Australian Government
Department of Sustainability, Environment,
Water, Population and Communities







Discovering Wetlands in Australia

A Primary classroom resource





Front cover:

Green turtle on the Great Barrier Reef, QLD (Great Barrier Reef Marine Park Authority)

Bar-tailed godwits on a Cairns beach, QLD (Brian Furby Collection)

Giant burrowing frog (Steve Wilson)

Disclaimer: The views and opinions expressed in the non-Government internet resources referred to, and the education centres listed in this publication, do not necessarily reflect those of the Australian Government or the Minister for Sustainability, Environment, Water, Population and Communities.

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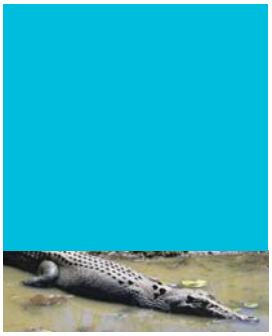




INTRODUCTION

Why teach your class about wetlands?

Wetlands are everywhere in Australia, from the man-made ponds of your suburb, and the rivers that criss-cross the continent, to vast floodplains in central Australia that only see water every few years. We often pass them unnoticed and without a thought to the important jobs they perform each day.

The term 'wetlands' encompasses a vast range of water based areas including swamps, marshes, billabongs, lakes, salt marshes, mudflats, mangroves, coral reefs, fens and peatlands.

Wetlands are an important part of the Australian landscape. They act as filters for our waterways, breeding sites for hundreds of Australian animals and recreational centres for many communities. They protect our shores from wave action, reduce the impacts of floods, absorb pollutants and improve water quality. They provide habitat for animals and plants and many contain a wide diversity of life, supporting plants and animals that are found nowhere else in the world.

Wetlands are vital habitats for international migration by birds, demonstrating how habitats around the world are connected.

Because of their unique ability to trap sediments and filter nutrients, wetlands have been likened to a cleansing 'kidney' within the river systems. They are essential for sustaining healthy rivers, on which communities throughout Australia depend.

All Australians rely on water and the quality of our waterways to sustain life. Whether it's water for our households, industries or ecosystems, wetlands play a central role and their conservation should be a priority for all Australians.

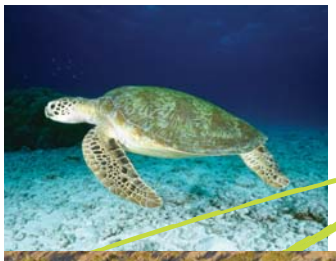
This unit is one way your students can be involved in thinking about the role of wetlands, their importance and why we should all hold some responsibility in their conservation.

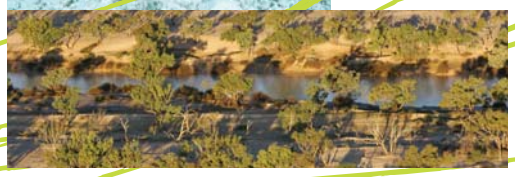
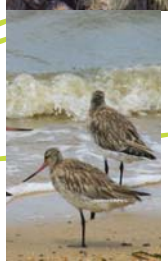
Studies of wetlands can be incorporated into a range of curriculum areas, including Science, Geography, English and the Arts.

Using this resource

The information and activities outlined in this resource will assist classes to:

- investigate Australia's wetlands
- gain an understanding of the diversity of wetland ecosystems in Australia
- broaden teachers' and students' understanding of wetlands and their importance to the Australian environment
- learn about the Ramsar Convention and internationally important wetlands in Australia, and
- demonstrate understanding of Australia's wetlands and the ability to share and communicate this information to an intended audience.

BACKGROUND INFORMATION

Wetland Types

There are many different types of wetlands in Australia and also many ways to group wetlands. To provide a small sample of their diversity, we have selected five ecosystem groupings for this learning unit. These are:

- alpine wetlands
- arid wetlands
- coastal and marine wetlands
- estuaries, and
- inland riverine wetlands

A fact sheet on each ecosystem is included as a starting point to support student research into these wetland ecosystems types. Further information on these wetland ecosystems is also available at Appendix Three – Appendix Seven.

Ramsar Convention

The Convention on Wetlands of International Importance holds the unique distinction of being the first modern treaty between nations aimed at conserving natural resources. The signing of the Convention on Wetlands took place in 1971 at the small Iranian town of Ramsar. Since then, the Convention on Wetlands of International Importance has been known as the Ramsar Convention.

2011 marks the 40th anniversary of the signing of the Convention. The Ramsar Convention's mission is 'the conservation and wise use of wetlands by national action and international cooperation as a means to achieving sustainable development throughout the world.' Countries that join the Convention make a commitment to:

- designate at least one site that meets the Ramsar criteria for inclusion in the List of Wetlands of International Importance
- promote the conservation and wise use of wetlands
- include wetland conservation within their national land-use planning
- establish nature reserves on wetlands and promote wetland training, and
- consult with other member countries about the implementation of the Ramsar Convention.

Australia was one of the first countries to join the Convention and designated the world's first Wetland of International Importance, Cobourg Peninsula, in the Northern Territory in 1974. Australia currently has 64 Ramsar sites which cover approximately 8.1 million hectares. This includes iconic places such as Kakadu National Park and the Coorong.

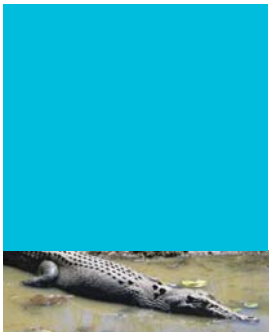
Appendix Eight provides a list of internet resources for further information on wetlands and available teaching resources that include wetland modules. Two key internet resources for background information on Australia's Ramsar sites and the Ramsar Convention are:

- www.environment.gov.au/wetlands
- www.ramsar.org

World Wetlands Day

World Wetlands Day marks the anniversary of the signing of the Ramsar Convention. World Wetlands Day was first celebrated in 1997. Since then government agencies, non-government organisations and community groups have celebrated World Wetlands Day by undertaking actions to raise public awareness of wetland values and benefits and promote the conservation and wise use of wetlands. These activities include seminars, nature walks, festivals, photographic and art exhibitions, launches of new policies, announcement of new Ramsar sites, newspaper articles, radio interviews and wetland rehabilitation.

World Wetlands Day 2011 will be celebrated internationally on 2 February. The theme for 2011 is "wetlands and forests - forests for water and wetlands" and this looks at the bigger picture of forests and wetlands in our lives.





