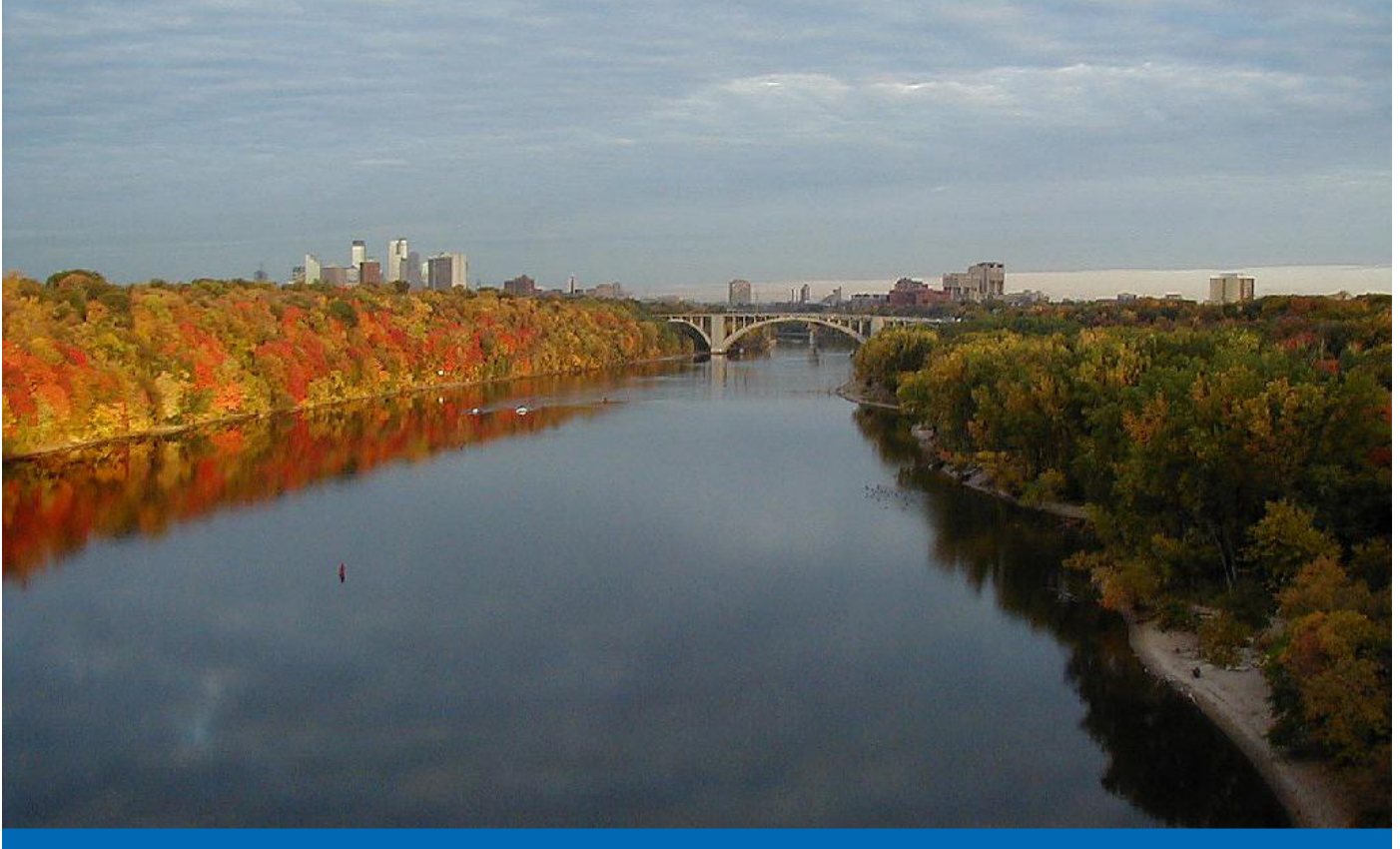


Protecting land and water



Minnesota is known for its abundance of water and natural resources. Hennepin County has a diversity of landscapes and habitats ranging from formal gardens and urban parks to prairies, forests lakes, streams and wetlands. Natural resources provide critical habitat for wildlife, protect water quality, offer recreational opportunities and serve as the foundation to the region's environmental well-being, economic prosperity and collective quality of life. Protecting the health of our natural resources is important for air and water quality, recreation, wildlife and tourism. However, our natural resources are under increasing pressure from population growth, development and climate change.

