

SALT LAKE COUNTY STORMWATER COALITION

2021 WATER QUALITY STUDENT ACTIVITY GUIDE

Hi, I'm Droplet!

It's my job to make sure that you know about stormwater and the many things you can do to keep our stormwater clean and to help your family to do the same.

Here are some questions that you may have, and answers that may help you to become a stormwater champion.

Q: What is stormwater?

A: Stormwater is water from rain, hail, sleet and snow melt. Once water hits the ground from a storm, it becomes stormwater.

Q: Does stormwater go to the water treatment facility to get clean?

A: No. Stormwater either sinks into the lawn, gardens and other ground surfaces that can absorb water. Other stormwater lands on the streets, sidewalks, rooftops and other hard surfaces and runs off, picking up whatever is in its path (leaves, cut grasses, fertilizers, garbage, oil, and other pollutants) - eventually flowing to the gutters and storm drains, and then, untreated, to our streams, rivers and lakes.

Q: Is there anything I can do to help to keep our stormwater clean?

A: Yes! There are many things that young people can do to help! Here is a shot list, but you can think of others - and be sure to get your family and friends on board!

- Pick up any garbage you see on the ground
- Pick up pet waste and dispose in the garbage can
- Use reusable water bottles
- Recycle - everything!
- Ask about the hazardous waste items that the adults you know use and how they are disposed. These might include chemicals used and cleaners, fertilizers and pesticides. They also might include paint, used motor oil or antifreeze. Ask the adults to dispose of these properly, and if they aren't sure where, they can check on the internet or ask the Salt Lake County Health Department at: <https://nc-cleanwater.com/category/kids/> or call 385-468-4100

I hope you have a great time keeping the stormwater clean, and that you have a beautiful, clean planet to live on as you grow! I'm looking forward to seeing you in the streams, rivers and lakes this spring!

Your friend, *Droplet*



We All Live in a Watershed

What is a watershed?

A watershed, also called a drainage basin, is an area of land from which all water drains to a common waterway, such as a river, a lake or the ocean.

As rainwater and melting snow run downhill, they carry soil, pollutants and other materials from the land into our rivers, lakes and bays.

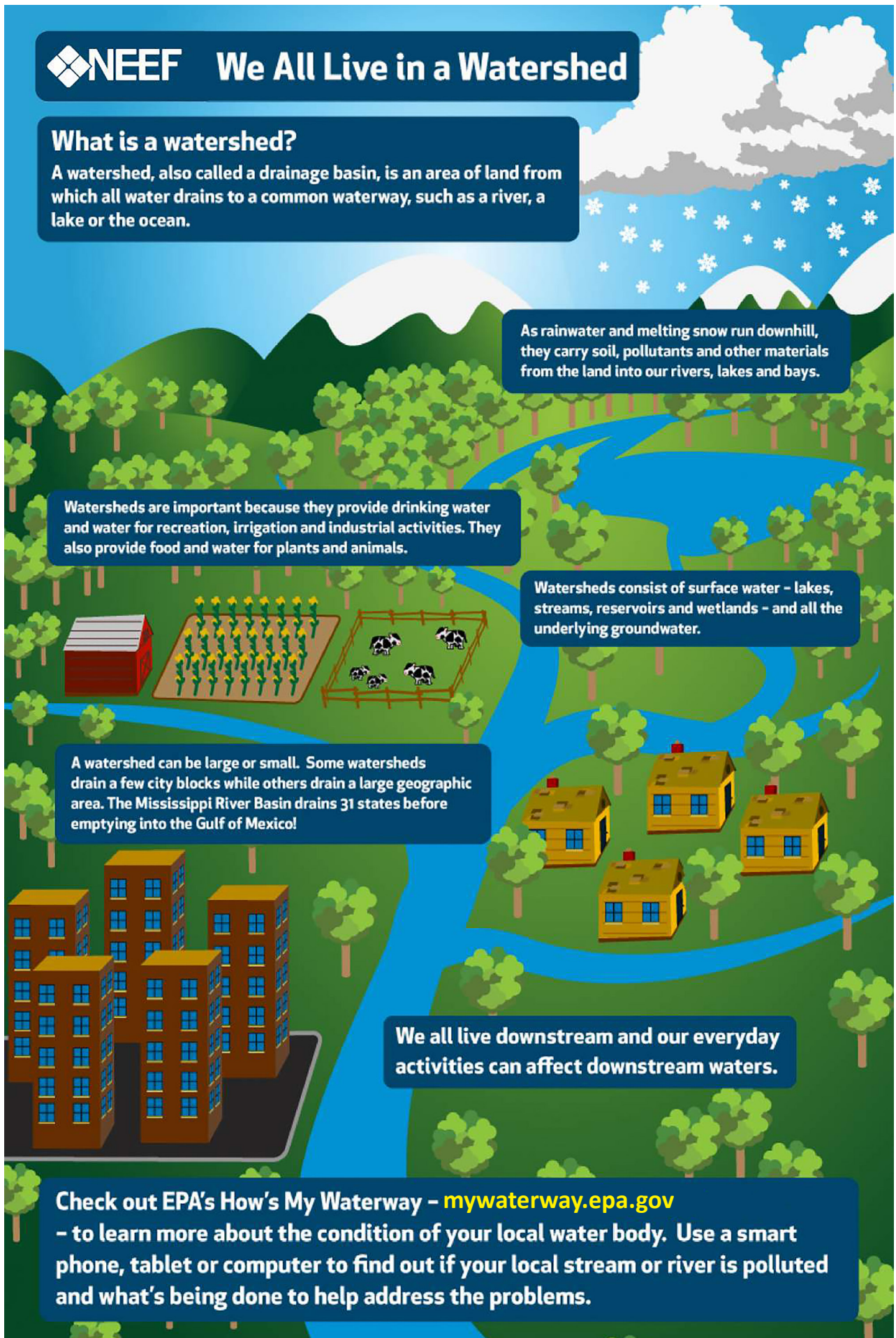
Watersheds are important because they provide drinking water and water for recreation, irrigation and industrial activities. They also provide food and water for plants and animals.