Forested wetlands and the special benefits they bring. Mangroves, peatswamp forests, freshwater swamp forests: biologically diverse, helping us manage our freshwater, and providing us with many other 'services' across the globe including vital roles in carbon storage – our allies in the face of climate change. Despite their utility, they are often under threat from development, drainage and conversion.

The role of forests – wet or not – in our lives, and why looking after them matters. Vital to all human lives, freshwater availability on a global scale depends on our forests. So too, to a large extent, does freshwater quality.

The role of forests in how our wetlands function. It's simple: the health of our wetlands, whether forested or not, is linked to the health of forests in our catchments. Losing and degrading forests means losing and degrading wetlands.

Australia has over 900 wetlands recognised for their national importance. Many of these wetlands are mangrove swamps and forested floodplains and rivers supporting stands of iconic wetland trees species such as river red gums.

Curriculum Links

This classroom unit is compatible with the new Australian National Curriculum K-12 which is currently being developed under the Australian Curriculum, Assessment and Reporting Authority (ACARA).

ACARA is working collaboratively with a wide range of stakeholders including teachers, principals, government, state and territory education authorities, professional education associations, business/industry, community groups and the broader public. Writers are referencing the new curriculum to national and international curriculum and assessment research and to state and territory curriculum materials.

The first phase of development of the Australian curriculum for English, mathematics, science and history is well under way. A second phase of work has begun to develop the Australian curriculum for languages, geography and the arts.

Curriculum for each subject includes content descriptions and achievement standards K-12. ACARA will with state and territory curriculum and school authorities to develop implementation plans to align State Curriculums with the National Curriculum.

Science

Year 3 Science

- Science Understanding / Life cycles S3SU2 Life Cycles and reproductive processes of plants and animals.

Year 4 Science

- Science Understanding / Interactions of living things S4SU2 Interactions between living things in a habitat, including simple food chains in a local environment.

Year 5 Science

- Science as Human Endeavour / Collaboration in Science.S5SHE3 Teams of Scientists are often required to work together on projects.
- Science Understanding / Micro-organisms S5SU1, the role of micro-organismsin areas such as human health, food and the environment.

Year 6 Science

- Science as Human Endeavour / Science and CultureS6SHE6 / Science and culture can interact to influence personal and community choices (eg, making decisions about resource use and sustainable management of the environment).
- Science Understanding / Relationships of living thingsS6SU1 Relationships between living things, including food webs, and suitability for particular habitats.
- Science Understanding / Using Earth's ResourcesS6SU2 / Human Activity, such as the use and management of water, energy resources and mineral resources, can have consequences for the environment and other living things.

CLASS ACTIVITIES

Activity One - What is a Wetland?

Purpose

To determine and benchmark your class's current level of understanding and knowledge of wetlands.

Action

Step One: Introduce your class to the topic of wetlands by showing the Ramsar Convention video 'Wetlands: keeping our planet alive and well' from the DVD provided in the classroom pack or online at http://www.ramsar.org/cda/en/ramsar-media-video/main/ramsar/1-25-331_4000_0__. Read 'Wetlands and World Wetlands Day' fact sheet and give relevant information to students.

Step Two: Now that your class has seen the video ask them to call out words, concepts or ideas that they associate with wetlands. Brainstorm words associated with wetlands. For example: river, frog, fish, mud, etc...

Step Three: Record all the class responses onto paper shapes, suitable for sorting.

Step Four: Get your class to suggest some 'topic headings', use these headings as categories to sort previous responses. Glue in place to create a structured mind-map.

Step Five: Word game. Give each student a copy of the Student Glossary (Appendix Two). Discuss some words and their meanings. Cut one copy into strips with word and definition, give one to each student. Put them all into a hoop. In groups, students find their word and definition. Repeat with different word.

Extension: Give students a word to find the matching definition.

Reflect back on this mind map at the completion of this unit to identify what your class has learnt.

Activity Two - Water and Wetlands

Purpose

To raise general knowledge and understanding of the importance of water for wetlands and stimulate discussion and thought around activities that can be undertaken by students to conserve wetlands.

Action

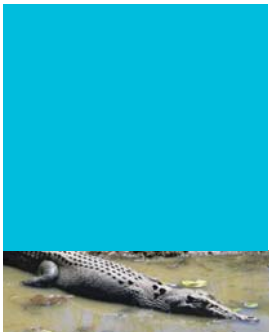
Step One: Introduce your class to the important role that water has for wetlands, select 'Environmental watering at Hattah-Kulkyne Lakes' and 'Environmental watering at Yanga National Park' from the DVD provided in the wetlands classroom kit or online at www.environment.gov.au/wetlands. Read the 'Environmental Watering' fact sheet and give students relevant information.

Step Two: Now that your class has seen the videos on environmental watering, discuss with the class about why water is important for wetlands and how the water in rivers is connected to the water used by the school. Discuss why it is sometimes difficult to balance the water we need for cities, towns and agriculture and the water we need to keep our wetlands healthy.

Investigate waterways near the school. Where does the water come from? Where does the water go? Google Earth (http://www.google.com/earth/index.html) can be used to locate the school and search for local waterways.

Step Three: Divide your class into groups. Give each group the name of a school participating in the Australian Sustainable Schools Initiative (AuSSI). Each group is to locate relevant information on what their school is doing to work towards being more sustainable with their water use. Each group to then share the responses with the class.

See http://www.environment.gov.au/education/aussi/ and www.sustainableschools.com.au





For AuSSI schools in your state see:

- Australian Capital Territory: http://www.sustainableschools.act.gov.au/
- New South Wales: http://www.sustainableschools.nsw.edu.au/
- Northern Territory: http://www.environment.gov.au/education/aussi/aussi-school/nt.html
- Queensland: http://www.sustainableschools.qld.edu.au/
- South Australia: http://www.decs.sa.gov.au/efs/
- Tasmania: http://www.aussietas.com/
- Victoria: http://www.decs.sa.gov.au/efs/
- Western Australia: http://www.det.wa.edu.au/curriculumsupport/sustainableschools/detcms/portal/

Learn about what schools are doing to use their water more wisely. See http://www.sustainableschools.com.au/sustainableschools/themes/water.html

Many of these schools are implementing sustainable water use through actions such as installing rainwater tanks that have been connected to the school toilets or gardens or working with their communities to reduce pollution entering stormwater drains and impacting on local waterways. Some schools are partnering with their local communities to conserve local wetlands.