Steps you can take to protect land and water

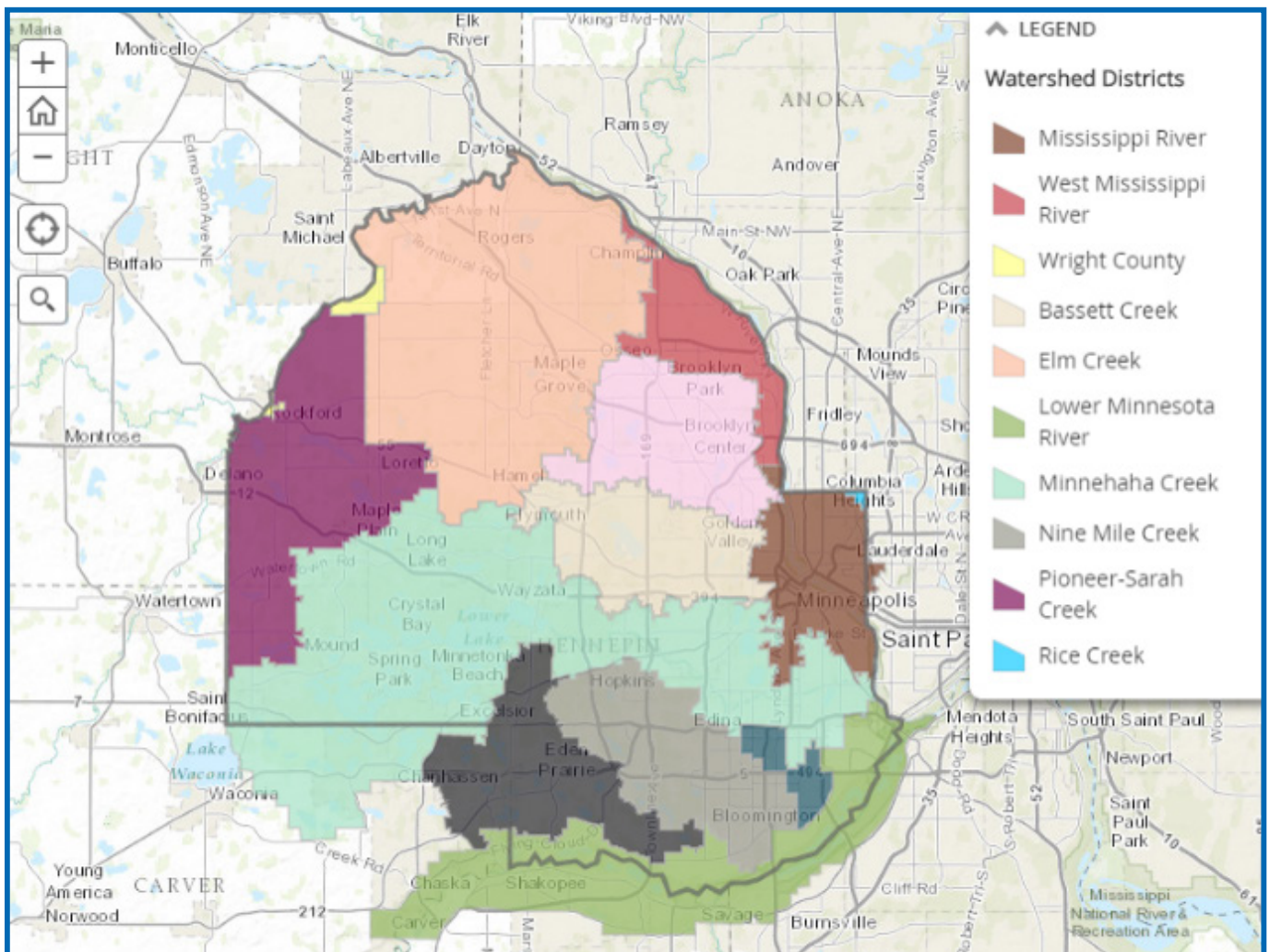
- **Use your runoff.** When it rains, the water that runs off driveways, lawns, houses and parking lots can carry pollutants such as oil, paint and chemicals down storm sewers that drain directly into nearby lakes, streams, rivers, and wetlands. Instead of letting it run off, you can capture rain water to reuse on your lawn and garden by directing your downspouts onto your lawn or garden or into a rain barrel.
- **Keep grass clippings and leaves out of the street.** Grass clippings and leaves in the street can be washed into the storm sewer where they are carried to nearby lakes, streams and wetlands. Clippings and leaves contain phosphorus and other nutrients that, like fertilizer, feed algae and other aquatic plants, contributing to algae blooms. Leave grass clippings and leaves on your lawn, use them in your backyard compost bin, or bag them up and bring them to a compost site.
- **Scoop the poop.** Grab a bag when you grab the leash and pick up after your pets. When waste is left behind, rainwater washes it into lakes and streams. Pet waste contains bacteria that can cause illnesses and nutrients that can contribute to excessive algae growth in lakes and streams.
- **Use chemicals wisely.** Use lawns and garden chemicals according to label directions, and use the minimum amount needed to control the problem. Sweep up any fertilizer or other chemicals that spill onto hard surfaces. Consider alternative or natural remedies to control weeds and pests.
- **Keep a healthy lawn.** Aerate your lawn, seed bare patches and mow at a higher setting. A vigorous lawn needs less watering, fewer chemicals and less maintenance.
- **Plant a rain garden.** Rain gardens are planted depressions designed to capture rainwater and allow it to soak into the soil. Find out more about rain gardens at www.bluethumb.org.
- **Replace turf with native plants.** Many native plants develop deeper root structures than turf grass, which reduces runoff by slowing the flow of water and allowing it to filter into the soil. Native plants can also provide food and habitat for birds, bees, butterflies and other wildlife. Drought-resistant native plants may require less watering than grass.
- **Reduce paved surfaces.** Replace paved surfaces, such as sidewalks, patios and driveways, with porous surfaces that allow water to seep through. Options include pervious pavers, grass strips and gravel.
- **Adopt a storm drain.** Keep storm drains on your street free of leaves, seeds and grass clippings. Storm sewers drain directly into a nearby body of water. Water running into storm drains can carry with it anything dumped nearby including leaves, grass clippings, soil, oil, paint and chemicals.
- **Reduce salt use.** Salt, or sodium chloride, is commonly used on driveways, sidewalks, roadways and parking lots to improve traction and safety. However, too much salt is polluting our lakes and streams – it takes only one teaspoon of road salt to permanently pollute five gallons of water. Reduce salt use by shoveling or using a snow blower, using the right amount of salt, using sand instead of salt when it's too cold (most salts stop working when it's colder than 15°F), and sweeping up any extra.
- **Practice sustainable landscaping.** Practice earth-friendly landscaping in your lawn by utilizing low-maintenance grasses, planting native tree and plant species, or composting food scraps and yard waste.