Watersheds consist of surface water – lakes, streams, reservoirs and wetlands – and all the underlying groundwater.

A watershed can be large or small. Some watersheds drain a few city blocks while others drain a large geographic area. The Mississippi River Basin drains 31 states before emptying into the Gulf of Mexico!

We all live downstream and our everyday activities can affect downstream waters.

Check out EPA's How's My Waterway – mywaterway.epa.gov – to learn more about the condition of your local water body. Use a smart phone, tablet or computer to find out if your local stream or river is polluted and what's being done to help address the problems.


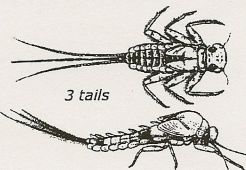
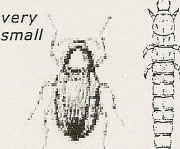
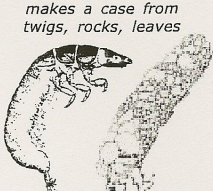




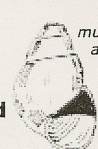
MACROINVERTEBRATES

Macroinvertebrates are small aquatic animals and the aquatic larval stages of insects. They include dragonfly and stonefly larvae, snails, worms, and beetles. They lack a backbone, are visible without the aid of a microscope and are found in and around water bodies during some period of their lives. Macroinvertebrates are often found attached to rocks, vegetation, logs and sticks or burrowed into the bottom sand and sediments.

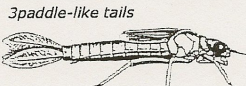
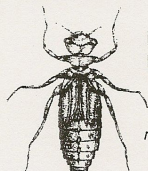
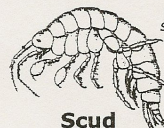
Macroinvertebrate Identification Key




GROUP 1 – Very Intolerant of Pollution

 Stonefly Nymph	 Mayfly Nymph	 Riffle Beetle Adult & Larva	 Caddisfly Larva
<i>2 tails</i>	<i>3 tails</i>	<i>very small</i>	<i>makes a case from twigs, rocks, leaves</i>




