

Service-Learning Curriculum Unit Plan

Unit/Topic: Who'll Stop the Rain? (Storm water Runoff: Rain Gardens Education of the Public)	Grade Level: 6 th and 7 th - Science
Service Idea: (Provide Description) Students will evaluate an area next to our school for storm water run off and make suggestions to reduce and/or improve the quality of water that enters the Flat River.	
1. Content Standards/Grade Level Content Expectations: (Identify learning outcomes to be addressed) 6th: L.EC.06.11 - Identify and describe examples of populations, communities, and ecosystems including the Great Lakes region. L.EC.06.41 – Describe how human beings are part of the ecosystem of the Earth and that human activity can purposefully, or accidentally, alter the balance in ecosystems. E.SE.06.12 – Explain how waves, wind, water, and glacier movement, shape and reshape the land surface of the Earth by eroding rock in some areas and depositing sediments in other areas. E.SE.06.13 – Describe how soil is a mixture made up of weather eroded rock and decomposed organic material. E.SE.06.13 – Compare different soil samples based on particle size and texture. 6th & 7th: Inquiry Process S.IP.06.13, S.IP.07.13 – Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes) appropriate to scientific investigations. S.IP.06.14, S.IP.07.14 – Use meter measurement devices in an investigation. S.IP.06.15, S.IP.07.15 – Construct charts and graphs from data and observations. S.RS.06.15, S.RS.07.15 – Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities. S.RS.06.16, S.RS.07.16 – Design solutions to problems using technology. S.RS.06.17, S.RS.07.17 – Describe the effect humans and other organisms have on the balance of the natural world. 7th: E.ES.07.41 – Explain how human activities change the surface of the Earth and affect the survival of organisms. E.ES.07.42 – Describe the origins of pollution in the atmosphere, geo-sphere, and hydrosphere, and how pollution E.ES.07.82 – Analyze the flow of water between the components of a watershed, including surface features and groundwater	

<p>2. Students will understand that.... (What are the enduring understandings?)</p> <p>6th – Students will understand how humans accidentally or purposely alter ecosystems and how that affects erosion at that site.</p> <p>7th - Students will make a connection between the water that flows down a storm drain and the water that flows down the river two blocks from our school.</p> <p>7th - Students will recognize situations that are environmentally sound or unsound and be willing to create change in order to improve the environmentally unsound situation.</p>	<p>3. Essential Questions to Guide Learning & Inquiry: (Turn understandings into essential questions.)</p> <p>6th - How do humans accidentally or purposely alter ecosystems?</p> <p>6th - How does change in ecosystems by humans affect erosion?</p> <p>7th – How is the water that flows down the storm drain connected to the river water?</p> <p>7th – What impact does that have on the river ecosystem?</p> <p>7th – What change can you make when you recognize an environmentally unsound situation?</p>
<p>4a. Students will know.... (What is the content knowledge focus?)</p> <p>6th – Know what an ecosystem is.</p> <p>6th – Recognize an accidentally or purposely altered ecosystem.</p> <p>6th – Know what is erosion and recognize it in the environment.</p> <p>7th – Understand watershed principles.</p> <p>7th – Know what a storm drain looks like and its purpose.</p> <p>7th – Recognize that pollution in one area of the watershed affects other areas of the watershed.</p> <p>7th – Know the difference between sound and unsound environmental situations.</p> <p>6th & 7th – Be aware of possible solutions to environmental problems.</p>	<p>4b. Students will be able to do.... (What are the skills?)</p> <p>6th – Identify components that make up an ecosystem.</p> <p>6th– Differentiate between an accidentally or purposely altered ecosystem.</p> <p>6th – Define erosion and recognize it when present.</p> <p>7th – Measure length using metric measurements and tools.</p> <p>7th - Define a watershed and label its components.</p> <p>7th - Accurately describe the effect pollution deposited in one area of the watershed has on another area of the watershed.</p> <p>7th – Accurately recognize and make appropriate recommendations for unsound environmental practices.</p>

Assessment Evidence

5a. Performance Task:

(What will students do to demonstrate their learning?)

6-1 Assessment on definition of an ecosystem and its components and explain why the south lawn is an ecosystem.

6-2 Illustrate an example of an area before erosion and after erosion.

6-3 Create a solution chart for the area of erosion on the south lawn with valid reasons for the solution.

7-1 Assessment of student's ability to measure perimeter and area.

7-2 Assessment on the definition of a watershed and its components.

7-3. Write a persuasive essay making appropriate recommendations for sound environmental practices for an area.

5b. Other Assessment Evidence:

(Describe formative/on-going/other summative assessments.)

5a. Performance Criteria:

(Provide checklists, rubrics, or criteria.)

6-1 Assessment of ecosystem and components.

6-2 Rubric for erosion illustration.

6-3 Rubric for solution chart.