Know your watershed

A watershed is an area of land that drains to a common lake, river, stream or wetland. Water resources are managed based on their watershed, which allows communities to work together to prevent and solve water-related problems. Watersheds districts and watershed management organizations are special units of local government that regulate land-disturbing activities, perform capital improvement projects and provide environmental education related to water issues.

The watersheds organizations in Hennepin County are:

- Bassett Creek Watershed Management Commission (www.bassettcreekwmo.org)
- Elm Creek Watershed Management Commission (www.elmcreekwatershed.org)
- Lower Minnesota River Watershed District (www.watersheddistrict.org)
- Minnehaha Creek Watershed District (www.minnehahacreek.org)
- Mississippi Watershed Management Organization (www.mwmo.org)
- Nine Mile Creek Watershed District (www.ninemilecreek.org)
- Pioneer-Sarah Creek Watershed Management Commission (www.pioneersarahcreek.org)
- Richfield-Bloomington Watershed Management Organization (www.rbwmo.com)
- Riley Purgatory Bluff Creek Watershed District (www.rpbcwd.org)
- Shingle Creek and West Mississippi Watershed Management Commissions (www.shinglecreek.org)



Resources:

- Hennepin County's Ten Things You Can Do To Improve Minnesota's Lakes, Rivers and Streams brochure

WHERE IN THE WATERSHED?

A watershed is an area that drains to a common waterway, such as a stream, lake, river or wetland. No matter where you live, you live in a watershed! Our individual actions can directly affect the health of water resources. Water resources are managed by either a watershed district or watershed management organization, which are special units of local government that work together to solve and prevent water-related problems. Determining which watershed you live in can help you learn how you get your water and where it goes after you use it.

Outcomes

- Participants will determine which watershed they live in.
- Participants will learn which waterways are connected to their watershed.
- Participants will learn actions to protect water resources.

Audience

Youth (ages 10+), adults

Time

Variable

Concepts

- A watershed is an area that drains to a common waterway such as a stream, lake, river, or wetland.
- Understanding which watershed you live in can help you learn how you get water and what happens after you use it.
- Our actions can directly impact the health of water resources.

Supplies

- Construction paper
- Markers, paints or crayons
- Ruler
- Watershed map from the Appendix



WHERE IN THE WATERSHED?

Preparation

Gather enough supplies by asking participants to bring their own or soliciting supplies a few weeks before doing the activity.

Procedure

- Use the watershed map in the Appendix to identify which watershed each participant lives in.
- Have participants identify the lakes, streams and rivers in your watershed. Analyze how the water resources are connected.
- Have participants think about how the water that falls on the property of your home, school, or organization travels to nearby lakes, streams, rivers and wetlands.
- Read about what individuals and families can do to conserve water and reduce pollution in the Background Section of this chapter. Think about both small and large actions they can take. Some examples:
 - Small: don't rake grass clippings and leaves into the street, clean up after your pets, etc.
 - Large: replace turf with native plants, plant a rain garden, etc.
- Encourage participants to commit to changes they want to make and write these on their watershed picture.
- Display the picture on the refrigerator or another "public" place.
- Make a plan to track the participants' commitments and encourage them to continue to take action to protect water resources.

Discussion questions

- What watershed do you live in? Did you know this prior to the activity?
- Why is it important for participants to know what watershed they live in?
- How can the behavior of people living in one watershed affect the people in another watershed?
- What are other actions you could take to protect water resources? (look at the "10 things you can do to improve Minnesota's lakes, rivers and streams" brochure)

Additional activity ideas

Watershed map

With the watershed map from the Appendix and a set of pushpins, have each participant pin where they live on the map to show which watershed everyone lives in.

Identify where water flows

Walk around your home, school, organization or workplace and identify sources of water and where the water flows on the property. Look for gutters, driveways, sidewalks, grass, gardens and other areas that water might flow through. Then, look for stormdrains or nearby water bodies that water flows into.

Sandbox watershed

Allow children in your program to create hills and mountains in the sand play area. Use a hose with a sprinkler attachment or a watering can to "rain" on

the sandbox. Watch how the water creates rivers and streams through the sand and collects at the lowest point.

Watershed game

The Watershed Game helps students understand connections between land use, clean water and their community. Working in teams, students apply practices, plans, and policies to decrease water pollution while juggling financial resources. Successful teams reduce water pollution without going broke. Hennepin County staff is available to facilitate the watershed game with classrooms or youth and community groups or to train educators in using the game. Contact Stacey Lijewski at stacey.lijewski@hennepin.us or 612-348-9938 for more information.

Resources

Handout: 10 things you can do to improve Minnesota's lakes, rivers and streams brochure

HABITAT ASSESSMENT

Assessing part of an ecosystem can reveal information about land and water and help participants gain confidence and enthusiasm for going outside. Making observations about a habitat site can also help participants discover parts of an ecosystem they might not have noticed before. In this activity, participants will fill out a field data sheet to organize their observations about the several characteristics of their habitat site, including weather, water appearance, water odor, stream surroundings, wildlife, local land use, stream bank and channel conditions.