Encourage students to read the following case studies for information. See :

- http://www.environment.gov.au/education/aussi/case-studies/tas.html
- http://www.environment.gov.au/education/aussi/case-studies/sa.html
- http://www.environment.act.gov.au/__data/assets/pdf_file/0004/198832/Urban_Wetlands_book.pdf

Step Four: Discuss and implement a class project to conserve water within the school. This could include: water monitors; complete a water audit; design reminder signs to turn off taps.

Step Five: Wetland 'The-odd-word-out' activity.

Activity Three: Types of Wetland

Identifying different wetland ecosystems and their defining characteristics

This is a group activity (2-5 students) which can be broken down over a number of lessons. Fact sheets required for this activity can be found in your wetlands classroom kit or online at: www.environment.gov.au/wetlands.

Purpose

For students to investigate one of the five wetland ecosystem groups (arid, alpine, coastal and marine, estuarine and inland riverine wetlands) and identify the unique characteristics of that wetland and share acquired knowledge with classmates.

Students can also identify what factors are threatening their chosen wetland ecosystem and investigate what they can do to minimise these threats.

Action

Step One: Define the word 'ecosystem' and discover some local ecosystems. The school might have a pond ecosystem, bushland ecosystem or beach ecosystem nearby.

Step Two: Divide your class into groups and assign each group one of the five wetland ecosystem groups (arid, alpine, coastal and marine, estuarine and inland riverine wetlands).

Step Three: Provide each group with the appropriate student fact sheet. Direct each group to a wetland that matches their wetland type, using the Australian Wetland Database.

Detailed information of many of these wetlands is available on the Australian Wetlands Database at www.environment.gov.au/wetlands. Teachers fact sheets also include links to further internet resources where students can learn more about wetlands.

Step Four: Each group researches the following topics for sharing with the class.

- What type of ecosystem have you investigated?
- What does your wetland look like? Is it always wet?
- Why are these wetlands important?
- What animals and plants live in these wetlands?
- What threats face these wetlands?

Step Five: Provide the class the origami templates of the:

- northern corroboree frog
- Australian pelican
- pig-nosed turtle

After the students have made the origami animals, ask the class which wetland ecosystem the animal is most likely found in, if it is only found in that wetland ecosystem or if it is found in many other wetland ecosystems.

Appendix Nine lists a collection of other do-it-yourself wetland animals.

Step Six: Appendix Ten outlines wetland education centres across Australia. Do a class virtual visit to several Wetland Centres across Australia. Discuss the location and the type of wetland represented.

Step Seven: 'Wetlands Find-a-Word' activity.

Reflect on the differences between the wetland ecosystems, for example: why different animals and plants live in different wetlands, why some threats are the same for all wetlands and why other threats are different may only affect certain wetland ecosystems.

Activity Four - Wetlands and Forests

Purpose

2011 is the United Nation's International Year of Forests. The Ramsar Convention has chosen Forests as the theme for World Wetlands Day 2011. This activity will introduce students to the characteristics of a forested wetland and focus on where they are found in Australia.

Background

The Ramsar Convention recognises three types of forested wetland:

Intertidal forested wetlands including mangrove swamps, nipah swamps and tidal freshwater swamp forests.

Freshwater, tree-dominated wetlands including freshwater swamp forests, seasonally flooded forests and wooded swamps.

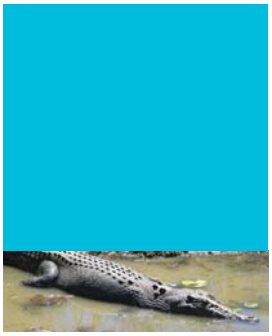
Forested peatlands including peat swamp forests.

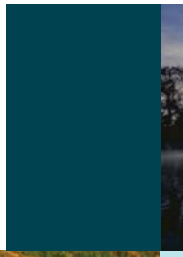
In Australia the more common and obvious forested wetlands include:

- swamp paperbark swamps
- casuarina swamps
- river redgum forests
- mangrove forests, and
- palm swamps.

Some examples of forested wetlands in Australia include:

- Barmah Forest on the Murray River in Victoria
- mangrove forests found in many coastal locations around Australia, and
- palm swamp wetlands in the Wet Tropics of North Queensland.






Action

Step One: Try to locate a forested wetland in your state and use Google earth to "visit" the wetland.

In NSW, the website, Ecosystems on Show, highlights some of these forests:

http://www.curriculumsupport.education.nsw.gov.au/env_ed/centres/ecosystems/eco_sytems/index.htm

Step Two: Print the Google Earth maps discovered and identify forested areas. Use symbols to identify different vegetation on the maps.

Step Three: Find the dominant tree species that is found in that forested wetland and research the tree species, collecting some photographs and some other locations where this tree species is found.

Step Four: Do a short power point presentation on the forested wetland showing a map location, an aerial view and some information on the plants and animals which use this wetland.

Posters and stickers on Wetlands and Forests can be downloaded from the Ramsar Convention website at www.ramsar.org/WWD

Activity Five - Indigenous values and perspectives of wetlands

Purpose

To raise awareness on the Indigenous values and perspectives of Australian wetlands.

Action

Step One: Introduce class to the terms 'values' and 'perspectives'. Discuss how water is a 'value' to you. How would your 'perspective' change if you were a waterbird?

Step Two: Introduce your class to the topic of Indigenous values and perspectives of wetlands by selecting 'Kakadu National Park - Mary River Roadhouse and Gunlom' from the DVD provided in the wetlands Classroom Pack (or online at http://environment.gov.au/parks/publications/kakadu/maryriver.html). This video shows the students some Indigenous perspectives on Kakadu National Park, one of Australia's Ramsar sites.

Kakadu National Park is a living cultural landscape. Generations of Bininj/Mungguy have lived on and cared for this country for tens of thousands of years. Their spiritual connection with the land is globally recognized in Kakadu's World Heritage listing. Further information on Kakadu's cultural values can be found in the Kakadu National Park World Heritage brochure available at http://www.environment.gov.au/heritage/places/world/kakadu/pubs/kakadu-brochure.pdf.

Step Three: Class discussion of the values the Bininj/Mungguy have for Kakadu's wetlands. Develop a joint list of 'values'.

For more advanced classes, students can undertake online research to gain a deeper level of understanding from the following web pages: http://environment.gov.au/parks/kakadu/index.html, http://www.environment.gov.au/heritage/places/world/kakadu/index.html, and http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=2.

