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Engaging Context Data Integration

Data Source: Hudson River Environmental Conditions Observing System. (HRECOS)

Relating the affect erosion has on the Hydrologic quality of the Hudson River.

Guiding Question for Lesson: How do storm conditions promote erosion to affect the hydrologic (water) quality of the Hudson River?

Objective: Students will use data gathered from the Hudson River Environmental Conditions Observing System (HRECOS) to analyze the affect storms have on increasing erosion and affecting the turbidity, dissolved oxygen and other measurable hydrologic variables that are important for the viability of the Hudson River and estuary system.

Rationale: Most students in New York City are familiar with the Hudson River, the massive flowing 315 mile waterway that starts in the Adirondack Mountains as freshwater flows southward and eventually drains into the Atlantic Ocean. As part of my Earth Science course students conduct chemical and physical water testing of a small section of the Hudson River that traverses our neighborhood. Many students are at first reluctant to even interact with the water in the river as they believe it is heavily polluted. After this field activity students are often left surprised to learn how much life is visible in our section of the Hudson River. This lesson on analyzing and interpreting data from the Hudson River will allow my students to make connections with this previous activity and enhances my unit by promoting relevancy with the current content addressing the Earth's Systems.

The lower Hudson River is a complex estuary system affected by many variables including tidal influence and storms. Many hydrologic variables are affected by metrological conditions (wind, tides, current) or geologic processes (erosion). We will be using the data provided from HRECOS to make connections between storm produced surface erosion by looking at turbidity as the variable and changes in the salinity and dissolved oxygen in the river as reported by the sensors.

Using this local data source is important because it represents information about a familiar and essential part of our community ecosystem. As a side note it is important that students learn about their local ecological communities as this helps to promote environmental stewardship. This lesson could be extended to include an engineering aspect where students could design a structure that would prevent storm and tidal surges from increasing soil erosion from the riverbank or prevent wastewater from seeping into the river.

Procedure for Data Collection

Students in a high school Earth Science class will use a computer to research for the exact date of storms that affected our region in the last ten years. (For example: Hurricane Irene was a strong tropical cyclone that affected the East Coast during Late August of 2011.) Students will be directed to use the NOAA site for storm events and to choose Bronx County as the region.

<https://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=36%2CNEW+YORK>

Once a 7-9 day time frame has been established students will log in to the HRECOS site and choose two recording stations from the Hudson River with turbidity (erosional process) along with one other hydrologic parameter. <https://ny.water.usgs.gov/maps/hrecos/>

Students will produce a similar graph as seen below to analyze if any relationships exist between increased erosion as produced by a storm; represented by increased turbidity and the effect on other hydrologic variables like the amount of dissolved oxygen in the river.

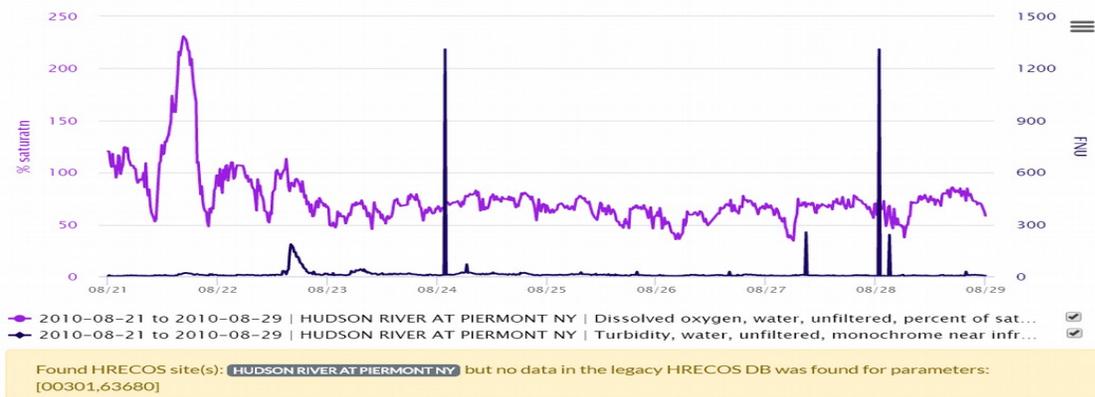


Figure 1: Sample of Turbidity vs Dissolved Oxygen

This lesson will address the NGSS standard that students will understand the interconnectedness of Earth's Systems by analyzing and interpreting data on how surface processes like erosion can affect the hydrologic variables like salinity or dissolved oxygen.

HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. The CCSSM standard addressed is MP.2; which states that students will reason abstractly and quantitatively. The data students are analyzing and interpreting in this lesson demonstrates a connection to technology as they are conducting research using real time and historical data.

Disciplinary Core Ideas. (2014). Retrieved from Next Generation Science Standards website: <https://www.nextgenscience.org/dci-arrangement/hs-ess2-earths-systems>

Hudson River Environmental Conditions Observing System (HRECOS). (2019) website:

<https://ny.water.usgs.gov/maps/hrecos/>