Outcomes

- Participants will explore part of a habitat site.
- Participants will fill out a field data sheet to organize their observations.
- Participants will draw a sketch of the habitat site.

Audience

Youth (8+), adults

Time

60+ minutes

Concepts

- Assessing part of an ecosystem can reveal information about land and water.
- Getting outside and making observations about a habitat can connect participants to the environment.

Supplies

- Pen or pencil (one per participant)
- Field data sheet available in the Appendix (one per participant)
- Clipboard, notebook or other hard writing surface (one per participant)



HABITAT ASSESSMENT

Preparation

- Select a habitat site to conduct the assessment that is close to the location where the participants will meet. The site could include part of a stream, lake or river, forest, field or other habitat.
- Read over the field data sheet to become familiar with the content before conducting the habitat assessment.
- Print enough copies of the field data sheet for each participant in advance and make sure each participant will have a pen or pencil and clipboard or other hard writing surface.

Procedure

- Gather participants and lead them to the selected habitat site.
- Before handing out the field data sheets, have participants walk around the habitat site for up to five minutes, taking notice of any plants, water and wildlife.
- After the participants make their initial observations about the habitat site, hand out the field data sheets, a pen or pencil and clipboard or other hard writing surface to each participant.
- Have participants fill out the front side of the field data sheet one category at a time, using the checkboxes to write down their observations. If you have a large group, consider breaking participants into partners or teams to complete the field data sheet.
- Next, have participants fill out the back side of the field data sheet by drawing a sketch of the habitat site. Encourage participants to be creative and remember that the sketch does not need to look like an exact replica of the site.
- When all participants have finished filling out the field data sheet, gather the participants to have a discussion using the discussion questions below.

Discussion questions

- What was the most interesting thing you saw during the habitat assessment?
- What surprised you about the habitat assessment?
- What did you notice while filling out the field data sheet that you might not have noticed before?
- What was the most difficult category of the field data sheet? Easiest category?
- How do you think the field data sheet would change for a different type of site?

Additional activity ideas

Volunteer with WHEP

- Hennepin County's Wetland Health Evaluation Program (WHEP), is an environmental monitoring program focused on assessing the condition and health of wetlands. Volunteers obtain water quality data and biological communities to assess the overall health of wetlands. Join a team of other interested citizens who are concerned about wetlands in your area. By volunteering with a WHEP team and attending informational workshops, you will gain skills to help you match your interest and commitment. You can be directly involved in collecting and submitting important, meaningful data to your community leaders. To learn more and sign up for WHEP, visit www.hennepin.us and search: WHEP.

Get youth involved with River Watch

- Hennepin County's River Watch program provides hands-on environmental education opportunities for high school classes and student groups. The program runs from April to August and allows students to assess water quality and learn how actions impact local water sources. Learn more and sign up at www.hennepin.us/riverwatch.

BUY OR BUILD A RAIN BARREL

A rain barrel is a system that collects and stores rain water from your roof that would otherwise run off into storm drains that flow directly into nearby lakes, streams and wetlands. Rain barrels typically hold 50 to 100 gallons of water that can be used on your lawn or garden, saving approximately 1,300 gallons of water during peak summer months. Capturing rain water in a rain barrel reduces runoff that can carry pollutants into streams and rivers. Rain barrels can be purchased at local hardware stores or through special sales organized by government agencies or non-profit organizations. You can also build your own rain barrel. Community groups can purchase the supplies and offer free or low-cost workshops for residents who want to build a rain barrel.

Outcome

Buy or build a rain barrel to capture rain water and reduce runoff.

Audience

Youth (ages 14+), adults

Time

60+ minutes

Concepts

- Collecting rain water in rain barrels can help reduce runoff.
- Rain water runoff can pollute streams and rivers.
- You can buy or build your own rain barrel.

Supplies

- Materials to build your own rain barrel (55-gallon plastic drum, plastic spigots, skimmer basket, window screening, power drill)
- Internet access to get instructions for building a rain barrel.
- Resources to buy your own rain barrel.



BUY OR BUILD A RAIN BARREL

Preparation

Decide if you want to buy or build a rain barrel.

Procedure

- Use the Background Information to have a discussion about rain barrels. How might they fit into your landscape design? What are barriers to buying or building a rain barrel?
- Ask your group if building or buying a rain barrel is feasible. Does buying or building make more sense for your group?
- If your group decides to build rain barrels, go to www.masterwaterstewards.org for instructions.
- If your group decides to buy rain barrels, search for options at your local hardware store, Home Depot, Lowe's, Mills Fleet Farm or specialty rain barrel sellers such as Barrel Depot, Mother Earth Gardens, Cedar Hill Natives, the Recycling Association of Minnesota (RAM) or Minneapolis Rain Barrel.
- To ensure participants commit to using rain barrels, the groups should check-in periodically to share their rain water experiences, lessons learned, etc.

Discussion questions

- What did you learn about rain barrels and rain water runoff?
- How can rain barrels help lower water costs?
- Why is it important to keep water from running off of impervious pavements?
- What types of pollutants can end up in local water sources from rain water runoff?
- What were the largest barriers to installing a rain barrel? How did your group overcome these barriers?
- What are the benefits of using a rain barrel?

RAIN GAUGE MONITORING

Monitoring the amount of rain falling on your yard is a great way to learn about water, specifically precipitation. Rain gauges are inexpensive, easy to install, and can be used to monitor daily precipitation totals. Observing and monitoring precipitation with a rain gauge can help participants understand how much rain falls into their yard and conserve water. Precipitation data gathered from the rain gauge can be reported directly to the State Office of Climatology (www.climate.umn.edu) and is used to develop maps and reports of precipitation trends.