Step Four: Group artwork. Identify a cultural value of the Bininj/Mungguy that was discussed in the videos for each group to illustrate. Combine into a class mural.

Step Five: Consider the cultural values of your local wetlands.

Step Six: Wetland 'Word Scramble' activity.

Reflect back on the earlier discussions on the different wetland ecosystems. Consider how the animals, plants and water of the wetland are linked to the cultural values.

Activity Six - What is a Ramsar site?

Investigate Australia's internationally important wetlands on the Ramsar List

Purpose

To raise general knowledge and understanding of Ramsar wetlands and stimulate discussion and thought around this topic.

Action

Step One: Students research the Australian Wetlands Database located at www.environment.gov.au/wetlands to locate and find out about Australia's 64 Ramsar sites.

A teachers' fact sheet on Australia's Ramsar wetlands is also included in this education package.

Teacher chooses one or two sites with a Virtual Tour option. Virtual tours are available for Kakadu National Park, Cobourg Peninsula, Lakes Argyle and Kununurra, Jocks Lagoon, Moulting Lagoon, Little Waterhouse Lake and Ord River Floodplain.

Use the map on the A-Z Ramsar site webpage (use www.environment.gov.au/wetlands to access the webpage) to locate which Ramsar sites are in your state. Then open up the web pages on each Ramsar site to read information on the key features of the site.

Step Two: Class discussion to classify the wetland type of these wetlands.

Step Three: Use the photographs of Australia's Ramsar sites shown on www.environment.gov.au/wetlands.

Collect photographs of Australia's Ramsar sites and classify them according to the wetland type.

Photos are also available through the internet resources listed in Appendix Three.

Step Four: Create a collage using the Ramsar photographs.

Step Five: On paper strips, students record:

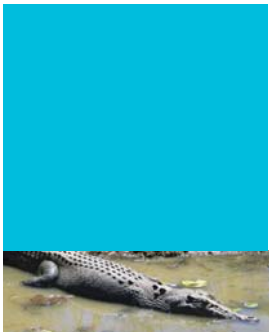
- Something good about Australia's Ramsar sites
- Something that can damage a Ramsar site
- Something interesting about a Ramsar site

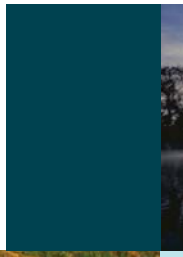
Step Six: Place three hoops in a circle on the floor, and sort the paper strips under each of the previous headings. Discuss results.

Step Seven: Bundle the responses and create a book for each topic.

Reflect back on the earlier discussion on wetland ecosystems and the mind map.

Optional Step Eight: Wetlands Environmental Education Centre (www.wetlands.eec.education.nsw.gov.au) manages an internet research competition for senior primary students. Each Wet & Wild session runs for three weeks in Terms 3 and 4 via the Environmental Education Centre website. In 2011, the theme will be Wet, Wild and Living in a Ramsar site to celebrate the 40th Anniversary of the Ramsar Convention.



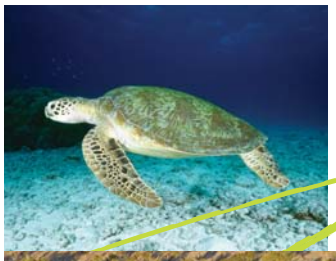


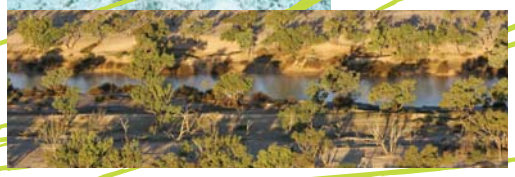
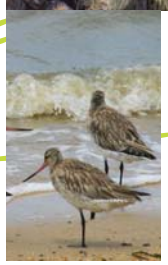

APPENDICES

Appendix One – Teachers' Glossary

(from http://www.sustainingriverlife.org.au/ and www.ramsar.org)

Amphibian	Animals such as frogs, toads, salamanders, newts, and caecilians, are ectothermic (or cold-blooded) animals that metamorphose from a juvenile water-breathing form, either to an adult air-breathing form, or to a paedomorph that retains some juvenile characteristics.
Aquatic vegetation	Plants that have adapted to living in or on aquatic environments. Because living on or under water requires numerous special adaptations, aquatic plants can only grow in water or permanently saturated soil.
Bank	The shoreline of a body of water. The grade (slope) can vary from vertical to a shallow slope.
Canopy	Refers to the upper layer or habitat zone, formed by mature tree crowns and including other biological organisms.
Carnivore	An organism that derives its energy and nutrient requirements from a diet consisting mainly or exclusively of animal tissue, whether through predation or scavenging.
Catchment	The total area draining into a river, reservoir, or other body of water.
Constructed wetland	An artificial marsh or swamp, created for anthropogenic discharge such as wastewater, stormwater runoff or sewage treatment, and as habitat for wildlife, or for land reclamation after mining or other disturbance. Natural wetlands act as biofilters, removing sediments and pollutants such as heavy metals from the water, and constructed wetlands can be designed to emulate these features.
Detritus	Non-living particulate organic material. It typically includes the bodies or fragments of dead organisms as well as faecal material.
Distribution	The range of a species is the geographical area within which that species can be found.
Drought	An extended period of months or years when a region notes a deficiency in its water supply. Generally, this occurs when a region receives consistently below average precipitation (rainfall). It can have a substantial impact on the ecosystem and agriculture of the affected region.
Ecological communities	Any naturally occurring group of species inhabiting a common environment that interacts with each other, especially through food relationships, and that is relatively independent of other groups. Ecological communities may be of varying sizes, and larger ones may contain smaller ones.
Ecosystems	The complex of living communities (including human communities) and nonliving environment (ecosystem components) interacting (through ecological processes) as a functional unit, which provides, inter alia, a variety of benefits to people (ecosystem services).
Ecologically sustainable development	Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depend.
Grazing	A type of predation in which a herbivore feeds on plants (such as grasses). Grazing differs from true predation because the organism being eaten is not killed, and it differs from parasitism as the two organisms do not live together, nor is the grazer necessarily so limited in what it can eat. For terrestrial animals grazing is normally distinguished from browsing in that grazing is eating grass or other low vegetation, and browsing is eating woody twigs and leaves from trees and shrubs.

