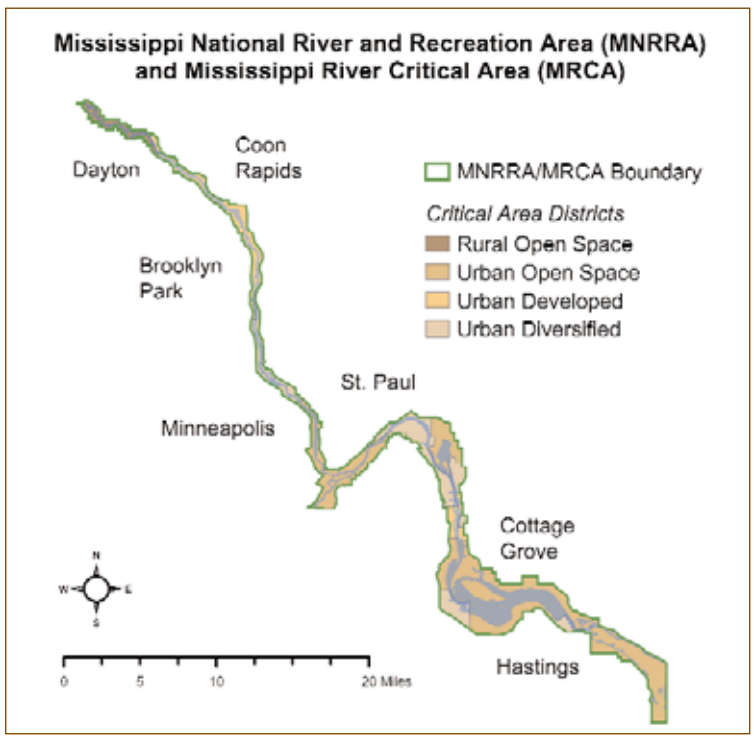


Illustration - National Park Service

The Metropolitan Mississippi

The Mississippi River is the reason the Twin Cities exist. Minneapolis grew around St. Anthony Falls as a source of waterpower, while St. Paul was the last port at the upper end of the commercially navigable river in the 1800's. Still today, many industries depend on the Mississippi River as a source of water and transportation, contributing to our local economy. The river continues to add to the quality of life for Minnesota residents in many ways.

The Mississippi River corridor in the Minneapolis - St. Paul area was designated a state Critical Area in 1976 by Governor Wendell Anderson (see illustration). The purpose of designating the river as a critical area was to provide a state mandate to protect and preserve the river resource. Currently, the Minnesota Department of Natural Resources, Metropolitan Council, and Mississippi National River and Recreation Area (National Park Service) work together in various roles to protect and preserve the corridor. In addition, there are many local organizations that help with these efforts. (See Local River Rats on page 17 for more information)

Mississippi Mud

Point source pollution comes from a known source, such as a pipe directly from an industry, while non-point source pollution comes from many sources like our yards, streets, and parking lots.

The Mississippi has lost much of its vitality due to water pollution. Due to the presence of contaminants like mercury and PCBs there are restrictions on eating fish taken from 85% of the section of the Mississippi that stretches from Minnesota to Illinois. In addition, there is an area at the Gulf of Mexico that people refer to as the "Dead Zone" because oxygen levels are so low that fish and other aquatic life cannot survive.

What has happened? The river collects pollution from the streams, wetlands, storm sewers and industrial pipes that drain into it. In a forested area, 50% of the water and rainwater is filtered as it seeps into the ground and trickles through the soil, 40%

evaporates and 10% becomes runoff. However, in the city where 75-100% of the ground is hard surface, rainwater flows over our lawns picking up fertilizers, particles and dirt, flows down our streets picking up leaves and trash, flows across our parking lots picking up gas and oil, and carries it all into the storm sewers and streams without being cleaned. In the city, only 15% of the water filters into the ground while 30% evaporates and 55% becomes runoff.

How you can make a difference!

This booklet focuses on ways to minimize the pollution that collects in the stormwater runoff from our yards, streets, roofs and parking lots. You can reduce pollution on your property by 1) slowing down the flow of the runoff from your property, 2) reducing the amount of runoff, and 3) filtering pollutants out of the runoff.

> The Mississippi River "begins" not only in Lake Itasca, but in every back yard, storm sewer and stream that drains into it.
>
> - Metropolitan Design Center

Volunteers stencil this message on stormwater drains to remind the public of the connection between runoff and their river.

