

Watershed Walk



In a Nutshell



Students explore the movement of water through the earth's systems, explore the Minnesota River watershed, and participate in an interactive story to uncover how their actions may affect the local watershed. Students discover how refuge managers lessen the negative impacts to people and wildlife by controlling water movement and maintaining wetlands.

Grades 4 and 5
Season Spring & Fall
Location Visitor Center

Literature Connections

The Wonder of Water by Mary Hoff, MN Conservation Volunteer Magazine

A Most Amazing River by Mary Hoff, MN Conservation Volunteer Magazine

The Snowflake: A Water Cycle Story by Neil Waldman

The Wartville Wizard by Don Madden

The Last River Rat: Kenny Salwey's Life in the Wild by J. Scott Bestul

Tales of a River Rat by Kenny Salwey

Trout Are Made of Trees by April Pulley Sayre

River by Debby Atwell

This is the Rain by Jane Wattenberg

Pre-Activities

Project WET *The Incredible Journey* (upper elementary), students travel through the water cycle as a water droplet. After their journey, students chronicle their adventure through a poem, a journal entry, or a story.

On-site Activities

Students build a watershed to understand how water travels across the land. They then explore the Minnesota River watershed hiking

Minnesota Valley National Wildlife Refuge

3825 American Blvd E Bloomington, MN 55425

15865 Rapids Lake Rd Carver, MN 55325



Minnesota Valley National Wildlife Refuge

to complete the Water Cycle Scavenger Hunt. Wrapping up the fieldtrip with the interactive story *Who Polluted the Minnesota River?*, students discover many negative impacts of human activities on river quality. They then identify environmentally responsible behaviors that can lessen the effects of wetland, wildlife, and people.

Classroom Connections

Select any of the following Project WET activities:

Branching Out! (middle school) students build a model landscape to investigate how water flows through a watershed and connects watersheds.

Just Passing Through (upper elementary, middle school) students investigate the effect of vegetation plays on the movement of water over land surfaces. This activity will encourage students to compare the rates of water flow down slope with and without plant cover, and identify Best Management Practices to use to reduce soil erosion.

Write an *Autobiography of a Water Droplet* using the results from the pre-activity *Incredible Journey* or the refuge hike. Create a classroom book of water droplet stories.

Teacher Resources

[Watersheds: A Practical Handbook for Healthy Water](#) by Clive Dobson & Gregor Gilpin Beck

[The Wonder of Water](#) by Mary Hoff, MN Conservation Volunteer Magazine, Teacher's Guide

http://www.dnr.state.mn.us/young_naturalists/teachersguides

[A Most Amazing River](#) by Mary Hoff, MN Conservation Volunteer Magazine Teacher's Guide

http://www.dnr.state.mn.us/young_naturalists/teachersguides

Education Kits and Other Resources*

- Enviroscope Watershed Kit
- Wetlands Educational Trunk

*Reservations for these items are done through the Refuge Library.

Minnesota Valley National Wildlife Refuge
3825 American Blvd E Bloomington, MN 55425 25865 Rapids Lake Rd Carver, MN 55325



Watershed Walk Pre-Visit Activities

Materials

- 9 station labels
- 9 station dice
- Clipboards (1 per student)
- Datasheet (1 per student)
- Pencils (1 per student)
- Bird call
- Water cycle poster

Introduction

Follow the Project WET activity, The Incredible Journey (page 161) with the following adjustments:

To introduce the activity, follow the warm up discussion from the lesson. Discuss how water travels around the earth through the water cycle, using the poster to illustrate.

#2. Before starting the program, tape the station signs around the classroom for easy transition from station to station.

#5. Ask students to move individually from one station to another throughout the whole activity.

#7. Instruct students to use the data sheet for recording their rotations.

#8. Use a bird call to begin and end the activity.

