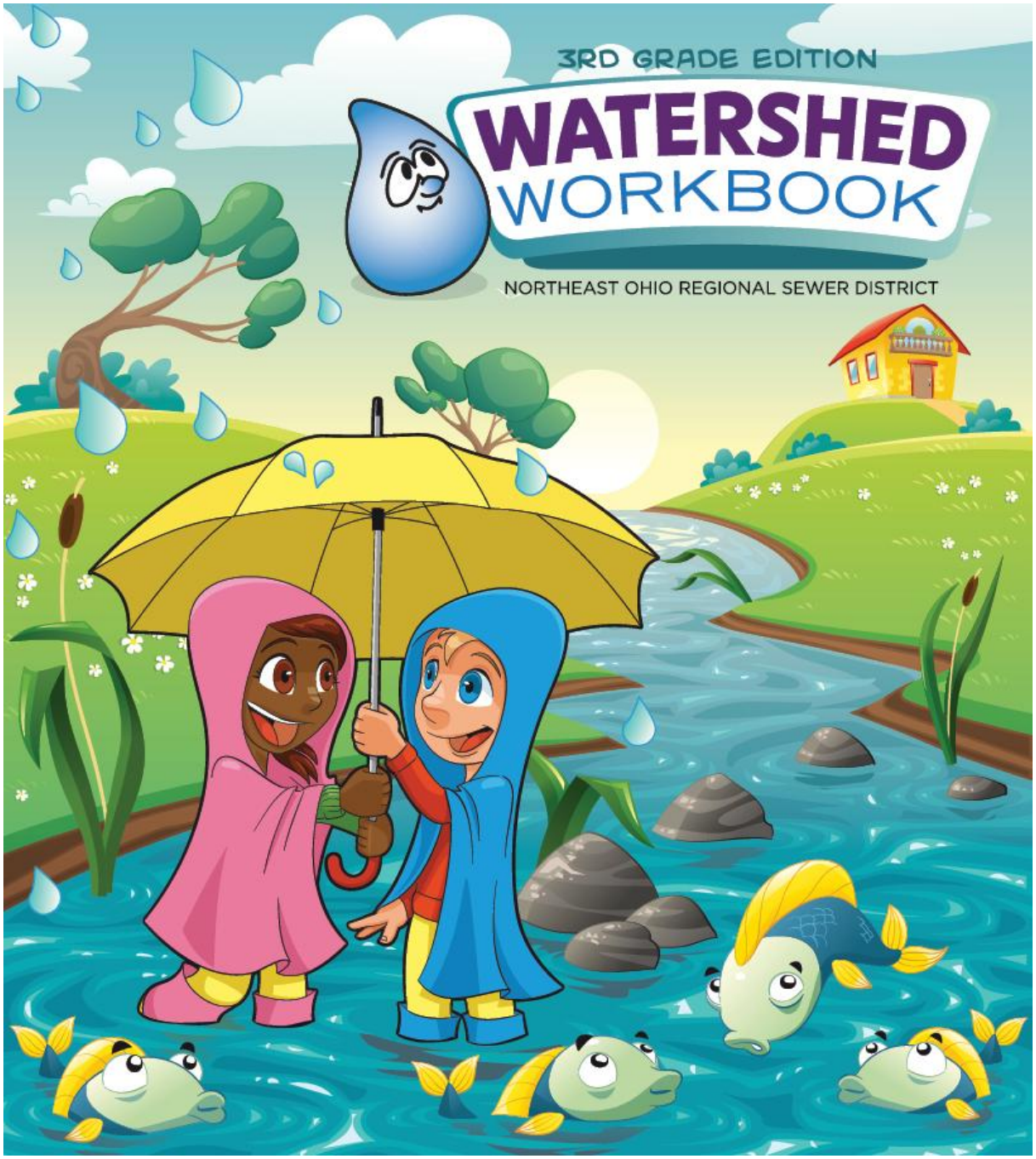


TEACHERS GUIDE

PROVIDED BY THE NORTHEAST OHIO REGIONAL SEWER DISTRICT

Northeast Ohio
Regional Sewer District

To our Northeast Ohio teachers and friends:

This curriculum was written by a group of practicing teachers with the hope that your students will gain a broader awareness of the watersheds of northeast Ohio, the water cycle and our region, and the Northeast Ohio Regional Sewer District's work present in our daily lives.

Each lesson can easily be modified to fit your classroom and meet the needs of individual students. The time frames indicated are the minimum amount of time to complete each activity. You will need to use your own judgment about how many class periods or days you will need to complete the unit.

If you have questions about the lessons, activities, or would like supplemental material, you may email us at community@neorsd.org or call (216) 881-6600 and ask to speak with our Watersheds department.

Thank you for helping us keep our Great Lake great.

Standard Alignment

The following lessons are designed to meet **Ohio's College and Career Readiness Standards in Science** for third grade. The lessons also address components of the math and ELA standards.

Grade Band Theme: Observations of the Environment

Science Inquiry and Application: During the years of PreK-4, all students must become proficient in the use of the following scientific processes, with appropriate laboratory safety techniques, to construct their knowledge and understanding in all science content areas:

- Observe and ask questions about the natural environment;
- Plan and conduct simple investigations;
- Employ simple equipment and tools to gather data and extend the senses;
- Use appropriate mathematics with data to construct reasonable explanations;
- Communicate about observations, investigations and explanations; and
- Review and ask questions about the observations and explanations of others.

Topic: Earth's Resources
This topic focuses on Earth's resources. While resources can be living and nonliving, within this strand, the emphasis is on Earth's nonliving resources, such as ***water***, air, rock, soil and the energy resources they represent.

