



Level 2: “Day in the Life of the Hudson River”

❖ **Background Information:**

For one day in October of each year, students (from elementary school to college) and teachers join together to participate in this Hudson River sampling event. Groups collect a variety of river data including salinity, dissolved oxygen, turbidity, and fish abundance. By collecting the same types of data from the same sites each year, the Day in the Life helps create annual snapshots of the river that can be used to compare how river conditions vary by location and over time.



Image Source:
<http://www.ldeo.columbia.edu/edu/k12/snapshotday/index.html>

Sampling takes place at over 80 sites from Manhattan to Troy. The event has grown tremendously since its creation in 2003; in 2016 more than 4,500 students and volunteers participated. This extraordinarily rich sampling feat would be impossible without their contributions. This event is coordinated by the Hudson River Estuary Program of the New York State Department of Environmental Conservation and Lamont-Doherty Earth Observatory of Columbia University. Each year they compile the data and add it to an online archive that is freely accessible for classrooms to use.

The official Day in the Life website has a substantial amount of information about the event, including related classroom resources: <http://www.ldeo.columbia.edu/edu/k12/snapshotday/>

❖ **Dataset Timeframe:**

- The Day in the Life is a single day of data collection that occurs mid-October each year. It has happened every year since 2003. In 2016 the Day in the Life was on October 20. School groups spend either part of the day or an entire school day sampling.

❖ **Data Collection Methods:**

- Data collection methods vary by site, depending on the equipment that each school group has available. Many groups use seine nets, water testing kits, and other measuring tools like turbidity tubes. See the Day in the Life website for information on the types of equipment used in each measurement.
- **Note:** Data points are collected by students with a range of experience (elementary-aged through college), so expect some site-by-site variation in data accuracy. However, the Day in the Life organizers spend a considerable amount of time checking the data for discrepancies, so you can be confident that most of the information is reliable.



❖ Dataset Variables:

Notes: *Datasets are organized on the Day in the Life website by year, parameter, and location. Each site chooses which variables to test, and most sites don't have results for all of the variables listed below.*

- **Alkalinity (ppm):** measure of how effectively the river can neutralize acid.
- **Currents (cm/sec):** students measure the speed and direction of the current.
- **Dissolved oxygen (ppm):** the concentration of O₂ gas dissolved in the river. It is crucial for aquatic life.
 - **Percent saturation of DO:** another measure of O₂ gas dissolved in the river. Percent saturation is calculated on a scale that varies with temperature, as colder water can hold more gas.
 - **Fish & Macroinvertebrates:** most students use seine nets to sample for fish and macroinvertebrates like crabs and backswimmers. They record the types of each species and the greatest number of each type caught per seine net haul. Some groups use fish pots, rod and reel or kick nets.
- **Nutrients**
 - **Nitrate (ppm):** this is a form of nitrogen, which is necessary in small amounts, but is considered a pollutant in large amounts.
 - **Phosphate (ppm):** the phosphate ion is readily usable by living organisms, and is often limited in river systems. However, high levels of phosphate can indicate pollution.
- **pH:** measures how acidic or basic the river is, measured on a scale from 0-14. Lower numbers are acidic, pH 7 is neutral, and higher numbers are basic.
- **Salinity (ppm):** measures the concentration of different ions in the water, as a way of determining how salty the water is. Chloride ions [Cl⁻] are used for locating the salt front in the Hudson (measured as 100 ppm Cl⁻). Fish species tolerate different salinity, so total salinity is also used.
- **Shipping:** students note time and location of boats traveling along the river, which allows for calculation of their average velocity.
- **Tide:** students measure the times and the heights of the rising and falling tides.
- **Turbidity (cm):** the cloudiness of the river, which is affected by the amount of suspended material. Most measurements on the Day in the Life are taken by reading the viewing distance to a secchi disk or the bottom of a turbidity tube.
- **Water temperature (°C or °F):** may be interesting for students to compare across sites on the same day.
- **Weather:** most groups record air temperature, wind speed, and weather from the previous 3 days.



Image Source: Lamont-Doherty Earth Observatory

❖ Information About Sites

Classrooms participate in the Day in the Life at about 80 sites scattered along the Hudson River from Manhattan to the Troy Dam. In addition, groups from New York City sample the East River, the Harlem River, the Bronx River, and the Upper and Lower Bays of New York Harbor. Visit the Day in the Life data page to download data from specific sites, including physical descriptions of the shoreline and vegetation at each site.



❖ Source of Datasets:

- Most data are student-collected, and then submitted to event organizers from the Hudson River Estuary Program and the Lamont-Doherty Earth Observatory of Columbia University. They curate the data and share it with the public through an online archive:
<http://www.ldeo.columbia.edu/edu/k12/snapshotday/Data.html>
- A few additional datasets are assembled by science partners who test student-collected samples for sediment, enterococcus, chlorophyll, and trace metals:
<http://www.ldeo.columbia.edu/edu/k12/snapshotday/SciPart.html>
- If you have specific questions about the data, please email Margie Turrin, Coordinator of the Lamont-Doherty Earth Observatory: mkt@ldeo.columbia.edu

❖ Inquiry Idea Starters

Here are some sample questions you could ask using these data. These are just suggestions, and we hope you'll come up with many interesting questions of your own!

- How has turbidity changed from year to year at your site?
- Was there a correlation between dissolved oxygen levels and fish diversity along the river in 2016?
- Was there a correlation between turbidity and fish diversity at your site from 2003-2016?
- Was there a correlation between salinity and fish diversity along the river in 2016?
- How did salinity compare at ~ the same river mile in the Hudson, the Bronx and the East River?

❖ Additional Resources

- The official Day in the Life webpage is chock full of additional resources and lesson plans that use Day in the Life data: <http://www.ldeo.columbia.edu/edu/k12/snapshotday/index.html>
- The Cary Institute has produced dozens of Hudson River Ecology lessons that incorporate authentic scientific data: <http://www.caryinstitute.org/educators/teaching-materials>
- The Hudson River Estuary Program also has a page of Hudson River Lessons that span the disciplines from ELA to math, science, and social studies: <http://www.dec.ny.gov/education/25386.html>
- Lamont-Doherty Earth Observatory has produced a very detailed worksheet on interpreting data from water quality sampling, fish sampling, benthic sampling, and plant inventories:
<http://www.ldeo.columbia.edu/edu/k12/snapshotday/activities/InterpretingYourDataQuest.pdf>



Image Source: <http://www.ldeo.columbia.edu/edu/k12/snapshotday/index.html>