NATIONAL GEOGRAPHIC

RESOURCE LIBRARY I ACTIVITY : 1 HR 40 MINS

Watersheds

Students learn how watersheds work and why they are important, before locating their local watershed online. Next, they turn their attention to Mount Everest and follow the path of the water from the mountain's ice to the surrounding watershed. Students then read about the people who rely on Everest's watershed. Finally, students complete a Project Journal at the close of the activity to reflect on their learning.

GRADES

6, 7, 8

SUBJECTS

Biology, Conservation, Earth Science, Climatology, Geography, Physical Geography

CONTENTS

3 Links, 2 Resources, 2 PDFs

OVERVIEW

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For the complete activity with media resources, visit:
http://www.nationalgeographic.org/activity/watersheds/

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DIRECTIONS

This activity is part of the Peak Water: Mount Everest and Global Water Supply unit.

1. Introduce watersheds, how they work, and why they are important, through a reading activity and video.

- Provide the *Watershed* encyclopedic entry and the *What is a Watershed?* worksheet to students. Explain that the purpose of reading the entry is to understand what a watershed is and why it's important to keep watersheds clean.
- Students should read the article in pairs and capture big ideas in the Frayer Model on their worksheet, to start to understand how water moves through an area.
- Have students watch the *What is a Watershed?* video for a clear, brief description about what a watershed does. Students should add to or change their responses to the Frayer Model as new information or ideas arise in the video.
- As a class, locate the watershed for your school's local area using the U.S. Geological Survey's (USGS) *Watershed Finder*.
- In pairs and using Google Earth with satellite view, have students follow the path of water when it rains in your school's local area to the nearest large body of water. Ask students to identify nearby areas of interest such as major cities, wildlife preserves or forests, wetlands, or industrial areas.

    - Ask students to discuss this question in pairs: *If rain falls over your whole local watershed and drains into the nearest body of water, what could get washed into the water with the rain?* (Students may say pesticides, pollution, animal waste, anything that is on the land.)

2. Lead students through several maps to identify the populations and location of major cities in the Mount Everest watershed.

- Project the *Mapping Mount Everest StoryMap* and navigate to the "The Big Picture" section to illustrate that the Himalaya, of which Mount Everest is the highest peak, are in the headwaters of watersheds, which are home to approximately 630-700 million people. Tell students that since the mountain straddles the Nepal-China border, the mountain is called Sagarmatha in Nepal and Qomolangma in China. Remind students that over the course of the unit, they will explore the health of the watersheds served by Everest and communities that rely on those watersheds. Guide students through the steps below to become familiar with Everest's geography and watershed.

- First, have students work in pairs to locate Mount Everest on Google Maps. Next, have them find the Sapt Kosi River (sometimes called the Kosi or Koshi River). The Sapt Kosi River can be found in Nepal and India. This river drains the region surrounding Everest and flows into the Ganges (Ganga) River. Have students follow the water from Everest, through the Ganges Basin, to the Ganges River, to the Bay of Bengal. Ask students to identify nearby areas of interest such as major cities, wildlife preserves or forests, wetlands, or industrial areas.
- Ask students to discuss this question in pairs: *If rain falls over this whole watershed and drains into the nearest body of water, what could get washed into the water with the rain?* (Students may say pesticides, pollution, animal waste, anything that is on the land.)
- Project "The Himalayan Drainage" section of the *Mapping Mount Everest StoryMap* to show the class the other watersheds surrounding the Himalaya. Read the caption aloud to help students interpret what they are seeing. Have students locate the Ganges-Brahmaputra River Basin. Explain that students will be reading stories of individuals who live here in the next step of this activity.
- Scroll to the "Downstream Populations" section of the *Mapping Mount Everest StoryMap* to show students how the water from the Himalaya serves large populations (the red shading indicates population levels). Read the caption aloud to help students interpret what they are seeing. Tell students that part of the unit project includes considering what might happen to these individuals if their water source becomes polluted or if there is not enough water for them.
- Scroll to the "Urban Centers" section of the *Mapping Mount Everest StoryMap* to show students that large cities rely on the water from the Himalaya. Ask students to locate and identify the populations and names of the three largest cities in the Everest watershed.

3. Facilitate students' investigation of stories of people living in Everest's watershed to illustrate how water plays a critical role in these individuals' lives.

- Distribute the *Living in the Mount Everest Watershed* article which illustrates how water is a central focus of life for bamboo traders on the Sap Kosi River, farmers of the Sapt Kosi River Basin, Hindus visiting the Ganges River, and women and girls collecting water in India.

    - Have students read in pairs one of the four stories of people who rely on water from Everest's watershed.

    - Share that the purpose for reading these stories is to understand how water plays a critical role in the lives of these individuals.

- Students discuss the story with their partner, in preparation for journaling about their own response in Step 4.

4. Prompt students to reflect on what they have learned in this activity in their Project Journal.

- Distribute the *Project Journal: Watersheds* and ask students to reflect on the path of water within their own watershed, Everest's watershed, and the article.
- Additionally, ask students to record evidence from this activity to support the claim that humans impact Earth's systems.

