

## Teacher Resources: Lesson #7: Renewable and Re-useable

### Lesson # 7: Renewable and Re-useable

**Driving Question:** Once it's gone is it really gone?

**Learning Goal:**

Renewable/re-useable: Depending on the type and rate of use, water can be a renewable and re-useable resource. (NSES 9-12F42 p. 198; LPG)

Humans need to take action to protect the water supply. Decisions about the water supply should consider

- 1) Data & evidence
- 2) Cost/benefits
- 3) Bias & perspective

**Objectives:**

O10 - Analyze water use situations to distinguish ways in which water is renewable and re-useable (using).

**Assessment:**

A10 - Given different water use situations, explain whether the water is renewable and re-useable.

**Lesson Purpose:**

This lesson serves two main purposes: a beginning to an assessment for the unit where students will start to think about the connections of what they have learned and a chance to explore if water is a renewable and re-useable resource. The lesson will also serve as a chance to connect the ideas of all the previous lessons by tracing the movement of water through all water systems.

**Lesson Overview:**

Activity Number	Label	Function	Description
7.1	Daily Journal questions	Elicit ideas; assess students think, preview new lesson	Students respond in journals to daily question. This activity is repeated each day of this lesson using different questions.
7.2	Defining the terms	Construct understanding – In this activity the teacher will engage in a class discussion of the meaning of the words renewable, re-useable, and non-renewable.	Students will answer teacher led questions to construct a definition for renewable and re-useable (option 1) The teacher will give the students definitions for the terms to use in 7.3. (option 2)
7.3	Renewable, re-useable and water	Construct understanding - In this activity students will construct a rational for if water can be categorized as renewable or re-useable in the Verona Wells situation. They will have to consider time, water movement, and acceptable levels of contamination.	Students will use the Verona Wells lesson to explore if the water from this situation is renewable or re-useable.

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7.4	Putting It Together – Role Play	Assess and connect lessons, elicit ideas - This activity is used to connect all the ideas of the movement of water the student has learned throughout the unit.	Students will engage in a role play using the story of a friend who wished to dispose of used oil improperly.
7.5	At the Theater – Watch the Role Play	Assessment- This activity will allow the student to listen for strengths and weaknesses in the role plays.	In this activity students will watch the role plays of their classmates and assess the accuracy of the explanations.

### Preconceptions:

1. Students may believe that resources such as water can never be used again or are unsure of the timetable of when it can be used.
2. Students may not realize that the journey of a contaminant, no matter the starting point, will have common aspects.

Common Preconceptions	Goal Conception	Addressing activities	What to Emphasize
1- Renewable and re-useable	A substance is considered renewable if the resource can be replenished within our life time. A re-useable resource is one that can be replenished or refreshed by humans.	7.2 – Defining Terms	The teacher will lead a discussion to define the terms and model an example of oil.
		7.3 - Renewable, nonrenewable, re-useable and Water	Students will use the definitions of the terms to determine how the water at Verona wells could be described as each of the terms.
2- Tracing of contaminant		7.4 – Putting It Together – Role Play	Students will trace the path of oil through the natural and man-made water systems by performing a role play.
		7.5 – At the Theater – Watch the Role Play	Students will watch the role plays of their peers, pointing out strengths and weaknesses of content.

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### Materials:

Activity Number	Per Student	Per Group	Per Class
7.1	Journals		Journal questions posted on OHP or board
7.3	Student page 1 and 2 (option 1) Student page 3 and 4 (option 2)		
7.4	Student page 5 and 6		
7.5	Student page 7		

### Activity 7.1: Daily Journal Questions (10 minutes)

#### *Function/Rationale:*

This activity:

- 1) Allows the teacher time to take roll and complete administrative duties while students enter the room. Students should be expected to complete the journal activity everyday without prompting.
- 2) Elicits student ideas and previews the new lesson for the day.

#### *Directions*

1) Post journal questions on the overhead projector or chalk board. Suggested journal questions:

- a) Can humans ever run out of water? Explain.
- b) Draw a quick picture of the path a water molecule might take if its starting place is in rain that fell on the grass.

2) Also see lesson descriptions below. Some lessons begin with guiding or review questions that could be used for the journal.

3) Students should respond individually in their journals to the daily journal questions. Review the questions. Lead a short discussion asking for sample student responses

### Activity 7.2: Defining Terms (10-20 minutes)

#### *Function/Rationale:*

- 1) The purpose of this activity is to construct knowledge referring to the definition of renewable and re-useable resources in the context of water.

#### *Directions:*

This activity has two possible options. The teacher can choose to do a class discussion where the teacher guides the students to a definition of the terms renewable and re-useable (option 1). The teacher could choose to give the students the definitions as a part of activity 7.3 (option 2).

