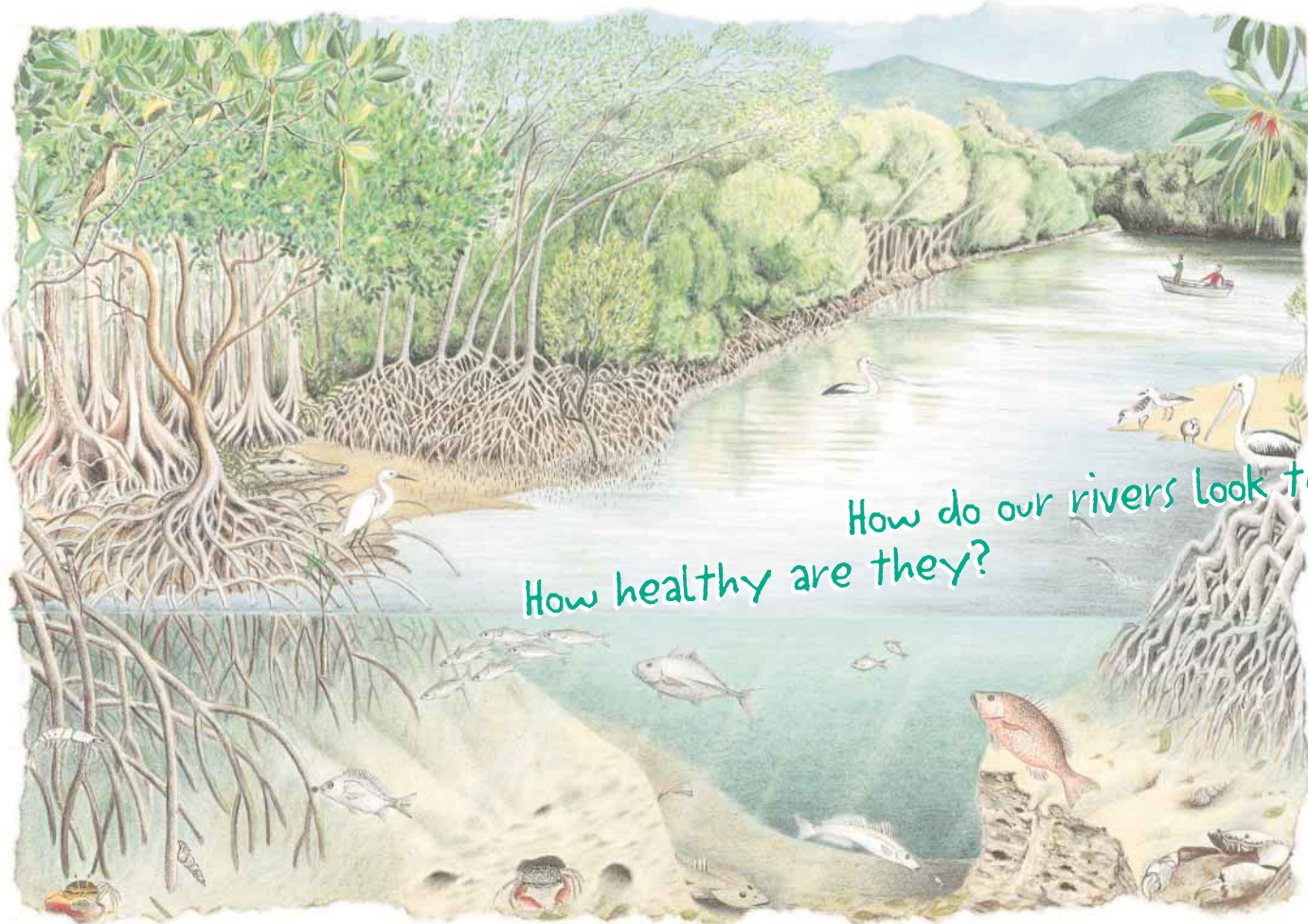


THE PRESENT



How do our rivers look today?
How healthy are they?



A river resort—assessing waterway health for humans and animals

This activity suggests that our rivers are like resorts for many plant and animal species as well as for humans. The following ideas and resources will help you ascertain what qualities a resort needs to attract guests. You can also assess how appealing your resort currently is, and what needs to be done to enable it to attract more guests in the future.