Content Statement: The Earth's resources are limited.
Some of Earth's resources become more stressed due to overuse and/or contamination. Reducing resource use, decreasing waste and/or pollution, recycling and reusing can help conserve these resources.

Grade 3 Concepts
The focus is on the different types of Earth's resources, how they are used and how they can be conserved. Scientific data should be used to evaluate and compare different methods of conservation.

Topic: Matter and Forms of Energy
This topic focuses on the relationship between matter and energy. Matter has specific properties and is found in all substances on Earth. Heat is a familiar form of energy that can change the states of matter.

Content Statement: Matter exists in different states, each of which has different properties.
The most common states of matter are solids, liquids and gases. Shape and compressibility are properties that can distinguish between the states of matter. One way to change matter from one state to another is by heating or cooling.

Grade 3 Concepts:
Gases, liquids and solids are different states of matter that have different properties. Liquids and solids do not compress into a smaller volume as easily as do gases. Liquids and gases flow easily, but solids do not flow easily. Solids retain their shape and volume (unless a force is applied). Liquids assume the shape of the part of the container that it occupies (retaining its volume). Gases assume the shape and volume of its container. Heating may cause a solid to melt to form a liquid, or cause a liquid to boil or evaporate to form a gas. Cooling may change a gas into a liquid or cause a liquid to freeze and form a solid.

SESSION 1

States of water and the water cycle

SUMMARY AND BACKGROUND KNOWLEDGE

Water progresses through stages in our environment. This is called the **water cycle**. The earth has a limited amount of water. That water is recycled in the water cycle. This cycle is made up of a few main parts: **evaporation** (and **transpiration**), **condensation**, **precipitation**, and **infiltration and run off**

Students will learn:

1. The different stages of the **water cycle**.
2. The different forms water can take: **solid**, **liquid**, **gas**.
3. The importance of the **water cycle**.

SESSION 1 AT A GLANCE

ESSENTIAL QUESTIONS

How does water change?

How does water move?

How does life depend on water?

Where does the water that forms on the outside of your drinking glass in the summertime come from?

Where does the water go when it is evaporated?

MATERIALS

- The Magic School Bus at the Waterworks
- A partially filled glass of water
- An ice cube in a bowl
- A wet paper towel on a tray or plate
- Word cards with the following vocabulary words: **evaporation, precipitation, condensation, runoff and infiltration**
- Chart paper

TIME FRAME

	Estimated
States of water	18 min.
Exploring the water cycle	15 min.
Constructing a model	15 min.
TOTAL	48 min.

ASSESSMENT

Ask students to share examples of where they have seen water **condensing** and **evaporating**.

Have the students draw the **water cycle** in a diagram or ask them to construct a concept map of the **water cycle** and have students explain the various parts.

It is recommended that these activities be completed in pairs or individually to get a more accurate evaluation of student understanding.

UNIT VOCABULARY

- collection
- condensation
- gas
- evaporation
- filtration
- infiltration
- lake
- liquid
- pond
- precipitation
- recycle
- river
- runoff
- solid
- stream
- transpiration
- water cycle
- water vapor
- stormwater

States of water

1. In order for students to understand how the **water cycle** works, review what they know about water and the different states water can take (**solid, liquid,** or **gas**) in the environment.

2. Display three items—a partially filled glass of water, an ice cube in a bowl, and a wet paper towel on a tray or plate. After each discussion, students should record their observation and notes in their *Watershed Workbooks*.
    a. Examine the glass of water. Engage students in a discussion with these questions as:
        - What is in this glass?
        - What is water? What does it look or feel like?
        - Is water a **solid**, a **liquid**, or a **gas**?
        - Where can you find water? Where does it come from?

    The students will understand that water is a liquid. Create a list of where water can be found in our environment (rain, in oceans, **lakes**, **streams**, **rivers, ponds**, and underground).

3. Examine the ice cube. Engage students in a discussion with these questions as:
        - What is in this bowl?
        - Describe ice. What does it look or feel like?
        - Is ice a **solid, a liquid,** or a **gas**?
        - What is ice made of? How is it made?
        - If I left the ice in the room for a few hours, what would happen to it?

    The students will understand that ice is frozen water. The water became a **solid** due to a change in temperature. Students need to understand that when ice warms up, it returns to **liquid** water.

4. Examine the wet paper towel. Engage students in a discussion with these questions:
        - What is this?
        - What would happen if I left it out for a few hours?
        - Why would it dry out?
        - Besides paper towels, what are some other examples of wet things that dry out over time? (Examples could include wet clothes, watered plants, glasses of water, and puddles.)
        - What if I put this wet paper towel outside during the winter? What might happen to it? Why?

    Students will understand that water disappears or **evaporates**. This happens when the temperature rises, and the water becomes a **gas**. Water can also freeze into ice, becoming a **solid**. Stress that the three water samples that have

been examined characterize the three states that water can take. These forms of water are determined by changes in temperature.

Exploring the water cycle

- Read aloud The Magic School Bus at the Waterworks (pages 1-19)

- Define the words (**evaporation**, **precipitation**, **condensation**, **and runoff**) in context as you read and place words on the Science word wall.

- Think/pair/share. Explore the process of the **water cycle** by having students discuss these questions: Where does water go when it disappears or **evaporates**?
    - What role does the sun play in the **evaporation** process?
    - Where does water come from when it rains?
    - How are clouds formed?
    - When rain (snow/sleet) falls to the ground, what usually happens to it?
    - Where does the water go when there is an excess amount of rainfall in a short time period? (Accept all reasonable answers. Encourage students to elaborate on their responses.)