#### *Option 1:*

- 1) This discussion can be an extension to the daily journal questions. You could use some of the discussion questions as journal questions to help facilitate the discussion.
- 2) If you choose this option use the option 1 worksheet for the next activity 7.3.
- 3) Begin a discussion by asking some of the questions below. Try not to discuss the questions in the context of water. Students will have to apply these definitions to water in activity 7.3.
  - a) What do you think is meant by a renewable resource? *A substance is considered renewable if the resource can be replenished within our life time. Most substances are renewable, however we must consider time. Humans take*

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*resources from the Earth faster than nature has time to replace it. Natural replacement of a resource could take thousands of years. Students may have a difficult time grasping this length of time. So, for the purposes of this unit we will limit time to our life time. With this stipulation some resources are not renewable. Humans can intervene in replacement, e.g. lumber - humans can replant trees that were chopped down.*

- b) *What do you think is meant by a re-useable resource? A re-useable resource is one that can be replenished or refreshed by humans. In this case the resource can be used over and over again. Students will most likely be familiar with the term re-useable in the context of recycling. In which consumers are urged to re-use items like containers instead of throwing them away.*
- c) *How are the terms renewable and re-useable different? The difference between these two may seem subtle to students. The basic difference between the two is whether nature can replenish the resource or if humans can “clean it up” to be used again and again.*
- d) *Discuss an example: Lumber: Lumber is renewable because humans can replant trees. It is not re-useable because once the lumber is turned into something else (i.e. paper) it cannot be turned back into lumber. However, the definition of re-useable becomes a bit fuzzy if we consider that paper is re-useable by recycling it.*
- e) *Discuss a second example: Aluminum: Students know that aluminum foil can be used over and over within their own household. Aluminum can also be recycled into making more aluminum foil. This means the resource is re-useable. However, the resource is not renewable because it would take much longer than our life time for nature to replenish it.*

### *Option 2:*

- 1) Skip directly to activity 7.3 and use option 2 student worksheets. The definitions of renewable and re-useable are on the top of the student page.
- 2) The teacher can instruct the students to work on the problem of categorizing the water in Verona Wells by using the given definitions of the terms.

### *Notes to the teacher:*

The term nonrenewable is often used as an antonym to the term renewable. This term is often found in textbooks. For this lesson we do not use the term nonrenewable. Instead we consider resources as renewable or not. The reasons a resource would not be considered renewable are the same reasons it would be considered nonrenewable.

### *Discussion suggestions (for option 1):*

- 1) Make sure to elicit comments from all students.
- 2) The questions here are meant to construct the definitions of renewable and re-useable. It is important that a fair understanding of these terms be obtained in order for students to be successful in the following activities.
- 3) Activity 7.3 (option 2) begins with the students listing a definition for the terms. You may want to synthesize a definition for students to list on the page.

## **Activity 7.3: Renewable, Re-usable and Water (20 minutes)**

### *Function/Rationale:*

- 1) This activity will revisit the Verona Wells scenario with the intention of considering if the water is renewable and re-useable.

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- 2) The purpose of this activity is not for students to solidify the definitions of the renewable and re-useable. The greater purpose is to encourage students to think critically about a real life situation using the terms as a guide. *See notes to teacher below for more information.*

### Directions:

- 1) Determine which student pages you will use for this activity. If you choose option 1 in 7.2 use the 7.3 option 1 student pages. If you chose option 2 in 7.2 then use 7.2 option 2 student pages. See below in the teacher's notes for a chart depicting the use of options 1 and 2.
- 2) If you chose option 1 you may want to synthesize a definition for the discussion for students to write at the top of the page where space is provided.
- 3) Students will work on answering the questions as a group. The assignment requires students to use their knowledge of Verona Wells in order to think about water as renewable or re-useable in a specific context.
- 4) Option 2 worksheets offer an extra question in which students will compare water as renewable or re-useable with other resources (i.e. lumber and oil). The assumption is that if you chose option 1 above you have discussed these comparisons as examples with the students.
- 5) You may want to have the Verona Wells activity materials available for student use.

### Notes to Teacher:

- 1) The terms renewable and re-useable can be somewhat ambiguous which is why we chose to narrow the time scale of the terms to our life time in an attempt to reduce some of this ambiguity. However, students will most likely encounter the terms in real life so, this activity is designed to allow students to think about the Verona Wells situation in the context of these terms. The point is for students to think about the consequences of a situation like Verona Wells to the issue of water as a resource. It is not necessary that students have a concrete definition of the terms.