Wrap-Up

Ask students to begin a creative story that chronicles their travels as a water droplet. Give examples of what you want the stories to include:

- The states of water they change into. From a solid to a gas or a liquid to a solid. Did they change from a liquid to a vapor rising to

Minnesota Valley National Wildlife Refuge

the clouds? Did they change from a drop of liquid to a solid as they moved through the cold winter sky?

- The action of change; evaporate, melt, freeze, thaw, vaporize, etc. Did they evaporate from a leaf? Did they melt, drop by drop, from an icicle on a warm winter day? What caused them to move? Were they eaten while in a plant, slurped up by a deer, or left behind by a bear?
- Adjectives that show how they felt as they moved. Adverbs to describe the movement. Were they ever bored being stuck in a glacier? Did they explode from the clouds during a violent thunderstorm? Did they shiver as they floated to the ground during the first snowfall.

If there is not enough time for students to complete the stories ask teachers to give them additional time to complete them before their fieldtrip. Students should vote for the story they like the best, bring the winner to the fieldtrip to be read during the fieldtrip Introduction.

Explain to the students that during their refuge fieldtrip, among other things, they will hike along the Minnesota River discovering how water moves through the refuge watershed.

Minnesota Valley National Wildlife Refuge

The Incredible Journey

Place an "X" at the station you travel to or stay at for each roll of the dice. At the end, add the total number of times you were at each station.

Roll of Dice	Clouds	Plants	Animals	Rivers	Oceans	Lakes	Glaciers	Ground Water	Soil
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
TOTAL									

Watershed Walk

On-site Activities

Materials

Introduction and Shower on the Land Demonstration

- Shower Curtains- 2
- Watering Can filled with water
- Assortment of different sizes plastic buckets or flower posts
- Posters: *Minnesota River Watershed, How Does Your Watershed Flow?, Tree Silhouette*

Who Polluted the Minnesota River?

- Who Polluted the Minnesota River? Kit

For a group of 16 students or less:

One clear bowl/bucket half full of water
One set of pre-labeled and pre-filled canisters
Story master to be read aloud
Roll of paper towel

For a group of 17-32 students:

Two clear bowls/buckets half full of water
Two sets of canisters
Story master to be read aloud
Roll of paper towel

- Set of river clean-up tools for Extension (forceps, paper filters, cotton balls)

Watershed Hike

- Clipboards, pencils and Water Cycle Scavenger Hunt page for each student or team of two students.
- One ziplock baggie per hike leader

Introduction

Outside (30 minutes)

Gather students first in the classroom for a welcome, orientation and discussion of the plan for the day. If the class brought a winning water cycle story invite the author to read it aloud to the class. Award the winner a water related prize for their work and creativity.* Briefly review what students learned from playing the Incredible Journey.

**Before you leave, please turn in the winning story at the Visitor Information Desk to have it added to the refuge Student Authors book.*

A Shower on the Land Demonstration

Gather students around a shower curtain that has been spread flat on the ground outside of the Visitor Center. Make sure the area is protected from the wind.

Review the three ways water can move through earth systems (refer to the water cycle poster): percolate into the ground, run-off the ground surface, or return to the air through transpiration or evaporation.

Begin the activity by asking students the question: What is a watershed? (*A watershed is the land area from which surface runoff drains into a stream channel, lake, reservoir, or other body of water. A watershed is also sometimes called a drainage basin.*) The pattern of water flow in a watershed can be compared to the branches of a tree. Using the *Tree Silhouette* poster show how smaller creeks and streams (represented by the branches) flow from higher elevations to lower elevations and eventually join up with large rivers (represented by the trunk). Using the *How Does Your Watershed Flow?* poster, show students the three major watersheds in Minnesota. Select a few volunteers to locate the Minnesota River watershed. Ask students where they think all the water in our watershed ends up? (Minnesota River and then the Mississippi River)

Ask for a student volunteer to become your "model mountain." Direct the volunteer to lie down on one curtain in the fetal position and cover them with the other shower curtain, being careful to fully cover the bottom curtain so water doesn't pool underneath the student. If the

Minnesota Valley National Wildlife Refuge

ground is cold or no volunteer is forthcoming, use an assortment of objects under the shower curtain. (Inverted buckets work well.)

