

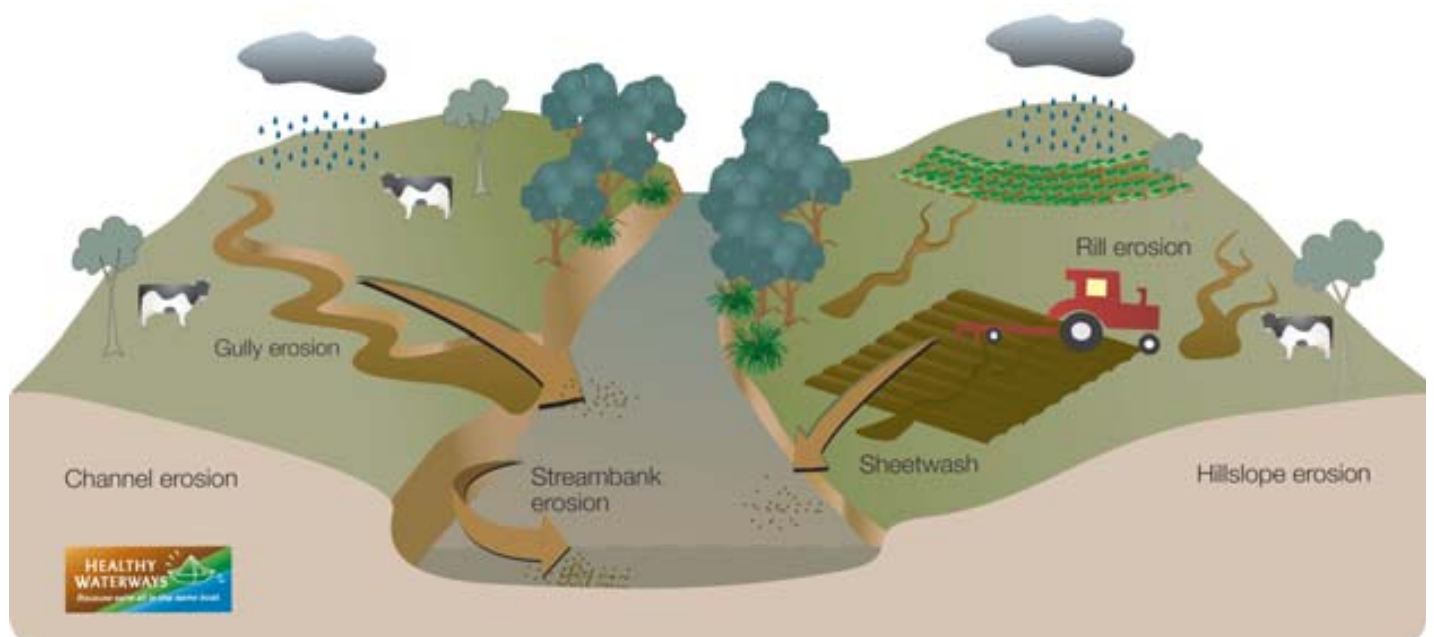
# Erosion in catchments

## Erosion processes and impacts

'Erosion' is when soil, sediment, rock, or other particles are removed or moved in the natural environment. Erosion can lead to increased sediments in waterways. Soil particles are created by weathering—weathering is when rocks are broken down by the chemical processes and the physical effects of climate and the environment. This sediment is then transported by 'agents' of erosion such as wind, running water, waves, and glaciers. Two main types of erosion carry sediment into our waterways—hillslope erosion and channel erosion.

Hillslope erosion commonly happens in areas with bare soil, especially soil that has been disturbed or exposed by cropping or by urban development. Runoff from rainfall flows over the ground and picks up loose soil. This soil is carried to the low point in the catchment, which is often a waterway. Movement of soil into waterways is affected by the amount of protective riparian vegetation (riverbank vegetation) that can catch and hold eroded soil.

“Rocks are pretty hard but water can erode them down into smaller and smaller pieces.”



Channel erosion includes gully and streambank erosion. Hillslope erosion includes sheetwash and rill erosion. Sheetwash is a thin sheet of water flowing over ground and removing a layer of loose material. Rill erosion is shallow channels less than 20cm deep.

Sheetwash is a form of hillslope erosion with soil particles being detached and transported downslope by water flowing overland as a thin sheet rather than in definite channels or rills.

Runoff from rainfall can also form shallow channels called 'rills'. When a number of rills are combined they can form gullies. Deep gullies are a sign of soil erosion problems. Channel erosion is found in gullies and along stream banks. Channel erosion deposits sediment directly into waterways.

