

RESOURCE LIBRARY
ACTIVITY : 15 MINS

Down to the Last Drop

Explore the impact of human activities on water resources.

GRADES

9 - 12+

SUBJECTS

Geography, Geographic Information Systems (GIS), Human Geography, Physical Geography

OVERVIEW

Explore the impact of human activities on water resources.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/down-last-drop/>

Content Created by



DIRECTIONS

Help students explore the impacts of human activities on freshwater resources by looking at the Aral Sea and the Colorado River. Give students [the link to this map](#) and have them follow the steps below.

Teach students to navigate a map using a Bookmark.

1. Click the button, Bookmarks.
2. Select a bookmark name to zoom to its map location and scale.

Have students identify a map feature.

1. Click a feature on the map, and a pop-up window will open with information.
2. Links and images in the pop-up are often clickable.
3. An arrow icon in the upper-right of the window indicates that multiple features have been selected.
4. Click the arrow button to scroll through the features.

Engage: Can human actions alter water resources?

1. Click the map URL link above to open the map.
2. Examine the recent view of the Aral Sea in Central Asia.
3. With the Details pane visible, click the button, Show Contents of Map.
4. Click the checkbox to the left of the layer name, Aral Sea, 2000 (image) and 1960 (black outline).
5. The image is from 2000 and the outline shows the 1960 extent of the sea before humans began to alter water flow to the Aral Sea.

Ask: What physical changes can be seen in the Aral Sea since humans altered the water flow?
[The smaller, shallower, upper portion remains more intact after a dam was added between the north and south sections.]

Explore: Where are other lakes and rivers that are drying up due to human actions?

1. Click the Bookmarks button. Select one of the other location bookmarks for a closer examination.
2. Click the map marker to view detailed information about human alterations to this water resource.

Ask: What human events have caused changes in water resources? [Water diversions, deforestation, and overuse] *What natural events have caused changes in the water resource?* [Droughts and changes in rainfall patterns]

Explain: Why is the water to the Aral Sea decreasing?

1. Click the Bookmark, Aral Sea Region.
2. Do both rivers reach the Aral Sea? (Zoom in and out.) [The Amu Darya River Does not reach the Aral Sea.]
3. Turn on the layer, Aral Sea Watershed Dams.
4. Turn on the layer, Irrigated Lands in Aral Watershed (Zoom in to irrigated areas to view canals.).

Ask: Do dams or canals have the greatest impact? [Canals] What factors could influence the placement of the dams and canals? [Political boundaries, arable land, and geographic features]

Elaborate: How would the Aral Sea drying up affect the surrounding areas?

1. Turn on the layer, Aral Sea Dust Impact. Zoom out to see the impact area.
2. Increased dust and salt storms sometimes send dust 500 km from the Aral Sea (Look closely at the areas within the buffer.).

Ask: What causes the dust and salt storms? [The dry bed of the salty sea has no vegetation.] What environmental, economic, and human health effects might have on the surrounding areas? [Environmental: desertification due to soil erosion; economic: salinization of soil in farmed regions; health: respiratory problems]

Evaluate: How has human alteration affected the Colorado River?

1. Press the button, Bookmarks. Select the Colorado River bookmark.
2. Turn on the layer, Lower Colorado River Basin Dams and Canals.
3. Zoom in and out to identify human alterations and causes.

Ask: What are some similarities and differences between the effects of human alterations on the Colorado River and the Aral Sea? [Both have dams and canals, and both fail to reach the ocean. The Colorado River supports both agriculture and urban areas. The rivers of the Aral Sea are diverted primarily for agricultural areas.]

Check out the original activity at [Esri here](#).

OBJECTIVES

Subjects & Disciplines

Geography

- Geographic Information Systems (GIS)
- Human Geography
- Physical Geography

Learning Objectives

Students will:

- Explore the consequences of human actions on water resources.
- Examine the health impacts of availability to clean water.

Teaching Approach

- Object-based learning

Teaching Methods

Skills Summary

This activity targets the following skills:

National Standards, Principles, and Practices

NEXT GENERATION SCIENCE STANDARDS

- HS. Earth and Human Activity:

HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

- HS. Earth and Human Activity:

HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

• **HS. Earth and Human Activity:**

HS-ESS3-2. Evaluating competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

• **HS. Earth and Human Activity:**

HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

• **HS. Earth and Human Activity:**

HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.

• **HS. Earth and Human Activity: HS-ESS3-4:**

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

Preparation

What You'll Need

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per learner, 1 computer per pair

PHYSICAL SPACE

- Classroom
- Computer lab

BACKGROUND & VOCABULARY

Background Information

Prior Knowledge

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
agriculture	<i>noun</i>	the art and science of cultivating land for growing crops (farming) or raising livestock (ranching).
alter	<i>verb</i>	to change.
arable	<i>adjective</i>	land used for, or capable of, producing crops or raising livestock.
canal	<i>noun</i>	artificial waterway.
dam	<i>noun</i>	structure built across a river or other waterway to control the flow of water.
desertification	<i>noun</i>	rapid depletion of plant life and topsoil, often associated with drought and human activity.
dust	<i>noun</i>	microscopic particles of rocks or minerals drifting in space. Also called cosmic dust or space dust.
dust storm	<i>noun</i>	weather pattern of wind blowing dust over large regions of land.
erosion	<i>noun</i>	act in which earth is worn away, often by water, wind, or ice.
irrigate	<i>verb</i>	to water.
salination	<i>noun</i>	process where soils build up high salt content.
salt	<i>noun</i>	(sodium chloride, NaCl) crystalline mineral often used as a seasoning or preservative for food.
sea	<i>noun</i>	large part of the ocean enclosed or partly enclosed by land.
soil	<i>noun</i>	top layer of the Earth's surface where plants can grow.
urban area	<i>noun</i>	developed, densely populated area where most inhabitants have nonagricultural jobs.
watershed	<i>noun</i>	entire river system or an area drained by a river and its tributaries.

