

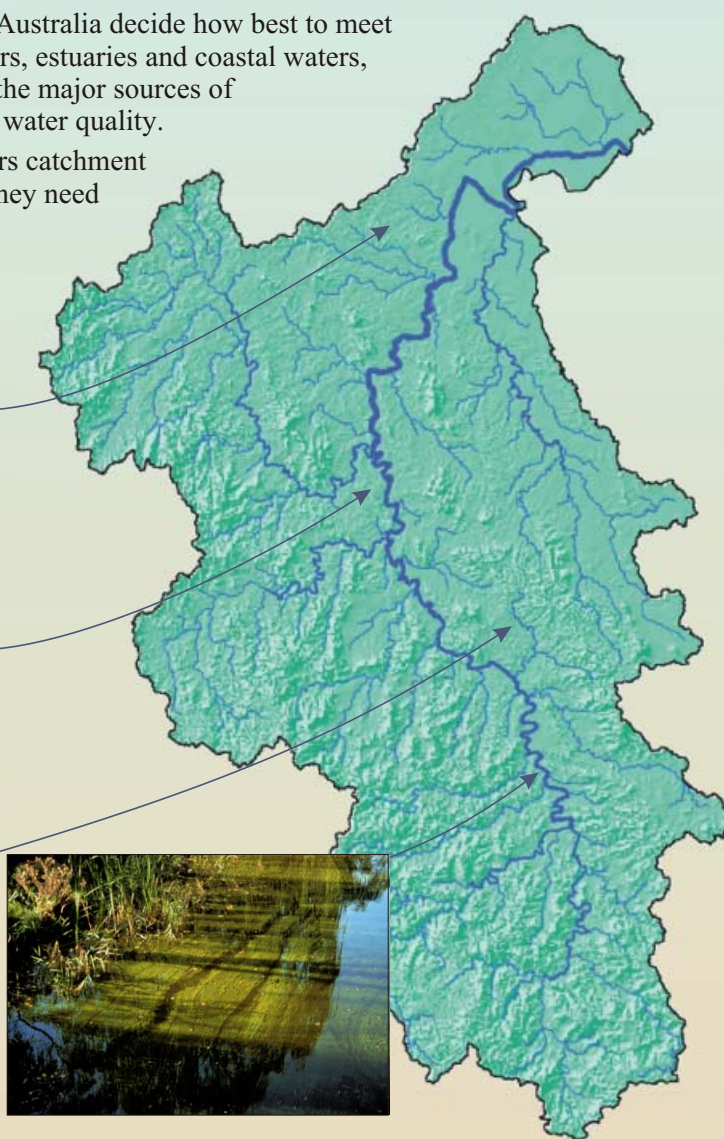
Managing Regional Water Quality

Do you know how to improve water quality in your catchment?

CSIRO and the National Land and Water Resources Audit can help.

As regional communities around Australia decide how best to meet water quality targets for their rivers, estuaries and coastal waters, they need to identify and control the major sources of sediment and nutrients that affect water quality.

CSIRO Land and Water now offers catchment and land use managers the tools they need to guide these decisions at the regional level.



National Land & Water Resources Audit
A program of the Natural Heritage Trust



SedNet

Assessing catchment water quality

CSIRO, together with the National Land and Water Resources Audit (NLWRA) has developed methods to:

- predict river sediment and nutrient loads, and the delivery of sediment to the coast
- identify the major sources of sediment and nutrients
- show how those sediment and nutrient loads might change with different management.

These methods are packaged in a set of computer programs called *SedNet*.

SedNet was used in a national assessment of the movement of sediment and nutrients across Australia for the NLWRA.

CSIRO further developed *SedNet* to incorporate regional data to assess water quality across regional catchments.

The techniques identify the sources of most of the sediment and nutrients that cause water quality problems downstream. For the first time it is also possible to predict whether future catchment management will improve downstream water quality.