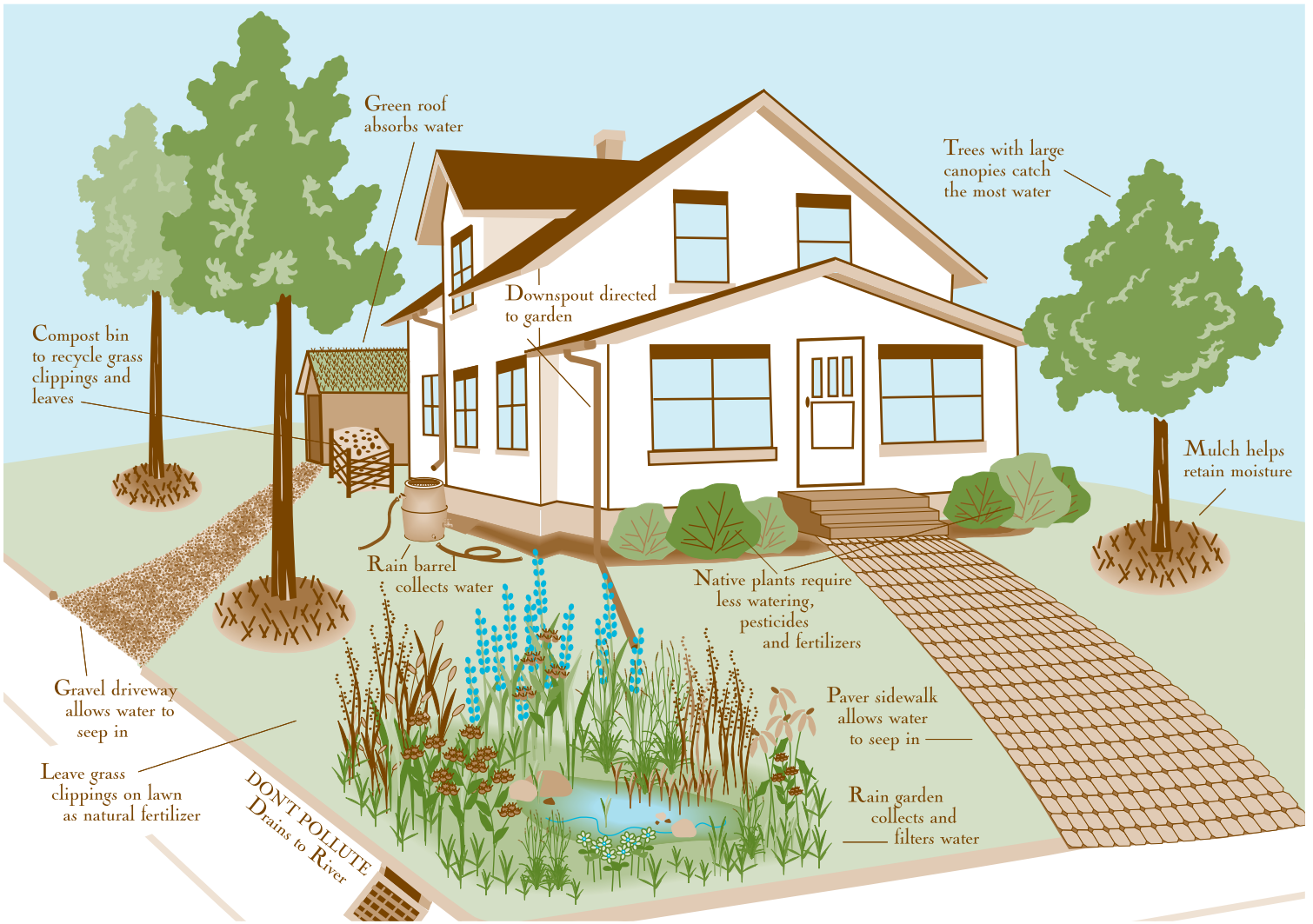
The following pages introduce landscaping ideas that help reduce and clean stormwater runoff from your property. Each idea is introduced briefly and web links are provided for more how-to information. Start by trying one idea, or putting a few together. In addition, most of the ideas list local examples to go explore.

This booklet has three sections -

- Ideas for Everyone—Ideas for both residential lots and for larger, commercial or industrial lots.
- Commercial Ideas—Ideas more appropriate and realistic for small business or commercial lots. However these ideas can be applied to a residential lot at a smaller scale. These ideas require further consultation with an engineer or other specialist to complete plans and designs. (See page 17 for a list of local engineers that work with stormwater management.)
- Neighborhood Ideas—
  Ways to incorporate all the ideas in the book on a community-wide scale. This approach is best implemented as part of a new development or redevelopment since it involves planning and foresight.

Five easy ways to make a difference today

1. Sweep up your grass clippings and leaves so they don't get into stormwater drains.
2. Plant native plants—they require fewer pesticides and fertilizers.
3. Stencil the stormwater drains in your neighborhood.
4. Buy natural household cleaning products and fertilizer without phosphates.
5. Plant a tree that has a large canopy.


Green roof absorbs water
Trees with large canopies catch the most water
Downspout directed to garden
Compost bin to recycle grass clippings and leaves
Mulch helps retain moisture
Rain barrel collects water
Native plants require less watering, pesticides and fertilizers
Gravel driveway allows water to seep in
Paver sidewalk allows water to seep in
Leave grass clippings on lawn as natural fertilizer
Rain garden collects and filters water
DON'T POLLUTE
Drains to River

Everyone can clean and reduce stormwater runoff

Below are landscaping ideas for both residential lots and for larger, commercial or industrial lots that clean and reduce stormwater runoff (or sprinkler runoff). These ideas may seem individually small, but collectively, they have a large effect on the river.

Lawn Care

There are ways you can reduce use of fertilizers, pesticides and water and still have a great looking yard.

Plants

- Reduce your total amount of hard surface and increase areas of vegetation.
- In areas where grass will not grow or areas that don't get used, replace grass with a ground cover, shrubs or flowers.
- Plant native species where possible. They are adapted to our conditions and generally require less water.

Water Use

- Capture rainwater using rain barrels, ponds or rain gardens.
- Turn sprinkler heads so they don't water the sidewalk, street or parking lot.
- Only water when needed instead of setting sprinklers on an automatic timer.
- Redirect or extend downspouts to flow onto planted areas.

Fertilizing

Phosphorous is an element found in fertilizers, leaves, grass clippings and dog poop. Phosphorous naturally occurs in the river. However, too much is entering the river for the system to accommodate. An overabundance of phosphorous causes aquatic plants to increase growth, just like your grass. With an increase in plants that consume oxygen, the dissolved oxygen levels become so low that fish and other aquatic life die.

- Leave grass clippings on your lawn as a natural fertilizer. However, be sure to sweep up your sidewalk, driveway or street so clippings don't pollute nearby lakes or streams.
- Choose organic fertilizers like compost. Ask about other organic options.
- Test your soil to see what nutrients your lawn needs and then pick an appropriate fertilizer. Most Minnesota soils are naturally high in phosphorus, so our lawns usually don't need any extra. **Instructions on soil testing are available through the U of M Extension Service's INFO-U by calling 612-624-2200 and requesting message 468.** (Routine phosphorus use on lawns is now restricted statewide. Minnesota homeowners in the seven-county metro area are not allowed to use fertilizer containing phosphorus, with exceptions when establishing new lawns or when a soil test indicates a need.)
- If you do use fertilizer, follow label directions. They are there to protect you and the river.
- Pick up your dog's poop! Pet waste also washes into the river.