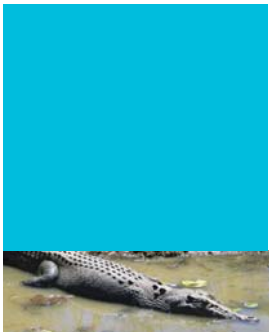
Groundwater	Is water located beneath the ground surface in soil pore spaces and in the fractures of lithologic formations.
Habitat	An ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism.
Herbivore	Animals that are adapted to eat plants. Herbivory is a form of predation in which an organism consumes principally plants, algae and photosynthesizing bacteria.
Introduced species	A species living outside its native distributional range, which has arrived there by human activity, either deliberate or accidental.
Irrigation	An artificial application of water to the soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall.
Invertebrates	An animal without a backbone.
Large woody debris	Logs, sticks, branches, and other wood that falls into streams and rivers. This debris can influence the flow and the shape of the stream channel. Large woody debris, grains, and the shape of the bed of the stream are the three main providers of flow resistance, and are thus, a major influence on the shape of the stream channel. Large woody debris is also referred to as snags and in important refuge habitat for native fish species.
Larvae	Distinct juvenile form many animals undergo before metamorphosis into adults. Animals with indirect development such as insects, amphibians, or cnidarians typically have a larval phase of their life cycle.
List of Wetlands of International Importance ('the Ramsar List')	Wetlands that have been designated by the a member country of the Ramsar Convention in which they reside as internationally important, according to one or more of the Ramsar criteria.
Macroinvertebrate	An invertebrate that is large enough to be seen without the use of a microscope.
Migration	The travelling of long distances in search of a new habitat. The trigger for the migration may be local climate, local availability of food, or the season of the year. To be counted as a true migration, and not just a local dispersal, the movement of the animals should be an annual or seasonal occurrence, such as birds migrating elsewhere for the winter, or a major habitat change as part of their life cycle.
Native species	A species that normally lives and thrives in a particular ecosystem.
Nitrogen	A non-metallic element that occurs as a colourless, odourless, almost inert gas and makes up four-fifths of the Earth's atmosphere by volume. Used in the manufacture of ammonia, explosives, fertilisers and by plants and animals to make protein.
Nutrients	Substance that provides nourishment, for example, the minerals that a plant takes from the soil or the constituents in food that keep an organism healthy and help it to grow.
Over-fishing	When fishing activities rise to a level at which fish populations can not be maintained/sustained.
pH	A measure of acidity or alkalinity in which the pH of pure water is 7, with lower numbers indicating acidity and higher numbers indicating alkalinity.

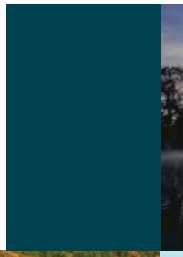





Photosynthesis	A process by which green plants and other organisms turn carbon dioxide and water into carbohydrates and oxygen, using light energy trapped by chlorophyll.
Pollution	The introduction of contaminants into an environment that causes instability, disorder, harm or discomfort to the ecosystem.
Pools	A stretch of a river or creek in which the water depth is above average and the stream velocity is quite low. Such pools can be important for juvenile fish habitat, especially where many stream reaches attain high summer temperatures and very low flow dry season characteristics.
Predation	A biological interaction where a predator (an organism that is hunting) feeds on its prey (the organism that is attacked). Predators may or may not kill their prey prior to feeding on them, but the act of predation always results in the death of its prey and the eventual absorption of the prey's tissue through consumption.
Ramsar	City in Iran, on the shores of the Caspian Sea, where the Convention on Wetlands was signed on 2 February 1971; thus the Convention's short title, 'Ramsar Convention'.
Ramsar Criteria	Criteria for identifying Wetlands of International Importance, used by Contracting Parties and advisory bodies to identify wetlands as qualifying for the Ramsar List on the basis of representativeness or uniqueness or of biodiversity values.
Ramsar Convention	Convention on Wetlands of International Importance especially as Waterfowl Habitat. Ramsar (Iran), 2 February 1971. The abbreviated names "Convention on Wetlands (Ramsar, Iran, 1971)" or "Ramsar Convention" are used more commonly.
Ramsar sites	Wetlands designated by the countries that are members of the Ramsar Convention for inclusion in the List of Wetlands of International Importance because they meet one or more of the Ramsar criteria.
Revegation	The process of replanting and rebuilding the soil of disturbed land. This can be natural or human assisted.
Riparian vegetation	An assortment of plants that either are emergent aquatic plants, or herbs, trees and shrubs that thrive in proximity to water.
Riparian zone	The interface between land and a river or stream. Riparian zones are significant in ecology, environmental management, and civil engineering because of their role in soil conservation, their habitat biodiversity, and the influence they have on fauna and aquatic ecosystems.
Salinity	The saltiness or dissolved salt content of a body of water. It is a general term used to describe the levels of different salts such as sodium chloride, magnesium and calcium sulfates, and bicarbonates.
Sediment	Material that is broken down by processes of weathering and erosion, and is subsequently transported by the action of fluids such as wind, water, or ice, and/or by the force of gravity acting on the particle itself.
Sedimentation	Also called siltation, is the falling out of suspended particles from flowing water resulting in the formation of depositional landforms. Siltation is a major source of pollution in waterways.
Spawning	Pattern of behaviour by which aquatic animals produce and deposit large quantities of eggs in water.
Temperate	An intermediate climate zone between polar and tropical regions.