Outcome

Use a rain gauge to monitor the amount of precipitation on your yard and report data.

Audience

Youth (ages 13+), adults

Time

15 - 20 minutes, daily

Concepts

- Learn how to use a rain gauge for monitoring precipitation levels.
- Report daily precipitation totals to the State Office of Climatology.
- Understand water conservation strategies.

Supplies

- Rain gauge
- Computer with internet access to report data



RAIN GAUGE MONITORING

Preparation

- Buy a rain gauge from your local hardware store.
- Create your own rain gauge with an empty can marked in one-inch increments

Procedure

- Install a rain gauge at your home or at your program site.
- Monitor daily precipitation by reading the measurements on the side of the rain gauge.
- Data can be reported directly at with the State Office of Climatology at www.climate.umn.edu through the MNGage program. The data is used to develop maps and reports of precipitation trends.
- Participants can also be part of the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) program program by signing up at www.cocorahs.org. Participants will be able to enter data and see the results immediately.
- Compare measurement results from different locations around the community. Discuss why there might be differences (or similarities) in water levels.
- Think about ways to conserve water and discuss this with your group. Use the information in the background section or the 10 Things You Can Do to Protect Minnesota's Lakes and Streams brochure for ideas.

Discussion questions

- What did you learn from rain gauge monitoring?
- Why is data from rain monitoring important information to report?
- How is precipitation connected to climate change?
- What observations did you make when monitoring the rain gauge? What observations did you make when comparing your rain gauge measurements with those taken from other locations in your community?
- How much water do you think a typical lawn needs each week? A tree? A flower garden?
- How much rain do you think comes off your roof in a one-inch rainfall?

ORGANIZE OR PARTICIPATE IN A RIVER CLEANUP

Non-point source pollution is pollution that can't be traced back to a specific location and is the greatest threat to our waterways today. Organizing or participating in a river cleanup with your group, neighbors, friends or family can help protect the health of water by preventing pollution from many sources such as land runoff, precipitation and more. You can also join the Adopt a River program through the Minnesota Department of Natural Resources. If there isn't a river near you, a stream or lake cleanup also works.

Outcome

Organize or participate a river clean-up to keep polluting trash out of water.

Audience

Youth (ages 5+), adults

Time

1 - 3 hours

Concepts

- Gather neighbors, friends or family to clean-up a section of a river.
- Pick up trash around a river, lake, stream, or wetland.
- Encourage participants to reduce waste to improve water quality.

Supplies

- Trash bags
- Gloves
- Scale (*optional*)



ORGANIZE OR PARTICIPATE IN A RIVER CLEANUP

Preparation

- Set a date, time and location for the river cleanup. Check with city or watershed to see if you need permission to hold a river cleanup or if they have resources available to assist in a river cleanup.
- Freshwater Society offers resources for planning a community cleanup. Find out more at www.freshwater.org/community-clean-ups-for-water-quality. You can also visit the Adopt a River program

website for additional planning assistance. The Adopt a River program through the Minnesota Department of Natural Resources helps groups select a site, provides a How-to kit for organizing a cleanup, and supplies including free bags and gloves. Volunteers are required to commit to conducting an annual cleanup for two consecutive years. For more information, visit www.dnr.state.mn.us/adoptriver/index.html.

Procedure

- After you pick a date, time and location for the river cleanup, coordinate with your group, neighbors, family or friends by inviting them to attend.
- On the day of the cleanup, bring trash bags and gloves to the site.
- Before you go out to pick up trash, discuss why keeping pollutants out of water sources is important. Ask the group why water is important to them and what motivated them to participate in the cleanup.
- Divide the participants into smaller groups if the area is large to cover more ground.
- Consider making the cleanup a contest between smaller groups. Whoever collects the most trash or the weirdest item wins!
- If you have a scale, consider weighing the trash collected after the cleanup. Then you can tell others how many pounds of trash you collected to help keep pollutants out of water resources.

Discussion questions

- What did you learn from organizing or participating in the river cleanup?
- How did you feel after cleaning up the river (or stream or lake)?
- What was challenging about the river cleanup? What was rewarding?
- How can cleaning up the area around the river help improve water quality? What impact can this have on fish and other aquatic wildlife?
- What else do you want to learn about water quality?

ORGANIZE OR PARTICIPATE IN A RIVER CLEANUP

Additional activity ideas

Leaf cleanup

Leaves are one major source of pollution into waterways because they can act like fertilizer in nearby water sources, contributing to algae blooms. Gather friends, family and neighbors for a leaf cleanup to rake, collect, bag and dispose of leaves properly. Find disposal options at www.hennepin.us/yardwaste.

Litter scavenger hunt

- To organize a litter hunt and cleanup near your program site, prepare sturdy gloves for all participants and large trash bags. Consider using recycling bins to collect recyclables that were picked up. You may also want a scale to weigh trash collected, maps of the area and list of scavenger hunt categories for each team (categories could include biggest, smallest, heaviest, weirdest, oldest).
- Talk with participants about how streets connect with local rivers and lakes. Ask participants to brainstorm examples of pollution that could be taken by rain into lakes and rivers via storm sewers. Discuss other materials that can be carried into water sources and why it is a problem.
- Explain that participants are going to go on a litter scavenger hunt and help reduce pollution in the process. Talk about safety issues in picking up trash: wear gloves, don't touch anything sharp, and, if you are working with youth, ask adults if they are unsure if something is safe to pick up.
- Form small teams, pass out gloves, trash bags and scavenger hunt categories on a handout or describe the categories. Set a time limit. An adult should accompany groups of younger children.
- Gather at the end to weigh the trash picked up, sort recyclables and reflect.