What do the numbers on my fertilizer bag mean?
22 - 0 - 15
(nitrogen - phosphorous - potassium)

Native Landscaping, Phillips Eco-Enterprise Center, Minneapolis PHOTO - GREEN INSTITUTE

Pesticides

Pesticides that get into the river can contaminate drinking water supplies and be poisonous to humans and aquatic life.

- Choose products that are less toxic, including household chemicals.
- Use alternative methods of pest control such as Integrated Pest Management. Ask about other alternatives. (See How-to links)
- Use native plants, which have fewer pest problems.

Yard Waste

Leaves, grass clippings and other plant materials are high in nitrogen and phosphorus and add too much sediment to the river. It's tempting to push the leaves into the street, but they will get into the storm sewers and this practice is actually prohibited by ordinances in most cities. Instead, you should:

- Leave grass clippings on your lawn
- Add yard waste to a compost bin
- Call your trash hauler or city to see if they pick up yard waste
- Bring your yard waste to a commercial drop-of site. For locations in Hennepin County, go to www.co.hennepin.mn.us/ and search under "yard waste."

How-to Web Links

- Minnesota Office of Environmental Assistance, How to Grow a Healthy, No-waste Lawn & Garden, www.moea.state.mn.us/campaign/garden
- Minnesota Department of Natural Resources, Native Plant Suppliers and Landscapers in Minnesota, www.dnr.state.mn.us/gardens/nativeplants/suppliers.html
- USDA, Backyard Conservation, www.nrcs.usda.gov/feature/backyard

Rain Gardens

A rain garden is a shallow depression or consistently wet area on your property that is planted with native wetland or wet prairie wildflowers and grasses—plants that like their "feet" wet. Rain gardens are attractive, low-maintenance and can be small or large in size.

Rain Gardens - the gardening choice with water quality in mind!

Rain gardens capture excess water from the roof, sidewalks, yard or street runoff. As the captured water seeps through the soil, pollutants are filtered out. With a rain garden instead of grass, 30% more water seeps into the ground (Center for Watershed Protection).

On a larger scale, communities or larger property owners can design rain gardens to manage stormwater runoff from streets and parking lots. "When the streets need upgrading or reconstruction, it is easy to sell rain gardens to residents rather than expensive curb, gutter, and storm sewer assessments," according to Cliff Aichinger, Administrator, Ramsey-Washington Metro Watershed District.

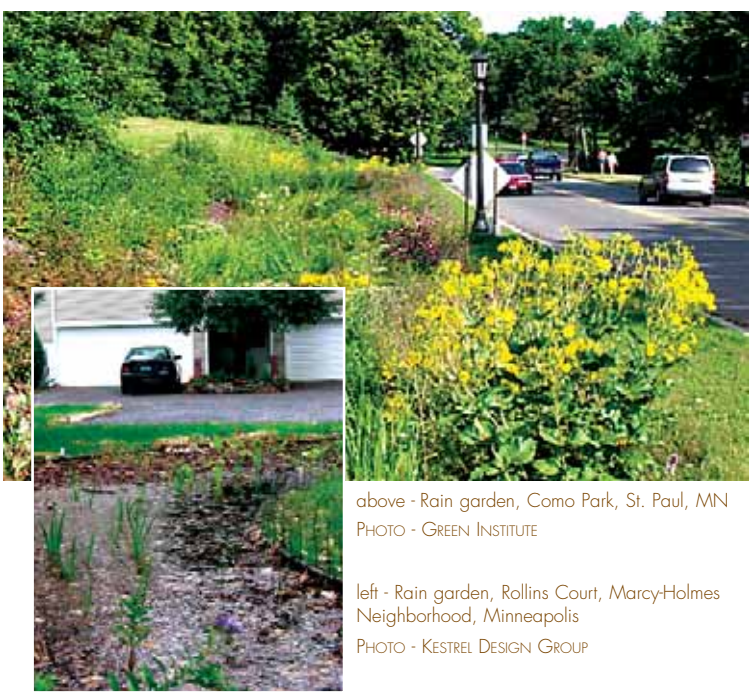
Rain garden, residential home, Maplewood — Photo - Green Institute

How-to Web Links

- Rain Gardens of West Michigan, Saving the Great Lakes One Rain Garden at a Time, www.raingardens.org
- Applied Ecological Services, www.appliedeco.com/RainGardens.cfm
- University of Wisconsin Extension Service. Rain Gardens: A how-to manual for homeowners, http://clean-water.uwex.edu/pub/raingarden

Visit a local rain garden:

- Como Park, St. Paul, Intersection of Lexington Parkway and Nebraska Avenue
- Marcy-Holmes Neighborhood Rain Garden Demonstration Sites (See walking tour link for more information, www.marcy-holmes.org/projects/rainwater/3.html)



above - Rain garden, Como Park, St. Paul, MN
Photo - Green Institute

left - Rain garden, Rollins Court, Marcy-Holmes Neighborhood, Minneapolis
Photo - Kestrel Design Group

Tree Planting

Improved water quality is just one of the many benefits of trees. Trees also conserve energy through shading windows and blocking wind, reduce temperatures in urban areas, absorb air pollutants such as nitrogen oxide from cars, reduce atmospheric carbon dioxide and increase property values.

A tree's canopy catches rainwater before it reaches the ground, allowing much of it to gently drip and seep into the soil and the rest to evaporate. Research has shown that 100 mature trees catch about 100,000 gallons of rainwater per year in their canopies (United States Forest Service). Trees' roots hold soil in place, especially along riverbanks—soil that would otherwise erode into the river or storm sewers. To provide all of those benefits, trees must be protected, preserved and cared for in our neighborhoods.