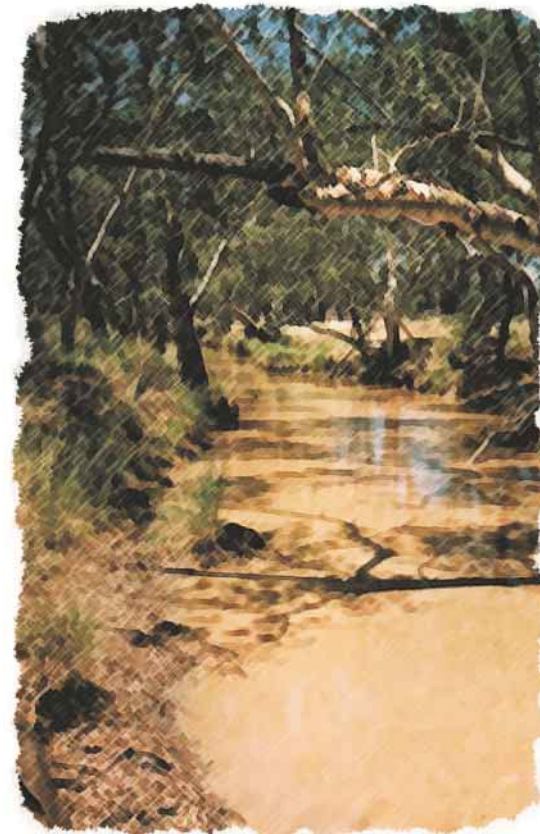
The information you obtain about your river resort can be synthesised into a multi-media PowerPoint presentation, portfolio, video, poster or report. This could either market the river resort or assess its quality.

Background

Our waterways provide homes for plants and animals, water supplies for people, industries and farms as well as places of recreation and fun for kids and adults. Our waterways and wetlands also reflect the health of the catchment because they are the collection point for water coming from higher ground.

A healthy waterway usually means that the surrounding land or catchment is in good condition. Alternatively, an unhealthy waterway indicates something may be wrong in the catchment.

One way of understanding the condition of a waterway is to conduct habitat surveys to establish the quality of the habitat for supporting aquatic life. The information is very useful in determining the changes that are required to improve the ability of the river habitat to support this life. It is also very useful as a basis (or benchmark) for comparison with surveys undertaken in the future.



The present...



Imagining a river resort

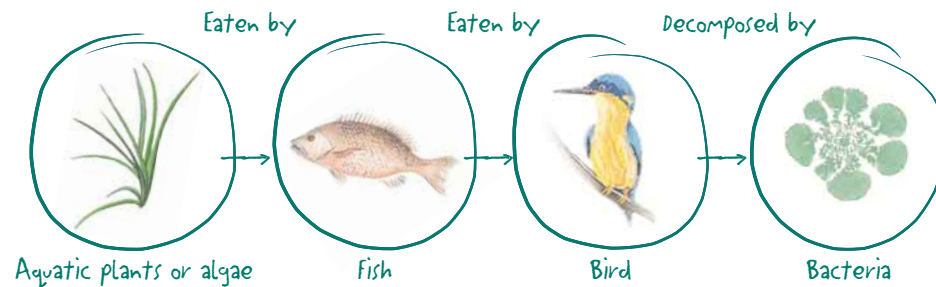
Collect various pictures and images of aquatic environments and their animal and plant inhabitants. Discuss the variety of life in an aquatic environment. Imagine a river resort for river animals.

Use your pictures as a springboard to discuss the concept of a river as a resort for these animals. What do you think the animals that come to this resort are looking for? What do they need? Make a list of all the features in, on and around the river that would attract and support the animal and plant guests coming to and living in the resort.

Examine and construct some simple food chains to show the links between various animals and plants. Try to identify all the possible positions/roles that living things have in a food chain.

The chain starts with basic producer organisms (e.g. aquatic plants or algae), which are food for first-order consumers. These in turn are eaten by second-order consumers (such as fish) which themselves are food for third-order consumers (such as birds) and so on. The final link in the chain is the organisms such as bacteria, which break down the dead remains of plants and animals (decomposers).