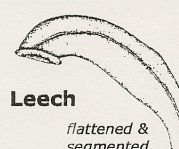
 Dobsonfly Larva	 Water Penny Larva	 Right-Handed Snail
<i>large head & 2 pinchers</i>	<i>top</i> <i>bottom</i> <i>looks like a suction cup</i>	<i>must be alive</i>

GROUP 2 – Moderately Intolerant of Pollution

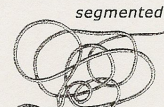


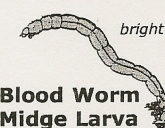
 Damselfly Nymph	 Dragonfly Nymph	 Scud
<i>3paddle-like tails</i>	<i>no tails</i>	<i>flattened side-ways & swims on side</i>

 Sowbug	 Cranefly	 Clam/Mussel
<i>flattened top to bottom (looks like a pill bug)</i>	<i>caterpillar-shaped, ringed</i>	<i>must be alive</i>

GROUP 3 – Fairly Tolerant of Pollution

 Midge Larva	 Planaria	 Black Fly Larva	 Leech
<i>visible head & prolegs</i>	<i>2 eye spots & very small</i>	<i>one end is swollen</i>	<i>flattened & segmented</i>

GROUP 4 – Very Tolerant of Pollution

 Aquatic Worms	 Left-Handed Snail	 Rat-tailed Maggot	 Blood Worm Midge Larva
<i>segmented</i>	<i>must be alive</i>		<i>bright red</i>

100 www.HoosierRiverwatch.com

Evaluating the abundance and variety of macroinvertebrates in a waterbody gives us an indication of the biological condition of that waterbody. Generally, healthy waterbodies support a wide variety and high number of macroinvertebrates, including many that are intolerant of pollution. Samples yielding only pollution-tolerant species or very little diversity or abundance may indicate a less healthy waterbody. When a waterbody is healthy, the chemical and physical components of the waterbody are also typically in good condition.

STORMWATER SOLUTIONS

Stormwater runoff happens when rain falls on any hard surface where it cannot soak in to the ground. Areas with soil and plants do not have much runoff because a lot of the rainwater soaks into the ground (infiltrates). Surfaces that are hard or made of concrete have a lot of runoff because the water cannot soak in. Trees, shrubs, and planted areas help rainwater soak into the ground.

Take a walk around your school or home. While walking, observe and record things that can affect the amount of stormwater runoff, such as hard surfaces, planted areas, downspouts and more. Use the activities on the following pages to collect the data. Then use the data to grade your home or school. When finished, explore ways that would help slow down stormwater so more can soak in and less will run off.

Step 1. Create a Tally

As you walk around your house or school keep track of how many trees, gardens and flower beds and storm drains you see on the property. Use the table below to keep track of what you observe.

How Many...	Tally	Number
Trees		
Gardens, Shrubs or Flowerbeds		
Storm Drains		

Step 2. Take a Downspout Survey

Do you know what a downspout is? A downspout (or roof gutter) takes the water that comes off of a roof and directs the water away from the building. Some downspouts direct water onto the grass, plants, mulch, or rocks. This practice slows water runoff, giving it a chance to soak into the ground. Some downspouts direct water onto driveways, sidewalks or the street. These areas move water quickly away from a building and off of a property. Downspouts also prevent buildings from flooding. Some downspouts that take water directly to a storm drain, stream, or lake.

How many downspouts direct water to...	Tally	Number
Grass or planted areas?		(A)
Mulch or rocked areas?		(B)
Bare dirt, driveways, sidewalks or the street?		(C)
To a storm drain, gutter or stream?		(D)
How many downspouts does your house or school have in total? (A+B+C+D)		(E)



Step 3. Score your Home or School

Using the data collected on your stormwater walk, fill in the blank for each of the following questions. Then circle the number of points that go with the answer.