### 2) Option 1 and 2 depiction

Option	Activity 7.2	Activity 7.3
1	Teacher-led discussion of the terms renewable and re-useable	Use 7.3 option 1 student pages in which students write their own synthesized definition of the terms.
2	Teacher will not use this activity or will use it for a very short clarification of the terms	Use 7.3 option 2 student pages in which the definitions of the terms are given to the students.

### Group work suggestions:

- 1) The group work activities here are very much like those the students have encountered throughout the unit. Remind students that they must all contribute and that group answers must be a collaboration and expansion of individual responses.

### Activity 7.4: Putting It Together – Role Play (30 minutes)

#### Function/Rationale:

- 1) This activity will allow students to connect the knowledge they have learned about water by following the path of oil through the introduced systems.

#### Directions:

- 1) Explain to students that they will be engaging in a role play. They are to role play the actors in the story (listed below). Students will need to work in pairs for this activity.

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From student pages

### Story:

One day your friend calls you asking for your help to change the oil in his new car. You agree and go to his house where he is ready with all the materials you will need to complete the task. Before you begin you ask him where you will take the oil to recycle it. He responds that recycling is a big hassle and waste of time. He tells you four suggestions that are much easier.

### Directions:

- 1) You will work with a partner in this activity. List your partner's name here: \_\_\_\_\_
- 2) Below is a list of the suggestions your friend gives you. Your job is to choose one of these suggestions and explain why it is not a good idea.
  - a) Allow the oil to drip onto the driveway.
  - b) Collect the oil then pour it out over the grass.
  - c) Collect the oil then pour it down the sewer.
  - d) Collect the oil and throw it in the trash were it goes to a landfill.
- 3) Use the questions below to help you think about what to say to your friend.
- 4) Once you have completed the questions. Role play with a person in your group. Each of you will take turns playing the educated, environmentally minded friend who explains why the suggestions are not a good idea and the ignorant friend.
- 5) Your teacher will ask for volunteers to act out the role play in front of the class.

- 2) Explain to students that they will need to choose one of the suggestions above. They will then use the student pages to help them brainstorm ideas about why the suggestion is not a good one. You may also choose to assign scenarios to pairs. In activity 7.5 some students will act out their role play, you could choose groups with different scenarios.
- 3) After they have thought of some ideas they will need to compare them with another pair of students.
- 4) Once students feel they have a complete list, they are to practice their role play with their partner each taking turns being the educated and ignorant friend. If you choose you can skip this step and go directly to activity 7.5. This would work if you have students who are willing to volunteer without practice.
- 5) Suggestions are given to the students about how to play each individual. You may want to emphasize the fact that the point of the role play is to have a dialog.

From student pages:

### Suggestions for how to play each person:

Educated, environmentally minded friend: This person needs to think of the reasons why it is not a good idea to just dump the oil. You must consider all the places the oil would travel in the water system and how long it would be at each place. Remember you need to be convincing, but not insulting.

Ignorant friend: Since the person playing the ignorant friend (you) is actually smarter than their character, you can try to trip up the person playing the educated, environmentally minded friend. Try to second guess what he/she is going to say and ask those questions.

**Remember this is a role play. There must be a dialog between actors not one person just explaining while the other sits back and listens.**

### Activity 7.5: At the Theater – Watching the Role Play (20 minutes)

*Function/Rationale:*

This activity:

- 1) Will allow students the chance to assess their own thoughts and listen for strengths and weaknesses in arguments

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### Directions:

- 1) Ask for volunteers to perform the role play in front of the class.
- 2) Students who are not performing the role play will fill out the chart on the student pages based on the performance. This could be used as incentive for volunteers. Explain to students that if they volunteer they will not have to fill out the chart for their performance
- 3) Remind students that they chart is meant to list ideas about the content not about the performance.

From student pages:

<b>Chart:</b>			
Actor's names (who is participating in the role play)	List two things the actors explained well about water	List anything that the actors may have missed	List at least one new thing you learned by watching this role play

### Notes to Teacher:

The chart incorporates enough space for three potential performances. It is your discretion how many performances you would actually like to use. You may choose to elicit performances from students who worked on different scenarios. You can use these performances to point out the similarities in the paths the oil took.

Name: \_\_\_\_\_ Hour: \_\_\_\_\_

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**Activity 7.3 (option 1):**

**Renewable, re-useable and Water**

**Purpose:**

In this activity you will revisit the Verona Wells scenario in order to consider if water is a renewable or re-useable resource.

**Definitions:**

Write a definition of renewable and re-useable based on the class discussion.

