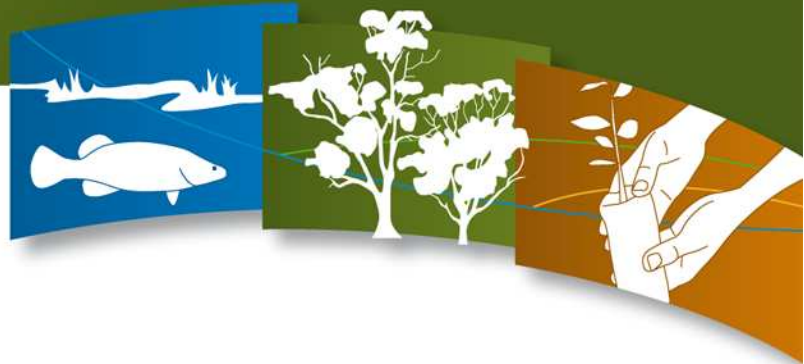


Understanding River Health



Connecting Rivers, Landscapes, People

How rivers work

Rivers are one of the major forces shaping our landscape. They are dynamic systems which have evolved over a very long time in response to Australia's extremely variable climate. Flow variability largely determines the shape and ecology of rivers. The river catchment also has some effect on its condition, such as the slope, geology, soil, vegetation and surrounding land uses.

To understand properly how healthy a river is three aspects of the river system need to be considered:

- the diversity of the habitats, flora and fauna
- the effectiveness of the linkages
- the maintenance of ecological processes

Habitat and species diversity

Rivers and streams support an enormous diversity of life. This is to a large extent because they provide a great range of habitats and link aquatic and terrestrial ecosystems. At the broader scale, river habitats include the river channels, the riverside (or riparian) vegetation, the floodplains, wetlands and lakes.

Each of these areas include a complex array of habitats with different physical conditions, and their own suite of flora and fauna. For example, river channels have pools, rocks and woody debris. Floodplains may have billabongs, swamps, chains-of-ponds and natural channel systems.

Sustaining this diverse range of habitats and the species they support is a key component to maintaining the ecological health of a river.

Landscape linkages

Maintaining linkages is essentially about making sure that a river is part of the total landscape and is not just regarded as a channel running through the land. A river links with its catchment in three different dimensions:

Along the river

Within the North Central CMA region, water, sediments, nutrients, chemicals and aquatic life are moved from the hilly areas within the catchment downstream to larger waterways, the Murray River and ultimately the ocean. Along its length, the rivers changes from small, rocky-based, shaded streams in the upland region of the Great Dividing Range to wider rivers in the valleys to broad, muddy rivers in the lowland floodplain.

While most movement is downstream, many fish move upstream at some stage in their life cycles.



Loddon River descending the Great Dividing Range

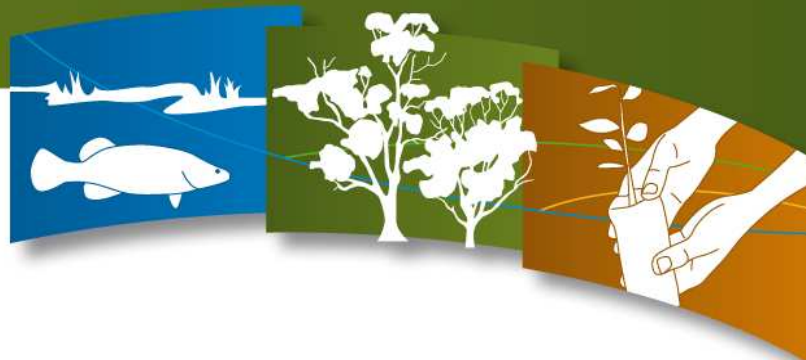
Lateral linkages

Lateral (or sideways) linkages occur between the river, the adjacent riverside land and the floodplain. In the uplands, the riverside zone provides organic matter (e.g. leaf litter) to the river. Organic matter is a major energy source for the instream aquatic life.

In the lowland floodplain, lateral linkages are more important and come into operation when rivers flow over their banks and inundate the floodplain on a regular basis.



*The Loddon River flows north across the floodplain.
Photo – Greg Chant*



Flooding is the key to maintaining the health of both the river and the floodplain. Transfer of sediments, nutrients and organic material between the river and the floodplain is vital to the maintenance of both ecosystems. A flood stimulates a boom in floodplain productivity with the regeneration of floodplain and riverside plants, and the breeding of invertebrates and vertebrates such as waterbirds, frogs and tortoises. It opens the floodplain as new habitat for fish and macro-invertebrates and is often the cue for breeding for these species. As the flood recedes, it transfers organic matter back to the river, replenishing instream energy sources and ensuring recruitment in fish populations and insect communities.

Vertical linkages

A river links vertically with groundwater systems. The base flow in rivers is maintained by groundwater, and rivers can also recharge shallow groundwater aquifers. Groundwater provides organic carbon (an energy source) to the streams, and during high flows the streambed can provide a refuge for invertebrates as they move down below the stream surface to take shelter.

Recognition of these important linkages in river functioning is a key part of the ecological definition of a river. Thus, the definition of a river or waterway encompasses the stream channel, the riverside zone which includes the regularly wetted floodplain and any associated floodplain wetlands, and the terminal lakes.

Maintenance of ecological processes

To maintain river health, in particular to maintain biodiversity, it is essential to maintain the ecological processes operating within the system. They can be grouped into three types:

- *Energy and nutrient dynamics*
- *Processes which maintain animal and plant populations, such as reproduction or regeneration, dispersal, migration, immigration and emigration.*

For example, some fish need specific flows before they will migrate and/or breed, colonial waterbirds need particular flood durations and temperatures before breeding, and many plant seeds require flooding prior to germination.

- *Species interactions, which can affect community structure.*
These include predator-prey, host-parasite and competition relationships. Changes to physical conditions (e.g. flow), to energy sources (e.g. removing riverside vegetation) or species composition (e.g. spread of an exotic species such as carp) can affect species interactions by favouring some species over others.



*Platypus are well known inhabitants of our rivers.
Photo: Australian Platypus Conservancy*

Fact sheet series

This series of fact sheets introduces readers to the major waterway management issues for the Loddon River and Tullaroop Creek. The series outlines the values and threats associated with waterways and relates them directly to the Loddon River catchment. They particularly concentrate on the flow-regulated reaches of the river downstream of Cairn Curran Reservoir to the Murray River and Tullaroop Creek, which is the major focus of the *Loddon Stressed River* project.

Would you like to find out more?

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www.nccma.vic.gov.au

Information for this fact sheet was sourced from:

- Department of Natural Resources and Environment (NRE) (2002) *Victorian River Health Strategy – Healthy Rivers, Healthy Communities & Regional Growth.*