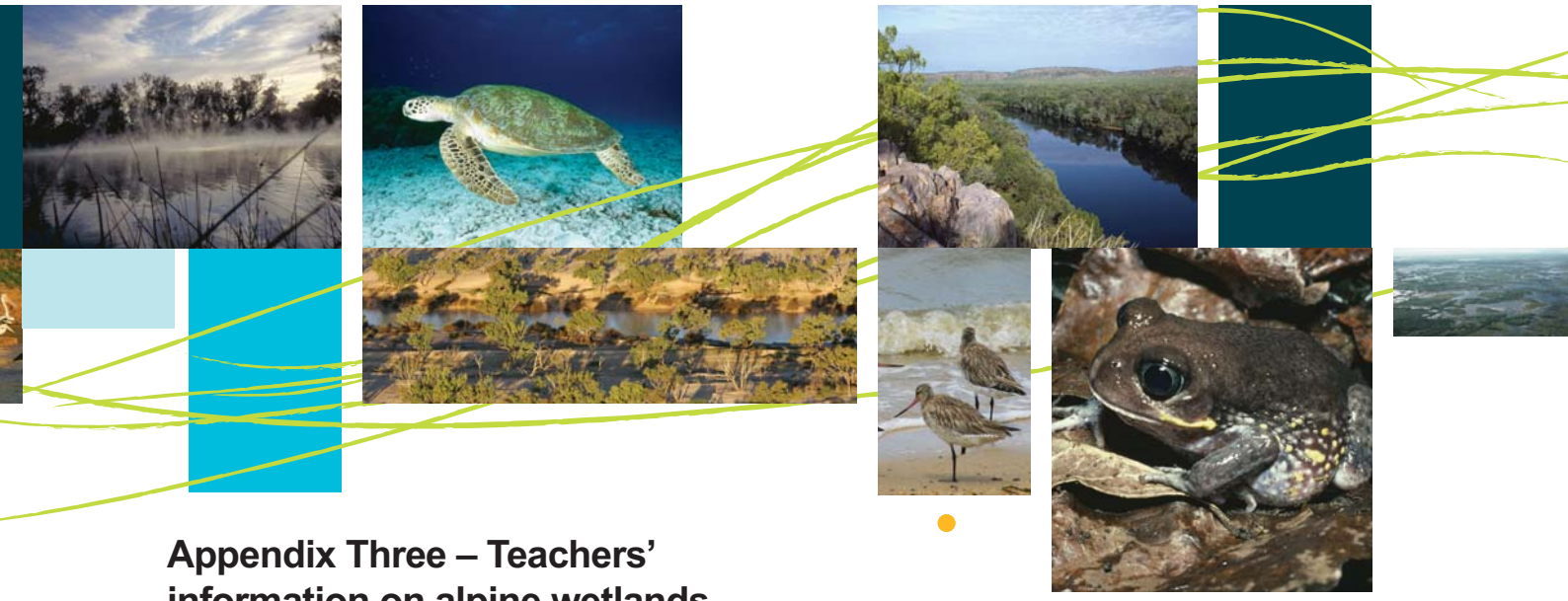
Temperature	The degree of heat as an inherent quality of objects expressed as hotness or coldness relative to something else.
Thermal stratification	Refers to a change in the temperature at different depths in the lake, and is due to the change in water's density with temperature.
Trophic level	A stage in a food chain that reflects the number of times energy has been transferred through feeding, for example, when plants are eaten by animals that are in turn eaten by predators. Plants and plant-eating animals occupy the first two levels, followed by carnivores, usually to a maximum of six levels.
Turbidity	Degree to which particles and sediment are suspended in a liquid.
Understorey	A layer of small trees and bushes below the level of the taller trees in a forest.
Urban area	Characterised by higher population density and vast human features in comparison to areas surrounding it.
Vegetation	Plants in general or the mass of plants growing in a particular place.
Vertebrate	An animal with a segmented spinal column and a well-developed brain, for example, a mammal, bird, reptile, amphibian or fish.
Waterbirds	Birds ecologically dependent on wetlands. This definition thus includes any wetland bird species. However, at the broad level of taxonomic order, it includes especially: • penguins: *Sphenisciformes*. • divers: *Gaviiformes*; • grebes: *Podicipediformes*; • wetland related pelicans, cormorants, darters and allies: *Pelecaniformes*; • herons, bitterns, storks, ibises and spoonbills: *Ciconiiformes*; • flamingos: *Phoenicopteriformes*: • screamers, swans, geese and ducks (wildfowl): *Anseriformes*; • wetland related raptors: *Accipitriformes* and *Falconiformes*; • wetland related cranes, rails and allies: *Gruiformes*; • Hoatzin: *Opisthocomiformes*; • wetland related jacanas, waders (or shorebirds), gulls, skimmers and terns: *Charadriiformes*; • coucals: *Cuculiformes*; and • wetland related owls: *Strigiformes*.
Water logging	Refers to the saturation of soil with water. Soil may be regarded as waterlogged when the water table or the groundwater is at or near the surface.
Water quality	The physical, chemical and biological characteristics of water. It is most frequently used by reference to a set of standards against which compliance can be assessed. The most common standards used to assess water quality relate to drinking water, safety of human contact and for the health of ecosystems.
Wetlands	Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.






Appendix Two – Student Glossary

Amphibian	Animals that have a young water-breathing stage and an adult air-breathing stage eg frogs
Aquatic vegetation	Plants that live in water.
Bank	The edge of an area of water.
Canopy	The top layer of a forest consisting of tree tops.
Carnivore	An animal that eats another animal.
Catchment	The land where all the water in an area comes from.
Drought	A long time without rain.
Ecosystem	A group of living things (plants, animals and insects) that live and interact together.
Exotic	A species living outside its natural area.
Extinct	A species that no longer exists.
Food chain / Food web	Shows how each living thing gets its food. Some animals eat plants and some animals eat other animals. Each link in this chain is food for the next link. A food chain always starts with plant life and ends with an animal.
Habitat	An area in which an animal, plant or insect lives eg bushland habitat, pond habitat.
Herbivore	An animal that eats plants.
Introduced species	A species that has been brought into a natural area and does not belong there.
Invertebrate	An animal without a backbone, usually an insect.
Larvae	The young form of an animal before it changes to an adult e.g. flies and beetles
Macroinvertebrate	An insect large enough to be seen with your eyes.
Migration	Travelling long distances to move to a different habitat.
Native species	A species that naturally occurs in a particular ecosystem.
Photosynthesis	The process used by plants to change sunlight into energy to grow.
Predator	An animal that hunts for its food.
Ramsar	A city in Iran
Ramsar Convention	An international convention which recognises wetlands of significance.
Ramsar sites	Wetlands that have been recognised by the Ramsar Convention as being important.
Temperate	An intermediate climate zone between polar and tropical regions.
Turbidity	The clarity of water.
Understorey	A layer of small trees and bushes below the level of taller trees in a forest.
Urban area	A town or city where there are many houses.
Vertebrate	An animal with a backbone e.g. mammal, bird, reptile, fish.
Waterbirds	Birds which live in wetlands.
Water quality	The health of water. Tests can be carried out to measure the level of water quality to show how clean and healthy water is.
Wetlands	Areas of wet land. Places that may have permanent or temporary water, still or moving water, salty or fresh water.