SedNet produces a set of detailed maps, tables, and geographical databases, which provide a valuable decision support tool for catchment managers and regional planning.

SedNet uses the idea of budgets to account for all the major inputs and losses of sediment and nutrients within a river system. The budgets are based on the available catchment information and can include stream flow and water quality data, erosion measurements, fertiliser inputs, rainfall, soil properties, terrain, land use, vegetation cover, and geology.

What is a catchment budget?

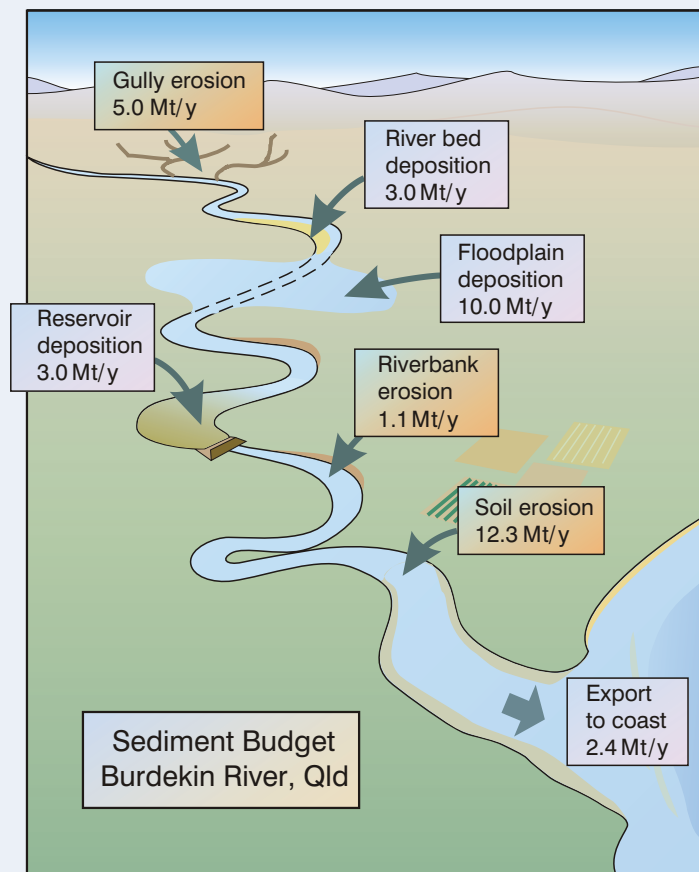
Within a catchment, various budgets can be created to quantify the inputs and outputs of material such as sediment or nutrients.

The sediment budget predicts the load of sediment carried in each stretch of the river (in tonnes per year) by examining the sediment delivered from areas upstream, and the amount deposited during transport. For nutrients, *SedNet* also takes into account inputs from major point sources (such as sewerage treatment plants) and nutrients dissolved in runoff.

The summarised sediment budget for the Burdekin River (right) shows the annual amount (millions of tonnes/year) of sediment from soil, gully and riverbank erosion that enters the catchment. This is balanced by the amount that is deposited (stored in floodplains and reservoirs) or exported out to sea.

In the Burdekin catchment, only 13% of all sediment entering the river reaches the sea – the rest is deposited along the way:

	Mt/y
Gully erosion	5.0
Riverbank erosion	1.1
Soil erosion	12.3
<i>Total inputs</i>	<u>18.4</u>
Reservoir deposits	3.0
Floodplain deposits	10.0
River bed deposits	3.0
Export	2.4
<i>Total outputs</i>	<u>18.4</u>