5. Lead a class discussion to revisit the *Know & Need to Know* chart.

- Revisit the class *Know & Need to Know* chart created in the *A Day Without Water* activity for students to see how their thinking and understanding about water is already changing.
- Ask students to discuss with a partner:

    1. *What do we already know about the importance of Everest's ice?*
    2. *What do we need to know?*
    3. *What questions can move from the* Need to Know *to the* Know *column?*

- Prompt students to share ideas and questions in a class discussion. Record new ideas and revise their questions as needed in the *Know & Need to Know* chart.

Tip

Step 1: Read more here to learn more about the purpose of and teaching with the Frayer Model.

Modification

Step 1: You may want to pre-identify difficult vocabulary from the reading (like "endorheic" or "phosphorous") and visit the links embedded in the reading with students before having students read independently.

Tip

Step 1: Google Earth indicates surface elevation at the bottom of the computer screen when you move your mouse around. Point out that elevation (and slope) can help students figure out the direction of water flow.

Informal Assessment

Students' responses to class discussions and on the *What is a Watershed?* worksheet provide input on their understanding of watersheds. Additionally, students record their responses to specific prompts in the *Project Journal: Watersheds*. You may decide to collect these journals at the end of each activity to provide feedback or check for completion, and then redistribute them to the students for use in their final project. The *Know & Need to Know* chart also serves as an assessment of their collective learning.

Extending the Learning

As time allows, have students Build a Watershed or complete the *In Your Watershed* activity to relate the components of a watershed to point and nonpoint pollution. You may also want to explore the *Aquifers* article with students so they can understand the movement and sources of underground water.

OBJECTIVES

Subjects & Disciplines

Biology

- Conservation

Earth Science

- Climatology

Geography

- Physical Geography

Learning Objectives

Students will:

- Understand the role of watersheds in water security.

- Locate their own watershed.
- Understand the impact of humans on water resources within watersheds (in terms of pollution and water availability).

Teaching Approach

- Project-based learning

Teaching Methods

- Multimedia instruction
- Reading
- Reflection

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Learning and Innovation Skills
    - Communication and Collaboration
    - Critical Thinking and Problem Solving
- 21st Century Themes
  - Environmental Literacy
- Critical Thinking Skills
  - Analyzing
- Geographic Skills
  - Acquiring Geographic Information
  - Asking Geographic Questions
- Science and Engineering Practices
  - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

• **CCSS.ELA-LITERACY.SL.7.1:**
Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on Grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.

NEXT GENERATION SCIENCE STANDARDS

• **Crosscutting Concept 2:**
Cause and Effect
• **MS-ESS3-4:**
Construct an argument supported by evidence for how increases in human and natural resources impact Earth's systems.
• **Science and Engineering Practice 1:**
Asking questions and defining problems
• **Science and Engineering Practice 2:**
Developing and using models
• **Science and Engineering Practice 8:**
Obtaining, evaluating, and communicating information

Preparation

What You'll Need

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per pair, Monitor/screen, Projector, Speakers

PHYSICAL SPACE

- Classroom

GROUPING

- Heterogeneous grouping
- Large-group instruction

- Large-group learning
- Small-group instruction
- Small-group learning

RESOURCES PROVIDED: WEBSITES

- USGS: Science in Your Watershed: Locate Your Watershed
- Google Earth

RESOURCES PROVIDED: HANDOUTS & WORKSHEETS

- What is a Watershed?
- Project Journal: Watersheds

RESOURCES PROVIDED: REFERENCE

- Watershed

RESOURCES PROVIDED: ARTICLES & PROFILES

- North Texas Municipal Water District: What is a Watershed?
- Living in the Mount Everest Watershed

BACKGROUND & VOCABULARY

Background Information

Millions of people worldwide are without clean water. As more cities, countries, and regions are faced with water shortages, it's critical for water security that we protect our sources of freshwater like glaciers, snowpack, groundwater, lakes, and rivers. This activity focuses on watersheds and helps students understand what watersheds are, where their watershed is, and where the Mount Everest watershed is. Sometimes watersheds are known as drainage basins or catchments.

Prior Knowledge

["Students should have an understanding of what freshwater is and why freshwater is important."]

Recommended Prior Activities

- A Day Without Water

Vocabulary

Term	Part of Speech	Definition
drainage basin	*noun*	an entire river system or an area drained by a river and its tributaries. Also called a watershed.
Ganges River	*noun*	(2,495 kilometers/1,550 miles) river in South Asia that originates in the Himalaya and empties into the Bay of Bengal. Also called the Ganga.
headwater	*noun*	source of a river.
Mount Everest	*noun*	highest spot on Earth, approximately 8,850 meters (29,035 feet). Mount Everest is part of the Himalaya and straddles the border of Nepal and China.
river basin	*noun*	land drained by a river and its tributaries
tributary	*noun*	stream that feeds, or flows, into a larger stream.
watershed	*noun*	entire river system or an area drained by a river and its tributaries.