- How many downspouts are directed onto grass, plants, mulch or rocks? _____ (A+B)
 More than 3 (10 points): 2 (5 points): 1 (3 points): 0 (0 points)
- What share of the downspouts point onto driveways, sidewalks, gutters, etc.? _____ (C+D)
 More than 3 (5 points): 2 (3 points): 1 (1 point): 0 (0 points)
- What is the total number of downspouts? _____ (E)
 More than 5 (10 points): 3 to 5 (5 points): 1 or 2 (3 points): 0 (0 points)

Use the information in the tree, garden and storm drain tally above to record:

- How many trees did you count? _____
 More than 5 (10 points): 3 to 5 (5 points): 1 or 2 (3 points): 0 (0 points)
- How many gardens and shrub or flower beds did you count? _____
 More than 5 (10 points): 3 to 5 (5 points): 1 or 2 (3 points): 0 (0 points)
- How many storm drains did you count? _____
 More than 5 (10 points): 3 to 5 (5 points): 1 or 2 (3 points): 0 (0 points)
- BONUS:** Do the storm drains near your home or school have a label saying what they are or where the water goes?
 They all do: 10 points At least half of them do: 5 points
 Less than half of them but at least one does: 2 points None: 0 points

What's the score?

Total up all the points from the questions above to find the score for your home or school.

45 or above = GREAT! 30-44 = Average Below 30 = Needs work

POOP! WHY DO WE CARE?

Dog poop is a major contributor to stormwater pollution. Rain and melting snow runs across yards, dog parks, and trails on its way to creeks via our streets and storm drains. Dog poop contains bacteria and is high in nitrogen and phosphorus, which are nutrients that negatively affect our waters.

The Impact

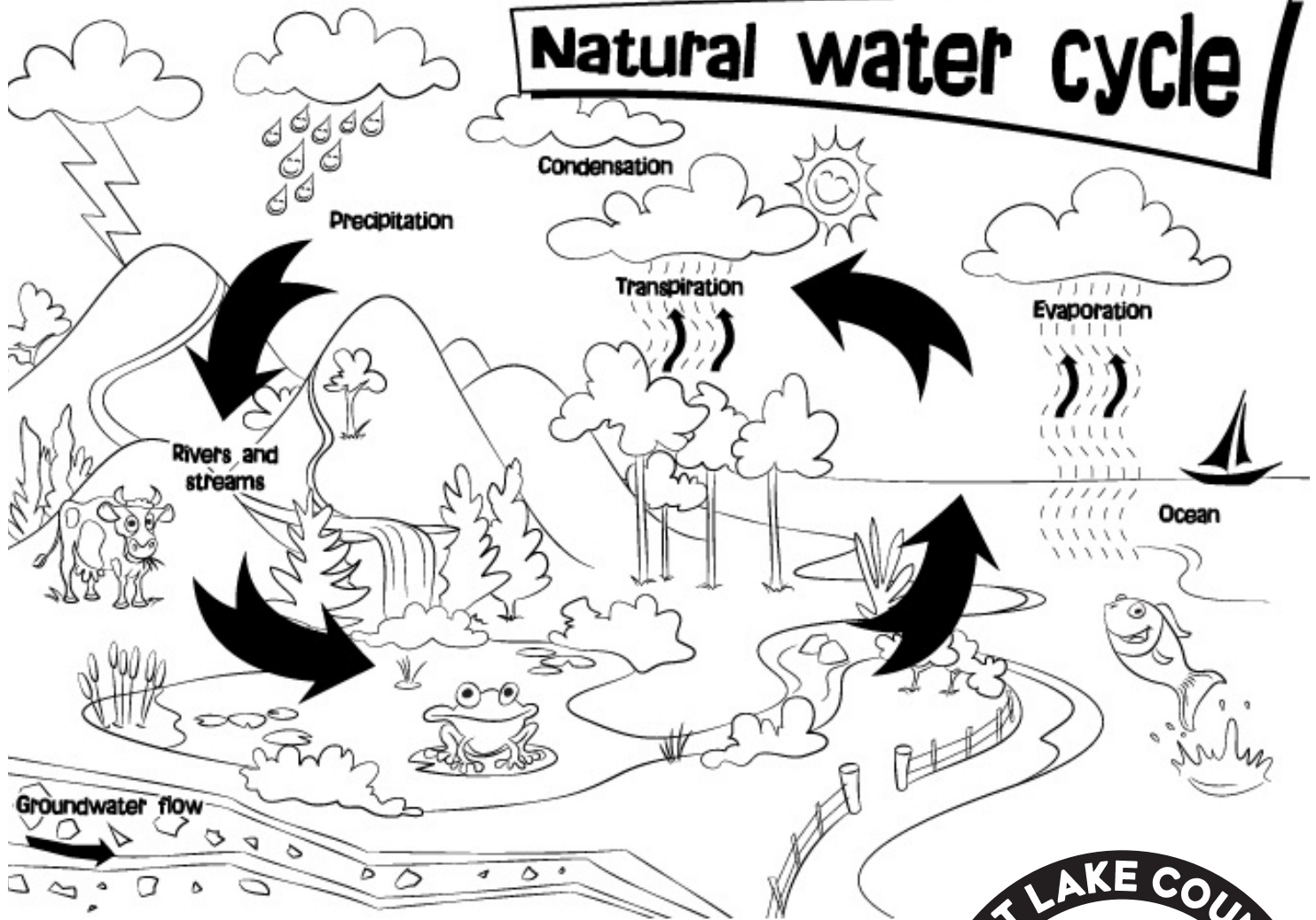
Pets and urban wildlife are major sources of contamination because pet waste contains harmful bacteria and parasites. Just one gram of dog feces can contain 24,000,000 fecal coliform bacteria, which can spread diseases like E.coli, Giardia, Salmonella, and Campylobacteria, causing serious illness in humans. Data show that pet waste and in particular dog waste is a significant source of E.coli and other potentially health harming bacteria in Salt Lake County streams, rivers, and lakes.