Constructing a model

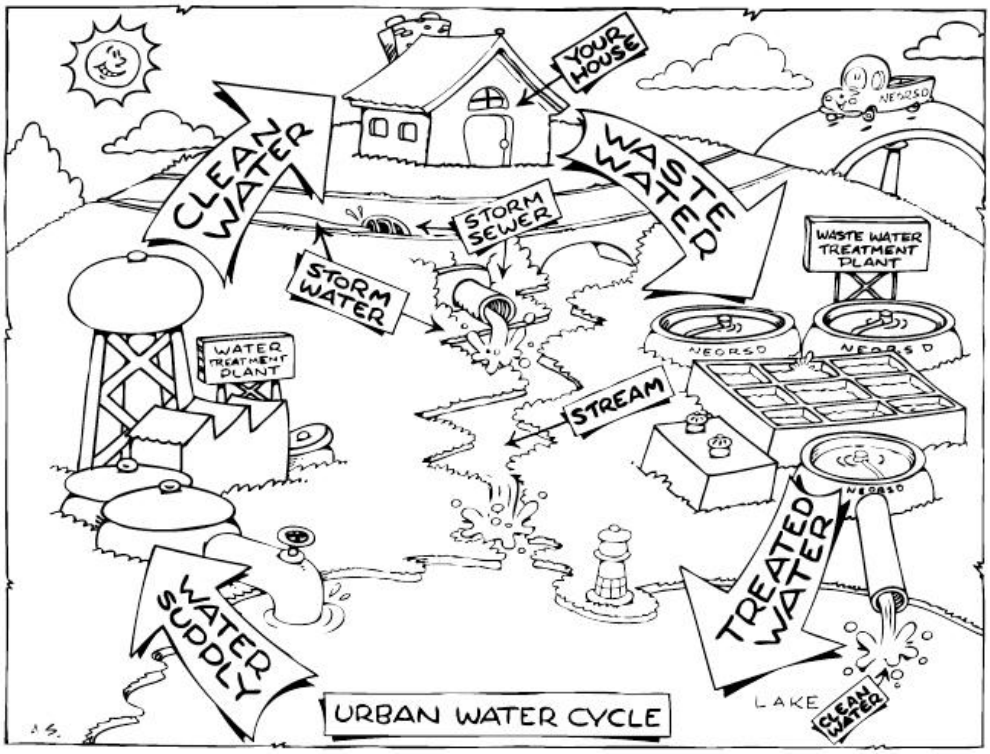
1. Working in small groups or in pairs, students will draw a model of a water cycle on large chart paper, be sure to include precipitation, condensation/transpiration, evaporation and runoff. Discuss questions such as these:

    - Describe what is happening in your water cycle.
    - What effect is the sun having on your water cycle? The shade?
    - What caused the water to evaporate?
    - Where did the water go?
    - How can you explain what is taking place?

    Explain the processes involved in the water cycle.

2. Now that the students have a thorough understanding of the water cycle, show them and discuss the urban water cycle (see page 6 in the students' *Watershed Workbooks*).

The urban water cycle



Water supply: Lake Erie is the source of Cleveland's drinking water. The Cleveland Division of water draws its water from the lake.

Clean water: The Cleveland Division of Water pumps treated lake water to our homes and businesses.

Homes and businesses: We use clean water at home to drink, wash, bathe, or flush our toilets, and there are many other uses.

Wastewater: Once we use the water, it is called wastewater and enters the pipes under your home and reaches sewers underground and flows to the Northeast Ohio Regional Sewer District.

Treated water: Once the wastewater has been cleaned, it is released safely back into Lake Erie.

QUESTION: How does the URBAN water cycle compare to the NATURAL water cycle?

SESSION 2
The urban water cycle

SUMMARY AND BACKGROUND KNOWLEDGE

The Northeast Ohio Regional Sewer District serves residents by leading effective wastewater and **stormwater** management that protects the health and environment of the region while enhancing quality of life. Northeast Ohio Regional Sewer District is responsible for **wastewater** treatment facilities and interceptor sewers in the greater Cleveland Metropolitan Area. This service area encompasses the City of Cleveland and all or portions of more than 60 suburban municipalities in Cuyahoga, Summit, Lake and Lorain Counties.

Northeast Ohio Regional Sewer District owns and operates three **wastewater** treatment plants and a laboratory and maintenance facility to treat wastewater and reduce pollution entering Lake Erie and the Cuyahoga River. It is also responsible for a variety of related **wastewater** treatment infrastructure and projects.

Other Areas: Other Northeast Ohio Regional Sewer District activities include Regional Stormwater Management, which involves watershed protection, planning, working with local communities to ensure that small streams and tributaries are properly maintained and related support services to ensure our ability to meet our responsibilities to the regional drainage system.

Students will learn:

- How water is transported
- Importance of wastewater treatment

SESSION 2 AT A GLANCE

ESSENTIAL QUESTIONS

What are the steps the Northeast Ohio Regional Sewer District takes to treat our water?

What are the steps the Cleveland Division of Water takes to purify our drinking water?

Why is it essential to treat our water?

MATERIALS

- The Magic School Bus at the Waterworks
- Computer with internet access
- Projector
- Word cards with these vocabulary words**: reservoir**, **purify**, **impurities, lake, pervious, impervious, wastewater, stormwater**

TIME FRAME

	Estimated
Introducing the waterworks	15 min.
Exploring the treatment process	25 min.
Reflecting on the necessity of treatment systems	8 min.
TOTAL	48 min.

ASSESSMENT

The teacher will observe as students demonstrate understanding of the wastewater **treatment** process as they act it out.