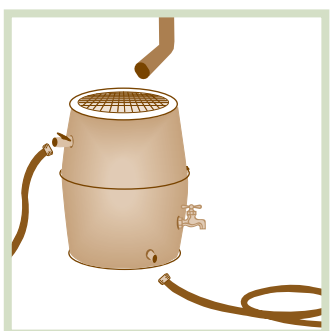
When planting trees, consider:

- Planting location & site conditions (such as salt tolerance or soil type).
- Tree species and its size at maturity. Plant trees with large canopies if space allows since these provide the most water quality benefits.
- Appearance or other characteristics of the tree (such as seed production).
- Climate in which the tree thrives.
- Plant trees correctly and add mulch to help retain moisture (refer to links for up-to-date-methods)

How-to Web Links:

- **MNtrees.org,** a new website for Minnesota residents dedicated to providing current, up-to-date information on trees in Minnesota
- University of Minnesota Extension Service, Forest Resources— A variety of resources to select appropriate trees for Minnesota. www.cnr.umn.edu/FR/extension/Treeandshrubselection.html
- How to Plant a Tree flyer, www.treetrust.org/pdfs/tree_planting.PDF

Rain Barrels



Use a rain barrel to collect rainwater that would otherwise become runoff from the roof. A rain barrel is a 55-gallon or larger drum that collects and stores rainwater from the downspout of your roof gutter. You can use the collected water for watering your plants, trees and lawn or washing a car or windows. If you are concerned with mosquitoes, use a rain barrel with a fully enclosed lid or a mesh screen to keep mosquitoes from leaving the barrel. Mosquito dunks or granules (see web links) can also be added to your rain barrel to kill mosquito larvae.

Lawn and garden watering make up nearly 40% of total household water use during the summer (EPA). A rain barrel not only saves water for dry months, it provides FREE soft water, containing no chlorine, lime or calcium, making it perfect for gardens, lawns and indoor plants.

How-to Web Links:

- Ready-made Rain Barrels (range from $100-$250): Clean Air Gardening, www.cleanairgardening.com/rainbarrels.html Spruce Creek Company, www.sprucecreekrainsaver.com Composters.com, www.composters.com
- Build your own rain barrel! www.cbf.org/site/DocServer/rain_barrel_guide.pdf?docID=681

Visit a local rain barrel:

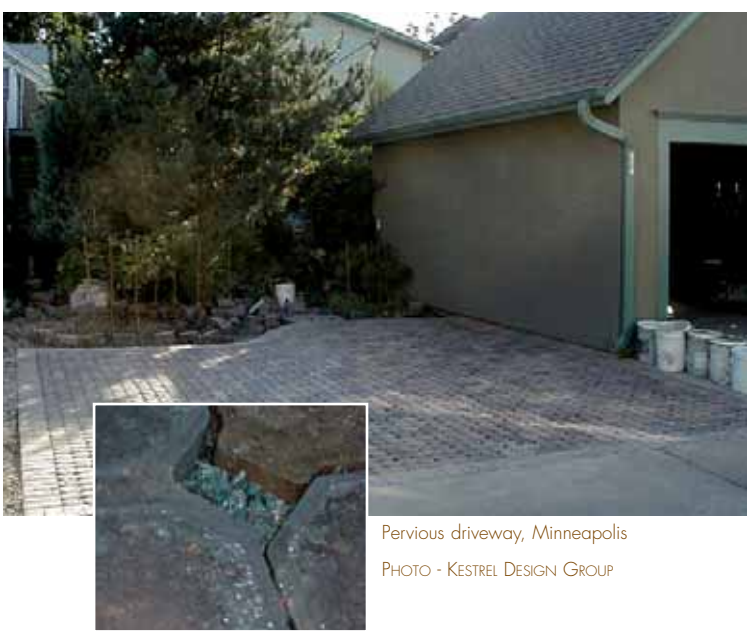
- Marcy Holmes Neighborhood Rain Barrel Demonstration Sites— www.marcy-holmes.org/projects/rainwater/index.html. Click on the rain barrell link. Also check out the walking tour link.

How many rain barrels do you need? A typical 2-story house can use 1 or 2 rain barrels. For example, a 1-inch rainfall on a 1000 ft^2 roof yields 623 gallons of water!

Alternative surfaces for paths, patios and parking

Runoff from driveways, parking lots, bike paths and streets can be especially damaging because the rain and snowmelt wash pollutants, like fluids from vehicles, sand, salt and pet waste, from concrete or blacktop surfaces directly into storm sewers. As an alternative to these impervious surfaces, sidewalks, driveways, etc. can be constructed using pervious materials that allow water to seep into the ground. These materials include:

- Porous paving blocks
- Flagstone or limestone
- Gravel or other crushed stone
- Woodchips