Appendix Three – Teachers' information on alpine wetlands

Alpine wetlands can be found in Australia's mountain country, generally in areas above the treeline (more than 1850 metres above sea level). Alpine wetlands provide homes to many rare and endangered plants and animals and they provide areas where many animals can find food or shelter during drought. Some of these alpine wetlands were formed millions of years ago by retreating glaciers. Today, melting snow remains the most important source of water for our alpine wetlands. Alpine wetlands include sphagnum bogs, lakes and tarns.

Alpine wetlands in Australia

Two internationally important alpine wetlands in Australia are Blue Lake in Kosciusko National Park, New South Wales and the Ginini Flats Wetlands in the Australian Capital Territory. There are also many alpine wetlands in Victoria and Tasmania, such as large areas of buttongrass moorlands in the west and south-west of Tasmania.

Sphagnum bogs like the Ginini Flats Wetlands contain a particular type of moss called sphagnum or peat moss. As the sphagnum moss in alpine bogs dies and decays, it turns into peat. Peat is a mixture of dead plant materials including sphagnum moss and when dry, it can be burned like coal. Sphagnum bogs are also important for filtering water. However, peat can only operate successfully as a filter if they are healthy and do not dry out. The peat in the Ginini Flats Wetlands provides a natural filter for Canberra's water supply.

The endangered northern corroboree frog can be found in some alpine wetlands. These endangered frogs need sphagnum bogs like the Ginini Flats Wetlands to live and breed.

Blue Lake, high in the Snowy Mountains, is one of only four glacial cirque lakes in Australia. It was formed around 15 000 years ago, when a glacier carved its way through the mountain side. The surface of the lake is frozen for about four months of the year. Blue Lake and its catchment are home to many rare plants and animals including the mountain pygmy possum.

Mountain galaxias are the only native fish that is found in the alpine zone above the snowline during winter. They are a small fish that live in many of the creeks and rivers of Kosciusko National Park and are able to survive in extremely cold conditions.

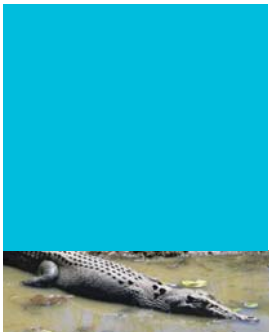
Threats facing alpine wetlands

Alpine wetlands are very sensitive ecosystems and are vulnerable to numerous threats. These include:

- cattle grazing, which increases erosion and the amount of sediment in water
- weed invasion, which reduces the space for native plants
- mining and harvesting of peat and sphagnum moss
- fire, which can severely damage peat and bog areas
- introduced animals including horses, rabbits, foxes and pigs, which damage large areas in their search for food
- unsustainable tourism and recreational use, which can trample the vegetation and contaminate the wetlands, and
- climate change, where even a small increase in temperature is likely to result in the loss of some alpine wetlands due to less snowfall and snowmelt and the increased frequency of fire.

Further information and references

- Australian Alps Education Kit: http://www.australianalps.environment.gov.au/learn/index.html
- Peat swamps: http://www.hn.cma.nsw.gov.au/multiversions/3980/FileName/PEAT%20SWAMPS%20FACT%20SHEET_Web.pdf
- Northern corroboree frogs: http://www.corroboreefrog.com.au/corroboree-frog
- Mountain galaxias: http://www2.mdbc.gov.au/subs/fish-info/native_info/mountainGalaxias.html






Appendix Four– Teachers' information on arid wetlands

Even though outback Australia is very dry (or arid), there are still wetlands. Arid wetlands include swamps, salt pans, clay pans, lakes and springs. Most of these wetlands are dry and then fill with water after rain and often remain wet for long periods afterwards. However, other arid wetlands, such as springs, have water all the time.

Arid wetlands in Australia

There are many salt lakes in the arid zones of Australia. The largest is Lake Eyre in South Australia. In fact Lake Eyre is the world's largest salt-lake, covering about 9690 square kilometres. On the rare occasions when it fills, it supports many native fish like bony bream and golden perch, and becomes a breeding site for enormous numbers of waterbirds, such as Australian pelicans.

Australia has some unique arid wetlands, such as ones supplied by water from underground. Mound springs form when underground water finds a weak spot in the ground and pushes upward. The water dissolves minerals out of the rocks to form salts. These salts collect around the edge of the spring, forming a mound with water in the centre.

There are over 700 mound springs in Australia and many of the mound springs are found in the Great Artesian Basin, the worlds largest and oldest underground water storage. The Great Artesian Basin extends from Cape York Peninsula in Queensland to Dubbo in New South Wales. The largest group of mound springs are the Witjira-Dalhousie Springs in South Australia. This group of around 60 springs account for over forty percent of the water that flows out of the Great Artesian Basin. Due to the isolation of the Dalhousie Springs many of the plants and animals that occur there have evolved into distinct species not found anywhere else in the world.

What lives in arid wetlands?

Many arid wetlands have saltbushes and bluebush growing in and around them. River red gum and coolibah trees can also occur around the edges of freshwater lakes and claypans in the arid zone. Many plant species that grow in and around arid wetlands were traditionally used for food, shelter, bags, nets, and medicines by Indigenous Australians.

The water and plants of arid wetlands provide habitat for many animals and birds. These wetlands attract many local waterbirds as well as birds that fly here every year from places as far away as China, Japan and Russia. Arid wetlands also support a range of other animals that have adapted to survive through dry times. For example the burrowing frog survives long dry periods by burrowing deep in the mud.

Giant burrowing frog (S Wilson)

Threats facing arid wetlands

There are many threats to arid wetlands including:

- introduced grasses and other weeds which displace native species and create a greatly increased fuel load for wildfires
- unsustainable water regulation or extraction
- grazing pressure from domestic and introduced animals, and
- unsustainable tourism impacts.