UNIT VOCABULARY

- filtration
- impervious
- impurities
- lake
- pervious
- purify
- reservoir
- runoff
- stormwater
- wastewater
- river

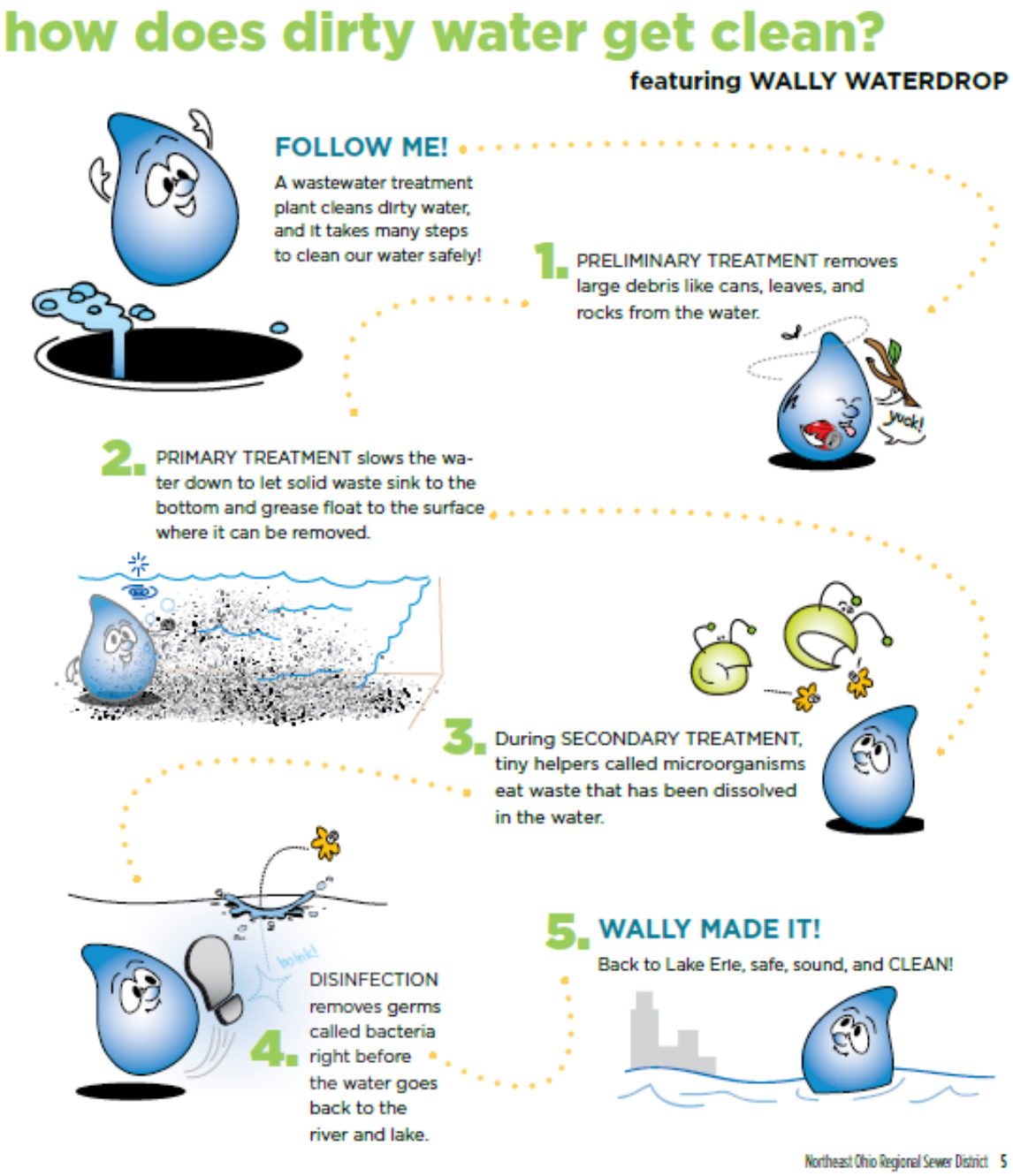
Introducing the waterworks

1. Read The Magic School Bus at the Waterworks (pgs. 19-37) and define (**reservoir, purify, impurities**, **lake, pervious, impervious, wastewater, stormwater**) in context as the words and/or concepts are encountered in the text. *Be sure to identify Lake Erie as our natural reservoir*. Then place the word cards on the Science word wall.

2. Using information from The Magic School Bus at the Waterworks, review the steps that water must go through in order to be **purified** for drinking purposes. Record this information in pictures and/or words on a chart or blackboard (You may wish to refer to the illustrations on pages 34-35). Remember: The Cleveland Division of Water purifies our water for drinking.

3. View "where does it go?" THE MOVIE found on the Northeast Ohio Regional Sewer District's website or by connecting directly to the link below. http://www.neorsd.org/wallysworld_geth2otv.php?a=set_browser1&browser=ie. Review page 7 in the students' *Watershed Workbooks* for additional clarification of how dirty water (wastewater) is cleaned. Remember: the Northeast Ohio Regional Sewer District is responsible for cleaning water from homes, business and schools and sending it back into the Cuyahoga River and Lake Erie. ***Additional videos and information on wastewater treatment may be found** on the Northeast Ohio Regional Sewer District's YouTube channel http://youtube.com/neorsdccr or its Wally Waterdrop page http://www.neorsd.org/wallysworld.php

4. Discuss the similarities and differences water goes through to be **purified** for drinking and how wastewater is cleaned and then returned to Lake Erie and the Cuyahoga River. You may wish to make a T-chart on the board to record information.



This excerpt was taken directly from *WHERE DOES IT GO? An Understanding the Value of Clean Water* presented by the Northeast Ohio Regional Sewer District. It is replicated on page 5 of the students' Watershed Workbook.

Exploring the wastewater treatment process by the Northeast Ohio Regional Sewer District

1. Select several students to be molecules of water. The remaining students will be materials found in each section of the **wastewater treatment** process at a wastewater treatment plant. These materials will include rocks, cans, twigs, solid waste, grease, microorganisms, disinfectant and bacteria.

