

River Habitats



Teacher Resource Pack

Primary Years and Middle Years





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Acknowledgements

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Contents



Links to the S.A.C.S.A. Framework

How to Conduct the Lesson

Introductory Session
River Habitats (Part 1 and 2)

Fact Sheets

Habitat Zones & Erosion
Habitat Survey Field Guide

Worksheets

Habitat Survey Record Sheet
River Habitat Cross Section

Teacher Notes

Factors that influence the flora and fauna of river habitats

Other Learning Opportunities

Habitat Photo - Discussion Points
Long Term Habitat Study
Murray Matters
Action Stations
The Carp Problem

Habitat Photos

Links to the S.A.C.S.A. Framework

Primary Years



| Learning Area | Strand | Key Idea |
|-------------------------|------------------------------|---|
| Science | Life Systems | Students pose questions and seek explanations about the internal and external features of living things in order to better understand the supports of life in particular environments. In T C KC6 |
| | | Students construct and explain their ideas about the diversity of living things and how they reproduce and grow. They identify and communicate the importance of maintaining diversity of living things in order to sustain life on earth. F C KC2 |
| | Earth and Space | Students analyse how the earth sustains life and understand and report that the earth is continually changing. F In T C KC1 KC2 |
| Society and Environment | Place, Space and Environment | Students examine natural and social environments in local and global communities, analysing patterns, systems and relationships. In T KC1 |
| | | Students consider sustainability and care of resources and places as they explore how people's attitudes and values affect their interactions with natural features and cycles. F In KC6 |
| | Time Continuity and Change | Students recognise the importance of collecting and evaluating information and source material as evidence, consider other points of view, and arrive at justifiable conclusions. T C KC1 |

Middle Years

| Learning Area | Strand | Key Idea |
|-------------------------|------------------------------|---|
| Science | Earth and Space | Students investigate, through field work and research, the central importance of the earth's role in sustaining life and how changes impact on life; and understand the interaction of the atmosphere, the oceans and the earth's surface. F In T KC1 KC3 |
| | Life Systems | Students develop a shared understanding of the characteristics and behaviour of living things and how they are interrelated and interdependent. They appreciate and report on the place of humans in the earth's ecology, and develop their understanding of, explore future possibilities for, and act to contribute to, sustainable environments. F In KC1 KC2 KC3 |
| Society and Environment | Place, Space and Environment | Students access, investigate, interpret and represent information from fieldwork, electronic systems and other research, in order to explain local and global interactions and relationships between people and environments. In T C KC1 KC2 |
| | | Students discuss environmental, conservation or resource issues, and individually and/or in teams collaboratively develop strategies to bring about positive change in the local community. F In T KC2 KC4 KC6 |
| | Social Systems | Students work cooperatively to collect, analyse and describe information about particular issues which have social, economic and environmental dimensions. They identify Key Ideas, justify positions, predict outcomes and suggest enterprising solutions. In T C KC2 KC3 KC6 |

How to Conduct the Lesson

Introductory Session

As a class, create a list of birds, animals, fish and insects that live in, on and along the River Murray.

1. Students work in groups to discuss the requirements of one of these creatures in terms of the environment, for example clean water, food and habitat. Consider human impacts that threaten their environment. Report back to the class.
2. Discuss the meaning of HABITAT: Places where individual species live that maximize their chances of survival and ability to produce offspring. Draw a picture of a healthy river habitat. Label the features that make it a suitable habitat for one or more creatures. For example a good frog habitat would include; clean water, plants along the river bank for protection, plants in the water for breeding and food for tadpoles, fallen bark and leaves on the ground for shelter and to attract insects.

River Habitats

To conduct a habitat survey students will need to know and recognize the different habitat zones.

Part 1 In the classroom

Equipment: Fact Sheet (habitat zones), river habitat photos

1. Read Fact Sheet, which describes the different habitat zones
2. Ask students to write their own description of:
 - Riparian Zone
 - Bank and Verge Vegetation
 - In-Stream Zone
3. Complete the River Habitat Cross Section worksheet, labelling the different zones.
4. Use the river habitat photos to identify different habitat zones. (work in groups)

Part 2 At a local river or creek

Equipment: Habitat assessment sheets (Cameras and sketch pads optional)

Once students are familiar with the different river habitat zones and features they can conduct a habitat survey to assess the condition of a local river habitat. Students will be assessing; Riparian Vegetation, In-Stream Cover, Erosion and Stability and Pools, Riffles and Bends.