Pervious driveway, Minneapolis

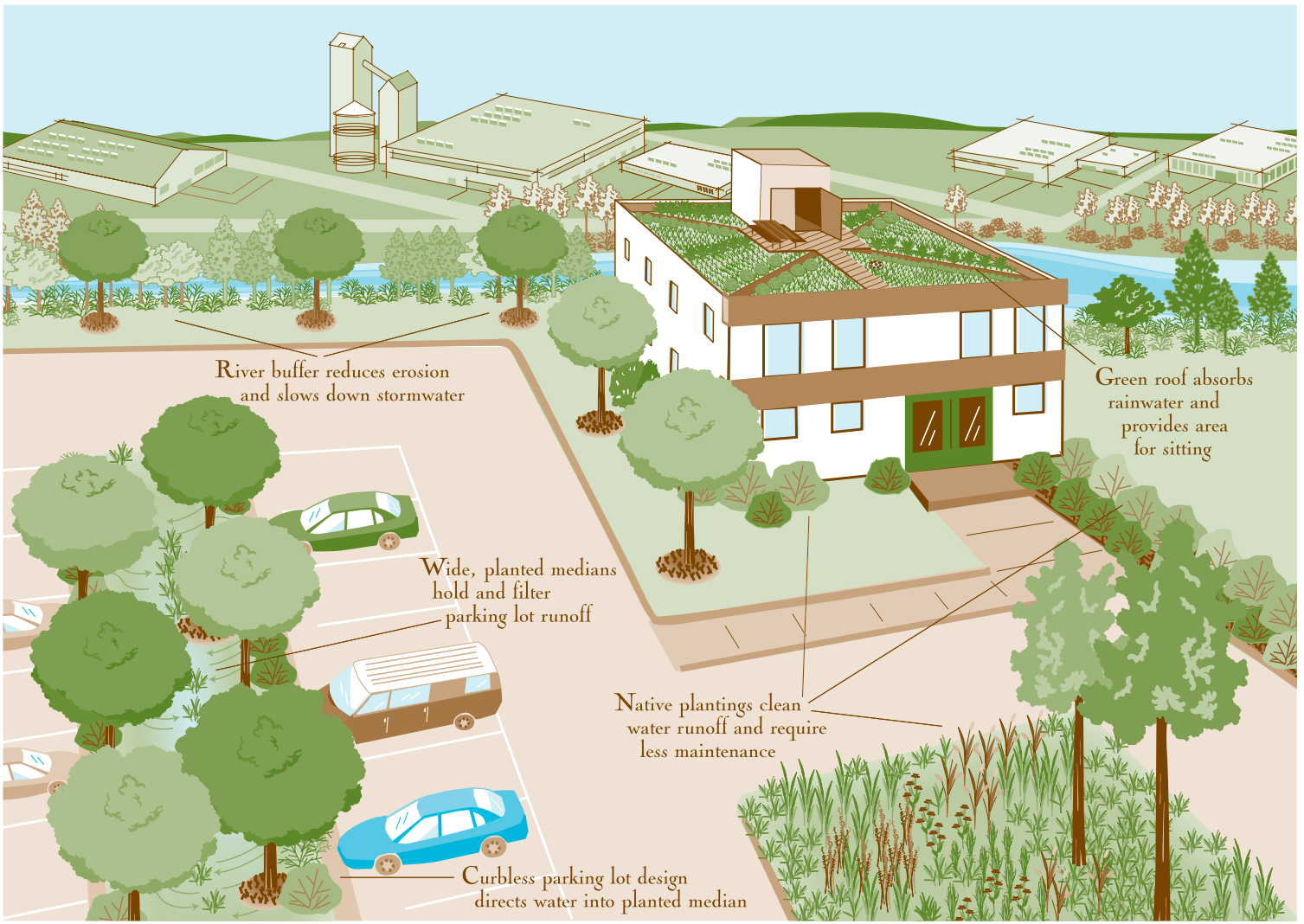
Photo - Kestrel Design Group

How-to Web Links:

- Capital Region Watershed District, Impervious Surfaces and Alternative Fact Sheet, www.capitolregionalwd.org, Click on "Resources"

Visit a local pervious design:

- Marcy-Holmes Neighborhood Pervious Pavement Demonstration Sites - www.marcy-holmes.org/projects/rainwater/index.html. Click on the pervious pavement link. Also check out the walking tour link. Website also has information about construction.


River buffer reduces erosion and slows down stormwater
Green roof absorbs rainwater and provides area for sitting
Wide, planted medians hold and filter parking lot runoff
Native plantings clean water runoff and require less maintenance
Curbless parking lot design directs water into planted median

Stormwater improvements for commercial properties

Ideas for business and commercial sites, or the ambitious home-owner. These ideas require further consultation with an engineer or other specialist to complete plans and designs. (See page 17 for a list of local engineers that work with stormwater management)

Green Roofs

A green roof is a roof that is a garden. A green roof can range from a simple container garden to a roof covered with several inches of soil. For homeowners a rooftop container garden on a flat roof is low-cost and easy to maintain. Commercial or industrial buildings can have other types of green roofs (and home-owners if they're up for it) where the garden actually becomes the roof:

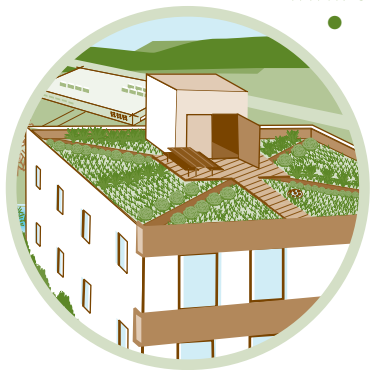
> Researchers estimate that green roofs absorb 75% of water falling on the roof during rainfalls of ½ inch or less (EPA) and that green roof vegetation removes heavy metals, including 95% of copper and lead and 16% of zinc.

- Extensive Green Roof—roof covered with 2"-5" of light weight growing material and hardy plants that are able to thrive in conditions such as little soil, drought, high winds and high sun exposure. Extensive roofs do not typically require addition structural support.
- Intensive Green Roofs—more like gardens on the ground, with deeper growing material and more maintenance needs such as irrigation and pruning.

Green roofs capture stormwater onsite, rather than diverting the water into storm sewers with a traditional rain gutter system. Green roofs insulate a building and actually prolong the life of the roof by blocking the roof from damaging weather and sunlight. The plant materials trap dust particles and airborne toxins. Green roofs also help cool summer temperatures in the city, improve air quality, create habitat for birds and butterflies and provide a garden refuge in a city.

How-to Web Links:

- A Guide To Rooftop Gardening, City of Chicago. This booklet guides you through planning for and designing your own rooftop garden. http://egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuidetoRooftopGardening_v2.pdf
- Roofscapes, Inc.: Green Technology for the Urban Environment, www.roofmeadow.com
- Green Roofs for Healthy Cities, www.greenroofs.org



Garage green roof, Marcy-Holmes Neighborhood, Minneapolis PHOTO - KESTREL DESIGN

Green roof, Brit's Pub, Minneapolis PHOTO - GREEN INSTITUTE

Green roof, Phillips Eco-Enterprise Center, Minneapolis PHOTO - GREEN INSTITUTE

Visit a local Green Roof:

- GREEN INSTITUTE, PHILLIPS ECO-ENTERPRISE CENTER - "Green" office facility built in 1999 includes an extensive green roof and 100% stormwater retention along with several other green building features. www.greeninstitute.org/peec/peec.htm
- BRIT'S PUB, MINNEAPOLIS, MN - features a intensive rooftop garden used for lawn bowling, patio seating and bonfires. www.britspub.com

Buffers

A buffer or buffer zone is a vegetated area along the river or a stream that flows into the river. Buffers protect both the water and the adjacent land. Buffers remove sediment and some pollutants and reduce and slow runoff. The established root systems of the plants along or buffer along with their interception of runoff reduce bank erosion and improve the quality of the riverfront. Buffers provide wildlife habitat, an area to manage floods, add to the community forest and serve as spaces for recreation. To provide water quality protection, buffers that are 100 feet wide from the river's edge are recommended. Depending on the slope of the bank, amount of moisture and types of soils, there may be different kinds of plants growing in zones along the buffer.