Resources

Your watershed district may provide assistance in selecting a site or offer other opportunities to get involved.

MAINTAIN YOUR DRAIN

Runoff from driveways, lawns, houses and parking lots can carry pollutants such as oil, paint and chemicals down storm sewers and into nearby lakes, streams, rivers, and wetlands. Cleaning out storm drains can help keep leaves, grass, litter and other items from getting washed into lakes, streams, rivers, and wetlands. In this activity you will maintain your storm drain by cleaning out the drains and gutters on your street to protect nearby water sources from contaminants.

Outcome

Storm drains are directly connected to water resources, and keeping litter out of drains can prevent water pollution.

Audience

Youth (ages 6+), adults

Time

60 minutes

Concepts

- Storm drains carry pollution directly to nearby bodies of water.
- Cleaning storm drains keep pollution from entering water resources.
- Keeping leaves, grass clippings and other items out of the streets prevents materials from entering storm drains.

Supplies

- Clear plastic bags
- Protective gloves



MAINTAIN YOUR DRAIN

Procedure

- Wearing the protective gloves, have participants collect everything from the storm drain and street in front of your house, school or organization's building during a specific time period. Children should be supervised, wear gloves, and should only pick up what they recognize and know is safe to touch.
- Put the items into clear plastic bags so participants can see the items through the bags.
- Analyze the items found in the gutter and discuss where it might have come from.
- Ask participants if they want to adopt a specific storm drain to keep free of litter or have them make a commitment to keep their own blocks litter-free. Then, share what you are doing and why with your neighbors in the area.

Discussion questions

- Were you surprised by the amount of litter you collected? What was the strangest item you found? The largest?
- How do you think all the litter ends up in the gutters? How could it potentially end up in nearby water sources such as lakes, rivers, streams and wetlands?
- Do you think this activity has an impact? Why or why not?
- How can you encourage your neighbors to make a commitment to keep their yards free of litter?

Additional activity ideas

"This Drains To River!" Mark the Storm Drains

When volunteers mark or stencil a message next to the storm drains in the street, it reminds everyone that whatever goes down the storm drain ends up in the nearest body of water. Visit www.fmr.org/storm-drain-stenciling for storm drain stenciling resources. Storm drain stenciling must be coordinated with city government and your watershed.

WATER WATCH

Water is a shared and limited resource that we rely on every day. On average, a person uses about 80 to 100 gallons of water a day. In Hennepin County, drinking water comes from a variety of sources. Drinking water sources include surface water such as the Mississippi River or other lakes and streams, and ground water that is pulled through wells from pools of water deep underground called aquifers. Some people are supplied water from a city or other public water source, while others get water from private wells located on or near their property. Regardless of where your water comes from, it takes energy to clean the water, transport it to our homes and use it in our daily activities, so we should take steps to reduce water consumption.

Outcome

Participants will learn how much water is used and wasted in everyday activities and will consider how to use less water.

Audience

Youth (ages 6-12), adults

Time

30 minutes

Concepts

- Daily activities can use a lot of water, which is a limited resource.
- By thinking about your activities, you can reduce the amount of water you use.

Supplies

- Empty plastic gallon milk jugs (about five per participant), five-gallon pails, or other physical representation of gallons of water.
- Props representing the activities listed in the table below, or the name of the activity written on a card or piece of paper.
- A larger bucket filled with water to represent the drinking water source for the participants' homes or program site (surface or ground water). A smaller container (1 cup) to represent a gallon of water. *(optional)*

Activity	Suggested prop	Average gallons of water used
Brushing teeth	Toothbrush or toothpaste	2 (with tap running)
Flushing toilet	Toilet paper	2 – 5
Taking a bath or shower	Soap or shampoo	30 – 50
Washing clothes	Detergent	30 – 60
Washing dishes	Soap or dish soap	10 – 20 (by hand or machine)
Watering the yard	Hose or watering can	10 – 15 per minute
Washing the car	Toy car	50 – 100



WATER WATCH

Preparation

Prepare the materials described in the table. Clear a large space for your group to spread out and work in teams.

Procedure

- Have participants research where the drinking water supplied to their homes or program site comes from. Label the larger bucket of water with that drinking source.
- Ask participants to name ways they and their families use water every day. As participants name one of the activities for which you have a prop or sign, give it to the participants. Once all props are given out, have participants with no props join with those who do as team members.
- Have the teams decide how many gallons of water are typically used to accomplish their activity. When ready, each group should put the prop or sign on the ground with the number of milk gallons next to it (if you run out of gallons, participants can write down their guess). Or have the participants fill up their milk jug or container with the number of gallons (represented by the smaller cup or container) that each activity requires.
- Discuss each activity, asking the whole group if the guess is correct, too high or too low. Reveal the actual amounts. Fill your containers with the correct amount of water.
- Ask participants to calculate how much water, on average, they likely use every day based on the amounts listed in the table. People typically use 80 to 100 gallons a day.
- Ask participants to brainstorm actions to reduce water use. Ideas include turning off the tap while brushing teeth or washing dishes, taking a shower instead of a bath, limiting shower time to five minutes or less, only watering the lawn when it's needed, and watering the yard in the early morning or late evening when it's cool outside.