With the model of a *rugged landscape* set before the group, ask students to make the following predictions if rain should fall on this model.

- Where will the water travel when rains falls on “mountain tops”?
- Where will small streams form?
- Where will larger rivers be located?
- Where will streams join together?
- Where will ponds and lakes form?

Using a watering can, slowly pour the water over the model. Advise students to watch where the water flows. Were their predictions correct? Can students find smaller watersheds within larger watersheds? You may wish to pour water more than once in order for students to make detailed observations.

Moving water is a very powerful force of nature and can affect natural systems as it moves. To counteract this force, nature has built in safety “stops” along the way to minimize the damaging effect of moving water:

- **Vegetation:** plant roots hold soil in place limiting the ability of water to carry away too much soil as it moves along.
- **Wetland plants and soil** act similar to a sponge, holding water and slowing the water pace reducing the damaging effects of floods.

When we alter or remove these natural “stops”, fast moving water is allowed to cause major damage more quickly.

Explain to students that they will investigate some of the ways water moves through the Minnesota River Valley, and then return to the Visitor Center to solve a river mystery!

Water Cycle Hike

On refuge, (60 minutes)

To focus students’ attention and guide learning help students discover the water cycle in action by using the Water Cycle Scavenger Hunt during the refuge hike.

Minnesota Valley National Wildlife Refuge

- To promote teamwork, advise students that the scavenger hunt is NOT a COMPETITION. In order for anyone to check off an item on the scavenger hunt sheet, everyone in the group must have seen or heard the item to be checked off.
- Sounds and signs of wildlife may be counted by the class in lieu of spotting the animal.
- On your way down the trail, select a leaf to enclose in a plastic zip-lock bag in a location you will pass by again. On the return, check for evidence of plant transpiration (moisture in the bag).
- Encourage students to work together to complete the statements or answer the questions within each scavenger item block. Keep in mind there may be more than one correct answer in some cases. An answer sheet is included.

Wrap-Up Management Connection

Why refuge managers control the movement of water

During the hike, point out water control structures you come across. Explain to students how refuge staff raise and lower water levels in some of the refuge wetlands.

The Minnesota River nourishes wetlands through the natural process of increasing and decreasing water levels. Refuge managers can simulate this natural cycle by controlling water levels or protect it by maintaining natural riparian habitat that is designed to thrive with the rise and fall of the river.

- *Why is it important to maintain the natural flow of water through a floodplain?* Due to urbanization within the watershed, the natural rise and fall of water levels no longer exists along vast sections of the river. Instead, heavy amounts of fast moving water funnels across hard, paved surfaces (parking lots, streets, & buildings) directly into the Minnesota River. Refuge Managers constantly monitor wildlife activities (like migration, daily feeding movements, and the presence of beaver dams), and weather patterns to decide whether or not water should be added to the river floodplain or removed.

Minnesota Valley National Wildlife Refuge

- *What species benefit from water level manipulation?* Migrating birds (song, shorebird, and waterfowl), wetland and bottomland plants and macroinvertebrates all benefit from maintaining the natural rise and fall in the river floodplain. In fact, floodplain forest species have adapted to seasonal fluctuation in water levels. Without these fluctuations some species would not survive.
- *Does floodplain water control benefit people?* Runoff carries with it trash, debris and polluting chemicals. Flood water is difficult to contain and can cause extensive damage to homes and business. When refuge managers maintain wetlands there are environmental benefits to people as well as wildlife. Wetland soils absorb and hold floodwater lessening damage to surrounding buildings. Wetland soils also aid in filtering and neutralizing pollution from storm water drainage.

Who Polluted the Minnesota River?

Inside Visitor Center (30 minutes.)

Summarize the Minnesota River History then read the short story out loud. Action prompts and directions appear in bold type.