How-to Web Links:

- RESTORE YOUR SHORE, Minnesota Department of Natural Resources, Shoreland Management program, www.dnr.state.mn.us/restoreyourshore
- MINNEHAHA CREEK WATERSHED DISTRICT, Stream Buffer Template, www.minnehahacreek.org/pdf/Stream_Buffer-Template.pdf
- STORMWATER MANAGER'S RESOURCE CENTER, The Architecture of Urban Stream Buffers, www.stormwatercenter.net/Library/Practice/39.pdf

Visit a local buffer:

- Vermillion River Buffer initiative, Vermillion, MN
  For information on project location, visit
  www.dakotacountyswcd.org/girgen
- William O'Brian State Park, Marine-on-St. Croix, MN
  For visitor information, call 651-433-0500 or visit
  www.dnr.state.mn.us/state_parks/william_obrien/index.html
- Como Lake Restoration, St. Paul, MN
  Capitol Region Watershed District, Como Park Fact Sheet
  www.capitolregionawd.org, click on "Resources"

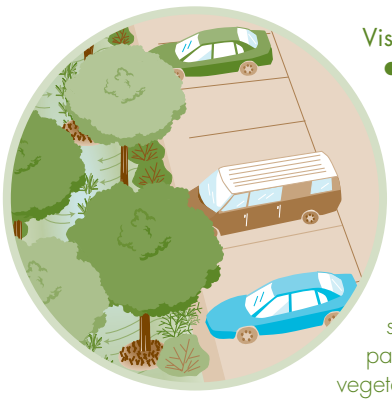
Green Parking

Parking lots contribute to the amount of the impervious surfaces in a city. Green parking consists of several techniques to reduce the total amount of blacktop, consequently reducing the amount of runoff pollution. Techniques include making the parking spaces a little smaller, decreasing the total number of parking spots, utilizing porous materials, and incorporating rain gardens, trees and other vegetated areas that capture and filter water from a parking lot with flat curbs.

"Green" parking lot, H.B. Fuller Company, St. Paul, MN Photo - H.B. Fuller Company

How-to Web Links:

- Stormwater Manager's Resource Center, Fact Sheets on Better Site Design: Alternative Pavers, Alternative Turnarounds, Green Parking, Narrower Residential Streets. www.stormwatercenter.net/
- Parking Lot Design, Minnesota Urban Small Sites Best Management Practices Manual, www.metrocouncil.org/environment/Watershed/BMP/manual.htm



Visit a local green parking lot:

- Minnesota Landscape Arboretum
  3675 Arboretum Drive
  Chaska, MN 55318
  For visitor information, call
  952-443-1400 or visit
  www.arboretum.umn.edu.
  With a grant from Metropolitan Council, the Landscape Arboretum successfully redesigned their parking lots with porous pavement, vegetated filter strips and other features to keep runoff from getting into Lake Minnetonka.www.metrocouncil.org/directions/water/parkinglot.htm

- H.B. Fuller Company
  Corporate Headquarters
  1200 Willow Lake Boulevard
  P.O. Box 64683
  St. Paul, MN 55164-0683
  Ph. 651-236-5900
  www.hbfuller.com

Innovative alternative parking lot design with wide medians that hold and filter water runoff from the parking lot and are planted with wetland vegetation. This ecological design improves the water quality of adjacent Willow Lake.

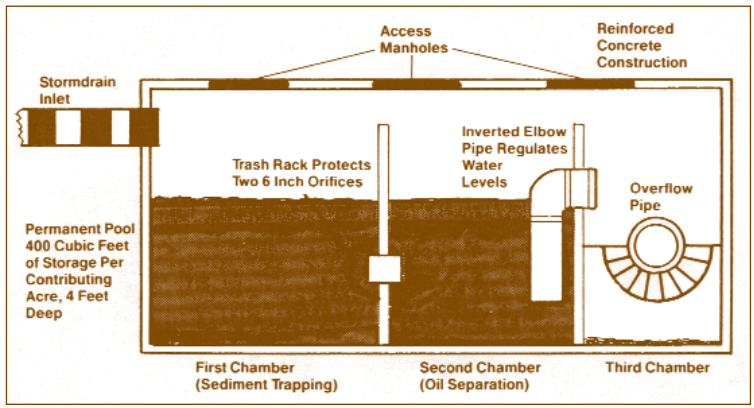
Going Above & Beyond

There are many more ways that stormwater runoff can be filtered and slowed down on larger sites and on a community-wide scale. Further consideration can be given to treating stormwater on a larger scale once it actually leaves your property. However, these techniques are generally not feasible for smaller business or commercial sites since they are more costly and can involve extensive engineering and ongoing management.

For more information and drawings of these ideas, look through the Minnesota Urban Small Sites Best Management Practices Manual, www.metrocouncil.org/environment/Watershed/BMP/manual.htm

Some of these larger-scale ideas include:

- Grit Chambers - an underground filtering system designed to remove particles or "grit" from roadways or sidewalks before the water moves into a traditional storm sewer system. The City of Minneapolis has installed several grit chambers near local lakes.
- Bioretention - a best management practice for stormwater management that was developed in the 1990's. It is essentially a large-scale, engineered rain garden that consists of trees, shrubs, perennials and grass and different filtering layers underneath like soil, sand and gravel.
- Wet/Dry Swales - Dry and wet swales (also called grassed swales) are a type of open vegetated channel used to treat a large volume of stormwater runoff. The water is temporarily stored in a pool, where pollutants settle out, especially sediment. They can also slow down the flow of stormwater runoff and promote more infiltration into the soil. A dry swale has an underlying filtering bed that is constructed, whereas a wet swale is constructed directly within existing soils and may or may not go down to the water table.



