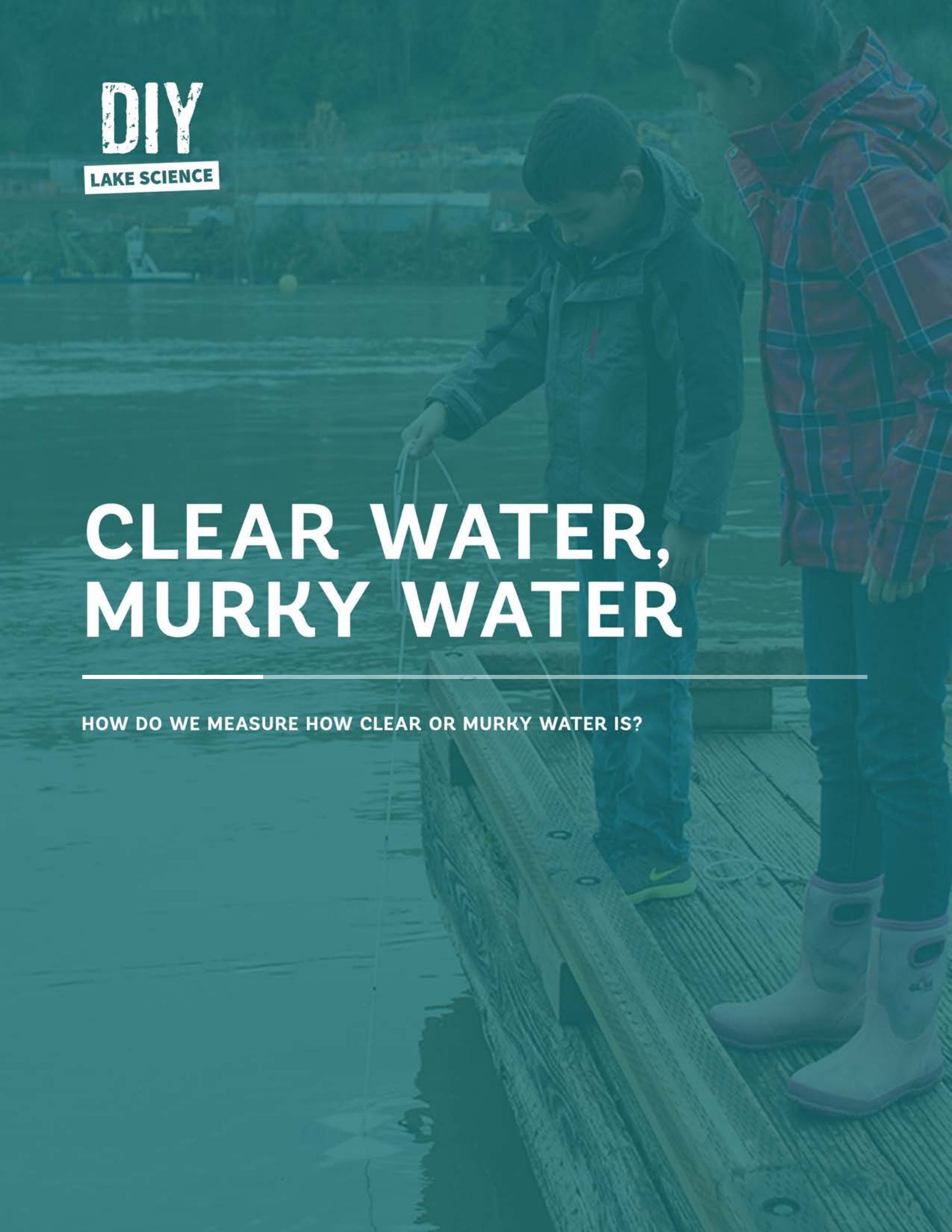




DIY

LAKE SCIENCE

CLEAR WATER, MURKY WATER

HOW DO WE MEASURE HOW CLEAR OR MURKY WATER IS?

ACTIVITY DESCRIPTION

How do scientists measure how clear or murky water is in a lake? How does water clarity (clearness) affect what lives in the lake? In this activity, you'll make a Secchi disk—a tool to measure the clarity of a lake or other body of water.

Age: 9 and up

Preparation: 15 minutes

Activity: 15 minutes

Cleanup: 10 minutes

ACTIVITY MATERIALS

- 3 disposable plastic dinner plates, at least 20 cm in diameter (black or white is best)
- Thick, light-colored string that won't stretch, such as nylon, at least 10 m long
- Weights such as nuts or metal washers with holes large enough to pull the string through
- White and black waterproof paint
- Paintbrush
- Scissors (strong enough to cut plastic plates)
- Stapler or strong glue
- Masking tape
- Tape measure
- Hammer and nail
- Dark marker
- Ruler or other straight edge (such as a book)
- Recording device (notebook and pen/pencil or mobile device)
- Access to a body of water, at a location where you can't see to the bottom



MATERIALS NOTE

If plastic plates aren't available, use another rigid, disk-shaped object like a plastic container lid, aluminum pie tin, or bucket lid. For weights to sink the disk, use any relatively heavy objects with a center hole through which you can thread the string. Choose a body of water with a bridge, pier or dock so you can access a location that you can't see to the water's bottom.

SAFETY

Exploring watersheds is fun! But it's important to be safe and respectful when doing science in or near a body of water.

- If necessary, go with an adult.
- Only enter a body of water if it is safe and legal to do so.
- Rinse off equipment with clean water after using it.
- Wear appropriate footwear and clothing when working in or near a body of water.
- Follow the "leave no trace" and "pack it in, pack it out" principles.
- Check to see if the water and/or the creatures in it are protected by environmental regulations. Some sensitive ecosystems need to be left alone in order to recover from damage or overuse.