Minnesota River History

The Minnesota River has had an exciting beginning! More than 10,000 years ago, the land that is now called Minnesota, North Dakota, and Manitoba, Canada was covered by a giant ancient lake named Agassiz. Created by the water of melting glaciers, which formed its northern shore, Lake Agassiz was much larger than *all* the great lakes combined! On the southern end of this big lake, where the boundaries of North and South Dakota and Minnesota now exist, the lake had an outlet, the Glacial River Warren. This big lake fed a big river. The River Warren was one to five miles wide and varied from 75 to 200 feet deep. The rushing river water carved a large channel through the earth as it tore away sandstone, granite and glacial debris.

As the glacier lining the northern shore continued to melt, the deep water of Lake Agassiz broke through this ice wall and began draining water into what is now Canada's Hudson Bay. Water levels in the giant lake began to drop and the lake shrank in size. The land that Lake

Minnesota Valley National Wildlife Refuge

Agassiz once claimed became dry prairie land with hundreds of smaller lakes; the prairie pothole region.

One of the glacial remnants, Big Stone Lake on the Minnesota/South Dakota border, is the beginning of the Minnesota River. Clear water flows southeast out of the lake and travels down the big valley carved out by the ancient River Warren. Miles further downstream the River turns and flows north. In St. Paul, the Minnesota River contributes its waters to the Mississippi River. Then the Mississippi carries this water all the way to the Gulf of Mexico.

As the glaciers melted away and the climate became warm enough for plants and animals to survive, ancient hunting cultures came to the area – long before history books were written.

Later the Sioux, Dakota and Chippewa people inhabited the lush, green Minnesota River Valley and surrounding prairies. These native peoples hunted, fished and lived with the creatures of the land. Buffalo, elk, antelope, deer, wolf, grizzly and mountain lion roamed the grassland. Beaver created great ponds and marshes. Fish in abundance swam the river where otter, mink and raccoons splashed. Prairie dogs, black-footed ferrets, badgers and ground squirrels plowed the prairie. Countless waterfowl clouded the sky and nested in the wetlands. Hawks and eagles soared.

Then, much later European explorers arrived followed by pioneer settlers. In this last 100 years of settlement the Minnesota River Valley changed quickly.

Today bridges span the river and farms, factories, towns and big cities dot the landscape. The story you are about to hear is the story of what has happened to the river in recent years.

Distribute a canister to each student. Ask them to read their character label and to keep the canisters closed. Instruct them not to reveal the identity of their character yet. (Let them shake them once to satisfy their curiosity. Have a few paper towels handy, sometimes caps leak and the motorboat canister might be greasy).

Explain that you will continue the story about the river, and that each of them will play a role in the story. When they hear the name of their

Minnesota Valley National Wildlife Refuge

Character mentioned in the story, their job is to open the canister and empty its contents into the “river” which is represented by the bowl of clear water in the center of the circle.

To minimize distractions, collect each canister as it is emptied. Follow the story sheet.

Question: Imagine the bowl of water represents the Minnesota River about 150 years ago. Would you drink this water? Would you eat fish from it? Would you swim in it?

As the Minnesota River travels towards its’ mouth at the Mississippi River, it gathers water from many drainage ditches, wetlands and smaller rivers along the way. Over the 335 mile length of the river, the water is changed by many things.

As our story begins today, it is starting to rain. Unlike the ancient times, many people now live and work along the river. Houses are being built, and the pounding rain washes soil from a nearby **CONSTRUCTION SITE** into the river. Winds blow through the **TREES** and leaves fall into the water.

*Question: Is the water safe to drink now? * If students say “no,” ask if the river had soil and leaves in it when the Dakota and Chippewa people used to drink the water (soil and vegetation are natural and the water can be filtered)*

Would you swim in the water? Would you boat in it? Is it safe for wildlife?

