



Florida Department of Environmental Protection Solid Waste Recycling Curriculum Solid Waste, Liquid Problems!

COURSE Biology 1	TIMEFRAME 2-3 Class Periods (165-205 minutes)
LESSON SUMMARY Students will investigate how solid waste is implicated in surface and groundwater pollution. They will explore multiple factors that contribute to surface and groundwater pollution, and they also will develop actionable steps to reduce/reuse/recycle/rethink that will mitigate surface and groundwater pollution in their community.	
NGSSS SCIENCE CONTENT BENCHMARKS SC.912.L.17.20 Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability. SC.912.L.17.16 (Honors course only) Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution. Note - <i>This lesson addresses only surface and groundwater pollution.</i> NGSSS NATURE OF SCIENCE BENCHMARK SC.912.N.2.4 Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability (not assessed).	
LEARNING OBJECTIVES <ul style="list-style-type: none"> • Students will identify how solid waste is implicated in surface and groundwater pollution. • Students will examine factors that contribute to surface and groundwater pollution. • Students will learn the differences between reduce, reuse, recycle and rethink. • Students will develop actionable steps to reduce/reuse/recycle/rethink that will mitigate surface and groundwater pollution in their community 	
SCIENCE VOCABULARY <ul style="list-style-type: none"> • fungicides • herbicides • leach • recycle • reduce • reuse • solid waste 	ACADEMIC VOCABULARY <ul style="list-style-type: none"> • contamination • factor • mechanism • mitigate • refuse
INQUIRY QUESTION How can we reduce solid waste so it doesn't become a liquid problem?	STATEMENT OF STUDENT MASTERY I can explain how solid waste impacts the water supply and can connect recycling specific solid wastes to a reduction in surface and groundwater pollution.



ENGLISH LANGUAGE ARTS CONNECTIONS

ELA.K12.EE.1.1 Cite evidence to explain and justify reasoning.

ELA.K12.EE.4.1 Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

SOCIAL STUDIES CONNECTIONS

SS.912.C.2.11 Analyze public policy solutions or courses of action to resolve a local, state or federal issue.

SS.912.C.2.3 Experience the responsibilities of citizens at the local, state or federal levels.

Lesson Overview

ENGAGE



10-60 minutes

Students will engage in a discussion regarding solid waste.

Teacher Moves (this option is 10 minutes)

- Play video of landfills.
- Have students respond to the questions in the slide deck.
- Have students share their thinking as a class.
- Introduce "Reduce, Reuse, Recycle, Rethink."

Optional Lab Investigation (This option is 1 hour)

- Break students into groups.
- Facilitate student completion of lab investigations.
- Have students respond to questions.
- Have groups share out and facilitate class discussion on the two investigations and the differences between the two. Also have students brainstorm additional questions that they may have.
- Introduce "Reduce, Reuse, Recycle, Rethink."

Student Moves

- Watch the video.
- Respond to the questions individually.
- Participate in class share out.

Optional Method 1

- Break students into groups.
- Facilitate student completion of lab investigations.
- Have students respond to questions.
- Have groups share out and facilitate class discussion on the two investigations and the differences between the two. Also have students brainstorm additional questions that they may have.
- Introduce "Reduce, Reuse, Recycle, Rethink."

EXPLORE



60 minutes

Students will explore environmental issues and causes regarding surface and groundwater pollution.

Teacher Moves

- Allow time for students to read about drinking water issues.
- Facilitate a discussion on drinking water around the country.
- Distribute a graphic organizer.
- Introduce information on solid waste.

Student Moves

- Read the assigned article.
- Discuss issues and causes surrounding surface and groundwater pollution.
- Complete graphic organizer.
- Regroup and discuss issues, causes and solutions.
- Complete graphic organizer.

EXPLAIN

30 minutes




Students will gain a deeper understanding of how landfills, pesticides/fertilizers, organic waste (septic), and wells contribute to pollution of surface and groundwater. Students also will identify local/state policies that address these




concerns.

<p>Teacher Moves</p> <ul style="list-style-type: none"> • Distribute a chart to each student to utilize during reading. • Facilitate the jigsaw technique regarding how sources of solid waste impact surface and groundwater. 	<p>Student Moves</p> <ul style="list-style-type: none"> • Read the "Drinking Water - Is Yours Safe?" pamphlet. • Investigate sources of surface and groundwater pollution due to solid waste. • Complete chart as they read. • Participate in discussion on regulations that are in place to impact the effect of solid waste on surface and groundwater pollution.
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ELABORATE 30 minutes  Students will develop/enhance a waste management plan for their city/state to reduce solid waste in one of the four areas (landfills, pesticides/fertilizers, organic waste [septic], or wells) that create surface and groundwater pollution.

<p>Teacher Moves</p> <ul style="list-style-type: none"> • Facilitate students developing a waste management plan for their city to reduce surface and/or groundwater pollution. Each group will develop a plan to affect change in relationship to landfills, pesticides/fertilizers, organic waste (septic), or wells. • Provide guidance and a rubric. 	<p>Student moves</p> <ul style="list-style-type: none"> • Work in groups to develop a waste management plan for their city to reduce surface and groundwater pollution. Each group will develop a plan to effect change in relationship to landfills, pesticides/fertilizers, organic waste (septic), or wells, based on criteria given in rubric. Additionally, students will classify the parts of or entire plan as an element to reduce, reuse or recycle waste. <p>Additional Pathway: Social Studies connection (This will add time to the lesson but is additional information for students who are very engaged with this topic. This can be shared with students as enrichment.) How is wastewater treated in your area?</p>
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EVALUATE 30 minute  Student Outcome: Students will evaluate plans and create a PSA as a call to action for their waste management plan.

<p>Teacher Moves</p> <ul style="list-style-type: none"> • Have students create a public service announcement (PSA) in Flipgrid about waste management for their own community. 	<p>Student moves</p> <ul style="list-style-type: none"> • Evaluate plans of other groups. • Create a PSA in Flipgrid about waste management for your community using the rubric.
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<ul style="list-style-type: none"> • Provide guidance and a rubric. <p>Alternative method:</p> <ul style="list-style-type: none"> • Have students create a written PSA. • Have students create a PSA using an electronic device's camera. 	<p>Alternative method:</p> <ul style="list-style-type: none"> • Create a written PSA. • Create a PSA using an electronic device's camera.
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Source Data

These are the sources of data used to build this lesson/unit. You may or may not choose to share these with your students, but they are good reading for you as the instructor.

Engage	Solid waste -Teacher background Landfill video Optional Lab Investigation
Explore	Turning on the tap in America DrinkingWater-IsYoursSafe
Explain	Ground Water Contamination: Magnificent Ground Water Connection
Elaborate	DrinkingWater-IsYoursSafe Ground Water Contamination: Magnificent Ground Water Connection
Evaluate	DrinkingWater-IsYoursSafe Ground Water Contamination: Magnificent Ground Water Connection

