Turbidity

Turbidity is a measurement of how 'cloudy' a body of water is. 'Cloudiness' in water is often caused by suspended sediment, dead organic matter or algae. Aquatic and marine plants don't grow as well in cloudy water since they receive less light. Less plants, in turn means less oxygen in the water, which can make it hard for marine life to survive.

High turbidity can also be a sign of high nutrient levels which can lead to large growths of blue-green algae which can be very toxic to other organisms.

How do we measure turbidity?

In 1865 an Italian priest and astronomer, Angelo Secchi, invented a device to measure turbidity in a body of water. His creation was a plain white 30cm disk attached to a pole or line that is slowly lowered into the water. The depth at which you can no longer see the disk is called the **Secchi depth.** A modified smaller version that has a 20 cm diameter and alternating black and white quadrants is used for testing freshwater.

Build your own Secchi Disk (for freshwater)

Tools and supplies you need: White plastic or wood sheet (eg. Coroplast), black permanent marker, rope, hot glue gun, large straws (eg. Bubble tea), washers (3/8" inside diameter), large hex nuts

Step 1 – Cut a 20cm circle out of your plastic or wood

Step 2 – Draw a big X on the top of the disk and colour alternating quadrants black

Step 3 – Drill a hole in the centre of the disk, the hole should be the same size as your straw.

Step 4 – Place the straw through the hole and glue into place with a washer on either side of the disk for added support

Step 5 – Run the rope through the tubing and tie the hex nut on to the bottom of the disk.

Step 6 – Mark the rope every 50cm with a permanent marker

Using your Secchi Disk

Step 1 – Choose a testing site where the water is at least a few meters deep. Your measurement should always be taken on the shady side of the dock or boat.

Step 2 – Gently lower the disk into the water until it is just no longer visible, and record its depth (if it doesn't sink you may need to add additional weights on the bottom)

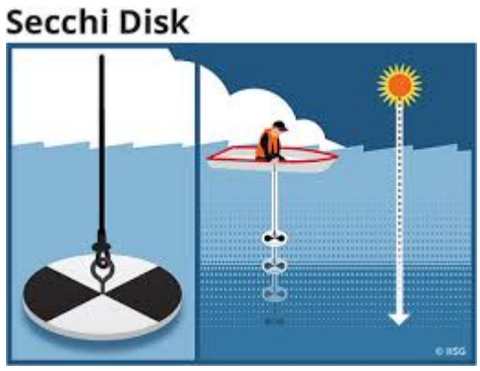
Step 3 – Slowly raise the disk until it reappears. Record this depth (in cm)

Step 4 – Average the two depths. This is the "Secchi depth", or the depth to which light can penetrate the water.

It's important to note that Secchi disk readings are not an exact measure. There can be errors because of glare from the sun, differences in eyesight from one person to the next or changes in lighting.

Try getting a friend to measure the same spot or come back at a different time of the day, did you get a different reading?

When doing measurements, scientists will try and standardise as much as possible (same user, same time of day, etc). It does, however, provide an easy, inexpensive, and straightforward method to measure water clarity, which is why it's been a useful tool for over 150 years!



For more design challenges and activity ideas check out the COVE website at:
https://coveocean.com/learning-tools/

Curriculum Outcomes

Science 7:

GCO1: Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO2: Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

- Identify and explain examples of mixtures and solutions that have an impact on development in science, technology, and environment {112-7, 113-1)
- Describe the science underlying particular technologies designed to explore natural phenomena, extend human capabilities, or solve practical problems {111-5)
- Identify questions, investigate, and record collected data on the ecosystem's components using materials effectively (208-2, 208-3, 210-1)

Science 7 Refreshed:

Outcome: Learners will analyse the interconnectedness of living things and the environment, in relation to the concept of Netukulimk.

- Investigate biological indicators of environmental health (COM/CT/TF)

Science 8:

- Survey and generalize strengths and weaknesses of science and technologies, including Canadian, that have improved and that support research and development (110-8, 112-5, 210-3, 113-10)
- Using data, including graphical, analyze and predict factors that affect productivity and species distribution in marine and freshwater environments {311-8, 210-4, 210-6)
- State a conclusion, based on experimental data and evidence, of light and describe qualitatively how visible light is refracted (210-11, 308-10)
- Provide examples of optical technologies that enable scientific research and relate personal activities associated with such technologies (109-10, 111-3)

Mathematics 7

M01: Students will be expected to demonstrate an understanding of circles by constructing circles with a given radius or diameter