Discussion questions

- What did you learn from participating in water watch?
- How did you feel after calculating water usage?
- What actions can you take to conserve water?
- What else do you want to learn about water?

STORM DRAIN DETECTIVES

To protect land and water, it is important to understand how water flows from roofs, driveways, and lawns and into storm drains and eventually local water sources. Impervious surfaces are those that prevent water from naturally soaking into the ground and include sidewalks, driveways, streets and roofs. Water flows over impervious surfaces and into the sewer system through storm drains, often carrying pollution with it. Pollution can be nutrients from leaves, grass clippings, pet waste or fertilizers, which cause algae growth, dirt that can impact aquatic habitats, bacteria, and trash. Storm drains connect to local water sources such as streams or lakes which can be contaminated with pollution from runoff. There are many ways to prevent water from running off, including permeable pavers, rain gardens, rain barrels and native plants that can infiltrate water. In this activity, participants will search for impervious and permeable surfaces and mark storm drains.

Outcomes

- Participants will learn how rain that runs down storm sewers drains directly into nearby lakes and rivers, taking pollutants and excess nutrients with it.
- Participants will act as detectives scanning the area around your program site for trouble spots and opportunities.

Audience

Youth (ages 8+)

Time

40 – 60 minutes (less time for Part One only)

Concepts

- Our streets connect directly to rivers and lakes.
- Hard (or impervious) surfaces allow rain, also called storm water, to quickly take pollutants from the streets into rivers and lakes.
- Helping water soak into the ground next to houses and other buildings helps prevent water pollution.

Supplies

- Cookie sheet or other hard, flat surface that water can't soak into
- Large bowl (clear glass is ideal), bucket, or other container for water
- Spray bottle of water
- Small bits of paper and other items representing pollution, such as vegetable oil
- Piece of green felt, or a slightly damp sponge or cloth
- Notebooks or paper
- Pens/pencils



STORM DRAIN DETECTIVES

Preparation

Prepare materials. Adult or youth leaders may want to do an initial scan of the area around the program site in preparation for Part Two.

Procedure

Part One

- Ask participants where they think water and any pollutants, leaves and litter go when they flow into a storm drain (sewer) in their street. Explain how our streets connect directly to rivers, lakes, and wetlands via storm drains and a system of underground pipes. Provide participants with information or have them each research what body of water storm drains in the area flow to.
- Demonstrate how rain runs off hard surfaces, carrying litter, leaves, grass clippings and pollutants with it into rivers and lakes.
- Hold a cookie tray (representing hard surfaces like roads, parking lots, roofs, etc.) at an angle over a bowl (representing a body of water such as a lake) and spray with water (representing rain or melting snow). Explain how the rain runs off the hard surface into the “lake” (bowl). Ask participants for examples of hard surfaces that allow water to run off.
- Add “pollution” to the hard surface, such as bits of paper (for litter), vegetable oil (for motor oil) or colored water (lawn chemicals). Repeat the “rain” and watch the pollution run into the lake (bowl).
- Add a piece of green felt or a damp sponge/cloth to the hard surface and repeat the rain, watching the “natural area” absorb some of the rain. Ask participants what the felt or sponge represents (gardens or other areas rain can soak into the ground).

Part Two

- Explain to participants that they are going to be detectives uncovering how rain water gets from the program site to rivers, lakes, or wetlands, looking for trouble spots and opportunities. Take participants outside with notebooks and pens. Ask small teams to investigate a specific area (e.g., the block you are on) and decide:
 1. How does rain water drain off the roofs?
 2. How does rain water then get to the streets?
 3. If it rained today, what kind of pollution would be taken by the rain water into the streets?
 4. Where in the streets does the rain get to the drains (and then to rivers and lakes)?
 5. Does rain water soak into the ground anywhere on its way to way the street?
- Go through the participants’ answers to 1 through 5 above. You could award a prize for the group that identified the most trouble spots and the most opportunities. Ask participants for their ideas for ways to reduce pollution and help more water infiltrate into the ground. Can they implement any of their ideas?



STORM DRAIN DETECTIVES

Discussion questions

- What are some of the streams, rivers or lakes nearby where rain water goes when it goes down the storm sewer? Did you know pollution from the street is washed into these places?
- What is the problem with pollution being washed into lakes and rivers? (It pollutes the water we use for drinking and recreation and negatively impacts plants, fish, birds and other wildlife.)
- Does a lot of rain water soak into the lawn? (More than on pervious surfaces, but most of the water will run over grassy areas because the soil is very compacted and the short roots of most turf grasses do not create channels in the soil for rain to soak into.)
- What can kids and adults do to reduce water pollution? (Some ideas to review include: pick up litter and pollutants, don't sweep leaves and grass clippings into the street, direct downspouts into the lawn or garden, capture rain water in a barrel, replace some turf grass with deeper-rooted plants.)
- What else do you know about pollution that we haven't talked about?
- What did you learn that you want to share with someone else? Who will you share it with?
- What more do you want to learn about?

Additional activity ideas

Brainstorm ideas and conduct research

Pursue ideas that came up during the participants' brainstorm about ways to reduce pollution and help more water infiltrate into the ground. If leaders don't know if the ideas are on-track or feasible, have participants conduct research using the recommended websites at the beginning of this chapter.

Measuring impervious surfaces and volume of water

- Have older youth measure the area of the parking lot or other impervious surface near the program site and calculate the volume of water running off the surface. Detailed instructions can be found at: www.sjrwmd.com/education/lessonplans/allmessedup.html.