An example of a simple food chain



Different roles in a food chain

- ★ Producer—the source of the food chain, e.g. sunlight
- ★ Consumer—gets energy by consuming other living things
- ★ Decomposer—an organism that helps break down dead material, e.g. bacteria and fungi
- ★ Herbivore—a plant-eating organism
- ★ Carnivore—a meat-eating organism
- ★ Omnivore—an organism that eats both meat and plants
- ★ Predator—an organism that eats other organisms
- ★ Prey—an organism that is eaten by other organisms

The present...



Managing your resort



Imagine you are a resort manager and it is your responsibility to manage the resort so that all of your guests have excellent accommodation, food, entertainment, etc., so that they will enjoy their stay and return time and time again. Remember that your clients are native fish, birds, native animals and macro-invertebrates.

Create a visual representation of your river resort showing all of the important features that your river resort offers. This could be a poster, painting, drawing, mural, collage or three-dimensional model. Design an advertising campaign to go with your visual representation that will attract the guests you want in your river resort. Think what descriptive and enticing words you can use to attract guests (look at the example here). Present your river resort advertising campaign to the class.

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**Superb food
Fabulous lookouts
Great entertainment!**

Riverland Beach is situated on the beautiful warm waters of the Avocado River. Our resort offers perfect conditions for every guest. With its beautiful indigenous trees Riverland Beach provides shade and food for everyone.

Diving lessons for all ages and levels, camps and clinics, and different styles of accommodation are provided.

Our snags provide fabulous lookouts for our bird clients, as well as getaways for fish and platypus. Entertainment for the smallest of our clients is a speciality.

Superb food for every diet is available 24 hours. Our chef is famous for his crispy sundried algae desserts and vegetarian roasted crepes tossed in water plant leaves.

Take advantage of our specials: Mayfly honeymoons, Oxygen reviver weekends, Beetle hunting parties and Scavenger deluxe suites on the riverbed. We also provide overnight accommodation for travelling fish.

Riverland Beach
Paradise on the Sun

Contact us now for your colourful brochure!


WEATHER

The present...



Conducting a habitat survey



 **Riparian zone:** The riparian zone is the strip of land directly adjoining a waterway, and extends from the water's edge to the next major vegetation or land-use change (often considered as 30 metres for the purpose of habitat assessment).

A habitat survey of your local river will help you determine its potential as a river resort. Make a list of the habitat features in, on and around the river that you will need to examine, and how you will assess them. Share suggestions on how the information gathered from the survey can be used to help market your local river resort.

What is surveyed? What does it tell us about stream health?

A habitat survey involves looking at the vegetation along the stream and the condition of the banks and stream bed. The condition of the vegetation in and around a stream (referred to as the riparian zone) provides a good indication of the likely conditions of the aquatic environment.

If it remains intact, stream-side vegetation:

- :: makes a good natural buffer against erosion
- :: controls water temperature
- :: assists with the transport of sediment into streams and wetlands
- :: provides habitat for local fauna species.

When the stream-side vegetation is degraded, it provides less protection against land-use impacts and the subsequent deterioration of water quality and of conditions for aquatic plants and animals.



Keeping a visual record—photographs

'A picture is worth a thousand words.' Taking photographs of your habitat survey site provides an excellent visual record. If you wish to use the site again you have an exact record of how a stream changes. 'Before' and 'after' pictures are very valuable in depicting stream alteration. Some streams will change more dramatically than others.

Suggested photographs are:

- :: from the bank looking upstream (include vegetation)
- :: from the bank looking downstream (include vegetation)
- :: a bend in the stream
- :: from a distance, overlooking the creek and surrounding areas from an elevated position, if possible.

Steps in conducting a riparian vegetation/habitat survey

- ::A:: Read the information provided for each factor.
- ::B:: Use the field guide ratings to determine a score for each factor.
- ::C:: Record your rankings on the Habitat Survey Record Sheet.
- ::D:: Interpret your results (give a rating to the area).

[Quote—Life at the water's edge]

'Riparian vegetation is the ribbon of trees and other plants that lines the edges of watercourses and includes many species of native (and exotic) sedges, grasses, vines, trees and shrubs.

The roots of the trees hold the soil of the creek bank in place, reducing erosion during high flow events. The trees and plants also filter run-off flowing into the creek from the surrounding landscape, trapping sediment, nutrients and debris. Riparian zones provide wildlife corridors so that small mammals and reptiles can move safely from one area to another. Honeyeaters, kingfishers, wrens and other small birds use dense riparian vegetation as protection from predators, and water dragons, platypus, and water rats live among its banks.

