Iowa - The Rivers of Her Valleys 4.0

REAP Resource Enhancement and Protection

UNI University of Northern Iowa
Earth and Environmental Sciences

Title - Building background to understand your local watershed. IRHV_4ESS_2-2_Earth's Systems
Audience - 4th/5th Grade
Lesson Description - *Big Ideas / Big Question* *5.6 Water shapes landscapes. Flowing water in streams strongly shapes the land surface through weathering, erosion, transport, and deposition. Water participates in both the dissolution and formation of Earth's materials. Questions* - Iowa Core, NGSS and Earth Science Literacy http://www..org/document.html 1. **What watershed is your neighborhood a part of? Where does rainfall on your school flow to? What is the route the water flows to the nearest stream?**
Time Needed to Complete - Two Lessons, approximately two hours.
Iowa Science Standards - Earth and Space Sciences 4–ESS2–2 Analyze and interpret data from maps to describe patterns of Earth's features. 4-ESS2-1 Earth's Systems Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Sustainability Implications & Practices
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)	**ESS2.B: Plate Tectonics and Large-Scale System Interactions** The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)	**Patterns** Patterns can be used as evidence to support an explanation. (4-ESS2-2) **Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change.	**How can our actions on Earth impact the movement of water across the land?** A. Agriculture's impact? B. Construction: building parking lots, roads, play grounds?
Students will…	**Students will**	**Students will**	**Students will**
Use observations and data to create a map to predict where the water may flow.	**Use their map and observations to verify where water flows on campus.**	**Identify the changes they observe** **Observe how water flow changes the area they have mapped over time.**	**Observe that water behaves differently in natural versus human altered environments.**

I-can statements

I can identify the path of water movement within my local watershed.

I can identify the nearest creek to my school.

I can create a map of the route water travels from my school to the nearest creek.

I can demonstrate an understanding of what happens to water on my property and how that water goes into my local stream.

Resources

Video: What is a watershed? https://www.youtube.com/watch?v=yhsHS1sYfdc

Map of Wapsinonoc Creek Watershed: https://mywaterway.epa.gov/community/52776/overview

Map of Lower Cedar River Watershed:
https://www.iihr.uiowa.edu/iowacedarbasin/watersheds/?doing_wp_cron=1592866076.5677878856658935546875

United States Topographic Map: Elevations: https://en-gb.topographic-map.com/maps/zjd/United-States/

Google Earth: https://earth.google.com/web/

Evidence of Learning

Students will produce:

A. Notes from class about the definition of watersheds.
B. Students will explore two websites with maps and make interpretations to conclusions about how water will move in their community.
C. Their own map predicting the movement of water from their school grounds.
D. An understanding of a watershed shown by participation in discussion and engagement in walking tour.

5-E Format

Engagement/ Excitement	**Indoors:** 1. Start discussion with students about where the rainfall that falls on the school building travels to? 2. Explore their understanding of a watershed by having them journal about what happens to the rain after it falls on their school. 3. Introduce the term watershed. 4. Watch the video: **What is a Watershed?** https://iowa.pbslearningmedia.org/resource/ket09.sci.ess.water.wshed/what-is-a-watershed/ 5. The teacher will present three maps of watersheds from the small to statewide (see resource links). 6. Students will explore the two map websites and journal about how they think water will move. 7. Using online tools students will find the elevation of their school and the nearest (creek, stream, or river) 8. Identify elevation of their school and creek.
Exploration	**Outdoors:** 1. Discussion about what will happen to water that falls on the school parking lot. 2. Using a garden hose or nearly full 5 gallon bucket, run water onto the concrete. 3. Discussion about how the water on concrete behaves. Did it travel the way you thought it would? 4. Walking tour to "follow the water" to your school's local creek. 5. Stop on the tour to reinforce earlier discussion about watersheds. The ideas of changing elevation (high to low), gravity water's down slope movement seeking the lowest local elevation. *An idea that may enhance student engagement would be to have them carry old soup cans or some other container that they could use to periodically take water from the stream and test how water moves to get back into the stream, move down a large rock, or some other surface. Questions you could ask the students may include: a. How may a slope's steepness influence the movement of water? b. Would the type or density of vegetation impact how water moves? c. Would the temperature of water matter, would cold water move slow or fast, what about frozen water or warm water? d. Would moving water be impacted if the ground was compacted and hard vs. ground that is made of loose 'soft' soil or sediment?
Explanation	Students will share in small groups: 1. How would you describe how the water moved? (Example form higher elevation to lower, in or out of a channel) 2. Where did the water go when it left the school? 3. The group will come to a consensus on their explanation of how water flows from their school.

