

Rainwater Harvesting: Global Experiences and Local Impacts

Lesson Time Block: 60 minutes

Grades: Middle School Science (6-8)

Lesson Description: Rainwater harvesting could be a reasonable means for people in India to meet some of their water needs that is sustainable and cost effective. This lesson will serve as an introduction to sustainability practices, focussing on water conservation, water resources and water usage for human needs.

Lesson Objectives:

- Students will be able to identify the various sources of water in India; and research the various ways people in the country gather their water.
- Students will analyze the reasoning behind water catchment systems.
- Students will explore the different practices used globally and locally regarding harvesting rainwater for different usages in our daily lives.
- Students will create a CER (claim, evidence, and reasoning) scientific argument and research the best practices for rainwater harvesting.

Standards:

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating) solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as air, water, or land).]

Assessment:

Teacher will support notetaking and student self-directed learning of topics on water harvesting and sustainability practices. Final assessment will come by assessing understanding of topics when students complete a follow up gallery walk of their claim, evidence and reasoning writing task. For this lesson, students will be assessed on their note-taking skills. Grading rubrics are reflective of video/lecture and article note-taking to support CER writing.

Resources:

1. Photographs and Images of Water Harvesting Practices in India, and NJ
2. YouTube Videos

3. Stepwell Atlas Mobile App via Google Play- <http://stepwells.org/atlas.php?cmbm=1>
4. Google Workspace for Education
5. Student Devices: Chromebook, Laptop, Tablet, etc.
6. Public service video from India, promoting rainwater harvesting:
<http://www.indiaenvironmentportal.org.in/content/389296/rainwater-harvesting-a-short-advertisement-film-on-rainwater-harvesting-by-centre-for-science-and-environment/>

7. Water Harvesting Articles

- <https://smartwatermagazine.com/news/smart-water-magazine/indias-stepwells-could-help-water-crisis>
- <https://www.bbc.com/future/article/20211012-the-ancient-stepwells-helping-to-curb-indias-water-crisis>
- https://www.nj.gov/dep/stormwater/bmp_manual/Archived_NJ_SWBMP_9.15.pdf
- <https://www.downtoearth.org.in/news/water/pride-in-ruins-60781>
- <http://www.indiaenvironmentportal.org.in/content/414410/how-raindrops-could-save-rup-ees/>
- <http://www.indiaenvironmentportal.org.in/content/273057/rainwater-harvesting-as-an-adaptation-to-climate-change/>

8. Visit to stepwell in India, along with tour guide.

<https://photos.app.goo.gl/6mxWcZuZLCRabgbB8>

9. Rainwater Harvesting Organization websites from India:

- <http://www.rainwaterharvesting.org/jalswaraj2.htm>
- <http://www.rainwaterharvesting.org/raincentre.htm>
- <http://www.rainwaterharvesting.org/Rural/Rural.htm>
- <http://www.rainwaterharvesting.org/Urban/Model-Projects.htm>
- <http://www.rainwaterharvesting.org/Solution/Water-Arithmetic.htm>

Rainwater harvesting systems from Rainwater Harvesting Org:

<http://www.rainwaterharvesting.org/Urban/Practices-and-practitioners.htm#chen>

5E Lesson Plan/ Instructional Model

Process Steps:	Teacher (What questions will you ask? What will you do, saw, and write? What tools will you use?)	Students (What answers/ thinking do you predict? What tools will students use?)
Engage (10 minutes)	Teacher will greet students- teacher will prompt students to complete “Do Now/Warm Up”	Students will complete (Graphic Organizer- in response to what students see, think, wonder when they observe the image, or watch the video.

	<p>activity. Begin with a video, or image of rain catchment systems</p> <p>Brainstorm</p> <ul style="list-style-type: none"> • What do you think? <p>Ask questions</p> <ul style="list-style-type: none"> • What do you wonder? What are you curious about? <p>Access prior knowledge</p> <ul style="list-style-type: none"> • What do you know? How did you learn it? 	<p>Discuss questions in breakout groups using Jam Board.</p>
<p>Explain (10 minutes)</p>	<p>Teacher will use a presentation platform via Google Slides, Power Point, or Prezi to explain to students how India has promoted a rainwater harvesting program to help people meet their water needs through government promotions.</p>	<p>watch the Public service video promoting rainwater harvesting in India. http://www.indiaenvironmentportal.org.in/content/389296/rainwater-harvesting-a-short-advertisement-film-on-rainwater-harvesting-by-centre-for-science-and-environment/</p> <p>Students explain the practicalities of applying rainwater harvesting for community and individual needs. They may write this up, illustrate it, or create some models that show how this concept would work.</p>
<p>Explore (10 minutes)</p>	<p>Teacher will have students review vocabulary around the topic of rain water harvesting</p> <p>Teacher will model annotation and method of note taking for students with a short one- page article</p> <p>Teacher will have students discuss and research from where people can get water to meet their needs.</p>	<p>Students will add new vocabulary terms into their Interactive science notebooks.</p> <p>Students will split off into their designated groups once instructed. Students explore various websites for different rainwater harvesting systems, traditional and contemporary, in rural and in urban settings.</p>
<p>Elaborate (20 minutes)</p>	<p>Teacher will be watching clips and monitoring student progress on articles.</p>	<p>Students will view clips/read articles and take notes in groups. Students will make connections to water sustainability practices in India, and New Jersey.</p> <p>Document process as a group by creating a CER-based narrative answering the driving</p>

	<p>Teacher will assist with note taking as needed and support understanding of material.</p> <p>Teacher will have students construct an argument around the topic of rain water harvesting.</p>	<p>question.</p> <p>“What is rainwater harvesting, how can step wells be used for water conservation?”</p> <p>Students will link data to claim with reasoning. Students must support the response with evidence from video notes, classroom notes, and discussion notes.</p> <p>Shared Google Docs, Slides, etc.</p>
Evaluate (10 minutes)	<p>Teacher will grade CER on a given rubric.</p> <p>Teacher will gage student understanding based on notes and wrap-up discussion</p> <p>Informal, and Formal Assessments</p>	<p>Student CER Scientific Writing will be graded using rubric.</p> <p>Tests and quizzes Kahoot Exit ticket Self Reflection</p>

C.E.R	Level 1	Level 2	Level 3
Claim: A statement that answers the question or problem posed.	Does not make a claim or makes an inaccurate claim.	Makes an accurate but incomplete claim.	Makes an accurate and complete claim.
Evidence: Data that supports a claim. Evidence can come from reading, observation or investigation.	Does not provide evidence, or evidence provided does not support the claim.	Provides appropriate but insufficient evidence to support the claim. Also includes some inappropriate evidence.	Provides appropriate and sufficient evidence from readings, research, etc. to support the claim.
Reasoning: Explains how and why evidence supports a claim using scientific ideas and concepts. Data to support the claim.	Does not provide reasoning, or only provides reasoning that does not link evidence to claim.	Provides reasoning that links evidence to claim, Makes minimal connections to science ideas and/or concepts.	Provides reasoning that links evidence to claim. Makes appropriate and sufficient links to science ideas and/ or concepts.

Writing-Style: Clarity of expression	Argument is not clear	Argument is written in a clear manner.	Argument is written in a clear, compelling, and scientific manner.
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