   SUGGESTION: You may want to make nametags for the students as they play their roles so students in the class can understand the actions. The actors could also hold sheets of paper that feature their roles, such as "WATER," "MICROORGANISM," etc.

   Once students have been assigned their role as either a water molecule or a material found in the treatment plant, have them stand in the center of a cleared area in the classroom.

   a. Step 1: Preliminary Treatment: All of these students begin to "move" through the treatment plant and the students representing the debris (rocks, cans, twigs) fall to the side of the classroom. They have now been removed from the water. All of the remaining students continue to flow to the next phase in cleaning the water.
   b. Step 2: Primary Treatment: Students move slowly as they enter the primary treatment phase in the treatment plan. The students representing solid waste "sink" to the bottom and the students representing grease "float" to the top of the water. They have now been eliminated from the water. Once again, have the remaining students slowly make their way to the secondary treatment phase in the treatment plant.
   c. Step 3: Secondary Treatment: The students move slowly through the secondary treatment phase as microorganisms "eat" the solid waste. The students representing solid waste should fall to the side of the classroom allowing the remaining students to continue to step 4.
   d. Step 4: Disinfection: As the students enter step 4 in the treatment plant, germs called bacteria are removed. The students representing the bacteria should fall to the side of the classroom and allow the clean water to move to the final step.
   e. Step 5: Clean Water: The remaining students should all represent water molecules. They will be returned to the Cuyahoga River and Lake Erie for reuse.

Reflecting on the necessity of a purification system

1. Reflect on the importance of clean water:
    - Why is the wastewater treatment process system so important?
    - What section of the **wastewater** treatment system do you feel removes most of the impurities? Why do you think that?
    - What if impurities in the water were not removed?

Session 3
Soil Erosion and Runoff (Hands-on investigation Part 1)

Summary
A **watershed** is the area of land that drains into a body of water. The largest watershed in Northeast Ohio is Lake Erie. Protecting the Lake Erie watershed and its smaller sub-watersheds is important to the environment, public health, and the economic well being of Greater Cleveland.

Erosion is a natural process. As stormwater flows over land, it removes loose soil particles from upper elevation and deposits them in low elevation areas. Stormwater infiltrates into the ground. When the soil is saturated excess water flows over the land and is called **runoff**. **Impervious** surfaces also reduce infiltration and increase runoff.

When surface runoff is not managed properly, the results are flooded streets and properties, land erosion. These actions deposit pollutants into the area streams, creeks, the Cuyahoga River and Lake Erie.

In this experiment the students explore the changing surface of the Earth and discover the effects of **erosion**. By setting up a simple model of a **stream**, students see how **slope**, soil texture, and cover affect the amount of **erosion** that occurs on **soil**. In addition, by comparing the clean "rain" with the water that runs off the **soil**, students begin to get an understanding of why **erosion** causes additional problems of downstream sedimentation in the Cuyahoga River and **Lake Erie**.

Students will learn:
1. Causes of **soil erosion**.
2. The effects of **soil erosion** on the **natural environment**.

SESSION 3 AT A GLANCE

ESSENTIAL QUESTIONS

What events in nature might cause soil to be moved from one place to another?

Why is it important for soil to stay in its place in our natural environment?

MATERIALS

- Small potted house plant
- Pot filled with soil
- Computer
- Projector
- Digital camera (optional)

For each group:

- 2 large disposable aluminum oven pans
- Natural soil from a garden, not potting soil from a bag
- Watering can
- Magnifying glass
- Scissors

TIME FRAME

	Estimated
Introducing soil erosion and runoff	8 min.
Making a model	20 min.
Explaining the model	10 min.
Extending learning	10 min.
TOTAL	48 min.

ASSESSMENT

As students discuss and work through their investigations, the teacher should "listen in" on the discourse to identify the level of understanding. Ask the students to identify causes of soil erosion after completing the investigation.

UNIT VOCABULARY

- erosion
- impervious
- investigation
- lake
- natural environment
- pervious
- runoff
- sedimentation
- slope
- soil
- stormwater
- stream
- infiltration
- rivers
- lakes
- saturation
- watershed

Introducing soil erosion and runoff

1. Show students a potted house plant that has been placed into a clear plastic cup. Also show the students another pot filled with **soil** that has been placed into a second cup. Ask the students to predict what will happen when water is poured into each of the pots. Pour water into each of the pots and discuss the outcome.

2. Show students images of **erosion** using the computer and projector. You may wish to use images supplied in the Soil Gallery at the following website http://neorsd.org/grade3. Ask students what they notice about each photograph. Record student responses on chart paper and save for future use.

3. Discuss the following essential questions with students:
    a. What events in nature might cause **soil** to be moved from one place to another?
    b. Why is it important for **soil** to stay in its place in our **natural environment**?

Making a model

1. Divide students into cooperative learning teams of 4-5 students. Each team should conduct the following hands-on **investigation**.
    a. Pour the **soil** into one of the pans so that it makes a layer on the bottom 2 to 3 inches deep. Smooth the **soil** out so that it is as even as possible on the top.
    b. Examine the **soil** closely with a magnifying glass. Touch it and run it through your fingers. Record your observations in your *Watershed Workbook*.
    c. Use scissors to punch 6 small holes in one end of the tray. (Teacher)
    d. Place the second pan under the end of the **soil**-filled pan where the holes are. (The second pan will catch the water as it leaves the top pan.)
    e. Slip 2 or 3 books under the other end of the **soil**-filled pan so that it is propped up about 2 inches higher than the end with the holes punched in it.
2. Ask the students to predict what will happen to the **soil** if they pour the water down the **slope**.
3. Guide students in using the watering can to pour water onto the **sloped** surface mimicking rain and observe and record the results.
4. Students should sketch the **soil** conditions before, during, and after the **investigation** in their *Watershed Workbooks (in the Hands-On Investigation Part 1 section)* and label the parts. (Optional: use a digital camera to photograph before, during, and after. Students can download the images and add text to them for labels. The images can be projected so that all students can view the data.)

