

Working towards a sustainable and productive catchment

What Is Water Quality ?

Water is one of the most important resources that we have. All living things – humans, plants and animals need water to survive. Only 1% of the earth's water is suitable for consumption, and the amount of freshwater we have today is roughly the same amount we had a thousand years ago and the same as the water we will have in a thousand years time. Conserving and maintaining water quality is especially important in Australia, the world's driest inhabited continent.

To most of us water quality may suggest only "clean" water for drinking, swimming, and fishing, however to the farmer or manufacturer, water quality may have an entirely different meaning. One of the most important issues concerning the quality of water is how that water will be used. Water suitable for irrigation might not be suitable for drinking or swimming. When water is degraded to a point that affects its use for a particular purpose, it has become polluted.

The quality of water can change as it flows over the land surface as rivers, streams, lakes, or ponds (surface water), or under the land surface (ground water). These changes in water quality may be due to natural factors or human activities.

As water comes in contact with rock minerals some dissolve and become part of the surface- or ground-water system. Other natural materials, such as soil or organic matter become suspended in the water and move from one place to another.

Human impacts on water quality may result from land disturbances such as clearing of vegetation which increases the amount of rock minerals, soils and organic matter transported and dissolved in the water. Human made pollutants such as litter, chemicals and fertilisers, household rubbish, sewage and runoff from roads and streets also impact on water quality.

How do we measure water quality?

Water quality is assessed by measuring the following physical, chemical and biological parameters:

Macroinvertebrates

What are they?

Macroinvertebrates are small aquatic animals without backbones such as dragonfly nymphs, prawns and leeches. They are good indicators of water quality because:

- They are affected by physical, chemical and biological conditions of the waterway.
- They are an important part of the food web – feeding on plants and being eaten by predators.
- They cannot easily escape pollution and can therefore show the effects of long and short term pollution events.
- They are abundant, easily sampled and identified. (Waterwatch Australia 1998)

Temperature

Why is it important?

The water temperature is important to water quality because:

- It is able to influence oxygen levels. Hot water cannot hold very much oxygen but cooler water can hold large quantities of oxygen.
- It can affect the rate of photosynthesis. If water is warm it will promote plant growth. If conditions such as light, nutrients and flow are suitable warmer waters are more likely to have algal blooms.
- All aquatic life depends on temperature. Each living organism has a temperature range that they can tolerate before dying. If the water temperature is too warm or too cold it may affect their growth and reproduction.

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pH

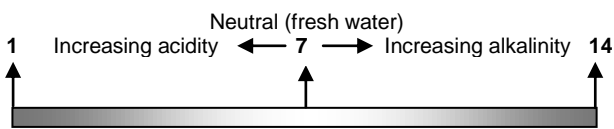
What is it?

pH is a measure of the acidity or alkalinity of water and is measured on a scale of 1 to 14.

If the water is neither acid nor alkaline it is neutral and is expressed as a pH of 7. The water that we drink out of the tap is usually neutral. If the water in a stream is too acid or too alkaline it can kill all aquatic life.

What factors can affect pH?

- Geology
- Air pollutants
- Overland pollution



Electrical Conductivity

What is it?

Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm. Low levels of salts are found naturally in waterways and are important for plants and animals to grow. When salts reach high levels in freshwater it can cause problems for aquatic ecosystems and complicated human uses.

Nitrate

What is it?

Nitrate is a dissolved state of nitrogen. In this form, the nitrogen can be readily taken up and used by plants. Natural sources of nitrates include soil, animal wastes and decomposing plants. Human sources include sewage, fertilisers and wastes from farm animals. Excess amounts of nitrate can cause dramatic plant growth and change the types of plants and animals found in the waterbody.

Turbidity

What is it?

Turbidity measures how clear the water is, the greater the turbidity the dirtier the water.

Turbid water looks cloudy or muddy and is caused by clay silt or organic particles being washed into the waterways. The sediment travels downstream and is deposited on the seabed, especially in times of flood. It smothers the seagrass beds that support dugongs and other marine species. Sources of turbidity include eroding river banks, waste discharge or land disturbance such as grazing, road construction or housing developments.

Dissolved Oxygen

What is it?

Dissolved oxygen is the amount of oxygen gas that is dissolved in the water and is essential for all aquatic living things. It is measured in milligrams per litre (mg/L) and as percent saturation (% sat). Percent saturation tells us the total amount of oxygen that water can hold at a certain temperature. Many aquatic organisms will suffocate if there is not enough oxygen in the water. For example fish need at least 6 mg/L or 80% saturation of dissolved oxygen in the water to survive.

What factors can affect DO?

- Flow rate: water flowing quickly, tumbling over rocks will have a higher DO than still water.
- Temperature: the cooler the water is the more oxygen it will hold.
- Salinity: the saltier the water is the less DO it will hold.
- Turbidity: higher turbidity means less dissolved oxygen.

Phosphate

Why is it important?

Phosphorus is an essential nutrient for plants and animals that make up the aquatic food web. There are many sources of phosphorus, both natural and human. These include soil and rocks, wastewater treatment plants, fertiliser runoff from lawns and crops, disturbed land and detergents in stormwater.