Renewable: \_\_\_\_\_  
\_\_\_\_\_

Re-useable: \_\_\_\_\_  
\_\_\_\_\_

**Directions:** Answer the following questions as a group.

- 1) Take a few minutes as a group to remind yourselves about the Verona Wells activity. Have each member of your group offer one idea about something they remember about the activity or the situation at Verona Wells.

Group member name	Idea

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Name: \_\_\_\_\_ Hour: \_\_\_\_\_

- 3) Explain how the water in the Verona Wells situation can be renewable and re-useable. Be specific about when the water can be classified in each of the categories. Answer this question by thinking about an answer alone then collaborate for a group response.

Classification	Your answer	Group answer
Renewable		
Re-useable		

Name: \_\_\_\_\_ Hour: \_\_\_\_\_

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**Activity 7.3 (option 2):**

**Renewable, re-useable and Water**

**Purpose:**

In this activity you will revisit the Verona Wells scenario in order to consider if water is a renewable or re-useable resource.

**Definitions:** Use the definitions to help you answer the questions.

**Renewable:** A resource that cannot run out or can be replaced within our life time.

**Re-useable:** A resource that can be used over and over again is usually cleaned up by some special process or treatment.

**Directions:** Answer the following questions as a group.

- 1) Take a few minutes as a group to remind yourselves about the Verona Wells activity. Have each member of your group offer one idea about something they remember about the activity or the situation at Verona Wells.

Group member name	Idea

**Student Resources: Lesson 7: Renewable and Re-useable**

Name: \_\_\_\_\_ Hour: \_\_\_\_\_

- 2) Explain if the water in the Verona Wells situation can be considered renewable and/or re-useable. Be specific about when the water can be classified in each of the categories. List your answer then collaborate for a group response.

Classification	Your answer	Group answer
Renewable		
Re-useable		

- 3) Choose one of the three resources below. Explain if the resource is renewable or re-useable. Answer the question as in #2, give your response then collaborate with your group. Circle the resource your group chose.

Resources: Lumber      Oil      Metal such as aluminum

Classification	Your answer	Group answer
Renewable		
Re-useable		

- 4) Explain how the resource you chose in question 3 is the same and different than water in terms of renewable and re-useable.

Similar	
Different	

Name: \_\_\_\_\_ Hour: \_\_\_\_\_

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**Activity 7.4:**

**Putting It Together – Role Play**

**Purpose:**

Here is your chance to be creative and demonstrate what you learned about water. You will participate in or observe a role play explaining to a friend why it is a good idea to recycle oil based on what you learned about water systems.

**Story:**

One day your friend calls you asking for your help to change the oil in his new car. You agree and go to his house where he is ready with all the materials you will need to complete the task. Before you begin you ask him where you will take the oil to recycle it. He responds that recycling is a big hassle and waste of time. He tells you four suggestions that are much easier.

**Directions:**

- 1) You will work with a partner in this activity. List your partner's name here: \_\_\_\_\_
- 2) Below is a list of the suggestions your friend gives you. Your job is to choose one of these suggestions and explain why it is not a good idea.
  - a) Allow the oil to drip onto the driveway.
  - b) Collect the oil then pour it out over the grass.
  - c) Collect the oil then pour it down the sewer.
  - e) Collect the oil and throw it in the trash were it goes to a landfill.
- 6) Use the questions below to help you think about what to say to your friend.
- 7) Once you have completed the questions. Role play with your partner in your group. Each of you will take turns playing the educated, environmentally minded friend who explains why the suggestions are not a good idea, and the ignorant friend who . . .
- 8) Your teacher will ask for volunteers to act out the role play in front of the class.

**Suggestions for how to play each person:**

Educated, environmentally minded friend: This person needs to think of the reasons why it is not a good idea to just dump the oil. You must consider all the places the water would travel and how long it would be at each place. Remember you need to be convincing, but not insulting.

Ignorant friend: Since the person playing the ignorant friend is actually smarter than their character, you can try to trip up the person playing the educated, environmentally minded friend. Try to second guess what he/she is going to say and ask them questions.

**Remember this is a role play. There must be a dialog between actors not one person just explaining while the other sits back and listens.**



Name: \_\_\_\_\_ Hour: \_\_\_\_\_

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**Activity 7.5:**

**At the Theater – Watch the Role Play**

**Purpose:**

In this activity you will evaluate the role play of your classmates.

**Directions:**

- 1) Watch the role play of your classmates closely.
- 2) Listen for points they made really well and points they did not make clear.
- 3) Fill out the chart for each role play you watch.

**Chart:**

Actor's names (who is participating in the role play)	List two things the actors explained well about water	List anything that the actors may have missed	List at least one new thing you learned by watching this role play