Explaining the model

1. Have students share the images they sketched/photographed.
2. They should refer back to the essential questions as they report their investigation data to their classmates.

Extending learning

Take students on a walk around the school grounds or their neighborhoods. Ask students to look for signs of **erosion**. They should look for **erosion**, as well as areas where **erosion** is not taking place. Encourage them to think about what is keeping **erosion** from happening in certain areas.

SESSION 4
Reducing Soil Erosion and Runoff (Hands-on investigation Part 2)

SUMMARY

Hard **impervious** surfaces like driveways, roofs, parking lots, and even some lawns pose two stormwater problems: (1.) Water Pollution caused by litter, debris, oils, fertilizer, etc., which the stormwater carries to local waterways untreated. (2.) Increased flow, the water flows quickly and in larger volumes, and that combination can increase flooding and **erosion**, the washing away of stream bank soils.

Three key factors help to control how much erosion will occur.

1. **Slope**: The steeper the **slope**, the more kinetic energy (energy due to motion) a stream will have and the better equipped it will be to remove loose particles. In many cases, fast flowing **streams** not only pick up **soil** grains, but they can transport larger rocks by rolling them along the bottom.
2. **Soil Texture**: The second controlling factor is the actual grain size of the **soil** particles themselves. Most **soils** contain a large variety of particle sizes ranging from coarse sand (about 2 mm in diameter) to microscopic clay particles. Generally speaking, the finer the particle size, the more easily the **soil** will be **eroded.** You can see the effects of eroded soil in the muddy appearance of **rivers** after a storm. They often look like chocolate milk for several days because the fine-grained clay particles easily go into suspension. These particles stay afloat until the **stream** enters a slower moving body of water like a lake, **pond** or **wetland** where the energy level is minimal.
3. **Cover**: The final factor that helps to control the amount of **soil erosion** is **cover**. The worst **erosion** occurs on loose, exposed **soil**. Without the roots of trees and grass to hold the particles together, **soil** will become rapidly **eroded**, leaving a bulk of the **soil** somewhere downstream. Plants also help to reduce the energy of running water by literally serving as obstructions to the flow. Finally, leaves of plants help to dissipate the energy from rain drops hitting the ground. Vegetated cover helps to slow the stormwater, giving it a chance to infiltrate before runoff can occur.

Students will learn:

- To compare data from two experiments.
- To compare their predictions to actual experiment results.
- A variety of ways to reduce **soil erosion** in and around their community.

SESSION 4 AT A GLANCE

ESSENTIAL QUESTIONS

What things can be done to help keep soil in its place?

What are the effects of soil erosion?

How can managing erosion help protect our watersheds?

MATERIALS

- Digital camera (optional)
- For each group:
- 2 large disposable aluminum lasagna pans
  natural soil from a garden, not potting soil from a bag
  watering can
  magnifying glass
- Scissors
- Planted grass tufts
- Mulch
- Soil with small plants
- Twigs
- Small rocks

TIME FRAME

	Estimated
Introducing methods to reduce soil erosion and runoff	8 min.
Conducting an investigation	20 min.
Explaining the investigation	10 min.
Extending learning	10 min.
TOTAL	48 min.

ASSESSMENT

Ask students to identify which environment created the least **erosion** in the investigation and why this environment is conducive to **soil** stability.

UNIT VOCABULARY

- cover
- erosion
- impervious
- lake
- Lake Erie
- pervious
- pond
- slope
- soil texture
- stormwater
- stream
- river
- watershed
- wetland

Introducing methods to reduce soil erosion and runoff

1. Review with the students that **erosion** is the process by which the surface of the Earth gets worn down. **Erosion** can be caused by natural elements such as wind, water, and glacial ice. The key to **erosion** is something called "fluid flow." Water, air, and even ice are fluids because they tend to flow from one place to another due to the force of gravity. Of the three, liquid water is the most common agent of **erosion** because there's so much of it on the surface of the Earth.
2. Introduce the idea that water, air, and ice may **erode soil**; there are elements that can reduce this process. Ask students to brainstorm a list of elements that they feel can slow the **erosion** process. Chart all logical student responses.

Conducting an investigation

1. Students will conduct a similar investigation to the one in session 3. Have students repeat the **soil erosion** test from session 3, but this time make a different environment on the **soil**.
2. Provide students with a variety of materials to add to their **erosion** test. They may choose planted grass tufts, mulch on top of **soil**, **soil** with small plants, twigs, or small rocks. (materials may be collected from around the school or home) Ask students to predict how the different environments will withstand **erosion** and then instruct them to run their tests and record their results in the *Watershed Workbooks (in the Hands-On Investigation Part 2 section)*.
3. Be sure to have students repeat their data collection. If it is possible to use a digital camera, repeat the same camera angle and location for the photographs so that they can be compared side by side with the base line test from session 2.

Explaining the investigation

1. Students can share the results from their group with the whole class. In their oral presentation to the class, have the students share their results against their predictions.

Extending learning

1. Re-examine the list of elements the students brainstormed at the beginning of the lesson. The class can compare the different materials used and determine the best environment for the least amount of **soil erosion**.
2. Discuss how **slope**, **soil texture**, and **cover** affect the amount of **erosion** that occurs on **soil**.
3. Begin a discussion on **soil erosion** opportunities around the school and brainstorm a list possible ways to prevent **erosion**.