After the storm passes and the sun comes out, people head to the river for some fun. **MOTORBOATS** zoom up and down and some engine oil leaks out. A **FAMILY OF PICNICKERS** spread their blanket along the shore in a park. When they finish eating, they fold up their blanket and go home and the wind blows some of their trash into the river. On a dock nearby, a **PERSON FISHING** snags their hook on a log and breaks the fishing line, leaving a tangle in the water.

Question: Would you drink this water now? Would you swim in it? Would you boat in it? Is it safe for wildlife? If not, what is

Minnesota Valley National Wildlife Refuge

the greatest hazard? (Oil on feathers, ingestion of garbage, getting tangled in fishing line)

A **FARMER** has been plowing the fields and heavy rain washed some of the freshly turned soil into a small stream flowing across the farm. This stream (is a tributary) that carries the muddy water to the Minnesota River. (*Tributary = stream that contributes its water to a larger stream or river*)

Many farmers and ranchers use the best possible management practices to protect their land, but others do not. Nearby is a **FEEDLOT** with many animals penned together on the hillside near the river. The rain splashing across the big manure pile carries some of the animal waste into a ditch that drains into the Minnesota River. The dissolved manure acts as a fertilizer that helps algae grow so thick it covers the ditch. When the algae dies and begins to rot, it uses up the oxygen in the water.

Downstream on the bank of the river is a summer home where people come to enjoy weekend retreats with friends and family. The house is not connected to a city sewer system and waste water from the kitchen and bathrooms goes into a septic tank (*large concrete box underground*). The **HOMEOWNER** has not maintained their septic tank properly and sewage water is seeping into the river. The human sewage could carry disease, and like the animal manure, acts like a fertilizer in the river.

Question: Would you drink this water now? Would you swim in it? Would you boat in it? Is it safe for wildlife? Some animals can swim away from polluted water that does not have enough oxygen. What happens to the rest of the animals?

In addition to small towns in the river valley, many new suburbs are being built in the metropolitan area. Gravel is needed to make concrete to build many of the new homes. At a **GRAVEL QUARRY** nearby, big machines are mining rocks and gravel from the river bluff and rain washes some of the crushed stone into the river.

Question: What does too much soil, sand, and silt floating in the water do to plants, invertebrates and fish that live there? (Clog gills, cover eggs, reduce visibility, affect water temp, and blocks sunlight for photosynthesis)

Minnesota Valley National Wildlife Refuge

Cities and towns get electricity from **POWER PLANTS** along the river. When the power plants burn coal, gasses coming out of the smokestacks combine with moisture in the air to form acids. The pollution falls back to earth with the rain.

Question: What kind of rain do we get? Acid Rain.

Mercury is another poison that comes from our air and contaminates our rivers and lakes. In many places, it is not safe to eat fish because they have so much mercury. Some mercury comes from burning coal, but it also comes from industries (*batteries, light switches, thermometers*) – also, the wind blows much of the mercury here from countries on the other side of the world.

Along the riverfront in the cities are many factories. One of these **INDUSTRIAL PLANTS** has had an accident. A pipe carrying chemicals breaks and spills into the river. Emergency crews work for days to clean up the spill.

In the big cities there are lots of **COMMUTERS** driving their cars back and forth to work, school, or shopping. Car exhaust fumes (like power plant gasses) cause more acid rain.

*Question: Would you swim in this water now? Would you boat in it?
Would you eat the fish?*

Once upon a time, prairie grasses, trees and wetlands soaked up much of the rainwater, but now with so many cars, miles and miles of pavement cover the land where plants used to grow. Rain water rushes across these hard surfaces on its way to storm drains. It carries dripping oil, antifreeze, asbestos from brakes, particles of rubber, rust, heavy metals and other pollutants from automobiles speeding along the roads or sitting in the large asphalt **PARKING LOTS**.

With all of the people living in the area, garbage is a big problem.

Question: When you throw something away where does it go?

Our **LANDFILLS** have a lot of toxic substances in them. After years of being buried, these poisons seep through the soil and into the river.