You Can Make a Difference

You can make a difference by being a responsible pet owner. Be prepared. When walking your dog, carry bags with you to pick up pet waste. It's a good idea to carry a few extras with you in case you meet someone in need. Collect your pet's poop in a bag and deposit it in a trash can. Do NOT leave bags on the ground in parks, on sidewalks, streets, or on the side of trails. Routinely pick up your pet's waste at home so you are not contributing to decreased downstream water quality. To learn more, visit stormwatercoalition.org or <https://slco.org/watershed/stream-friendly-practices/the-real-scoop-on-dog-poop/> and remember to scoop the poop-every time!



Natural water cycle



SOLAR ENERGY

Energy provided by the sun for the never-ending water cycle.

EVAPORATION

Vapor created when the sun heats water in the lakes , streams, rivers and oceans.

TRANSPIRATION

Vapor created when plants and trees give off moisture.

CONDENSATION

Tiny droplets of water formed when water vapor rises into the air and cools.

PRECIPITATION

Moisture released when clouds become heavy and form rain, snow, and hail.

PERCOLATION

Movement of water through the ground.



THE TROUBLE WITH NITROGEN AND PHOSPHORUS

Nutrients are elements needed for animals and plants to grow. The two most common nutrients found in water are nitrogen and phosphorus. The downside is that too much nitrogen and phosphorus can cause algae to grow and can turn the water green. The major sources of these nutrients in runoff is fertilizers from farms and lawns, animal waste, sewage treatment plants, and septic systems. Farmers, homeowners, cities, and towns are all working to reduce the amount of nutrients that get into rivers and streams.

Utah Lake Seems to Keep Changing. What's Going On?

Utah Lake's appearance changes noticeably over the summer. Dark green mats of *Lyngbya Wollei* flourish on the shoreline, along with several green algal and blue-green cyanobacteria blooms. This lake is responding to a nutrient overload in a phenomenon known as eutrophication. Eutrophication causes biological and physical changes in a waterbody, including: water turning green or turquoise from floating algae, algal mats forming along the shoreline, decaying vegetation, scum, foam, and oily slicks forming on the surface. Dissolved oxygen levels fall, which causes some fish to die. In significant quantities, large blooms can be toxic to animals and humans.

What Could Cause the Nutrient Overload or Eutrophication?

Eutrophication is usually related to excess nitrogen and phosphorus from stormwater runoff. In other urban settings, it might be from a combination of over fertilization of lawns and gardens, improperly disposed pet waste, sewage spills, nitrogen-rich grass clippings discharged into the lake, goose and duck feces deposited in or near the water, polluted rainwater containing nitrogen and phosphates that run into the lake, and disturbance of bottom sediments releasing bound nutrients. Confidence is high that the primary nitrogen source was urea used for snow/ice melt on institute roads and sidewalks. Changes in weather conditions across the west have also increased the number of algal blooms in Utah.