Step 1 Habitat Survey Field Guide and Record Sheet

- Each student fills out the site details on the Record Sheet (Use a map for the grid references)
- Read and clarify the rating descriptions (Excellent – Very Poor), for each feature.
- Students work in pairs or small groups to conduct the Habitat Survey

Step 2 The Results

- Once students have recorded a rating for each feature they calculate the overall score.
- Students compare their habitat rating with the rest of the class.
- Identify any differences between results (for example Group A rated the Riparian Zone at 10 while Group B rated the Riparian Zone at 6), then discuss the reasoning behind each rating.

Step 3 Follow Up Activity

- Students prepare a report on the river habitat
 - Identify the flora and fauna present
 - Include labelled illustrations
 - Make suggestions for future improvement to the site

Fact Sheet

Habitat Zones



RIPARIAN ZONE

Verge Vegetation

Vegetation such as trees, shrubs and grasses found on the strip of land near the river bank.

- Extends up to 30 metres from the bank.
- Provides shelter and a safe corridor for wildlife

Bank Vegetation

Vegetation such as reeds and rushes found on the banks of a river or creek.

- Provides habitat for birds, mammals, reptiles and frogs.
- Overhanging trees provide shelter, leaf litter, fallen branches and shade. This influences the amount of light available for smaller plants and will affect water temperature.
- Stabilises the banks and tree roots also provide habitat.

IN-STREAM ZONE

The in-stream zone may include a variety of features such as; a range of aquatic plants, pools, bends, riffles, islands, logs, rocks and snags. Fish use these in-stream features to navigate and mark out territory. Aquatic macroinvertebrates are adapted to live in different in-stream habitats.

Aquatic plants may be rooted or floating and provide food, oxygen, shelter and breeding grounds. They absorb nutrients from the water.

Riffles are created where shallow water rushes over rocks and debris. They help to aerate the water.

Logs (above the water) provide roosting sites for birds.

Islands slow down the flow rate and provide safe havens for birds, frogs and marsupials.

Snags (under the water) provide feeding grounds, burrows and protection from the current.

Bends and pools reduce the flow rate and create deep water habitats.

Erosion

An important aspect of the riparian zone is the extent of bank erosion. Erosion can cause the destruction of effective habitats directly and indirectly.

Directly

- It is difficult for plants to grow in unstable banks
- Undercutting of the banks
- Roots may become exposed

Indirectly

- Seeds and saplings are washed away
- Erosion washes dirt and debris into the river
- Sunlight can't penetrate water with a high turbidity (very dark or murky), so water plants are unable to photosynthesise.