INVASIVE TREE PESTS: IDENTIFYING AND MANAGING ASH TREES FOR EMERALD ASH BORER

The biggest current threat to the tree canopy in Hennepin County is emerald ash borer (EAB), an invasive tree pest from Asia that kills ash trees. Although the county's tree canopy is relatively diverse, ash trees make up about 15 percent of the canopy. There are about one million ash trees on maintained areas, such as parks, yards, boulevards and parking lots, in the county, and most residents live within 15 miles of an infested ash tree.

Additionally, Minnesota has the greatest number of ash trees in the U.S. with nearly one billion ash trees in forests and urban areas, and all of Minnesota's native ash species – green, black and white ash – are susceptible to emerald ash borer.

Based on experiences with emerald ash borer in other states, nearly all untreated native ash trees in Hennepin County could be killed within the next 10 to 15 years. In this activity, participants will identify and label ash trees, raise awareness about emerald ash borer with brochures and handouts, and decide what to do with ash trees on their property.

Outcomes

- Participants will learn what an ash tree looks like and identify ash trees.
- Participants will raise awareness about emerald ash borer with brochures and handouts.
- Participants will decide what to do with ash trees on their property.

Audience

Youth (14+), adults

Time

60 minutes+

Concepts

- Emerald ash borer is an invasive tree pest that kills ash trees.
- Nearly all untreated ash trees in Hennepin County could be killed by emerald ash borer within the next 10 to 15 years.
- Most residents in Hennepin County live within 15 miles of an infested ash tree, which means they should figure out now if they have ash trees on their property and how they're going to manage them.
- Educating and raising awareness about emerald ash borer can help people make informed decisions about their ash trees.

Supplies

- Green ribbon
- Hennepin County's Emerald Ash Borer brochure (order at hennepin.us/environmentaleducation under **communication resources and print materials**)
- Hennepin County ash tree id card (hennepin.us/-/media/hennepinus/residents/environment/documents/ash-tree-id-card.pdf)
- Handout: the Ash Tree Identification sheet (<http://msue.anr.msu.edu/uploads/files/e2942.pdf>)
- Handout: the University of Michigan Extension's Signs and Symptoms of the Emerald Ash Borer (emeraldashborer.info/documents/E-2938.pdf)

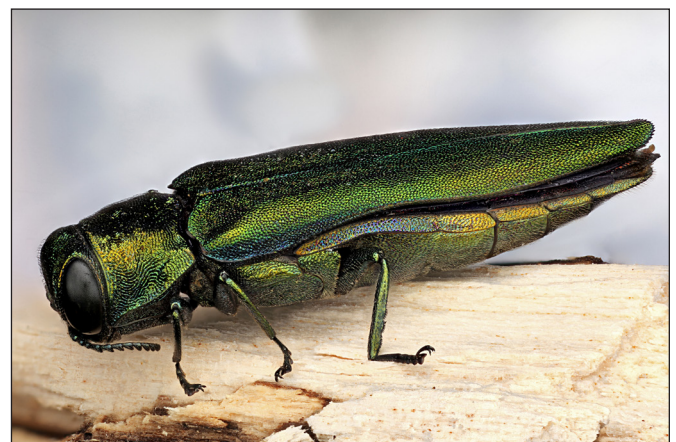


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INVASIVE TREE PESTS: IDENTIFYING AND MANAGING ASH TREES FOR EMERALD ASH BORER

Preparation

- Visit the area where participants are going to identify ash trees to learn ahead of time what trees are and are not ash trees. Consult whoever manages the property or your city forestry department if you're unsure.

Procedure

At a facility/public space

- Have participants read over the Ash Tree Identification sheet to become familiar with the key characteristics of ash trees.
- Using the Ash Tree Identification Sheet as a tool, have participants identify ash trees on the property at your organization, school, workplace, neighborhood, or public park.
- Have participants label the identified ash trees using the green ribbon. Make sure participants have permission from property owners and/or city before labeling trees.
- Have participants check for signs of emerald ash borer using the Signs and Symptoms of the Emerald Ash Borer handout. Participants should look for canopy dieback, sprouts growing from roots and trunk, serpentine galleries, D-shape exit holes, and increased woodpecker activity and damage.
- After participants have identified and labeled ash trees, have a discussion with participants about what will happen to the ash tree identified and why. Will any be treated, or will they all be removed? What is the plan for removal, and is there a plan to plant trees to replace the ones removed? Why or why not?

At their homes

- Have participants read over the Ash Tree Identification sheet to become familiar with the key characteristics of ash trees. If time permits, have participants look around their property to see if they have ash trees. Optionally, participants could share photos of ash trees they have on their property and what significance the trees holds for them.
- Use the decision tree and offer some guidance (https://extension.entm.purdue.edu/EAB/PDF/NABB_DecisionGuide.pdf)
- Options they have for managing ash trees on their property include treatment, removal and disposal, and replanting. Learn more about these options at hennepin.us/ashtrees.

Discussion questions

- How many ash trees did you find during the identification? How easy or difficult was it to identify ash trees?
- Did you spot any trees with signs or symptoms of EAB? If so, how many?
- What were common signs of EAB? Why?
- What are going to do with the ash trees you found (preserve through treatment, remove and dispose, replant)?
- Why is EAB such a big issue in Minnesota?
- What do you think the impact of losing ash trees will be - on you personally and on the community?

Resources

- Hennepin County ash trees and emerald ash borer website: hennepin.us/ashtrees