Sediments washed into waterways can settle out on the bottom of waterways or be suspended in the water by currents and be carried downstream. Sediments can negatively impact the health of streams and aquatic habitats such as seagrass beds in estuarine and marine areas. Fertiliser contains the nutrients nitrogen and phosphorus. These nutrients are often found in the soil naturally or from fertiliser and can cause algal blooms in waterways.

## Managing erosion

Hillslope erosion and channel erosion need to be managed in different ways.

In rural areas, hillslope erosion is best managed by encouraging vegetation groundcover.

Erosion and sediment control procedures, such as erosion control blankets and sediment fences, are the best approach for managing erosion during construction of urban developments.



SUNSHINE COAST REGIONAL COUNCIL

Hillslope erosion needs to be managed in urban developments.



Channel erosion is best managed by planting trees along river banks (riparian restoration), fencing to keep livestock away from riparian areas, and protecting or re-establishing vegetation in areas prone to channel erosion.



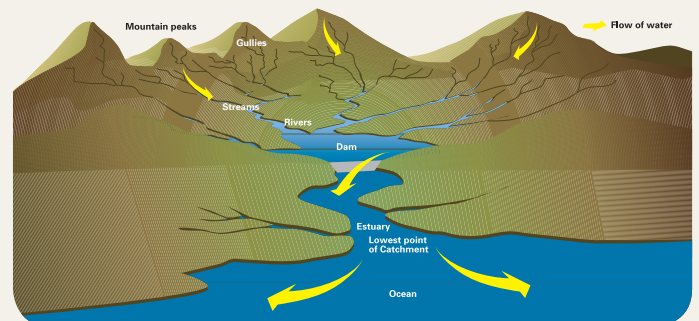
DEPARTMENT OF ENVIRONMENT AND RESOURCE MANAGEMENT

Channel erosion in the Logan River catchment.

## Modelling erosion in catchments

A catchment is an area of land from which all runoff water flows to a low point such as a stream, river, or the ocean. Together, many small sub-catchments make up larger catchments. Soil erosion in catchments in South East Queensland (SEQ) has been modelled to try to predict where sediment will arrive in waterways.

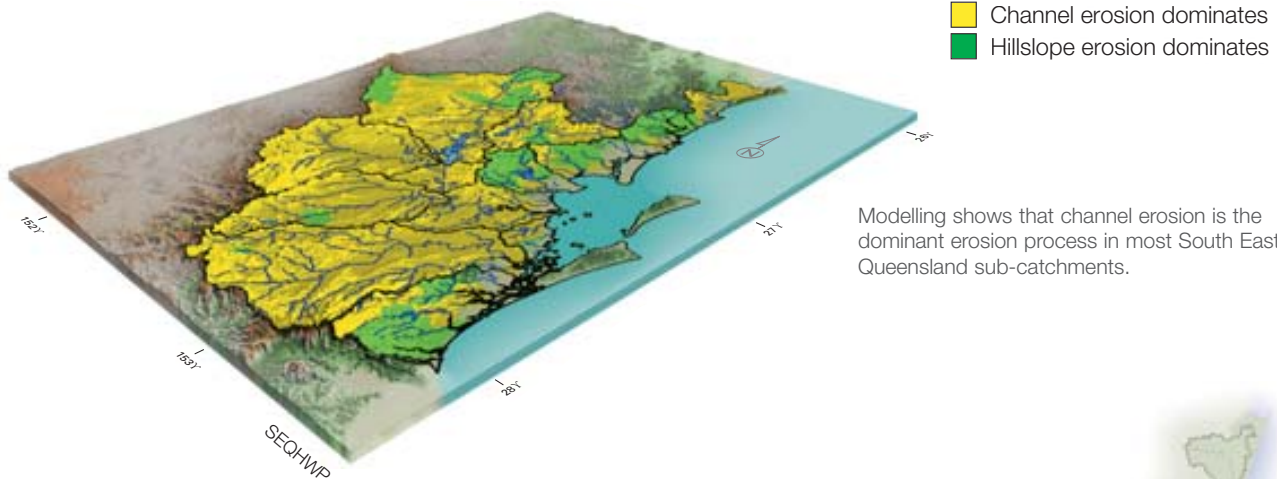
The sediment model uses formulas to describe erosion based on data that includes rainfall measurements, stream flows, elevations, vegetation cover, river widths, and channel erosion. These variables are measured using a variety of methods including remote sensing using information from satellites and by using aerial photography.



SECHWP

A catchment is an area of land surrounded by natural high features such as hills from which rainfall runoff flows to a stream or river and eventually to the ocean.