NUTRIENT POLLUTION

IMPACTS ON THE NATION

Nutrient Pollution is one of America's most serious water pollution issues today. Limiting nutrient pollution will protect people's health, support the economy, and keep America's waters safe for swimming and fishing.



www.epa.gov/NutrientPollution

Where does nutrient pollution come from?

Fossil Fuels

250 million cars and trucks in the US release more than 7 million tons of nitrogen oxides into the atmosphere, contributing to pollution in air and water



Agriculture

Animal manure, excess fertilizer applied to crops and fields, and soil erosion make agriculture a large source of nutrient pollution

Livestock production generates close to **1 BILLION TONS** of manure



From 1964 to 2008, agricultural fertilizer use increased by **25%**

Urban Sources

About 10% of the nutrients flowing from the Gulf of Mexico come from urban stormwater and wastewater/sewage treatment plants



Industry

In 2010, **592** industrial facilities released **100,000** tons of nitrate compounds, equal to **3,000** full railroad cars



RAIN GARDENS

Imagine the day after a big storm walking home from school or running around the playground, and avoiding -- or jumping through- all the puddles left over from yesterday. When it rains or when the snow melts on grass fields, forests, and gardens full of flowers, the water seeps into the soil, where it can be absorbed by the roots of the plants.

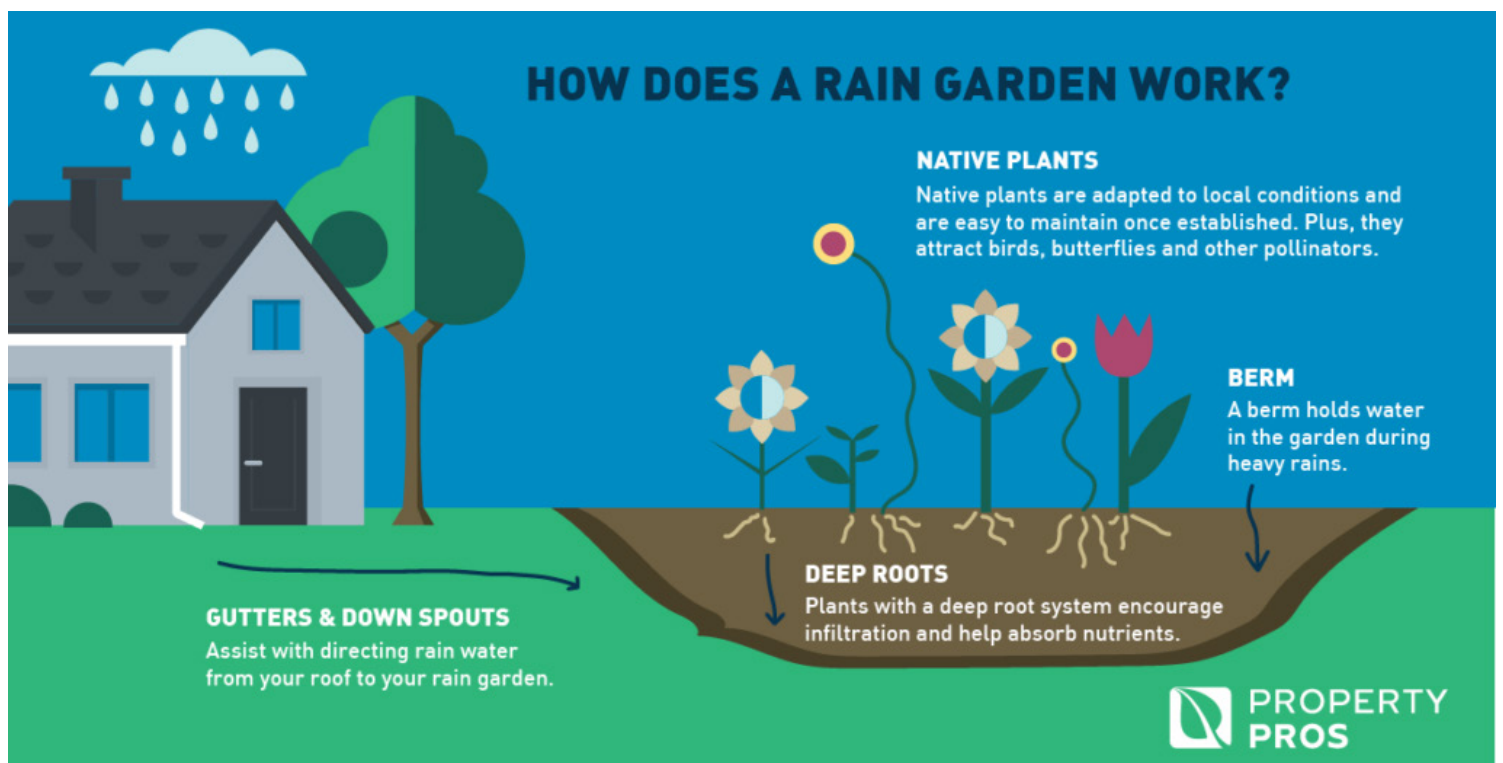
But what about sidewalks, roads, parking lots, and roofs? On those surfaces none of the water gets absorbed. And most of the rainwater does not become puddles. Instead , it runs down drains, cascades over sidewalks and roads, and sometimes overflows sewers and into nearby creeks, streams, or lakes, even far downstream. That can be a big problem for the health of our waterways.