7-1 Assessment on metric measurement of length and area.

7-2 Assessment on watersheds and its components.

7-3 DBQ format for persuasive letter writing.

5b. Other Assessments Criteria:

(Describe criteria for other assessments.)

1. Survey the area (soil testing/water testing)
2. Measuring the perimeter and surface area
3. Design the garden
4. Prepare and plant garden
5. Publish/promote rain gardens

Learning Plan:

(Develop a series of lessons/learning activities.)

(Give enough detail for another teacher to follow.)

(Consider the 5 Components of Service-Learning: **Investigation, Planning & Preparation, Action, Reflection, Demonstration of Results & Celebration.**)

A. Steps for Students:

- Lead Activity (Introduce desired results, ask essential question, connect with student experience, begin **investigation & pre-reflection**)
- Student-centered learning steps (Detailed sequencing of lesson; specify formative assessment during practice and summative assessment in conclusion. Include **planning & preparation, action, & reflection**)
- Closure (Revisit enduring understanding/essential question. Include **reflection & demonstration of results & celebration**)

Planning & Preparation

1. Survey the area for size (measure), problem areas (obvious erosion), and solutions to the problem (brainstorm).
2. Draw a map of the area (lesson in scale).
3. Define watershed and its features. Define pollution both man-made and natural (classroom activities)
 - Include weekly survey of storm drains surrounding the school for forms of pollution.
 - Gather data for data table and graph.
4. Investigate types of plants that will produce the desired result in our area. At this point we may call in an expert from a landscaping company.
 - Letter writing skills asking for a presentation.
 - On-line research of water gardens/wildlife gardens.
5. Design the garden including items we would like to see in the garden.

Action

6. Write persuasively to school board and/or make a presentation to the school board for permission to create the garden.
7. Prepare area for a garden.
8. Plant garden.
9. Create media (brochure/power point/video) to expose the public to the relationship between storm drains, the Flat River, and pollution entering the river.

Reflection

10. Students design a survey for students including what went well/what could we have done better.
11. Administer survey.
12. Tabulate results and present to student body.

Reflection & Demonstration of Results & Celebration

13. Create display for Community Showcase in Belding concerning the project.
14. Make presentation at a school board meeting.
15. Celebrate in the garden with ice cream?

B. Notes for Teacher:

(What do you need to remember to do?)

C. Materials Needed:

Soil enhancer, shovels, gloves, beams or rocks to terrace the area, appropriate plants for the area, enough benches to hold a classroom, possibly a picnic table, rocks or woodchips for cover.

D. Approximate Time for Unit:

Year long, incorporated into our curriculum.

E. Resources:

Students to plan, design, and plant smaller vegetation.

Local landscaper that may help with the larger, heavier items.

Maintenance department to install the benches and picnic table.

Lesson 1 of 2 for 6th grade**Lesson Essential Question(s):**

What are the components that make up an ecosystem?

Lesson Knowledge:

Identify the components that make up an ecosystem.

Lesson Skill(s)

Prediction, identification

1. Lesson Opener:

Show pictures of Michigan Ecosystems and discuss why do students think this is an ecosystem? What are things you see in the pictures? Are there things similar in the pictures of different ecosystems? Ask students to list things they think are necessary to have in an ecosystem.

2. Transition:

Students will share with the class what they think are the necessary things in an ecosystem.

3. Activity:

1. Discuss and take note on biotic and abiotic factors in our study area. Students will survey and create a school yard map of the Rain Garden area and make a list of abiotic and biotic factors in our area.
2. Students will do a soil test on the rain garden area, checking to detect nutrients in the soil and decide what we need to do to make the soil in the area better suitable for plants.

4. Lesson Wrap-Up:

Review biotic, abiotic factors and share soil findings and suggestions for making the soil better in our target area.

5. Additional Lesson Notes:

Will need supplemental materials to assist in teaching about abiotic, biotic and soil types and testing. Use science textbook, "Environmental Science"

Lesson 2 of 2 for 6th grade**Lesson Essential Question(s):**

Why does erosion occur and what are ways we can stop erosion from happening?

Lesson Knowledge:

What erosion looks like.
Planning steps to create the garden that will stop erosion.

Lesson Skill(s)

Identifying, developing, planning

1. Lesson Opener:

1. Pass back school yard maps from biotic and abiotic lesson.
2. Give students another opportunity to go to the garden area to get a refresher look at the area, point out the area of erosion near the storm drain.
3. Discuss possible reasons for erosion to occur at the area.

2. Transition:

Pair students together and have them brain storm possible solutions to the erosion at the storm drain.

3. Activity:

1. Students create a list of ideas to stop erosion at the site.
2. Create a solution chart for the erosion in the area.
3. Create a list of steps needed in order to carry out the design of the rain garden and the prevention of erosion in the area.