SESSION 5
Culminating Activity: Lapbook

SUMMARY AND BACKGROUND KNOWLEDGE

A lapbook is simply a file folder that contains a variety of "mini books," foldables, and other material and is laid out in a creative manner that fits in the student's lap. In this culminating activity, the lapbook will include information on the **water cycle**, **soil erosion** and **runoff**, and **the water purification** system. Black-line masters have been provided but what is included in your lapbook is entirely up to you and your students so be as creative as you want.

The benefits of a lapbook are first and foremost, a fantastic hands-on educational tool. The lapbook itself is highly interactive—from the creation to the finished product. And each component of the lapbook has given the learner an opportunity to concentrate on a specific aspect of the greater topic.

You may want students to complete their lapbook individually, with a partner, or even in a small group.

Students will:

- Review the phases of the **water cycle**.
- Review **soil erosion** and **runoff**.
- Review the importance of wastewater treatment.
- Create a lapbook containing all of their newly gained knowledge.

LAPBOOK AT A GLANCE

ESSENTIAL QUESTIONS

What did I learn throughout the Watershed Curriculum?

How will using this newly gained information help me to care for my environment?

MATERIALS

- Computer with internet access
- Projection devise

For each student, pair or small group:

- 1 file folder for each student
- Copies of the blackline masters (or students my cut them out of their Watershed Workbook)
- Scissors
- Glue
- Crayons/markers/colored pencils

TIME FRAME

	Estimated
Review	10 min.
Explaining the culminating project	8 min.
Making a lapbook	30 min.
TOTAL	48 min.

ASSESSMENT

The assessment of student understanding will be based on the completion of the student created lapbook and the information contained within it. A rubric has been provided in this document and the students' workbook for ease in grading.

UNIT VOCABULARY

- collection
- condensation
- cover
- Cuyahoga River
- gas
- erosion
- evaporation
- filtration
- impervious
- impurities
- infiltration
- investigation
- lake
- Lake Erie
- liquid
- natural environment
- pervious
- pond
- precipitation
- purify
- recycle
- reservoir
- river
- runoff
- slope
- soil
- soil texture
- solid
- stormwater
- stream
- transpiration
- water cycle
- water vapor
- wastewater
- wetland

Review

1. Review the **water cycle** with the whole class. Ask students to identify the steps within the **water cycle** including **runoff**. You may want to draw a diagram on the board for student reference.
2. Next, review **soil erosion** and **runoff** referencing the two investigations the students conducted in sessions 3 and 4. Be sure the students understand that **slope**, **soil texture** and **cover** and effect the amount of **erosion** that occurs.

Explaining the culminating activity

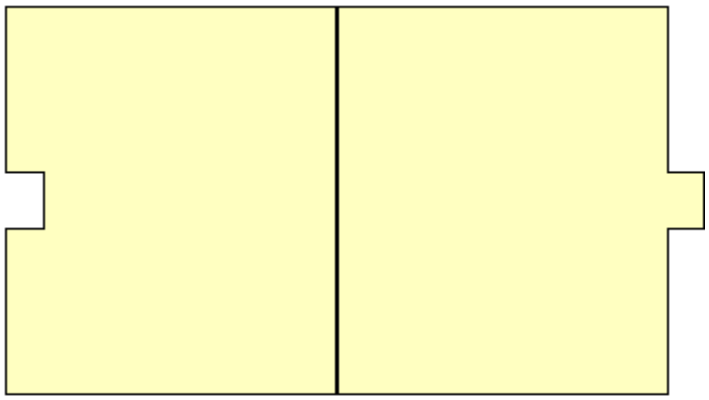
1. Explain to the students that they will be making a lapbook. A lapbook is file folder that contains a variety of "mini books," foldables, and other material and is laid out in a creative manner that fits in the student's lap. The students' lapbooks will include information on the **water cycle**, **soil erosion** and **runoff**, and the **wastewater treatment** system.
2. If technology is available, show this short video clip on how to make a lapbook. http://www.youtube.com/watch?v=t1inXbba3cg or follow the direction on the following pages.

Making a lapbook

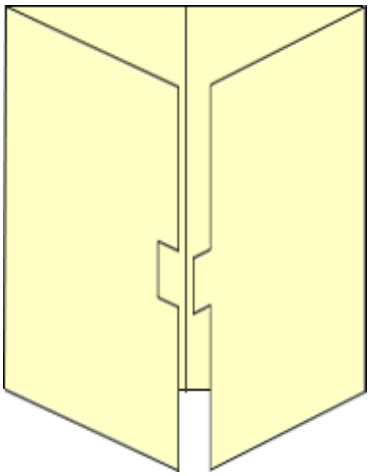
1. Model for the students how to fold their file folders as done in the video.
2. Next, students will complete each of the blackline masters with information they have learned throughout this unit. They may color each foldable and glue into their lapbooks.
3. If time permit, students may wish to share their lapbooks with their classmates.