In Queensland's warm, subtropical climate, over-hanging trees reduce water temperature through shading. This increases the amount of dissolved oxygen and prevents the excessive growth of aquatic weeds, allowing a greater diversity of plant and animal life to survive. The dappled light created by tree shading provides camouflage for predators and prey in the water.

Fallen branches from riparian trees form habitats in the river; and leaf litter and insects that fall into the stream are important food sources for fish and other aquatic organisms. Dragonflies, mayflies and many other aquatic insects mate in the riparian zone, then lay their eggs in the water. Their nymphs ... form part of the highly diverse communities that inhabit the stream.

Discovering the waterways of south-east Queensland, p.8

The present...

::A:: Assessing river habitat—key factors

To assess the health of the riparian vegetation/habitat around the stream you are monitoring, look at a number of the factors described below. For each, survey a distance of 100 metres up and down the river on both banks (if possible) from your monitoring site.

1. **Bank vegetation**
Bank vegetation refers to trees, shrubs and grasses actually growing on the bank. The canopy is the overhanging tree cover. This vegetation provides food and shelter for aquatic organisms in the form of fallen leaves, twigs, branches, etc.
2. **Verge vegetation**
The stream verge is different from the bank. For this stream habitat survey the verge is considered the section of land up to 30 metres from the bank. The verge vegetation can be quite extensive but many streams in urban settings have almost no verge vegetation at all.
3. **In-stream cover**
Fish and other aquatic organisms require snags, logs and rocks where they can shelter from predators and the current and can reproduce. These help them establish territories and provide markers that help them navigate. Aquatic plants are also very important for fish and other creatures in the stream. Apart from providing food, their presence has a direct effect on the available oxygen in the water, which in turn can affect the type of fish and other animals living in the stream. Protruding snags provide roosting and preening sites for birds.



4. **Bank erosion and stability**
Streams naturally erode, usually on bends (meanders). However, changes in adjacent land areas can cause a stream to become unstable, resulting in continuous erosion along its channel. Such changes include increased run-off from impervious surfaces and piped tributaries, stock access or direct interference such as straightening or channelling the stream. If it has been channelled or stabilised with concrete banks, the stream will obviously be stable with little erosion but should not be ranked highly as it has little or no vegetation cover.
5. **Riffles, pools and bends**
Rocks and debris in the stream may create shallow areas over which the water rushes quickly, forming a rapid. This is called a riffle in the stream system. Upstream of a riffle the water is often quiet and may form a pool. Pools are important in providing deeper areas for fish, and riffles are important for aerating (adding air and therefore oxygen) the water and providing habitat for many invertebrates. Streams that have a number of pools and riffles are able to support more life and a greater variety of species than those that do not vary in character.

Larger, slow-flowing rivers may not have riffles. However, bends in the river can provide different habitats because the cutting action of the water at bends provides deeper places, and areas of different water speed.