4. Lesson Wrap-Up:

Review what erosion is and what it looks like in the environment. Review possible solutions for stopping erosion at our rain garden site.

5. Additional Lesson Notes:

Take notes on erosion with examples of pictures. Show pictures of other rain gardens.

Lesson 1 of 3 – 7th Grade **Refer to MEECS Water Quality Curriculum – Lesson 3**

Lesson Essential Question(s):	Lesson Knowledge:	Lesson Skill(s)
Why should we care about our watershed?	Watershed components and how they are connected to each other.	Identify the parts of a watershed (vocabulary).

1.Lesson Opener:

Ask students to think about the last time it rained and where the water went that fell on the ground. Discuss similarities of their answers.

2.Transition:

Ask students to gather around a model of a watershed that you have prepared ahead of time. A small pool with newspaper crumpled under a shower curtain works nicely to create drainage divides and drainage basins.

Demonstrate the concept of watershed by spraying colored water onto the shower curtain and observing how the water droplets collect, run downhill, and then collect in the basins of the “watershed”. Point out and talk about the different parts of the watershed and indicate the different water sheds visible with this model.

3.Activity:

Hand out the blank diagram of a watershed and have students label the parts of the watershed as you label them on the overhead. Also give brief definitions of each part of the watershed.

4.Lesson Wrap-Up:

Return to the model of a watershed and ask students to lay labels on the parts of the watershed. The labels are copied onto overhead material and cut out ahead of time. You can give one to each student and ask them to place it in an appropriate spot on the model according to what they have just learned in their notes. Point out that the notes are a 2-D model of a watershed and what is before them is a 3-D model.

5.Additional Lesson Notes:

When giving definitions of the parts of a watershed, be sure to explain “upstream” and “Downstream” as children often don’t understand these terms.

Lesson 2 of 3 – 7 th Grade		Refer to MEECS Water Quality Curriculum Lesson 3
Lesson Essential Question(s):	Lesson Knowledge:	Lesson Skill(s)
How is our watershed connected to the Great Lakes?	Understand that our local watershed is connected to other watersheds and the Great Lakes.	Identify our watershed on a map of Michigan. Identify that our watershed flows into Lake Michigan.
<p>1. Lesson Opener:</p> <p>Ask students to write down the name of the closest river to their hometown. Then ask them to write down the river that their river empties into, etc. Lastly, ask them to write down the Great Lake their river eventually empties into.</p> <p>2. Transition:</p> <p>Using a Michigan road map have groups of students find their hometown and then find the river that flows through or closest to their hometown. Have students follow the river “downstream” until it empties into a Great Lake.</p> <p>3. Activity:</p> <p>Hand out a “Michigan’s Water World” poster to each group of two students. Hand out the directions sheet to each student. Have the students use overhead markers to make the designations on the poster and answer the questions on the handout. (Handout is in the MEECS Water Quality Binder – Lesson 3).</p> <p>4. Lesson Wrap-Up:</p> <p>On the back of the handout have students color the parts of Michigan that flow into each Great Lake. They can use their “Michigan’s Water World” poster to determine where the boundaries are between each of the Great Lakes watersheds.</p> <p>This activity demonstrates the different levels of watersheds.</p> <p>5. Additional Lesson Notes:</p> <p>There are multiple activities you can use to connect the idea of watersheds and sources of pollution to the watershed. The above 2 lessons are a beginning point. There would be a few lessons in between here and the next lesson concerning storm drains.</p>		

Lesson 3 of 3 – 7th Grade Refer to MEECS Water Quality – Lesson 8

Lesson Essential Question(s):	Lesson Knowledge:	Lesson Skill(s)
How Can We Stop Storm Water?	Recognize storm water runoff as a possible source of pollution and recognize ways to reduce it.	List possible pollutants in storm water runoff. Suggest ways to reduce storm water runoff.

1. Lesson Opener:
Over a three week or more period of time, monitor the storm drains surrounding the school. Define a six to eight foot radius around the storm drain and survey it weekly. Make note of the various pollutants observed around the storm drain that might go down the drain. Make a data table with categories determined by the students and then create a graph of your findings.

Walk to the river and observe where the storm drain empties into the river if possible. If not possible, obtain pictures of areas where storm drains empty into the river.

2. Transition:
Show the video, "After the Storm". Students should fill out the study guide, "Storm Water Study Guide".

3. Activity:
Show the overhead transparency "Storm Water Runoff and Infiltration". Discuss infiltration and the impacts of infiltration vs. runoff.

Go to the water garden site and have students make suggestions to improve infiltration and reduce runoff. Lead the students to conclude that more vegetation in the area will retard the runoff, reduce pollution to the river, and benefit the aquifer under the ground.

4. Lesson Wrap-Up:
Have students write in their journals making suggestions for the site. Include drawings.

5. Additional Lesson Notes:
At this point plans can be made for implementing the research and planning of the water garden.