Minnesota Valley National Wildlife Refuge

The sky is beginning to cloud up and it looks like it may rain again. In a neighborhood near town, **FAMILY GARDENERS** are spreading fertilizer, weed killers, and bug spray to keep their lawn and flowers looking pretty.

Question: What will happen to these poisons if it rains?

Next door to the family gardening, the neighbors are cleaning out their garage. They find a rusty old can with a tattered skull and crossbones label. It looks dangerous and they want to get rid of it before someone gets hurt. Junior gets a bright idea "Let's pour it down the drain out by the curb." So the **MYSTERIOUS LIQUID** goes down the storm drain and the poison is out of sight.

Question: But where is it headed?

Wrap-UP

Ask students these important questions:

- Who polluted the Minnesota River?
- Who can clean it up?

It should be obvious that each of us is responsible for what is happening to the river. But this is not a lesson of gloom and doom. Once we understand the problems, we can work to find solutions.

Ask students to reflect on what they have learned by examining each of the ways the waterway becomes polluted and considering ways that kids can have a *personal* impact by changing their simple daily habits. Ask them to start by thinking about the substances in their canister.

Some responses students may offer:

- Litter: This is an obvious and easy place to start. Don't litter! Participate in river or stream cleanup. Recycle and limit your use of disposable items.
- Power plant: Conserve power by turning off lights, TVs and appliances when they are not in use.
- Sewage: Conserve water when brushing your teeth. Install low-flow toilets and showers. The less water sent to a treatment plant or septic system, the less water dumped in the river!

Minnesota Valley National Wildlife Refuge

- **Yard maintenance:** Be careful using poisons and fertilizers. Consider pulling weeds, composting, and using biological controls instead. Try using a push mower or one with a four-cycle engine to reduce pollution.
- **Chemicals:** Don't dump chemicals down drains. Stencil the message *Runs to the River* on your curb drains as a neighborhood project. Clean up after your dog if you walk on city streets.
- **Air pollution from cars:** Leave the car in the garage! Try biking, walking, skating, car pooling and taking the bus or light rail system.
- **Landfill:** Dispose of chemicals properly. Recycle old automobile oil. Reduce, reuse, recycle – and refuse to buy things that are over-packaged.
- Be watchful for oil leaks in automobiles. Wash the car on the lawn where soapy water can soak into grass and not run off on the street, or use a Carwash.
- Tell others what you have learned!

Be sure to discuss ways that farmers, ranchers, homeowners, power plant operators, industries and cities are working to make improvements. Working together we can make a difference!

Optional Extension

Challenge the class to clean up the model "river" using the supply of cotton balls (to soak up oil), forceps (to pick out trash), paper filters (for smaller trash particles and debris). As part of the exercise, be sure to discuss which pollutants are easier to remove. Which are most difficult? Which is easier, pollution prevention, or pollution cleanup?

Watershed Walk Rainy Day Activities

Introduction

Outside (30 minutes)

Conduct the Introduction as described in the on-site activity. To conduct the Shower on the Land demonstration, move tables to the outer edges of the classroom and build the model watershed inside a plastic kiddie pool to contain the water. Give students a chance to use the plant containers and create several different watersheds to observe how landforms change the flow of water within a watershed.

Who Polluted the Minnesota River and Extension

Inside Visitor Center (45 min)

Conduct the activity as described in the on-site activity. Include the optional extension.

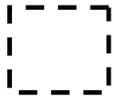
Enviroscape Model

Inside Visitor Center (45 min)

Follow the directions and associated discussion questions that accompany the model to show students how pollution can affect a watershed. Ask students to create their own scenarios and predictions. Let them experiment with the model to see if their predictions were correct. **NOTE: red food dye will stain hands and clothing.**



Water Cycle Scavenger



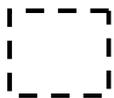
By what process will water leave this cloud?





Heron and other Shorebirds need water for....





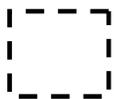
Some streams are fed by water from?





Where does the MN River start?





