Exploring and protecting waterways
Lesson 1: My community watershed

Grades	4–5	**Duration**	90 min.
Subjects	Science, English language arts		
Essential question	What is a watershed*? How do I affect my watershed*? **You may use "watershed," "drainage basin," or "catchment" in this lesson; all three vocabulary words refer to the same concept.*		
Content and language objectives	• Students will be able to name their local watershed and identify key features of it (animal, plant life, connections to other bodies of water). • Students will be able to describe the cause and effect connections between what happens in their watershed and the quality of the water for native species.		
Summary	In this lesson, students will connect the water movement and human impacts to water quality and its effects on local species.		
Standards	***Next Generation Science Standards:*** **4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.** 4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features. 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. *Crosscutting concepts:* A system can be described in terms of its components and their interactions.		
	Common Core English Language Arts: CCSS.ELA-Literacy.SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. **CCSS.ELA-Literacy.SL.4.2** **Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.** CCSS.ELA-Literacy.L.4.1.c Use modal auxiliaries (e.g., can, may, must) to convey various conditions.		

Language frames	_____because ... _____, so ... If _____, then ...	____may be affected by ... I think ...	
Vocabulary ***You may use "watershed," "drainage basin," or "catchment" in this lesson; all three vocabulary words refer to the same concept.***	watershed* catchment drainage basin	impact quality erosion species	drain/culvert to drain stream/river/lake
Materials	Pre-lesson activity: What is a watershed? Wild Guardians: Exploring and protecting waterways video Exploring and protecting waterways video guide Handout: Exit ticket Teacher resource: My watershed/native species cards Map of your area *(including your watershed; project or make copies to distribute)*		

Before the lesson
Complete the "Activity: What is a watershed?" before this lesson to ensure students understand the concept. Options for this activity include hands-on engineering, modeling, or a video. *Teacher note: You may use "watershed," "drainage basin," or "catchment" in this lesson; all three vocabulary words refer to the same concept.* **Before class:** ● Look up important animals and plants in your local watershed. Use the "Teacher resource: My watershed" for guiding questions. Fill in the "Native species cards" with the information you found. See example. These cards will be used during the collaborative and independent practice. ● Find a map of your area to project or distribute.
Engage and prepare
1. Ask students, "How is the model *(from the "What is a watershed?" activity)* the same or different from our community watershed? How is it the same or different from the parking lot or the streets outside our school?" Students share about how the water may move differently on concrete and around buildings, as opposed to just sand/dirt, as in the model. Discuss how these features may or may not change the trajectory of the water.

2. Walk around the streets surrounding the school with the class with the purpose of noticing how water would flow. Students are encouraged to notice culverts, drains, slanted concrete, hills, and natural waterways.

    Alternatively, students may complete the "Pre-watching activity" which uses images to replace this activity.

Modeled and shared instruction

1. Tell students, now that we understand the way water moves in our community, we are going to think about what we, as Wild Guardians, can do to explore and protect it.
2. Watch the video, "Exploring and protecting waterways" using the "Video guide" for stopping points and discussion questions, if desired. **Be sure to stop at 4:20 to discuss your local waterways.**
3. Review the list of waterways discussed during viewing. Distribute maps of your area, or view a map together. Locate the waterways students were familiar with and identify any additional waterways.
4. Trace these areas in blue on the map and discuss the movement of water in your community.
5. Students share their experience, if any, in visiting the watershed. This may include recreation opportunities, observations of plants, animals or even impacts of human activity.

Collaborative and independent practice

1. Show students the example "Native species cards." Tell students we are going to think about how animals and plants that live in our watershed survive. Read the information on an example native species card.
2. Ask students to discuss the cause and effect impacts on the species using the card as a guide to what it needs. Students may share answers orally. *Alternatively, include movement in their response by labeling one side of the room as "survive and thrive", one side as "may not survive" and the middle as "stay the same." Students can move along the continuum in response to the "What if ..?" questions.*
3. Ask students, "What may happen to this species if ..." *Note: These are predictions and may not be 100% scientifically accurate, the goal is for students to think about how species are impacted by outside factors, like pollution.*
    a. ... its food source died *(if it is an animal)*?
    b. ... the water quality changed from ____ to ____? (can be higher or lower, or give examples of both to show how positive or negative changes may affect the species)
    c. ... its shelter was affected (be specific giving negative examples like the grasses died, the sand eroded, etc. OR positive examples like we planted more native grasses)?
    d. ... the water was polluted by _____?

e. *Add questions about any other changes that you know have affected your local watershed, positively or negatively.*

4. Distribute the **"**Native species cards**"** you created to your students *(see **t**eacher resource for guidance)*. Tell students they are going to answer the same questions with the species on their card.
5. Ask similar questions to the example while students use their card to reflect and consider the effects on their species. Movement can be incorporated in the same way.