How to fold a lapbook

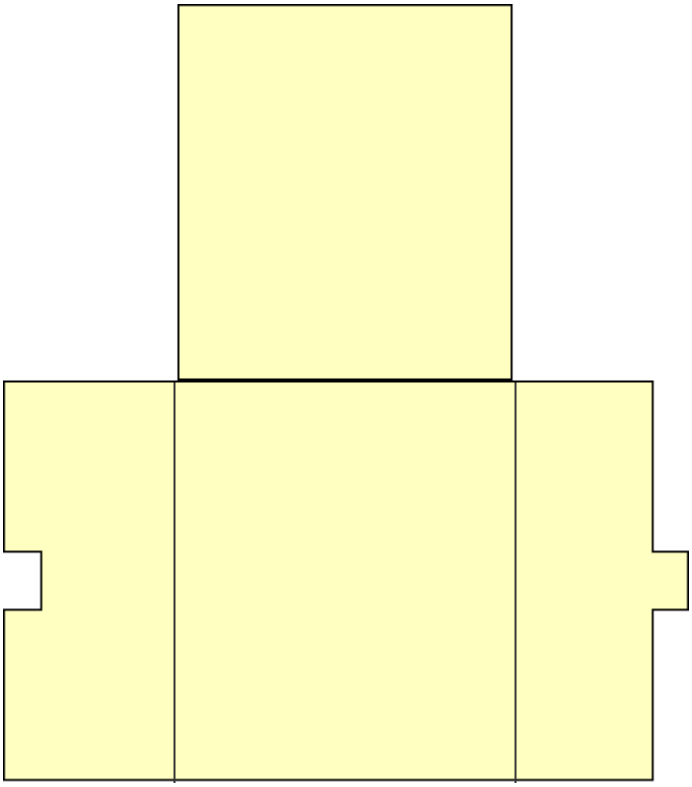
For each **lapbook**, you will need a file folder. Open up the folder.



Fold each side in to meet in the middle. You will glue each of the activities into this to make a **lapbook**.

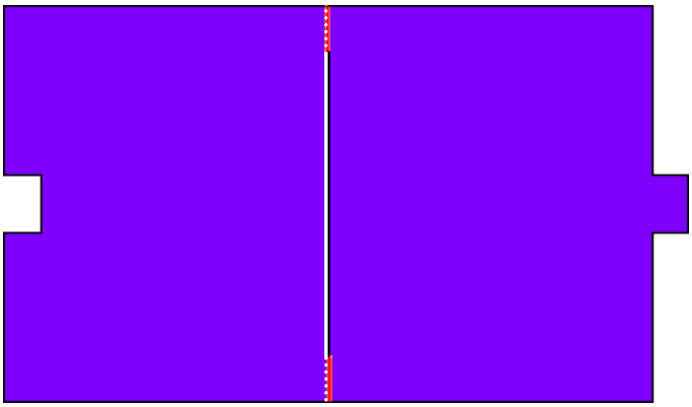


If you need additional room, you can add an extension. Use a sheet of card stock, or cut a file folder in half. Use wide packing tape to tape it to the top of your **lapbook**. Fold it down to close the book.

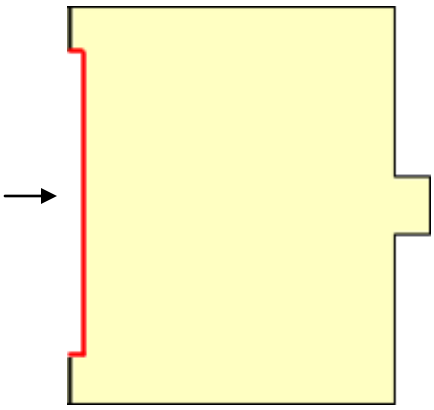


How to create a lapbook with multiple sections

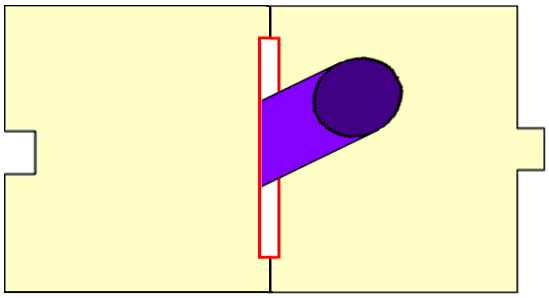
If you need an even bigger lapbook, you can put multiple file folders together to create a book of multiple sections. After you determine how many folders you will need to hold all of your information, measure down one inch on each side of the folded edge. On one folder, you will cut along the crease to the one-inch mark as indicated by the dotted lines in the picture below.



On the rest of the folders, you will cut where the arrow indicates below, starting and ending at the one inch marks, on the folded folders.



Stack together all of these last folders. With the first folder open, roll it from the bottom to the top and insert it into the slits in the middle of the other folders. When the rolled folder is halfway through, unroll it and line up the pages, sliding the slits over the creases in the stack of folders.



Lapbook GRADING RUBRIC

	4 ADV	3 PRF	2 PRG	1 BEG
Vocabulary • Multiple literacies • Science	All vocabulary words are included. Each word has a colored picture, definition and sentence.	No more than three vocabulary words are missing. Words have a colored picture, definition and sentence.	No more than seven vocabulary words are missing. Many words are missing a sentence, definition, or colored picture.	More than seven vocabulary words are missing. Notes are incomplete or illegible.
Notes • Science • Writing	Student took legible notes. He/she wrote in complete sentences explaining his/her learning. Answers are written in paragraph form.	Student took legible notes. Answers are written in complete sentences.	Notes are messy and illegible. Answers are written in complete sentences.	Notes are messy and illegible. The student did not answer all journal questions. Answers are incomplete.
Charts/Data/Graphs • Science • Multiple literacies	All charts are completed and attached to or enclosed in the lapbook.	Charts are completed, but not attached to the lapbook.	Charts are partially incomplete but included in the lapbook.	Charts are blank or missing from the lapbook.
Other • Science • Effort	All other pieces of the lapbook are completed.	One piece of the lapbook is missing. Remaining pieces are completed legibly.	Two pieces of the lapbook are missing. The remaining pieces are illegible.	Several pieces of the lapbook are missing, and the included pieces are illegible.

4 ADV = Advanced
3 PRF = Proficient
2 PRG = Progressing
1 BEG = Beginning

This rubric is included in your students' Watershed Workbook, page 16.

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2013 EDITION