Habitat Survey Field Guide



| Excellent | Good | Fair | Poor | Very Poor |
|--|---|---|---|---|
| Riparian Zone | | | | |
| (10) Mainly Undisturbed native vegetation on both sides of stream. Verge more than 30m wide. | (8) Well-vegetated wide riparian zone. Mainly undisturbed. Native vegetation on both sides of stream; some introduced or reduced cover of native vegetation. | (6) Wide corridor of mixed native and exotics or one side cleared, and other wide corridor of native vegetation. | (4) Very narrow corridor of native or introduced vegetation. | (2) Bare cover or introduced grass cover such as pasture land |
| In-Stream Cover | | | | |
| (10) Abundant cover. Frequent snags, logs or boulders with extensive areas of in-stream, aquatic vegetation and overhanging bank. | (8) A good cover of snags, logs or boulders, with considerable areas of stream and overhanging vegetation. | (6) Some snags or boulders present and / or occasional areas of stream or overhanging vegetation. | (4) Only slight cover. The stream is largely cleared, with occasional snags and very little stream vegetation. Generally no overhanging vegetation | (2) No cover. No snags, boulders, submerged or overhanging vegetation. No undercut banks. Site may have rock or concrete lining |
| Bank erosion and stability | | | | |
| (5) Stable; no erosion / sedimentation evident. No undercutting of banks, usually gentle bank slopes, lower banks covered with root mat grasses, reeds or shrubs. | (4) Only spot erosion occurring. Little undercutting of bank, good vegetation cover, usually gentle bank slopes, no significant damage to bank structure. | (3) Localised erosion evident. Relatively good vegetation cover. No continuous damage to bank structure or vegetation. | (2) Significant active erosion evident especially during high flows. Unstable, extensive areas of bare banks, little vegetation cover. | (1) Extensive or almost continuous erosion. Over 50% of banks have some form of erosion; very unstable with little vegetation cover. |
| Riffles, Pools and Bends (flowing water only) | | | | |
| (5) Wide variety of habitats, Riffles and pools present of varying depths. Bends present. | (4) Good variety of habitats-e.g., riffles and pools or bends and pools. Variation in depth of riffle and pool. | (3) Some variety of habitat-e.g., occasional riffle or bend. Some variation in depth. | (2) Only slight variety of habitat. All riffle or pool with only slight variation in depth. | (1) Uniform habitat. Straight stream, all shallow riffle or pool of uniform depth-e.g.; channelled stream or irrigation channel. |

Adapted from the Stream Habitat Record Sheet - South Australian Waterwatch Manual

Habitat Survey Record Sheet



Complete this habitat survey sheet on one day during each weather season. Use the Habitat Survey Field Guide Sheet to guide you through the survey. For understanding what your result means, refer to the table below to find out how healthy your site's vegetation is.

1. Site Details:

Site Name: _____

Date of survey: _____ Time of survey: _____

Site Grid Reference

Eastings (4 digits): _____ Northings (5 digits): _____

Length of Stream examined (meters): _____

Person(s) conducting the survey: _____

2. Stream Habitat Rating

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

| Rating | Riparian Vegetation | In-stream Cover | Erosion & Stability | Pools Riffles & Bends |
|-----------|---------------------|-----------------|---------------------|-----------------------|
| Excellent | 10 | 10 | 5 | 5 |
| Good | 8 | 8 | 4 | 4 |
| Fair | 6 | 6 | 3 | 3 |
| Poor | 4 | 4 | 2 | 2 |
| Very Poor | 2 | 2 | 1 | 1 |

Add up all the numbers you circles for a total score.
(The minimum score is 6 the maximum is 30)

TOTAL SCORE: _____

Compare your stream health with the score range listed below

| Habitat Condition | Rating | Score |
|---|-----------|-------|
| Site in natural or virtually natural condition | Excellent | 27-30 |
| Some alteration from natural state | Good | 21-26 |
| Significant alterations from natural state but still offering moderate habitat; stable. | Fair | 15-20 |
| Significant alterations from natural state with reduced habitat value; may have erosion or sedimentation problems | Poor | 10-14 |
| Very degraded, often with severe erosion or sedimentation problems | Very Poor | 0-9 |

WHAT IS YOUR STREAM HABITAT RATING ?: _____

River Habitat Cross Section



Describe the following:

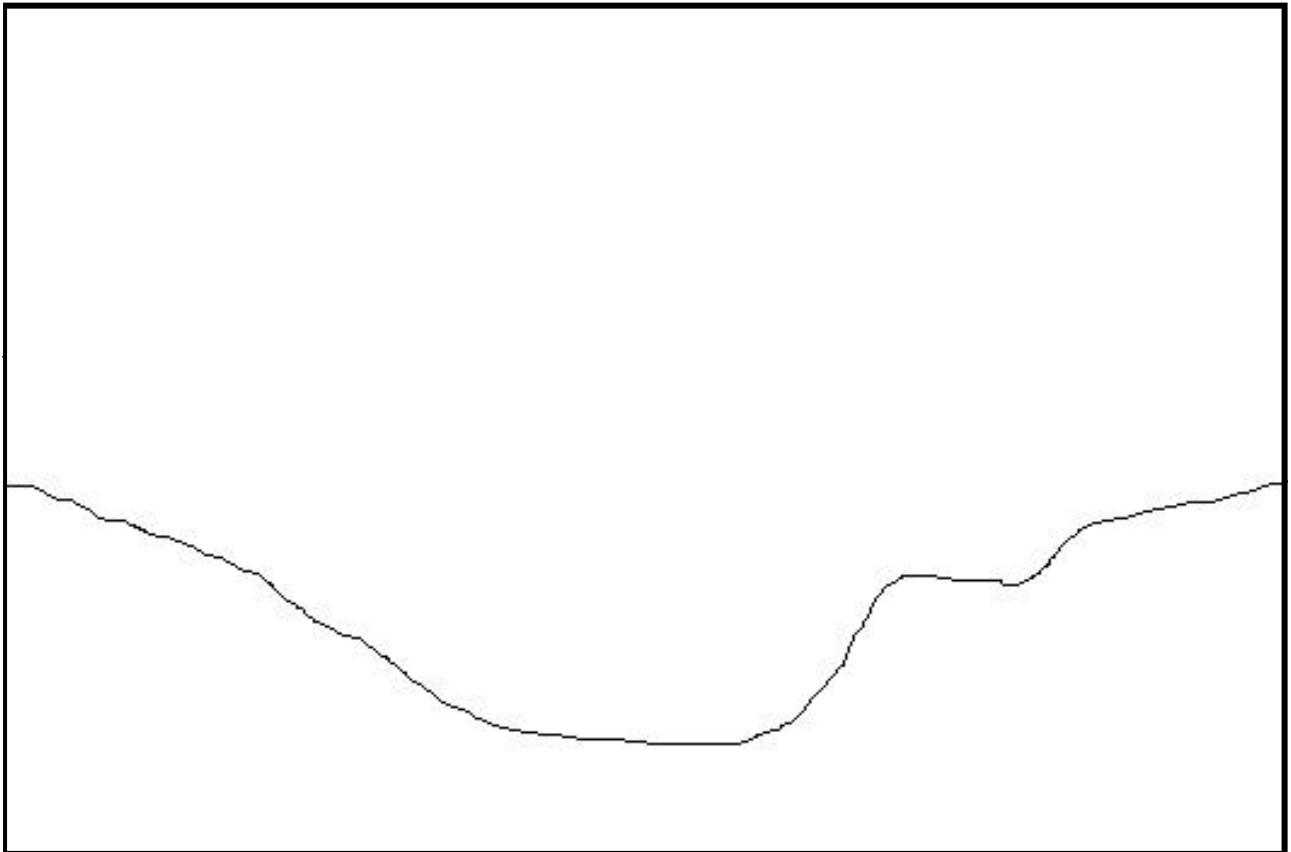
Riparian Zone _____

In-Stream Zone _____

The difference between Bank and Verge Vegetation

Name features found in the in-stream zone _____

Draw a labelled cross section of a diverse river habitat



Describe how erosion impacts on river habitats _____

Teacher Notes

Factors that influence the flora and fauna of river habitats

Habitats can be large (river), or small (a fallen log). A habitat is defined by the flora, fauna and land features present. Most animals and plants are adapted to specific habitats so the greater variety of habitats there are in and near the river, the more variety there may be in the animals present.

Water

Most native flora and fauna are adapted to cope with changes in water flow. Some can survive extremes such as drought and flooding.

- Healthy water quality is very important although some species of flora and fauna are adapted to survive in areas of poor water quality (e.g. low oxygen levels or high nutrient levels).
- The seeds of some plants and the eggs of some aquatic macroinvertebrates can lay dormant in dry creek beds, ready to colonise once the water returns.
- Some fish, birds and other creatures migrate during dry periods.
- Seasonal flooding provides breeding grounds for fish and wading birds

Flow Rates

The volume and speed of water flowing through an area will influence the types of animals and plants living there. Bends along the river and sections of deep and shallow water create different habitats because the water flows at a different rate.

