What is a Transparency Tube?

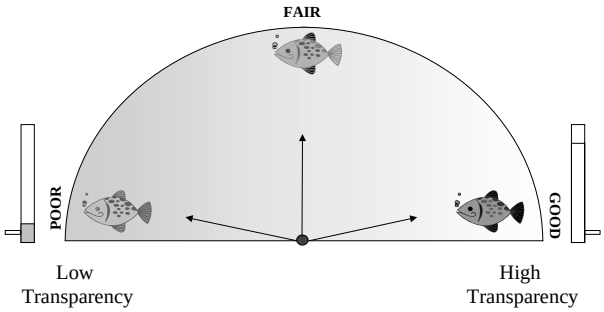
The transparency tube was developed in Australia for measuring stream water clarity. The clear plastic tube is 2 feet long x 1½-inch wide, with a release valve at the bottom. A stopper inserted at the bottom is painted black and white, so that when you look down into the tube a distinct symbol is visible. To measure water clarity, the tube is filled with water collected from a stream or river. Looking down into the tube, water is released through the valve until the black and white symbol is clearly visible. The depth of the water when the symbol becomes visible is recorded in centimeters, marked on the side of the tube. If the symbol is visible when the tube is full, the transparency reading is ">60 centimeters." A greater transparency reading reflects higher water clarity.

What Does the Transparency Tube Measure?

Stream transparency is an indirect measure of the amount of *dissolved* and *suspended* materials present in water. For most bodies of water, the amount of solids suspended in the water is the most important factor: the more suspended materials, the lower the water transparency. In lakes, the majority of suspended solids are algae. In streams and rivers, soil particles (predominantly silts and clays) have a stronger influence on transparency as water flows downstream, carrying and depositing this sediment. A good example of dissolved material affecting transparency is the tea color caused by organic material of some northern, bog-influenced lakes and streams.

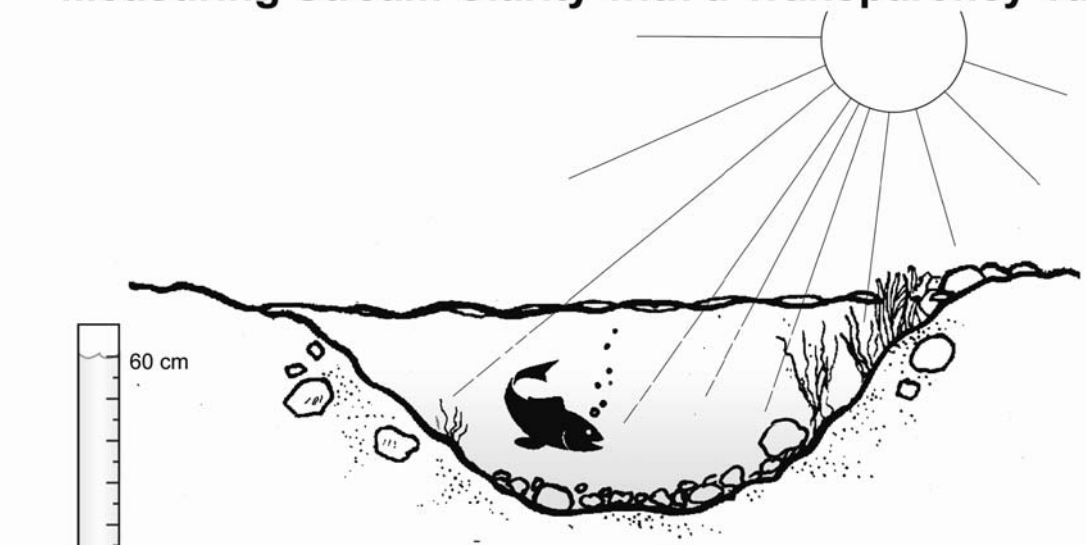
Tracking water transparency is like monitoring your blood pressure because it tells us about the health of a stream. Changes in transparency tell us when key water pollutants are present. In general, a low transparency reading reflects a large amount of sediment (excessive soil material) or other suspended material like algae in the water. Too much sediment in the water is a significant pollutant itself, whether it is suspended in the water column or deposited on stream bottoms. Suspended sediment reduces light penetration needed for the growth of beneficial aquatic plants. It also interferes with the ability of fish to see and capture their prey:

Low Water Transparency Influences Fish Health



A stream bottom is described as ‘embedded’ when smaller rocks such as gravel and cobble are surrounded or buried in clay, fine silt or sand. When a stream bottom is embedded, fewer fish and aquatic insects are able to survive. Less diverse assemblages of fish and insect species are also found in embedded streams. When a stream bottom is embedded from deposited sediment that has washed downstream, fish eggs become smothered, keeping them from getting the oxygen needed to survive. Deposited sediment also clogs spaces between rocks where insects like to live (Waters 1995). Reduced insect habitat from excess sediment leads to fewer species of fish that depend on insects for food. Finally, sediment may have pollutants attached to it such as phosphorus and petroleum products. These pollutants degrade the quality of flowing water, as well as downstream lakes or reservoirs.

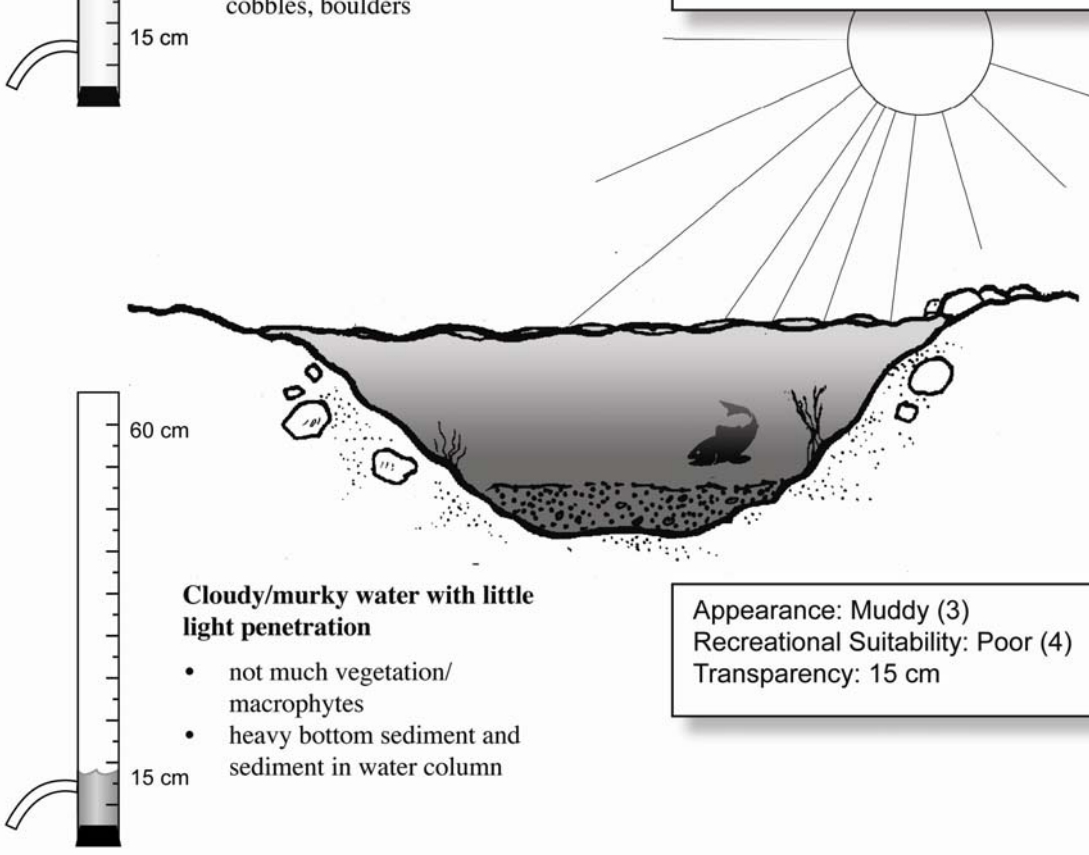
Measuring Stream Clarity with a Transparency Tube



Clear water with good light penetration

- lots of macrophytes
- clean, clear bottom gravel and cobbles, boulders

Appearance: Clear (1A)
Recreational Suitability: Very Good (1)
Transparency: >60 cm



Cloudy/murky water with little light penetration

- not much vegetation/ macrophytes
- heavy bottom sediment and sediment in water column

Appearance: Muddy (3)
Recreational Suitability: Poor (4)
Transparency: 15 cm