

TURBIDITY AND ITS IMPLICATIONS FOR RIVER QUALITY

Diedre Murphy, Coordinator – Waterwatch,
Corangamite Catchment Management Authority

Summary

Turbidity measures the clarity of water. Clarity decreases as the amount of suspended particles in water increases and takes on a muddy appearance. Such particles include fine clay, silt, organic detritus and plankton. Turbidity measurements relate closely to the amount of suspended particulate matter (SPM) in a water sample.

The greatest impact of sediment entering waterways is on habitat. Sediment will smother rocky bottoms, coat snags and fill deep pools reducing the available habitat and affect the feeding and breeding of fish and aquatic invertebrates.

SEEP (WoV) objectives for the uplands of the Moorabool catchment: 75th percentile ≤ 10 NTU

Typical range in healthy waterbodies $\leq 10 - 20$ NTU

Level which may cause ecosystem damage ≥ 100 NTU

An NTU is a Nephelometric Turbidity Unit

What is Turbidity?

Turbidity measures the clarity of water. Clarity decreases as the amount of suspended particles in water increases and takes on a muddy appearance. Such particles include fine clay, silt, organic detritus and plankton. Turbidity measurements relate closely to the amount of suspended particulate matter (SPM) in a water sample.

The units for turbidity are usually given as Nephelometric Turbidity Units (NTUs) which represent how much light has been scattered in the sample by the suspended material. Formazin Turbidity Units (FTU) are also used and generally $1 \text{ NTU} = 1 \text{ FTU}$. Most Waterwatch monitors use a turbidity tube that have increments of 10 to 400 NTU.

The amount of light entering the water is reduced when the water is turbid and this reduces the growth of submerged aquatic plants. Lack of light also makes it difficult for predators like fish and birds to hunt successfully. Turbid waters absorb heat and increase water temperatures and this will affect the growth of plants and animals.

Sediments are an important method of transport for contaminants. Small particles

have a large surface area relative to the volume of the particle and this provides great potential for contaminants e.g. heavy metals, to adsorb and be transported in waterways. These adsorbed materials will stop moving when flow is reduced and the sediments settle out of the water e.g. in estuaries or lakes.

The greatest impact of the sediment carried by turbid water is on aquatic habitat. Rocks, snags and river bed habitat become smothered and this reduces the available sites for biota to live and grow.

Sources of Turbidity

Most sediment in rivers and streams comes from catchment and stream bank erosion. This is a natural process that defines the shape and depth of our waterways, however human land use can result in excessive disturbance of soils and sediment runoff. For example, unsealed roads can contribute substantial quantities of sediment to waterways.

The Variation of Turbidity in Waterways

Levels of turbidity in waterways depend on activities occurring in and beside the river. Turbidity tends to increase from the headwaters to the lowlands. Rainfall events that increase the flow and velocity of rivers (e.g. in flood) will affect the amount and the size of particles carried. The vision of a turbid river reminds us of the forces at work in shaping our waterways.

Questions

Q1. *Do fish contribute to the turbidity in waterways?*

Some fish can, like the introduced fish carp *cyprinus carpio spp*. Carp normally disturb the river beds whilst feeding. Turbid waters can also induce changes in fish communities by the replacement of native fish with carp.

Q2 *Using the turbidity tube at my site, what do I record if I find the water level is in between two NTU values?*

It is best to take the higher NTU value, for example if you find the water is in between 10 and 15 NTU, record 15. The turbidity tube uses a logarithmic scale, and therefore it is too difficult to make an estimate. Another suggestion is to take water out of the tube

close to each increment so it would be easier to record the value.

Q3 Can a high turbidity reading effect my other water quality tests?

Depending on the instruments used, sometimes high turbidity levels can interfere with other tests. An example is the reactive phosphorus test. Monitors that use the Merck Aquaquant Test understand a clear solution is

needed to use the colour comparator chart. If the sample water is turbid (generally greater than 20 NTU) the solution needs to be diluted prior to testing.

References: Waterwatch Victoria, Data Interpretation Manual, found at <http://www.vic.waterwatch.org.au/monitoring-and-data/1011/>