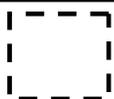
Animals transport water through _____ and _____



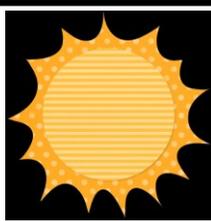


What does the term "amphibian" mean?





The sun's power to Change water from Liquid to vapor is called?





Through what process will water leave this leaf?





Another example of a natural "cycle" is:



Through what process will Water leave this puddle?





Minnesota Valley National Wildlife Refuge Water Cycle Scavenger



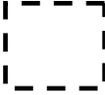
By what process will water leave this cloud?
precipitation





Heron and other Shorebirds need water for....
drinking, fishing





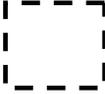
Some streams are fed by water from?
the ground, runoff, snowmelt, tributaries





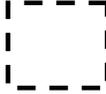
Where does the MN River start?
Big Stone Lake in Ortonville, MN





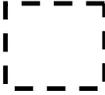
Animals transport water through _____ and _____
respiration and **their bodies**



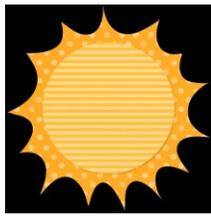


What does the term "amphibian" mean?
"double life"
eggs and young found in water, breath through gills
adults breath air using lungs, spends time on land





The sun's power to Change water from Liquid to vapor is called?
evaporation





Through what process will water leave this leaf?
transpiration



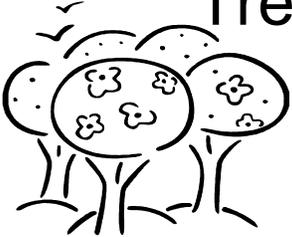
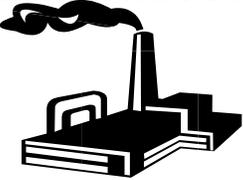


Another example of a natural "cycle" is:
many examples such as: life/death (rotten log); plant life cycle (seeds, fruit, growth)

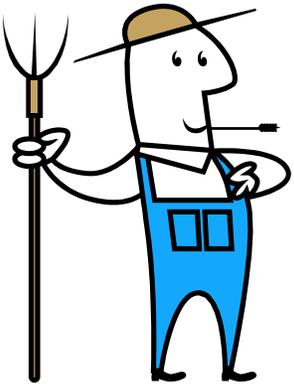


Through what process will Water leave this puddle?
evaporation



<p>Trees</p> 	<p>Construction Site</p> 	<p>Motorboats</p> 	<p>Industrial Plant</p> 
<p>Family Picnicking</p> 	<p>Person Fishing</p> 	<p>Farmer</p> 	<p>Feedlot</p> 
<p>Homeowner</p> 	<p>Gravel Quarry</p> 	<p>Power Plant</p> 	<p>Commuters</p> 
<p>Gardeners</p> 	<p>Landfill</p> 	<p>Parking Lot</p> 	<p>Mysterious Liquid</p> 

Minnesota Valley National Wildlife Refuge



Who Polluted the Minnesota River? Canister Materials

Note: All substances are safe for students to handle. For a realistic effect, it is best to use small amounts of substances in the canisters.

<i>Characters in Story</i>	<i>Substance in Canister</i>
Construction Site	1/2 tsp of dry clay
Trees	crumbled dry leaves
Motorboats	1/8 tsp of vegetable oil
Family Picnic	pieces of plastic, paper
Person Fishing	tangle of fishing line
Farmer	½ tsp dry Clay
Feedlot	½ tsp of green/brown liquid food color
Homeowner	yellow water & toilet paper/full canister
Gravel Quarry	Tbsp of Chalky water & sand
Power Plant	¼ Canister of vinegar
Industrial Plant	¼ Canister of greenish water
Commuters	¼ Canister of vinegar
Parking Lot	drop of oil & blue water
Family Gardeners	¼ tsp of baking soda
Landfill	brown/ yellow food color water
Mysterious Liquid	½ tsp of red food color water