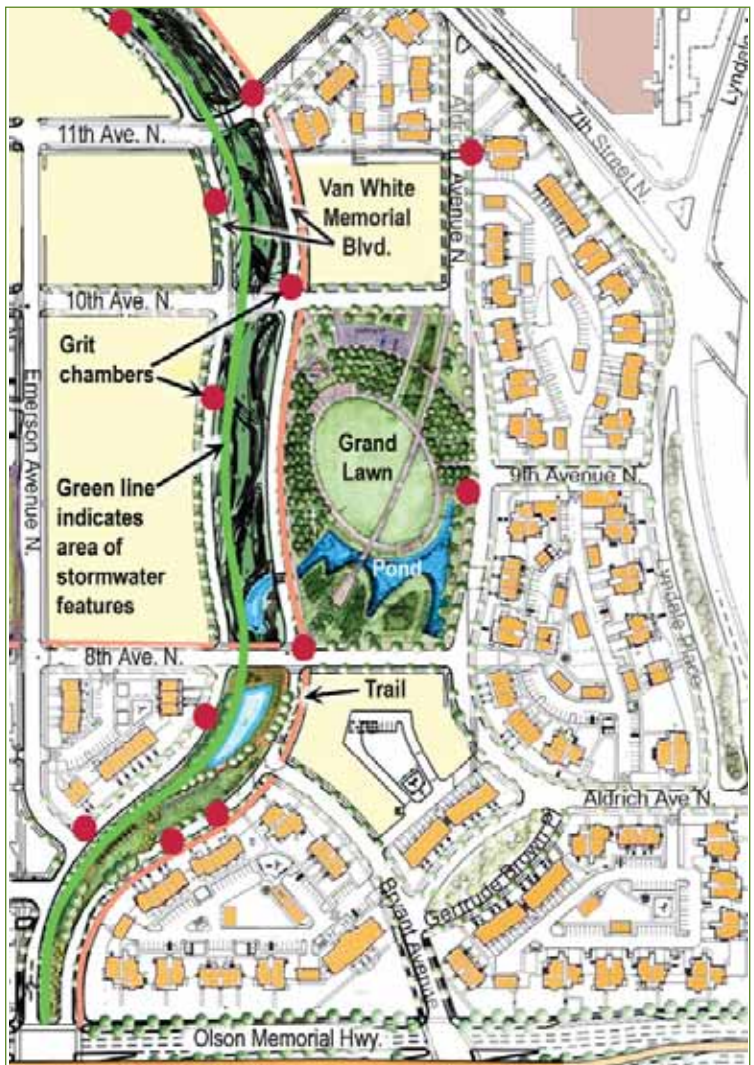
Oil Grit Chamber

ILLUSTRATION - METROPOLITAN COUNCIL

Special places—Special responsibilities

Homeowners and businesses located on or near the river and adjacent parklands have a special responsibility to protect the river and its resources. Property owners choose to be close to the river for recreation, aesthetics and other amenities. Therefore, they have an obligation to protect these values by managing their piece of land responsibly through implementing the techniques mentioned in this booklet. Buffers, native plantings, tree planting, green parking and alternative surfaces for parking lots and driveways are all good options for riverfront land.

Neighborhood Solutions



Heritage Park, Minneapolis

Illustration - City of Minneapolis

Moving forward, alternative stormwater management techniques, such as those introduced in pages 3-14 of this guide, should be incorporated and planned for during neighborhood development or redevelopment projects. Here are some ideas to focus those efforts.

Low Impact Development

Low Impact Development is an up-and-coming approach or philosophy to stormwater management that tries to emulate the natural water cycle within a community. Rather than moving water off-site as quickly as possible using storm sewers, Low Impact Development views rainwater as a community resource to be managed on-site. You can achieve a Low Impact Development approach by integrating the landscape ideas in this guide on your property.

Low Impact Development can also be implemented on a large, community-wide scale with proper planning and construction, especially as part of a redevelopment or revitalization project. Low Impact Development techniques implemented throughout a community can cost less than conventional stormwater management systems because of fewer pipes and large infrastructures.

Resources:

- Low Impact Development Center, www.lowimpactdevelopment.org
- Low Impact Development Urban Design Tools, Interactive Design page, www.lid-stormwater.net
- EPA, Polluted Runoff, Low Impact Development page, www.epa.gov/owow/nps/lid

Visit a Local Low Impact Development:

- Heritage Park is a Minneapolis redevelopment of four former public housing projects into a mixed-income, mixed-density, multi-cultural, community of 900 housing units and open-space amenities. The redevelopment is designed to provide stormwater management for the project area of about 140 acres and intercept runoff from surrounding drainage areas. Capturing runoff allows the project to create water amenities and reduce pollutants found in urban runoff, prior to discharge to the Mississippi River. To manage runoff, the design includes grit chambers, trench forebays, level

spreaders, native plant filtration-based processes and stormwater detention ponds. For the Heritage Park Stormwater Brochure and site location, visit www.ci.minneapolis.mn.us/CPED/heritage_park.asp