The creation of a rain garden-- a kind of “green infrastructure” can help rain have additional space to soak into the ground. Rain gardens are usually planted at the edges of parking lots, driveways, or sidewalks. They capture runoff and allow it to seep into the ground. Instead of dirty runoff reaching the storm drain, you get flowers!

Building a rain garden is a fun way to help keep your waterways healthy and learn about the water cycle!

How to Build a Rain Garden

1. Find a suitable location for your garden. Whether you're building your garden at home or at school, there are a few things to keep in mind when choosing the location. Look for areas where there are no natural dips and make sure it is located at least 10 feet from a house or building.
2. Figure out the best size for your rain garden. Don't worry too much about this though- big or small, every little bit helps.
3. Plan and then stake out the garden area.
4. Dig out the garden area to the desired depth. A good range is 4-8 inches to allow water to be captured, but it will also dry between rain events.
5. You're ready to plant! It's best to choose native plants because they generally require the least care. You'll have to water them for the first few weeks and after that they will be able to mostly take care of themselves (and your extra rain!)

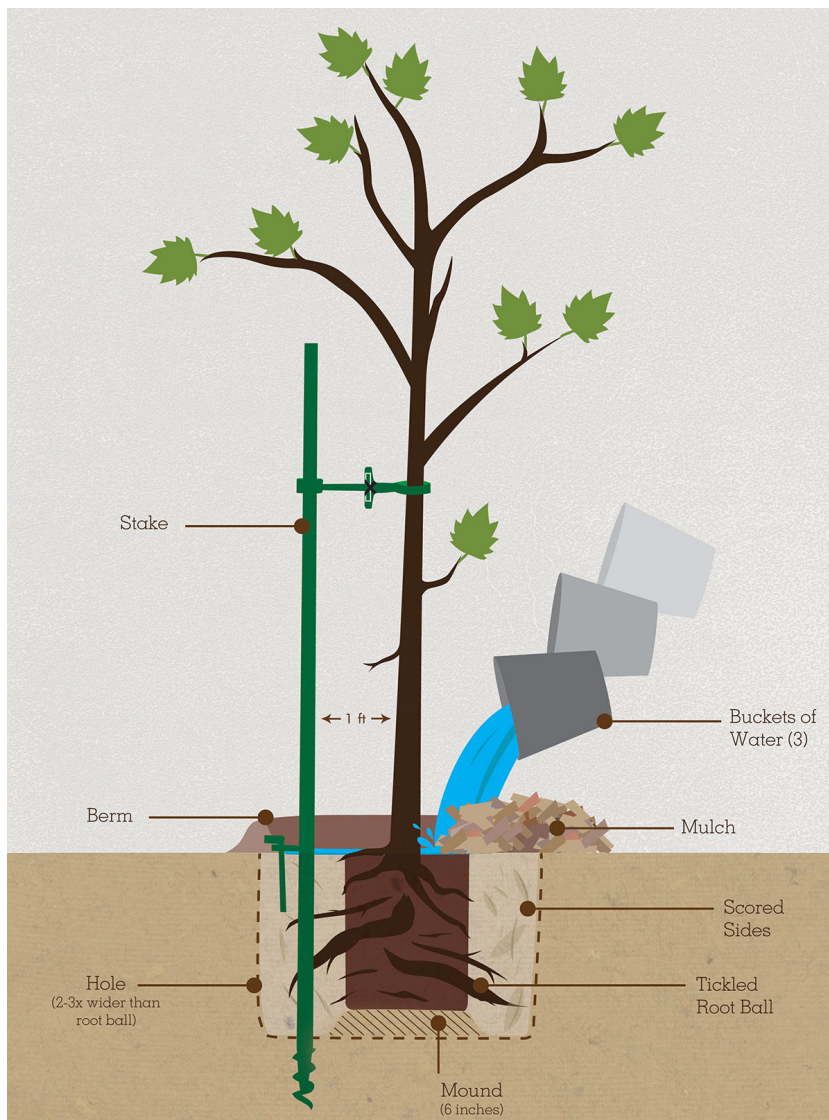


PLANT A TREE

Mature trees provide significant stormwater quantity and slow down runoff through soil storage, interception, and evapotranspiration (rain that evaporates before it hits the ground). A tree with a 25-foot diameter canopy can manage 1-inch of rainfall over a 2,400 square foot impervious surface. Interception and evapotranspiration also decrease runoff volume with larger trees providing exponentially more benefit than smaller trees. Trees have the ability to reduce stormwater that would normally flow directly into a city's storm sewer system. In addition, trees:

- Improve water quality by filtering pollutants
- Reduce effective impervious area
- Promote infiltration to the groundwater table
