

From Source To Sea: Lesson Plan



Concepts:

1. Understanding the path the Hudson River takes from the headwaters in the Adirondacks to the New York Harbor
2. Identifying the Hudson River watershed area, main tributaries, important natural and human made features and Estuarine section of the River
3. Compare different stretches of the Hudson River (Northern, Mid, and Southern)
4. Plot physical features from the digital tour online to their locations on the River Mile Map.
5. Identify potential pollution sources, locate them on the Hudson River, and relate them geographically to student's home or school

Vocabulary:

Headwaters, watershed, tributaries, estuary, replica, point source pollution, non-point source pollution, and river miles.

Introduction:

Many students in New York City and the greater Hudson Valley have seen the river from their car window while driving over the George Washington Bridge, have walked along her shores from a park or possibly enjoyed a ferry ride across her waters. Most students do not know where the mighty Hudson River begins or have seen the dramatic mountains, bays, bridges factories and even castles that she flows past. This short pictorial tour shows students the path of the Hudson River from her headwaters at Lake Tear of the Clouds in the Adirondack Mountains down to the New York Harbor where she empties into the Atlantic Ocean.

Like many rivers, the Hudson flows through protected parks, wetlands, agricultural farmland, and urbanized and industrialized zones. This diversity of land use presents a variety of challenges and opportunities for environmental protection. Students use the River Mile Map to plot examples of land use in order to understand how far they live and can be affected by the actions of their Hudson River Valley community.

Materials Needed:

1. Internet and computer access to view the pictorial tour (students can go through the tour individually, in groups or as a full class)
2. From Source to Sea Worksheet
3. Writing utensils (colored pencils or crayons)
4. Hudson River Miles Map

Discussion:

At the end of the activity students should have an understanding of the Hudson River's path, should be able to define the vocabulary terms, be able to identify a few physical features and know where they are in relation to the river.

Here are a few discussion topics for the entire class or small groups to address after the activity.

1. The difference between the northern section of the Hudson River and the lower estuary portion of the river are significant. Discuss how tides, salt water and changes in altitude can affect the biological community, development of transportation and land use.
2. If students are part of the Hudson River watershed, discuss the path water takes from them until it reaches the river. Does it go through any tributaries first?
3. The challenges between regulating point source and non-point source pollution are very different. Name some of each and discuss ideas for regulating them.

From Source To Sea: Teacher Copy Worksheet



Whether you are preparing to come sailing aboard the Hudson River Sloop *Clearwater*, the Schooner *Mystic Whaler* or simply learning more about your major waterways, this activity will allow you to see some of the splendor of the Hudson River and understand how you are connected to it.

In this lesson you will spend some time looking at the pictures and maps in the "Source to Sea" Photo Gallery, fill out the following questions, define the vocabulary terms and complete the Plotting Activity. You will have to click through the slides a few times to gather all the information needed to answer the questions.

Questions:

1. What is the source of the Hudson River?
Lake **Tear of the Clouds**, Mount **Marcy**
2. What is the altitude or, how high above sea level does the Hudson River begin? **Mount Marcy is the highest peak in New York at 5,344 feet above sea level, but Lake Tear of the Clouds is down the slope a bit at 4,322 ft.**
3. How many miles long is the entire Hudson River? **315 miles**
4. What state or states boarder the banks of the Hudson River? **New York and New Jersey**