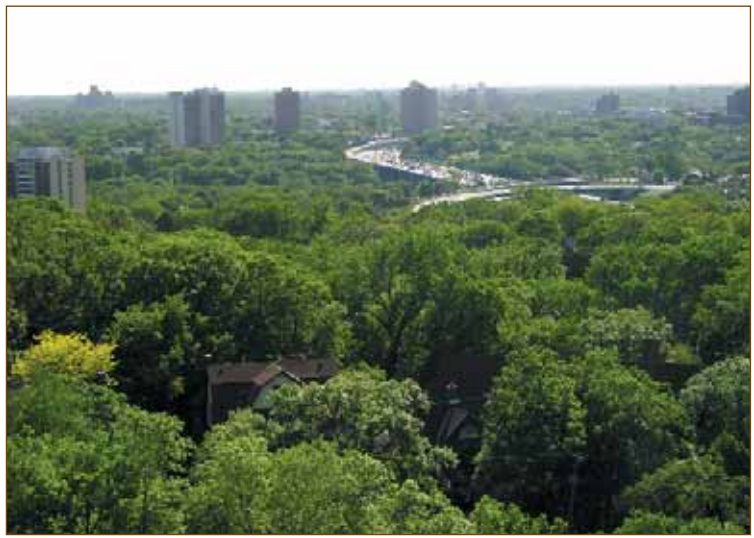
- Maplewood, MN - The Public Works department has installed rain gardens across the city to manage street runoff instead of adding expensive stormwater infrastructure. Go to the Public Works Department web page and click on "Rain Gardens in Maplewood" for maps of where to visit the rain gardens. www.ci.maplewood.mn.us

Community Forests

In section one, tree planting was introduced as a way to minimize and slow down stormwater runoff on a single property. It is also important to look at all the trees as a whole within a community. David Milarch, founder of Champion Tree Project (www.championtrees.org), shares an image that shows the value of community forests.

> *Imagine the most beautiful fish aquarium you have ever seen . . . the colorful fish swimming through the sparkling waters, the green plants swaying with the movement of the water and the stones glowing on the bottom. It's a beauty to behold. Now imagine the same aquarium with 90% of its filtering system blocked. After a few days, the water would become cloudy, the plants would die, the stones would grow algae and the fish would float to the top. It would make you sick just to look at it! Likewise, a beautiful community without its filtering system, the trees, would end up like an aquarium with a blocked filter. And we could be the fish!*

Trees are the air and water filter of a community. Their leaves absorb air pollutants like sulfur dioxide and nitrous oxides and their hair-like roots trap nutrients and other water pollutants. The larger the tree, the greater the benefits. Trees taller than 40 feet provide the best filtering capacity. The healthiest communities are the ones that have a large number of large trees that form an expansive tree canopy throughout the area. Communities that invest, protect and preserve in their community forest will not only benefit in terms of air and water quality, but also in energy conservation, reduced carbon dioxide and increased property values.



Minneapolis tree canopy

Photo - (c) Chris Gregerson
www.cgstock.com

Resources:

- Center for Urban Forest Research - Provides reliable scientific evidence that the benefits of urban forests add real value to communities. http://cufr.ucdavis.edu/
- Human Dimensions of Urban Forestry and Urban Greening - Features research on peoples' perceptions and behaviors regarding nature in cities. www.cfr.washington.edu/research.envmind/
- Minnesota Department of Natural Resources, Guide to Using Natural Resource Information - Natural resource information for local decision making and planning. www.dnr.state.mn.us/nrig/

Water quality starts with you!

Our small, collective efforts can make a big difference in the water quality of the Mississippi River. The river is not going to clean up on its own. We have a responsibility to ensure that the river remains a vital part of our community.

Resources

Must-see Websites: Visit these links for more in-depth information on the concepts presented in this brochure.

- Center for Stormwater Protection www.cwp.org
- Greenworks, Managing Stormwater Videos www.greenworks.tv/stormwater/videotopics.htm
- Minnesota Office of Environmental Assistance Green Building, Site and Water page www.moea.state.mn.us/greenbuilding/site.cfm
- Minnesota Sustainable Design Guide, University of Minnesota www.develop.csbr.umn.edu/msdg2/
- Minnesota Urban Small Sites Best Management Practices Manual www.metrocouncil.org/environment/Watershed/BMP/manual.htm
- Stormwater Manager's Resource Center (SMRC) www.stormwatercenter.net/
- US Environmental Protection Agency, Office of Waters, Mississippi River Basin www.epa.gov/msbasin
- US Environmental Protection Agency, Polluted Runoff (Non-point Source Pollution) www.epa.gov/owow/nps/urban.html

Local River Rats:

- Friends of the Mississippi River www.fmr.org
- Great River Greening www.greatrivergreening.org
- Minneapolis Park and Recreation Board www.minneapolisparks.org
- Minnesota Department of Natural Resources, Mississippi River Critical Area Program www.dnr.state.mn.us/waters/watermgmt_section/critical_area/
- Mississippi Corridor Neighborhood Coalition www.mcnc-mpls.org
- Mississippi National River and Recreation Area www.nps.gov/miss/index.html
- St. Paul Parks and Recreation www.ci.stpaul.mn.us/depts/parks
- The Watershed Partners http://cgee.hamline.edu/watershed/ and www.cleanwatermn.org

Local Stormwater Management Engineering Companies: This list is not comprehensive and does not give endorsement.

- Applied Ecological Services, Inc. www.appliedeco.com
- Barr Engineering www.barr.com
- Emmons & Olivier Resources www.eorinc.com
- HDR Engineering, Inc. www.hdrinc.com
- Hoisington Koegler Group, Inc. www.hkgi.com
- Houston Engineering, Inc. www.houstonengineeringinc.com
- Kestrel Design Group www.kestreldesigngroup.com
- Wenck Associates, Inc. www.wenck.com

Major Metro Area Watershed Groups: These publicly-funded agencies specialize in managing the quality of surface and ground water resources in the metro area.

- Bassett Creet Water Management Commission www.bassettcreekwmo.org
- Capitol Region Watershed District www.capitolregionwd.org
- Lower Minnesota River Watershed District www.watersheddistrict.org
- Minnehaha Creek Watershed District www.minnehahacreek.org
- Mississippi Watershed Management Organization www.mwmo.org
- Ramsey-Washington Metro Watershed District www.rwmwd.org
- Rice Creek Watershed District www.ricecreekwd.com
- Shingle Creek Watershed Management Commission www.shinglecreek.org

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