STEP 1

To make the Secchi disk, you may need to cut the rim off each plastic plate, so it is 20 cm in diameter. Glue or staple them all together, one on top of the other. This will make the disk stiffer.



STEP 2

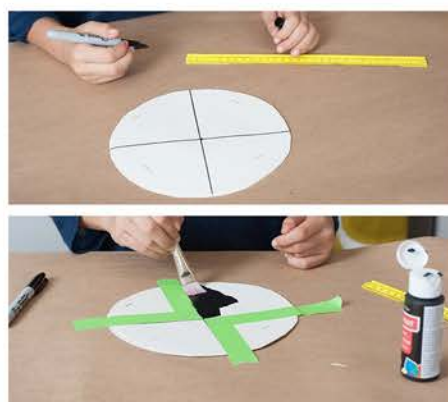
Mark the center of the disk with a dark marker. Use the hammer and nail to make a hole in the center (through all plates), large enough for the string to pass through.



STEP 3

Using white and black paint, paint the pattern on the disk shown in the photo. Use the ruler and marker to divide the disk into four quarters. Do this by drawing two perpendicular diameter lines that intersect in the disk's center. Use masking tape along those lines to help make sharp edges between the four sections when painting.

If your plates are black or white, you'll only need to paint two sections (instead of four). Let the paint dry fully before removing the tape.



STEP 4

Cut at least 10 meters of string. (You may need more string, depending on the body of water you want to measure.)

Tie a knot in the string, about 20 cm away from one end. Thread this short segment through the hole in your plates, from the painted side to the unpainted side. This 20 cm segment should be hanging from the unpainted side. The plates should not be able to slide past the knot you made.



STEP 5

Thread the 20-cm string segment through your weights. Tie a knot at the end of the string so the weights can't slip off.



STEP 6

Using a tape measure and marker, draw marks every 25 cm on the rest of the string, from the disk to the string's end. Make sure the marks are large enough to be seen from a few meters away. Now you're ready to use your Secchi disk!



STEP 7

To measure Secchi depths, go to a body of water. Find a way to access an area of the water deep enough that you can't see to the bottom. You can do this from a dock, bridge, pier or boat. This is best done in calm weather, between 9 AM and 3 PM, in a shaded area or with the sun at your back.

Holding onto the string, lower the Secchi disk down to the water. Once the disk reaches the surface, you may need to wiggle the string to help the disk sink. If the disk doesn't sink, you may need to add more weights.



STEP 8

Once the disk starts to sink, count how many black markings on the string pass below the water's surface. Stop counting when you can no longer see the disk. Record how many markings you counted. Multiply that number by 25 cm—the result is the Secchi depth.



STEP 9

Pull the disk up out of the water, and repeat Steps 7 and 8, to get another Secchi depth measurement. Add the two measurements and divide the total by 2, to calculate the average Secchi depth for your body of water.

If the two measurements are very different from each other (more than 0.6 m), these first measurements may not be accurate. Repeat Steps 7-9 until your measurements are consistent. Note the date, weather conditions, and location.



STEP 10

Repeat the Secchi depth measurements at the same time of day and in the same location several times throughout the year. How does the Secchi depth change as time passes and the seasons change? Make a hypothesis (an educated guess) about what might be causing the differences in water clarity at different times of year.



STEP 11

OPTIONAL

Make Secchi depth measurements in another location of your body of water or at another body of water. Make a hypothesis about what might be causing the differences in water clarity between the different locations.



STEP 12

OPTIONAL

You can submit your Secchi depth measurements to a database of water clarity measurements at <http://www.secchidipin.org/>. People from all over the world do this so that we can better monitor the health of lakes and streams.

Any measurements submitted must follow certain rules to make sure the data are of good quality: 1) your Secchi disk must be 20 cm in diameter, 2) your data must be recorded between 9AM and 3PM local time, and 3) your measurements must be consistent—not more than 0.6 m different from one measurement to another.



WHAT'S GOING ON?

Secchi depths are larger in clear water and smaller in murky, cloudy water. Murky water has more particles floating in it, like soil, pollution, or microscopic plants and animals. Such particles prevent light from shining through the water, so the Secchi disk “disappears” sooner as it’s being lowered.

The Secchi depth of a body of water can change over time. Mostly, Secchi depths decrease in warmer weather when plants and other organisms grow more. As weather cools, Secchi depths increase when organism growth in the water decreases. Did you measure differences in your water body over time? Or between two bodies of water?



Secchi depths are large for clear water and small for murky water.

IS MURKY WATER HEALTHY?

Which body of water would you want to swim in—one with a large or small Secchi depth? Generally, clear water with a large Secchi depth means the water is cleaner and healthier. Organisms living in a lake need sunlight to live. A murky lake prevents sunlight from shining through. Less sunlight means fewer plants, less food, and less oxygen for organisms that need it to breathe.



However, not all clear water is healthier than murky water. It all depends on what the average clarity is for the body of water. By making regular Secchi depth measurements, we can track changes in water clarity, to understand how our actions might be affecting a body of water.

LEARN MORE |

For more info and other activities, visit:

LawrenceHallofScience.org/do_science_now/diy_lake_science

CREDITS |

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This activity from the DIY Lake Science app allows families to investigate and learn about lakes and bodies of water at home or on the go! The app features twelve hands-on investigations, as well as videos and a lake simulation.

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