5. Name at least three animals you see on, in or near the Hudson River?
Canadian Geese, Snapping Turtles, Bald Eagle, and People are a tiny sample of the huge biological diversity living in the Hudson ecosystem.
6. Name at least three bridges that span the Hudson River: (that you see here, or know from previous experience) **Bear Mountain, Castleton-on-Hudson, George Washington, Kingston Rhinecliff, Mid-Hudson, Newburgh-Beacon, Walkway over the Hudson, Rip Van Winkle, Tappan Zee Bridges**
7. What is the Northern-most point where the Hudson River becomes large enough for ships and barges? **Just north of Albany, near the Erie Canal, the Troy Dam marks the northern-most section of the estuarine portion of the Hudson where ships can navigate.**
8. What other major river flows into the Hudson River? **The Mohawk is the Hudson's main tributary.**
9. There are two wooden ship replicas portrayed in the photos, what two sailing vessels are named? **The Half Moon and the Hudson River Sloop Clearwater**
10. Name at least three of the large land features that the Hudson River flows past: (mountains, cliffs or hills) **Adirondack Mountains (Mount Marcy), Catskills, Hudson Highlands (Storm King, Break Neck) Palisades Cliffs**
11. Name at least three things that you see as challenges to the Hudson River's environmental health: **Plastic Bottle, Sewage Discharge, Power Plants, Power Boats, And Urban Runoff**

Plotting Activity:

Using the River Mile Map, complete the following instructions and questions:

1. Draw a full compass rose on the map with all of the following cardinal directions: (north, south, east, west, northeast, southeast, southwest, northwest)
2. How many river miles long is the Hudson River on this map? 150
How many more miles are not being shown? 165
Why might this be a logical portion of the river to show? **This shows the navigable portion of the Hudson River which is also the Tidal Estuary portion of the river.**
3. Draw AND label the following bridges in blue across the Hudson River at their correct river miles: (fill in others if you know where they are too)
 - George Washington Bridge = **River Mile 9**
 - Tappan Zee Bridge = **River Mile 24**
 - Bear Mountain Bridge = **River Mile 43**
 - Mid-Hudson Bridge = **River Mile 75**
 - Rip Van Winkle Bridge = **River Mile 140**
4. Defining the Topography:

- Locate, color in green and label the **Catskill Mountains**: You could see them if you stood anywhere between Catskill and Kingston and looked West.
- Locate, color in green and label the **Hudson Highlands**: They line the east and west banks of the river between Beacon and Peekskill.
- Locate, color in green and label the **Palisade Cliffs**: they closely line the western shore of the Hudson River across from Yonkers.

5. Locate Hudson River Environmental Challenges:

Group A: (in orange)

Indian Point Nuclear Power Plant = **River Mile 38**

Albany Sewer Discharge = **River Mile 148**

Danskammer Power Plant = **River Mile 55**

Group B: (in red)

Agricultural Runoff = **Northern and Mid Hudson**

Urban Runoff = **Whole River**

Water Level Rise (from Climate Change) = **Whole River**

Litter = **Urban Areas**

What do you notice is different about Group A and Group B?

Group A are “**point source**” **polluters** and **Group B** are “**non-point source**” **polluters**

6. Is your home or school near the Hudson River?

If you went directly towards the Hudson River which river mile would you come closest to?

Are you affected by any of the environmental problems the Hudson River faces?

Vocabulary: Look up the following terms and write a brief definition of each, in your own words.

Headwaters: **Where a stream or river is said to begin, the Hudson River’s headwater is Lake Tear of the Clouds on Mount Marcy in the Adirondacks.**

Watershed: **The area of land where rain or melt water drains into a larger body of water. The Hudson River Watershed is almost 13,400 sq. miles and is partially defined by the Adirondacks, Catskills, Highlands and Palisades.**

Tributaries: **A stream or river that flows into a larger body of water before reaching the ocean. The Mohawk River is the Hudson’s largest tributary, but the watershed is full of many more.**

Estuary: **A body of water open to the ocean with riverine and tidal marine influences that result in a high level of biological diversity. The Hudson River is a tidal estuary all the way up to the Troy dam, more than 150 miles inland from the Atlantic Ocean.**

Replica: An accurate copy of an historic original. *Clearwater* is a replica built in 1969 of the Hudson River Sloops, which sail in abundance in the 19th century.

Point Source Pollution: A single localized source of pollution. These are more rare on the Hudson River since the 1972 Clean Water Act outlawed direct dumping into any navigable waterway.

Non-point Source Pollution: Defuse contamination that does not originate at a single definable source. The Hudson River is still greatly affected by runoff from agricultural land and city centers.