- **Riffles** – areas of fast flowing water, cascading over rocks or logs. The water is turbulent and well aerated. Fish living here will need to be strong swimmers. Most aquatic macroinvertebrates found in riffle zones live in the mud and silt or hide under rocks and in crevices. Some have suckers or hooks to attach to rocks or vegetation.
- **Pools** – areas of slow flowing water, including backwaters and channels. Sediment settles quickly in these areas so light penetration is good and aquatic plants grow well, providing food and shelter for a range of aquatic fauna. If the water flow is very slow a build up of nutrients can occur, leading to an abundance of plankton and algae. Aquatic macroinvertebrates that are adapted to lower oxygen levels are found here.

Substrate

The materials found on the riverbed have a major influence on the flora and fauna living in a particular area. Local geology may influence the particle size and pH of substrate matter. Examples of substrate are clay, mud, dirt, sand, silt, gravel, pebbles or boulders of various sizes.

- Substratum can be stable (boulders and rocks), or unstable (sand and silt moved by the current)
- Different species of plants and animals live in different types of substratum.
- Debris such as fallen logs or old tyres are part of the substrate.

Vegetation and Organic Matter

- Submerged and emergent plants provide habitat for fish, birds and frogs where they can escape predators, shelter from the sun and feed on aquatic macroinvertebrates living amongst the plants.
- Organic matter such as leaf litter provides habitat for microbes and macroinvertebrates.
- Vegetation along the riverbanks (riparian zone) stabilizes the banks, forms a safe corridor for animals to move and provides habitat for a wide variety of flora and fauna.

Other Plants and Animals

Animals will not inhabit areas with an insufficient food supply or where there are many predators.

- A healthy ecosystem is one where food sources are abundant and diverse.
- Plants compete for space, water, light and nutrients.
- Introduced flora (such as willows and brambles), and fauna (such as carp, gambusia, foxes and cats), compete with native species and can degrade the natural habitat.

Other Learning Opportunities

Habitat Photos - Discussion Points



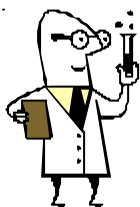
In Part 1 (4.) of the River Habitats lesson students use the habitat photos to familiarise themselves with different habitat zones. Extend this activity, using the Habitat Survey Field Guide, by asking students to rate the river habitat shown in each photo. Select 2 sites, the best and worst in terms of habitat variety, and comment on the following discussion points.

- What habitat rating did you give each site?
- Describe the riparian zone at each site.
- How many different plant species can you see?
- What wildlife might each habitat support? Why?
- What wildlife is each site unsuitable for? Why?
- Are there any human impacts at these sites?
- How might these sites change over time?
- What could be done to improve these sites?

Students can work in pairs or groups to prepare a report

Long Term Habitat Study

Conduct an ongoing study of the site you visit on the field trip. Observe changes in habitat, water flow, water quality, human impacts and wildlife present across the seasons.



- Use cameras, notes and sketches to record physical features at the site
- Conduct water quality testing (For example; chemical monitoring and/or aquatic macro invertebrate sampling)
- Collect samples of vegetation for identification
- Record the presence and abundance of different bird life
- Present this information as a report, display or PowerPoint presentation

Murray Matters

Maintain a scrapbook or classroom bulletin board of news articles related to the River Murray.

- Do the articles present a balance between the problems and possible solutions?
- Consider the intention and view point of each article.
- How do the issues raised in each article impact on habitat?
- For each article, write a summary and a reflective paragraph to share your thoughts.
- Write a letter to the Editor or a local organization expressing your views on the issues raised in a newspaper article.



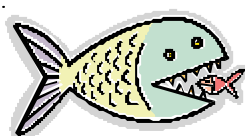
Action Stations

Students work in teams to create a list of groups and organizations involved in the conservation of the River Murray and improving water quality and habitat. Identify a relevant environmental action group, service group or government agencies and contact them to find out how your class/school can become involved and invite them to speak to your class.

Why not set up an environmental group in your school !

The Carp Problem

Create an information brochure about the Carp Problem in the River Murray.



- Describe the environmental impacts of Carp (Habitat degradation and threat to native fish species)
- Research the history of Carp in the River Murray
- Profile features and the life cycle of the Carp
- Summarise current policies on Carp fishing

Habitat Photos



Habitat Photos



Habitat Photos