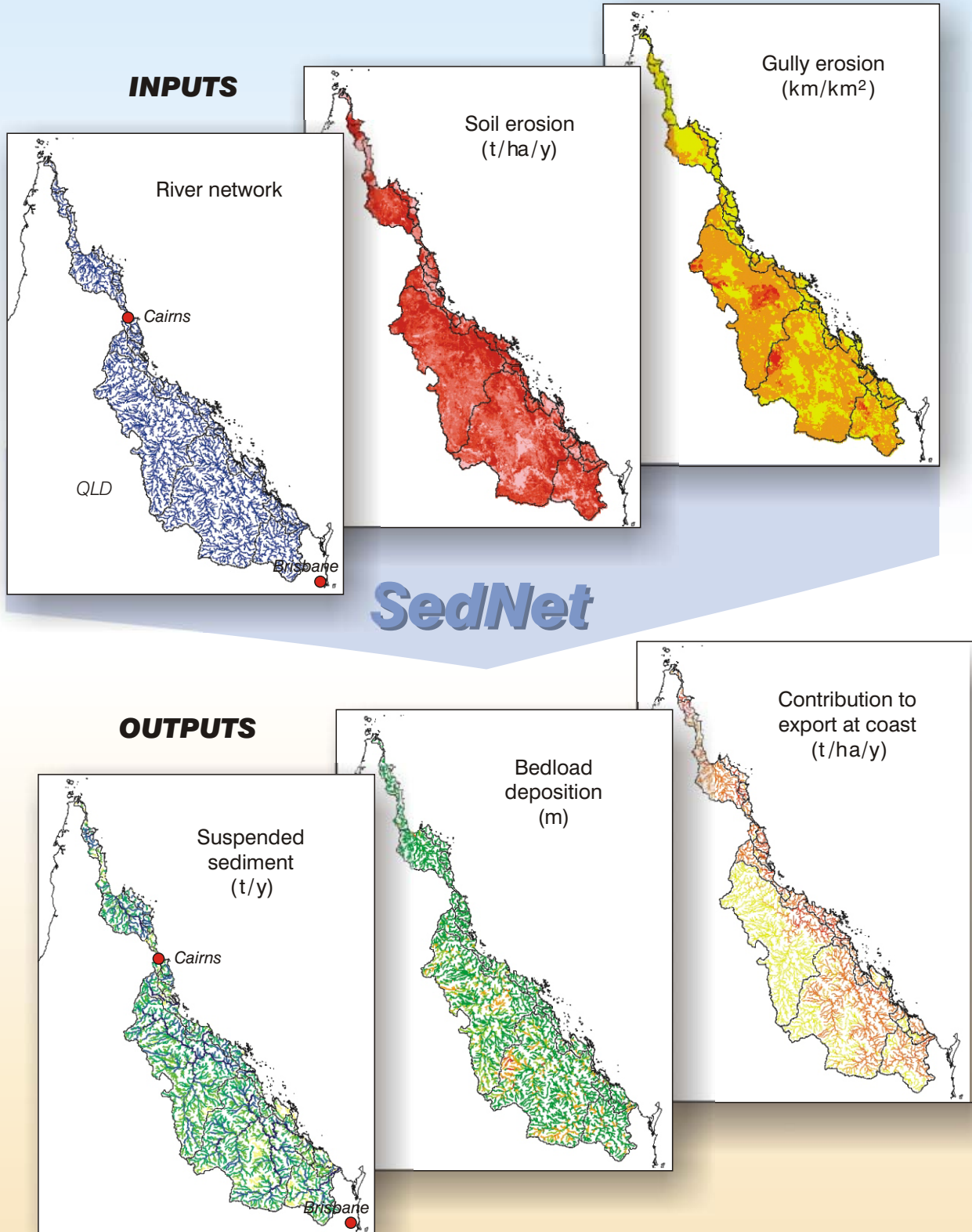


Cost-effective water quality assessments

The CSIRO Land and Water uses *SedNet* programs to assess regional water quality and identify the most cost-effective places to control it within the catchment. Regional assessments take two months on average and combine national (NLWRA) and regional data.

The *SedNet* computer models combine several input maps and knowledge of sediment and nutrient transport processes to produce maps of sediment and nutrient loads.

