

UNIT OVERVIEW

LAND, WATER, AND HUMAN INTERACTIONS

Listed below is a summary of the activities in this unit. Note that the total teaching time is listed as 19–34 periods of approximately 45 to 50 minutes (approximately 5–7 weeks).

Activity Description	Topics	Advance Preparation	Assessment	Teaching Periods
<p>1. Investigation: Where Should We Build? Students examine photographs of undeveloped and developed hillsides, wetlands, and cliff-top areas. Students make observations about changes that have happened to the land and water in these areas.</p>	evidence human impact trade-offs LITERACY	Prepare Student Sheet.		1
<p>2. Laboratory: Does It Dissolve? Students compare the solubility of solids in three different liquids. They compare the ability of the liquids to dissolve salts and apply the results to the natural world.</p>	dissolve evidence human impact LITERACY	Set up containers.	ODA: Proc.	1–2
<p>3. Investigation: Water Quality Students construct graphs of three common water quality indicators and compare them to a graph of Boomtown population. Students then consider whether the increase in population is a correlation or causal relationship between the population and the decline in water quality.</p>	causal relationship correlation dissolve evidence human impact indicator water quality LITERACY MATHEMATICS	Prepare glasses of water; gather local water quality report.	AID: Proc. Part B	1–2
<p>4. Investigation: Living Indicators Students analyze and interpret data collected from simulated catches of aquatic invertebrates collected at three different points in time corresponding with different levels of human impact. They identify patterns in the data and construct arguments for possible cause-and-effect relationships.</p>	causal relationship correlation human impact indicators macroinvertebrates model pattern water quality LITERACY MATHEMATICS	Prepare Student Sheet.	AID: A1 ARG: QC A2	1–2
<p>5. Laboratory: Nutrients as Contaminants Students explore one of the major routes for contaminants to enter the water supply by investigating water that passes through soil. They first test unfertilized soil and fresh water for the presence of nitrates then add fertilizer to the soil and test both the fertilized soil and the runoff water for nitrates.</p>	contaminants evidence groundwater indicator nutrients runoff trade-offs	Gather and prepare local soil.	OAD: Proc. E&T: QC A5	1–2

LAND, WATER, AND HUMAN INTERACTIONS (continued)

Activity Description	Topics	Advance Preparation	Assessment	Teaching Periods
<p>6. Reading: Gulf of Mexico Dead Zone Students read about the large-scale impact of human activity on aquatic systems. Students use an Anticipation Guide before, during, and after the reading to make predictions based on prior knowledge and then examine how their understanding has changed at the end of the activity. Students draw a model diagram to explain the chain of events leading to the formation of dead zones. They also discuss ways to minimize the size and impact of dead zones.</p>	causal relationship contaminant correlation dead zone evidence indicator model nutrients runoff trade-offs LITERACY	Prepare Student Sheet.	MOD: A4	1–2
<p>7. Modeling: Cutting Canyons and Building Deltas Students use a river model to investigate how flowing water erodes and deposits sediments to create common landforms. They then design erosion-control structures and use the river model to test them. Based on the results of their initial testing, students redesign and retest their structures.</p>	constraint criterion, criteria delta deposition erosion model sediments LITERACY	Gather large containers for sand and water; gather newspapers; confirm level work surfaces; prepare Student Sheet.	ENG: QC Proc. Part B	2–3
<p>8. Investigation: Traveling with the Water Cycle After reviewing the three most common phases of matter and the phase changes of water, students use a card-based simulation to follow water as it travels through the water cycle. Each pair of students writes a story that describes and demonstrates their understanding of the water cycle’s major processes and reservoirs, and the types and sources of contaminants that can be picked up along the way.</p>	condensing contaminant energy evaporation freezing gravity melting water cycle LITERACY	Set up stations around room (optional); prepare Student Sheets.	MOD: A4 COM: A5	1–2
<p>9. Reading: Human Impacts on Earth’s Water Students complete a Three-level Reading Guide as a means to increase their comprehension of a reading that describes some ways in which human activities affect Earth’s water. The reading focuses on how humans impact water quality and the water cycle, and on how these effects can be mitigated.</p>	condensation contaminants evaporation freezing human impact melting mitigate monitor water cycle water quality LITERACY	Prepare Student Sheet.	MOD: A3 ARG: A6	1–2

LAND, WATER, AND HUMAN INTERACTIONS (continued)

Activity Description	Topics	Advance Preparation	Assessment	Teaching Periods
<p>10. Investigation: Making Topographic Maps Students use a small-scale plastic model to construct a topographic map of a land formation. This experience provides students with a better understanding of topographic maps and how to interpret them. In the next activity, they apply this understanding to compare topographic maps of Boomtown made at different times.</p>	contour line topographic map topography		MOD: QC A5	1–2
<p>11. Problem Solving: Boomtown’s Topography Students compare the street maps and topographic maps of Boomtown in the present with topographic maps of Boomtown from 25 and 100 years ago. They identify changes that have taken place in the landforms at the building locations. They consider how evidence from the topographic maps might suggest potential problems for the three possible building locations.</p>	contour interval contour line landform scale topographic map topography LITERACY	Prepare Student Sheets.		1–2
<p>12. Modeling: Modeling Cliff Erosion Students model the effect of ocean waves on a cliff. They then design, test, and redesign structures to prevent cliff erosion. They use their observations and understanding of erosion to compare the likely rate of erosion on a hillside and a shoreline cliff.</p>	causal relationship constraint correlation criterion, criteria deposition erosion mitigation model	Gather large containers for sand and water; prepare Student Sheet.	ENG: QC Proc. Part B	1–2
<p>13. Reading: Weathering, Erosion, and Deposition Students read about geoscience processes that include those they investigated in the last activity—erosion and deposition—and the related earth process of weathering. The impact of human activity on these earth processes is presented with information on how to monitor and mitigate changes caused by development.</p>	deposition earth processes erosion human impact sediment weathering mitigation monitor LITERACY		MOD: A2 EXP: A6	1–2
<p>14. Role Play: Building on the Mississippi Through a role-playing exercise, students explore the history of New Orleans’ location on the Mississippi River and the interaction of the city and the river. Students focus on the impact of human activities that have prevented natural cycles of erosion and deposition in the Louisiana Delta region</p>	dead zone deposition erosion evidence mitigation monitoring trade-offs LITERACY	Prepare Student Sheet.	EXP: QC E&T: A4 EXP: A5	1–2

LAND, WATER, AND HUMAN INTERACTIONS (continued)

Activity Description	Topics	Advance Preparation	Assessment	Teaching Periods
<p>15. Investigation: Building in Boomtown Students use the information they have gathered throughout the unit to create a report about the geology at each of the building locations in Boomtown. Then they use their reports and information from the Boomtown City Council to make their decision.</p>	<p>causal relationship constraint criterion, criteria deposition erosion evidence nutrient runoff sediments topographic map trade-off</p> <p>LITERACY</p>	<p>Prepare Student Sheets.</p>	<p>COM: Proc. E&T: A1</p>	<p>2–3</p>
<p>16. Investigation: Building Site Plan Students play the role of a building team that generates a site plan for the school and fields. They also design a plan for monitoring and minimizing soil erosion, increase nutrient run off, or reduce the water quality of Boomtown River.</p>	<p>causal relationship constraint criterion, criteria deposition erosion evidence mitigation monitor nutrient runoff sediments trade-off water quality</p> <p>LITERACY</p>	<p>Prepare Student Sheets.</p>	<p>COM: PROC. ENG: QC Proc.</p>	<p>2–3</p>