

Glossary of terms

Aerobic sediment: sediment that has oxygen present.

Anaerobic sediment: a highly organic sediment formed in the absence or near absence of oxygen in water that is rich in hydrogen sulfide.

Baseline: first assessment of a situation or environment against which subsequent changes are measured.

Biogenic sediment: sediments composed of material produced by animals and plants. Shells are common sources of biogenic sediments in estuaries.

Calcium carbonate: a common substance found in limestone and chalk rocks. It is extracted from seawater by animals such as shellfish and snails to form their hard shells. The chemical formula for calcium carbonate is CaCO_3 .

Clastic sediment: sediments formed by the breakdown of rocks by wind and water into sediments. Clastic sediments range in size from boulders that may weigh hundreds of kilograms to microscopic clay particles that are not easily seen by the naked eye. These sediments are mainly transported into estuaries from the land by rivers.

Deforestation: the removal of naturally occurring forests by logging, or deliberate or accidental use of fire.

Ecological: of or relating to ecology. Ecology is the relationship between organisms and their environment.

Edge effect: changes in environmental conditions that occur over short distances at the boundary between different environments or habitats. The edge effect is particularly noticeable in small habitat fragments.

Fixed reference level: in relation to land surveying, the height or elevation of a point on the land or sea surface (e.g., mean sea level, MSL) whose value does not change. The elevations of other points are given relative to a fixed level. For example, the elevation of a sandflat could be stated in metres above the local MSL.

Geomorphology: morphology describes the three-dimensional shape of an object. In the environmental sciences, geomorphology is the study of the processes that shape the earth's surface or landforms. An intertidal flat is an example of a landform found in an estuary that is formed by the deposition of catchment and marine sediments. River flows, tidal currents, and waves transport and rework sediments that form intertidal flats.

Hydrostatic: refers to the science of fluids (e.g., water) at rest. The total pressure exerted at any depth in a fluid at rest is due to the force of gravity, the density of the fluid (weight per volume), and the air pressure exerted by the atmosphere. At the water surface, the height of the water column changes mainly due to air pressure and will be equal at all nearby locations. For example, the height of the water surface in a bucket of water will be at the same level everywhere in the bucket due to air pressure.

Mean sea level: the level of the sea halfway between low and high tide. This is typically a fixed level or **vertical datum** established using tide-gauge records. In New Zealand, local fixed levels have been established historically by determining the mean sea level (MSL) measured at tide gauges around the coast during the 1900s to 1950s.

Pollutants: substances that are introduced into an environment or ecosystem which cause damage or harm (directly or indirectly) to plants and animals. Pollutants can be artificial or naturally formed. Artificial pollutants, such as chemicals, are created in industrial processes (e.g., pesticides, fertilisers, oil, metals). When these chemical pollutants get into estuaries, typically they build up in sediments and, at certain concentrations, cause harm to plants or animals that come into contact with them. Effects may include reduced growth and/or reproduction success and/or even death. Natural substances become pollutants when their levels in the environment exceed natural or original levels and have adverse effects on the environment. As we have seen, fine sediments are a major pollutant in many New Zealand estuaries because of deforestation and resulting increased soil erosion in catchments. Adverse environmental effects include reduced water clarity and light penetration, smothering of plants and animals, and increased sedimentation. The most common way that many pollutants are delivered to estuaries is via stormwater runoff.

Sediment accumulation rate (SAR): the average rate of sediment accumulation at a given location, which is usually expressed as a rate in millimetres per year (mm yr^{-1} or mm/yr). The SAR is a net value because a core accumulates the effects of all the processes that influence sedimentation. For example, sediment may be deposited and then reworked again by tidal currents and/or waves. Thus, over the long term, sedimentation rates derived from cores represent the net or cumulative effect of many cycles of sediment deposition and reworking. However, the amount of reworking will depend on the local environment. For example, sediments deposited in a saltmarsh are much less likely to be reworked than sediment deposited on an open sandflat exposed to waves.

Sediment budget: analyses and describes inputs (sources) and outputs (losses) of sediments in a coastal environment, such as an estuary. The net amount of sediment that accumulates in the estuary over time is given by the difference between the rates of input and output. For example, if the annual input of sediment to an estuary from land and sea sources is 10,000 tonnes and the annual output to the sea is 4000 tonnes, then the net gain or deposition of sediment is 6000 tonnes/year.

Sediment entrainment: the movement of sediment particles due to the combined forces of gravity and fluid motion (e.g., tidal current). In estuaries, water flows induced by tides and waves are the main processes by which sediment particles are transported.

Sediment size: refers to the diameter of individual sediment particles. The diameter of particles can be measured using several different units. In this toolkit we use millimetres (mm) as a measure of particle size. Sediments are divided into four major size classes: clay, silt, sand, and gravel.

Sediment texture: the mix of sediment sizes and materials in a sediment sample. For example, muddy fine sands are sediments composed mainly of fine sands with less than 50% mud content. The sand itself may be composed of quartz or ironsand, so that the full description of sediment texture could be: muddy, fine ironsand.

Stratification: vertical layering of a fluid, such as water, due to the difference in fluid density. In an estuary, stratification typically occurs when lower density freshwater forms a surface layer on top of higher density seawater. Stratification is an important process that influences how sediment is transported and deposited in estuaries.

Sub-sample: a sample collected from a larger sample, such as a cup of water taken from a bucket of water collected in an estuary. Sediment cores are often sub-sampled by collecting sediment from a section of the core representing a depth range (e.g., 5 to 10 cm depth).

Time resolution: the shortest period that can be determined from an environmental record. For example, the growth rings in trees typically provide an annual (yearly) record of growth. In sediment cores, the time resolution depends on the sediment accumulation rate (SAR) and the slice thickness. For example, for a SAR of 5 mm/year and a slice 10 mm thick the time resolution is equal to $10/5 = 2$ years.

Topography: the surface features of a place or region.

Turbid: having sediment or foreign particles stirred up or suspended

Transect: a line or strip of ground along which environmental measurements and observations are made, often at regular intervals. For example, measure the number of mangroves along a straight line transect at 5 m intervals between the high tide and low tide marks on a beach.

Vertical datum: a fixed level used by surveyors and scientists. (See also **mean sea level**.)