Evaluate and close
Call to action

1. Ask students, "How would the actions described in the video help our watershed?"
    a. Plant native plants (reduce erosion, give homes/food to native wildlife, filter water from rain going into the waterway)
    a. Monitor water quality (recognizing a problem before it gets worse is important to ensuring the water is healthy)
    b. Pick up litter (waterways flow downstream and all pollution flows with it, affecting the plants and animals in different places)
2. Students choose one action to implement as a class or independently. Use the "Lesson: Action in our community" to plan an activity for the class, if desired.
3. Students complete the "Exit ticket" to show their understanding.

Written by Emily Townsend in collaboration with Mongabay Kids.

About Wild Guardians

Mongabay Kids is the Kids Desk of Mongabay, a nonprofit environmental science and conservation news platform.

Wild Guardians is a multimedia educational series that uses videos, comics, and hands-on activities to engage grade 4–5 students in community-based interdisciplinary learning about how to be stewards of wild things and wild places in their community.

Website: kids.mongabay.com

Special thanks

This project was supported by a grant from The CEK Foundation Earth Focus Initiative.

Activity: What is a watershed?

Duration: 30 min.

*This activity can be stand-alone or used before teaching either of the **exploring and protecting waterways lessons** to introduce the concept of a watershed.*

Science and Engineering Practices: Developing and Using Models

Before class, compile materials for groups of 3–4 to engage in hands-on exploration with a watershed. Several options are described below:

a. Each group needs a baking tray (or something of a similar size) with several large scoops of sand or dirt and a spray bottle or eye dropper with water. Sand or dirt may be dry or slightly damp to allow students to work with it more easily.
b. Alternatively, this activity may be done outside on the playground and only water and spray bottles/eye droppers will be needed.
c. The class may instead observe one example, facilitated by the teacher.
d. A video of a similar simulation can be used to show students the concept of a watershed.

Activity:

1. Distribute materials to student groups. Instruct groups to build a landscape with at least one hill/mountain, including high and low areas. *You may instruct students to build the landscape of your community, if desired. You may ask students to sketch their landscape after building.*
2. Ask students to locate the highest points in their landscape and predict, “If it rains here, where will the water go?”
3. Students discuss their predictions of how the water will move from the highest places around their landscape. *If students have sketched their landscape, they may mark their predictions on their sketch.*
4. Next, students use the eye dropper or spray bottle to simulate rain and observe the movement of water.
5. Students discuss and revise or confirm their predictions and why the water may have moved differently than they anticipated. *If students have sketched their landscape, they may mark the true path of the water on their sketch.*
6. Student groups share their observations with the class.
7. Label the place where all the water drained downhill as the “watershed.” Alternatively, if may be referred to a drainage basin or a catchment.
8. Student groups clean up their materials.

Teacher resource: My watershed

1. Locate your local watershed using your own background knowledge or one of these sites. Your watershed is the area of land over which rainwater or snowmelt flows downhill into the same creek, river, lake, or other body of water. See sites below for maps to find yours or search for a map of your local watershed online.
    a. USGS
    b. Model My Watershed
    c. NOAA
2. Record the names of two or three native plants or animals that live in the watershed. Research their food source, water quality needs (excellent, good, fair, poor), shelter and habitat requirements. See example below. Fill in this information into the *native species cards* and print for student use in the collaborative and independent practice.

Native species cards examples

Native species name: hellbender **Food source:** crayfish, small fish, insects, snails **Water quality:** excellent **Shelter:** under large rocks **Habitat requirements:** stay mostly in one place in a fast-moving watershed; hunt in area of hiding place under large rock	 Image: Reid Hardin via iNaturalist (CC BY)
Native species name: great blue heron **Food source:** fish, frogs, snakes, insects **Water quality:** excellent **Shelter:** nests in trees, hunts in wetlands and along the shore **Habitat requirements:** hunt along shorelines of rivers and lakes	 Image: Canva
Native species name: crawfish **Food source:** plants, insects, decaying matter **Water quality:** good or excellent **Shelter:** in a lake or pond, under rocks or in burrows **Habitat requirements:** weedy muddy shorelines	 Image: evangrimes via iNaturalist (CC BY)

Native species cards: My community

Fill in with examples from your community.

Native species name: **Food source:** **Water quality:** **Shelter:** **Habitat requirements:**	Insert image
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Name _____Date_____

Exit Ticket

1. What is the name of our watershed?

_____

2. What is one species that lives there? What does it need to survive? How do changes to the watershed affect it?

_____

_____

_____

3. How do the choices we make affect the watershed?

_____

_____

Name _____Date_____

Exit Ticket

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