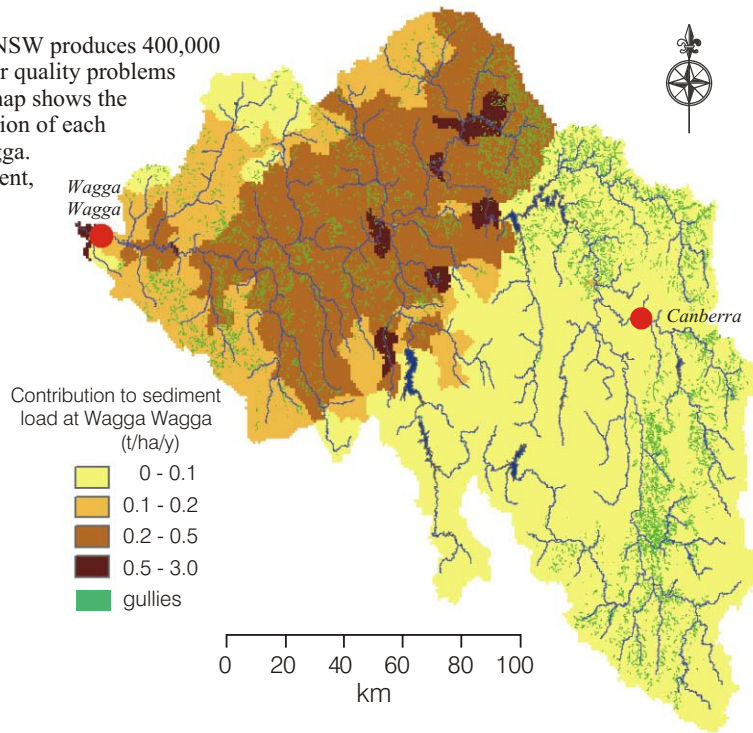
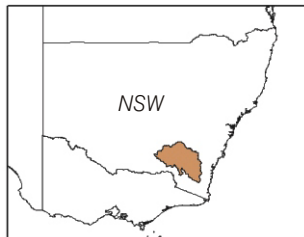
The input maps can be obtained from the Australian Natural Resources Data Library (NLWRA), from regional mapping, or from mapping modules developed for the NLWRA.



The *SedNet* programs will also be available on CD-ROM accompanied by a user guide.

The Murrumbidgee River catchment in NSW produces 400,000 tonnes/year of sediment that causes water quality problems downstream from Wagga Wagga. This map shows the source of this sediment and the contribution of each sub-catchment to the load at Wagga Wagga. Also shown are the gullies in the catchment, which are the major sediment source.

Note that only a fraction of the gullies are in the brown-shaded parts of the catchment. It is these gullies that contribute to water quality problems downstream from Wagga Wagga. The other gullies cause only local problems



Sharing national knowledge

The National Land and Water Resources Audit (NLWRA) worked with CSIRO to understand the movement of sediment and nutrients across Australia. Soil erosion was mapped more accurately at a national scale than was previously possible, and gully and stream bank erosion were mapped on a national scale for the first time. The most significant development was a new approach that used erosion maps to assess river sediment and nutrient budgets (*SedNet*). The results are now available from the NLWRA Australian Natural Resource Atlas and Data Library.

The NLWRA found that since European settlement:

- riparian vegetation has been degraded along 120,000 km of river
- 325,000 km of gullies have formed
- soil erosion rates have tripled on average
- 30,000 km of stream have highly degraded river bed habitat
- 20,000 km of river have >50 times natural suspended sediment load
- sediment delivery to the Great Barrier Reef is six times the natural rate
- phosphorus loads in rivers have tripled on average
- nitrogen loads in rivers have more than doubled on average
- 20% of the land produces 90% of sediment that reaches the sea.

The treatment of all these these problems is well beyond the resources available for natural resource management, and is, in many cases, unnecessary. It is now recognised that management should focus on protecting undegraded areas and remediating the areas of degradation that directly impact on assets such as rivers, estuaries and the coast. The *SedNet* techniques provide a method to identify those critical areas.

More information

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