Evaluation	**Goal:** Students will create a geographic representation (map) to illustrate the path water will flow from their school to the closest stream. They will also write a one page description of what a watershed is, identify their local watershed, and describe how water flows from their school and the waterway it discharges into.
Enrichment/ Elaboration/ Extension	**Extension Ideas**: Why should you be concerned about what you do with water on your property? Could construction activities increase or decrease the possibility of water getting into your basement?

Rubric

The most important aspects for 4th to 5th grades would be :

The concept of shape, water that falls within the watershed/shape/basin will move through that basin and not another one... AND

Relief/elevation change/slope water flows from high to low

'Criteria'	Emerging	Developing	Proficient
Content ● Students organize their information to create a map of water flow. ● Students identify patterns in the location of Earth features. ● Students also organize the information they have been presented with to create a written description of a watershed and a description of how water flows in their own watershed.	Student's map is a copy of an existing map or does not represent the school grounds - many major features missing. Prediction of where water flows is missing or lacks supportive evidence. Student narrative does not define a watershed or provides no observations, evidence, or examples to back up their definition. Student's description of how water flows includes misconceptions/is not accurate and/or is not backed up by evidence.	Student integrates a few sources of information, including their own observations to develop a map of the school grounds. Map may be missing some key features. Prediction of where water flows missing supporting evidence and/or includes inaccuracies. Student's watershed description is missing a key feature or idea (such as elevation change high to low/slope). Student's description of how water flows is missing a key feature or idea or only minimally backed up with evidence from observations or research.	Student integrates information from the field trip and research activities to develop an accurate map of the school grounds. Prediction of where water will flow is based on elevation and physical features of the area. Student's narrative accurately describes a watershed. Student's narrative accurately describes who water flows, is presented logically and backed up by multiple sources of evidence.

Application ● Students use logical reasoning to organize the information they are presented with to define a watershed. ● In their mapped description include the Earth's features occur in patterns that reflect information about watersheds and how they act.	Students who are emerging miss important evidence or leave it out completely (The sky IS blue. No information about why).	Student may rely on a single source too much or completely or put together the evidence in a confusing order/way.	Students who are proficient assemble their evidence logically and include more than one source.

2. Earth Systems : Processes that Shape the Earth
4 ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.
The performance expectations above were developed using the following elements from the NRC document for K-2 Science Education

Connections to other DCIs in # grade

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Articulation of DCIs across grade levels Articulation of DCIs across grade-levels: 2.ESS1.C (4-ESS2-1); 2.ESS2.A (4-ESS2-1); 2.ESS2.B (4-ESS2-2); 2.ESS2.C (4-ESS2-2); 5.ESS2.A (4-ESS2-1); 5.ESS2.C (4-ESS2-2); MS.ESS1.C (4-ESS2-2); MS.ESS2.A (4-ESS2-2); MS.ESS2.B (4-ESS2-2)
Iowa Common Core Standards Connections : Common Core State Standards Connections: ELA/Literacy – RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2) W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS2-1) W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS2-1) Mathematics – MP.2 Reason abstractly and quantitatively. (4-ESS2-1) MP.4 Model with

mathematics. (4-ESS2-1) MP.5 Use appropriate tools strategically. (4-ESS2-1) 4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS2-1) 4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1),(4-ESS2-2

Potential online resources :

NEEF(National Environmental Education Foundation) website: https://www.neefusa.org/nature/water/lesson-1-watershed-basics

PBS Learning Media (What is a Watershed): https://iowa.pbslearningmedia.org/resource/ket09.sci.ess.water.wshed/what-is-a-watershed/