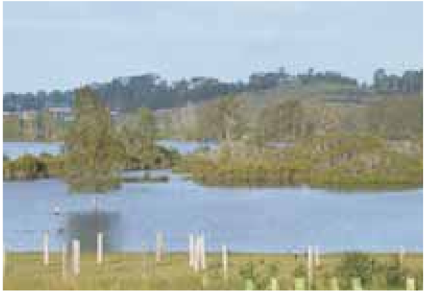
Tumbi Creek

Wyong River



Porters Creek

Constructed Wetland

The life and tides

Sediments, organisms and nutrients

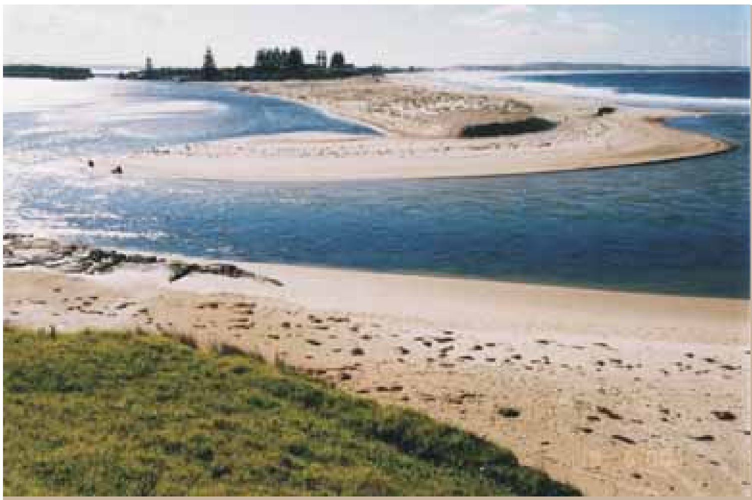
Sediments are an important part of how estuaries function. The sediments of Tuggerah Lakes come from the surrounding rivers and creeks. The sea also provides sandy material during storms and strong tidal currents. Tuggerah Lakes Estuary is one of the slowest infilling estuaries on the coast, and at current rates, would take over 1000 years to fill in completely. However, increased development in the catchment in recent years has created the potential for increased erosion and infilling of the lakes.

Tuggerah Lakes Estuary acts as a sink for nutrients and sediments. Material carried or washed into the estuary, as well as water plant and animal material falls to the bottom. This material is the main food source for many microscopic organisms living in the lake bed. These organisms break down and recycle the organic matter and contribute to chemical reactions between the sediments and the lake water. Oxygen is used in these chemical reactions but at the bottom of the lake, the concentration of oxygen can become very low. Reduced oxygen levels can lead to the release of nutrients from the sediment back into the water. As we move down into the sediment, oxygen is further depleted and hydrogen sulphide (rotten egg gas), which occurs naturally in soils with low oxygen content is released.

When the ecosystem is under strain or out of balance, hydrogen sulphide emissions increase causing offensive odours.

tuggerah lakes estuary

Get into the habitats



Wind and water - all in the mix

The large expanses of open water, shallow depths, small tidal ranges and small freshwater inflows of Tuggerah Lakes Estuary favour wind-driven circulation. Wind is highly variable and can change on scales from minutes, days, weeks and seasons. Wind-driven currents can mix the estuary vertically (top to bottom) in about three hours and can mix the whole lake system within about 12 days.

Water circulation, mixing and flushing

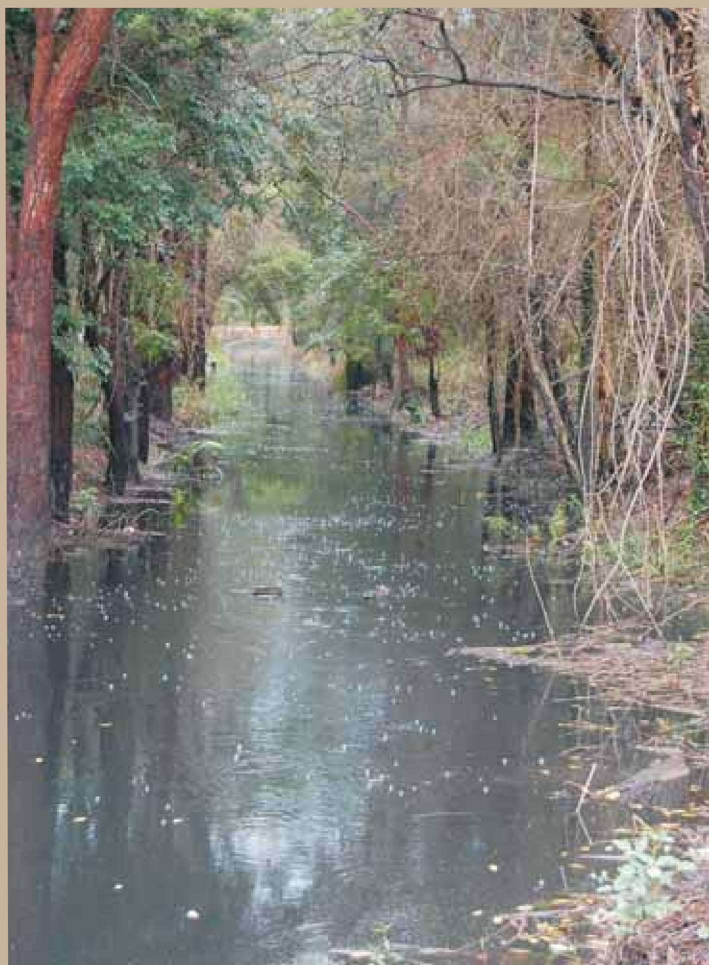
Water circulation and mixing are important to the water quality and ecology of an estuary. The three main driving forces for water circulation are gravity (e.g. via density differences between fresh and salt water), tides and wind. Circulation patterns change in response to variations in wind speed and direction and tidal currents. The shape and depth of the estuary are important in shaping the circulation patterns. Human activities such as dredging, channel diversion, breakwalls and river regulation also affect circulation patterns.

Gravitational circulation in an estuary is primarily related to its salinity and temperature. The salt water tends to sink below fresh water, and cold water tends to sink below warm water. Gravitational circulation within the Tuggerah Lakes Estuary are significant in summer when temperatures are high or following rainfall when fresh water flows into the lakes. Gravitational circulation is important for water exchange between:

- shallow fringing seagrass areas of the lakes and the deeper open water
- rivers and the estuary during low flow
- major basins and the ocean following large freshwater inputs

The flow of water at the Entrance Channel to Tuggerah Lake is driven by the tide and accounts for only 1 per cent of the system's water exchange. The incoming tide brings heavier salty water into the estuary, which forms a high-density current that flows into the deeper parts of Tuggerah Lake. During the outgoing tide, only waters located near the entrance are ejected. The tidal inflow is small in relation to the size of The Estuary, with the tide rising and falling only a few centimetres. At 80km sq in size, this large expanse of water also generates its own water and wind circulation system to support a very diverse ecology including prawns and fish stock.

Multiple studies have concluded that constructing a breakwall would only increase the water exchange to a total of 1.01 per cent.



WYONG SHIRE COUNCIL

CARING FOR OUR COUNTRY

This project is coordinated by Wyong Shire Council, through funding from the Australian Government's Caring for our Country.