- Reduce urban heat island effect
- Improve air quality
- Reduce energy usage
- Increase tree canopy and tree species diversity Provide habitat
- Increase aesthetics city-wide

What are you waiting for? Go plant a tree!



STEP 1: Dig a planting hole 24" wide x 18" deep. Dig a mulch ring 6' wide by 4' deep. Remove and dispose of turf, weeds and rocks. Save the extra soil. Put soil on a tarp to keep your yard tidy.

STEP 2: Mix compost and manure with existing soil.

STEP 3: Put tree in hole - make sure roots aren't bent or twisted. Make sure root flare is even with surrounding ground. Sprinkle the roots with water and sprinkle root stimulant grains on the roots.

STEP 4: Shovel soil mix around the tree. Don't hit roots with the shovel. Firmly press in place with your hand or shoe. Continue filling hole and gently compacting in layers. Fill hole to be level with surrounding ground.

STEP 5: Water to soak all soil. Stop watering when puddles form. Add soil if area has sunk.

STEP 6: Place mulch in ring area, leaving a 6" diameter ring around the trunk bare. Water mulch until wet. Step around the mulch area and root area to gently compact soil and ensure the tree trunk is straight up.

STEP 7: Water to soak all soil. Stop watering when puddles form. Add soil if area has sunk.

STEP 8: Put the watering bag around the trunk and fill weekly.

CLEAN STORMWATER DEPENDS ON EACH OF US DOING OUR PART.

Everyone in your family can help keep stormwater clean!



Pet Waste

Bag and trash or flush it down the toilet.



Debris

Sweep dirt into the lawn, pick-up debris and put in trash.



Lawn Care

Mulch grass clippings and leaves, leave on lawn, or compost.



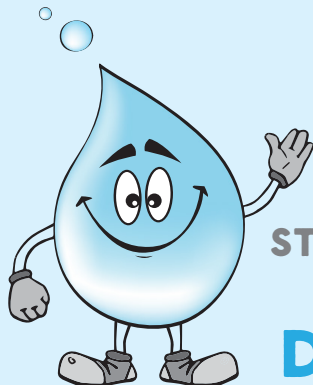
Vehicle Maintenance

Pour waste oil into unbreakable container, seal, label, and recycle. Wash car on the lawn or at a commercial car wash.



Household Chemicals

Target fertilizers and pesticides to the lawn & garden. Take excess chemicals to household hazardous waste facility.



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DOWNSTREAM**

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