::B:: Habitat survey field guide ratings

	Bank vegetation	Verge vegetation	In-stream cover	Bank erosion and stability	Riffles, pools and bends (flowing water only)
Excellent	<p>10</p> <p>Mainly undisturbed native vegetation. No signs of alteration.</p>	<p>10</p> <p>Mainly undisturbed native vegetation on both sides of the stream. Verge more than 30 metres.</p>	<p>10</p> <p>Abundant cover. Frequent snags, logs or boulders with extensive areas of in-stream, aquatic vegetation and overhanging bank.</p>	<p>5</p> <p>Stable: no erosion/sedimentation evident. No undercutting of banks, usually gentle bank slopes, lower banks covered with root mat grasses, reeds or shrubs.</p>	<p>5</p> <p>Wide variety of habitats. Riffles and pools present of varying depths, bends present.</p>
Good	<p>8</p> <p>Mainly native vegetation. Little disturbance or no signs of recent site disturbance.</p>	<p>8</p> <p>Well-vegetated wide verge corridor. Mainly undisturbed native vegetation on both sides of stream; some introduced or reduced cover of native vegetation.</p>	<p>8</p> <p>A good cover of snags. Logs or boulders, with considerable areas of in-stream and overhanging vegetation.</p>	<p>4</p> <p>Only spot erosion occurring. Little undercutting of banks, good vegetation cover, usually gentle bank slopes, no significant change to bank structure.</p>	<p>4</p> <p>Good variety of habitats, e.g. riffles and pools or bends and pools. Variation in depth of riffles and pools.</p>
Fair	<p>6</p> <p>Medium cover, mixed native/introduced. Or one side cleared, the other undisturbed.</p>	<p>6</p> <p>Wide corridor of mixed native and exotics, or one side cleared and the other a wide corridor of native vegetation.</p>	<p>6</p> <p>Some snags or boulders present and/or occasional areas of in-stream or overhanging vegetation.</p>	<p>3</p> <p>Localised erosion evident. A relatively good vegetation cover. No continuous damage to bank structure or vegetation.</p>	<p>3</p> <p>Some variety of habitat, e.g. occasional riffle or bend. Some variation in depth.</p>
Poor	<p>4</p> <p>Introduced ground cover, little native under- or overstorey, predominantly introduced vegetation.</p>	<p>4</p> <p>Very narrow corridor of native or introduced vegetation.</p>	<p>4</p> <p>Only slight cover. The stream is largely cleared, with occasional snags and very little in-stream vegetation. Generally no overhanging vegetation.</p>	<p>2</p> <p>Significant active erosion evident especially during high flows. Unstable, excessive areas of bare banks, little vegetation cover.</p>	<p>2</p> <p>Only slight variety of habitat. All riffle or pool with only slight variation in depth.</p>
Very poor	<p>2</p> <p>Introduced ground cover with lots of bare ground, occasional tree. Also includes sites with concrete-lined channels.</p>	<p>2</p> <p>Bare cover or introduced cover such as pasture land.</p>	<p>2</p> <p>No cover, no snags, boulders submerged or overhanging vegetation. No undercut banks. Site may have rock or concrete lining.</p>	<p>1</p> <p>Extensive or almost continuous erosion. Over 50% of banks have some form of erosion: very unstable with little vegetation cover.</p>	<p>1</p> <p>Uniform habitat. Straight stream, all shallow riffle or pool of uniform depth, e.g. channelled stream or irrigation channel.</p>

Extracted primarily from the *Community water quality monitoring manual for Victoria*, 1994. The habitat survey technique was adapted from *The environmental condition of Victorian streams*, Phillip Mitchell, a report for the Department of Water Resources, Victoria, February, 1990.

::C:: Stream Habitat Record Sheet

Name of monitoring group.....

Person(s) conducting survey/test.....

Date of survey/test.....

Time of survey/test *am/pm*.....

Length of stream examined *m*.....

Stream Habitat Rating

Circle your stream's rating for each factor in the table below:

	Bank vegetation	Verge vegetation	In-stream cover	Bank erosion and stability	Riffles, pools and bends
Excellent	10	10	10	5	5
Good	8	8	8	4	4
Fair	6	6	6	3	3
Poor	4	4	4	2	2
Very poor	2	2	2	1	1

Add up all the numbers you circled for a total score
(The minimum score from this rating table is 8 and the maximum is 40) Total score.....

Compare your stream's total score with the range of scores below to assess the Stream Habitat Rating of your site.

Rating	Scores
Excellent	36-40
Good	29-35
Fair	20-28
Poor	12-19
Very poor	8-11

Stream Habitat Rating.....

::D:: Interpreting your results

Excellent (36-40) Site in natural or virtually natural condition: excellent habitat condition.

Good (29-35) Some alteration from natural state: good habitat condition.

Fair (20-28) Significant alterations from the natural state but still offering moderate habitat: stable.

Poor (12-19) Significant alterations from the natural state, with reduced habitat value; may have erosion or sedimentation problems.

Very poor (8-11) Very degraded, often with severe erosion or sedimentation problems.



Your river resort now and in the future

Use your stream habitat record sheet, photographs, drawings and reflections to create a presentation on the state of your local river resort. Include in your presentation recommendations for changes that are needed to improve the rating of your river resort. Present this to your school or to an expert in the field. Even better, hold a workshop session during your river festival to advise people of the current state and future needs of your local river resort.

Ensure that all of your records, reports and presentations are kept somewhere safely, so that future groups conducting habitat surveys of the same local river resort can use your information as a benchmark (i.e. a baseline of information that can be compared with future habitat surveys).