## Erosion processes in South East Queensland

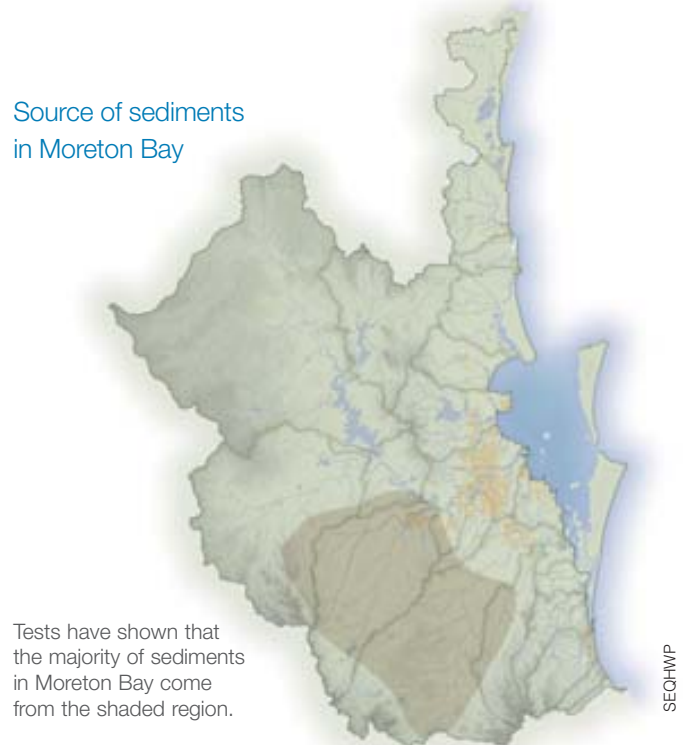


## Where sediments are coming from

The sediment model predicts that channel erosion (areas in yellow) is the main form of erosion in South East Queensland and that hillslope erosion (green areas) is of concern in some coastal catchments. These predictions describe the 'average' situation over the long term. But variations may occur because of changing land management activities and changes in climate.

Soils from major rock types have what are called 'chemical signatures'. The resulting sediments also have chemical signatures. These signatures can be used to track where sediments have come from. Tests of sediments at the mouths of rivers and in Moreton Bay show that about 70% of sediments come from sub-catchments that occupy less than one-third of the South East Queensland region.

## Source of sediments in Moreton Bay



## The SEQ Healthy Waterways Strategy

The SEQ Healthy Waterways Partnership is a collaboration between government, industry, researchers, and the community. *The SEQ Healthy Waterways Strategy 2007–2012* contains over 500 actions, committed to by the Partners, to improve the health and protect the values of our waterways.

Many of these actions are aimed at preventing excessive erosion and preventing nutrients from entering waterways. The aim of the *Non-Urban Diffuse Source Pollution Action Plan* within the Strategy is to reduce erosion in the sub-catchments that are creating most of the sediment runoff. Management actions include improving and rehabilitating riparian vegetation and increasing the stability of stream banks.

### Key Fact

**Approximately 315,000 tonnes of eroded soil (about 9000 dump trucks!) is deposited into Moreton Bay each year. This sediment level is worse when there is high rainfall and is a major threat to the waterways of South East Queensland.**



### Key Learning Area

### By the end of Year

### Essential Learnings

#### Science

7

Ways of working—Students are able to collect and analyse first- and second-hand data, information, and evidence.

Knowledge and understanding—Science as a human endeavour:

- Scientific knowledge can help to make natural, social, and built environments sustainable, ranging from local to global scales.

Knowledge and understanding—Natural and processed materials:

- Properties of a material will vary according to the type and quantity of components that make up its structure.

9

Ways of working—Students are able to research and analyse data, information, and evidence.

Knowledge and understanding—Science as a human endeavour:

- Immediate and long-term consequences of human activity can be predicted by considering past and present events.
- Responsible, ethical, and informed decisions about social priorities often require the application of scientific understanding.

Knowledge and understanding—Earth and beyond:

- Geological evidence can be interpreted to provide information about past and present events.

#### SOSE

7

Ways of working—Students are able to collect and analyse information and evidence from primary and secondary sources.

Knowledge and understanding—Place and space:

- Sustainability requires a balance between using, conserving, and protecting environments, and involves decisions about how resources are used and managed.

9

Ways of working—Students are able to research and analyse data, information, and evidence from primary and secondary sources.

Knowledge and understanding—Place and space:

- Interrelationships between human activity and environments result in particular patterns of land and resource use, and can cause environmental problems.