Further information and references

- Inland rivers and floodplains: http://lwa.gov.au/files/products/river-landscapes/pf020260/pf020260.pdf
- Arid lakes: http://www.nt.gov.au/nreta/wildlife/nature/aridwetlands.html
- Arid swamps: http://www.epa.qld.gov.au/wetlandinfo/resources/static/pdf/Profiles/p01868aa.pdf
- Arid frogs of the Cooper Basin: http://www.santos.com/library/frogs.pdf
- Arid wetlands of the Northern Territory: http://www.nt.gov.au/nreta/wildlife/nature/aridwetlands.html
- Witjira-Dalhousie Springs: http://www.environment.gov.au/heritage/places/national/witjira-dalhousie-springs/pubs/witjira-dalhousie-springs-factsheet.pdf
- Great Artesian Basin Mound Springs: http://www.epa.qld.gov.au/wetlandinfo/resources/static/pdf/Profiles/p01718aa.pdf

Appendix Five – Teachers' information on coastal and marine wetlands

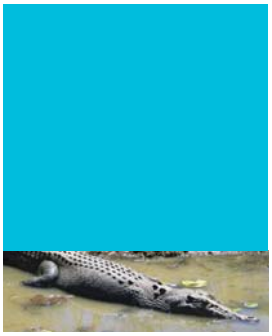
Australia is one of the world's largest islands, our coastline stretches about 36 000 kilometres. This means we have a wide variety of coastal and marine wetlands. There are many different types of coastal wetlands such as sand or pebble shores, estuarine lakes and lagoons, coastal floodplain forest, dune swamps, mangrove and saltmarsh swamps. Marine wetlands are saltwater wetlands exposed to waves, currents and tides in an oceanic setting. Marine wetlands include coral reefs, and aquatic subtidal beds with sea grass and kelps.

Coastal and marine wetlands are important nursery and feeding areas for animals such as fish, dugongs, and marine turtles. These wetlands are often greatly valued for tourism and recreation. Coastal wetlands also provide important habitats for migratory waterbirds.

Coastal and marine wetlands in Australia

A significant coastal wetland in Australia is Eighty-mile Beach, an internationally important wetland located in the Kimberley region of Western Australia. It is considered to be one of the major arrival and departure areas for migratory shorebirds visiting Australia, especially for the great knot. These birds fly up to 26 000 kilometres each year from the Arctic Circle, through East and south-east asia, to Australia and New Zealand. The corridor through which these waterbirds migrate is known as the East Asian-Australasian Flyway and is one of eight major waterbird flyways recognised around the world.

Coral reefs are a well known marine wetland type. Corals are colonies of tiny animals that are dependent on the food produced by microscopic algae (zooanthellae), that live within them, to






survive. Coral reefs are underwater structures made from calcium carbonate produced by corals. Coral reefs, such as the Great Barrier Reef, have very high levels of biodiversity. The Great Barrier Reef's network of reefs is home to thousands of species. Extensive areas of seagrass meadows, mangrove stands, salt marsh and sand and mud areas also provide a diverse range of habitats for many species.

Many nationally threatened animals in Australian waters depend on coral reefs and sea grass beds to survive. For example, the threatened green turtle grazes on seagrasses, marine algae (seaweeds) and some sponges. Green turtles often nest on tropical beaches or islands, such as the beaches in Ashmore Reef, an internationally important wetland.

Marine algae (also known as seaweed) is considered extremely important for shallow marine environments as they oxygenate the water by using sunlight to make food and oxygen (this is called photosynthesis). This means that the marine waters are a more liveable habitat for animals such as fish, corals and sea stars that need oxygen to survive.

Threats facing coastal and marine wetlands

Coastal and marine wetlands are vulnerable to numerous threats. These include:

- climate change, which increases sea temperatures, cyclones and storm surges
- over-fishing
- pollution from urban, industrial and agricultural waste
- unsustainable recreation and tourism use, and
- destructive fishing practices such as dynamite fishing or cyanide fishing.

Further information and references

- Reef Education Network: www.reef.edu.au
- Reef Beat Education Program: http://www.reefed.edu.au/home/reefbeat
- Queensland Wetlands Program education products: http://www.epa.qld.gov.au/wetlandinfo/site/spreadtheword/GBR.html
- Coastal wetlands: http://www.wetlandcare.com.au/Content/articlefiles/407-Coastal%20Wetlands%20A4.pdf
- Green turtles: http://www.environment.gov.au/biodiversity/threatened/publications/pubs/tsd06green-turtle.pdf
- Marine algae: http://www.rbgsyd.nsw.gov.au/science/Plant_Diversity_Research/marine_algae

Great Barrier Reef, Qld (DSEWPaC)

Appendix Six – Teachers' information on estuarine wetlands

The area where a river meets the sea is called an estuary and the wetlands connected within this environment are known as estuarine wetlands. These wetlands contain water that has a mix of saltwater tides coming in from the ocean and freshwater from the river. Estuarine wetlands include tidal marshes, salt marshes, mangrove swamps, river deltas and mudflats.

Estuarine wetlands are very important for birds, fish, crabs, mammals, insects and other animals as they provide important nursery grounds for young animals, breeding habitat and a productive food supply. Estuarine wetlands provide nursery habitat for many species of fish that are critical to Australia's commercial and recreational fishing industries.

Estuarine wetlands in Australia

Australia has many estuarine wetlands. For example, Kakadu National Park in the Northern Territory has four large river systems - the East, West, South Alligator and Wildman rivers - and seasonal creeks, all of which have numerous estuarine wetlands. These wetlands are famous for the large numbers of birds present throughout the year – and are spectacular at the end of the dry season, when they gather around the permanent water bodies. The wetlands are also famous for the large population of saltwater crocodiles.

Saltwater crocodiles are often called estuarine crocodiles. They live in the waterbodies of northern Australia, including estuarine wetlands where there is abundant food. As the floodplains fill with water in the wet season, they spread out along the rivers and freshwater swamps. In the dry season they congregate in permanent waterbodies and estuarine wetlands. Saltwater crocodiles eat fish, such as barramundi, and other live prey.

The jabiru is an iconic wetland bird in Australia, often seen in the wetlands of Kakadu National Park. Jabiru eat meat and wade through the wetlands trying to catch frogs, lizards and insects.

Another significant example of an Australian estuarine wetland is Moreton Bay in Queensland.

Two common plants found in Moreton Bay are seagrasses and mangroves. Moreton Bay's mangroves support fish, birds and other wildlife for feeding and breeding.

Australia has the highest diversity of temperate seagrass in the world and Moreton Bay's seagrasses provide food and habitat for dugong, turtles, fish and crustaceans. Dugongs, which are also known as sea cows, can grow to about three metres long and weigh up to 400 kilograms.

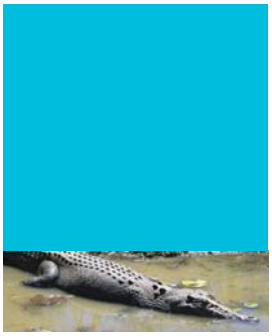
Threats facing estuarine wetlands

There are many threats to estuarine wetlands including:

- dredging
- pollution from urban, industrial and agricultural products
- over-fishing
- climate change, increasing storm surges and sea levels, and
- unsustainable recreational activities.

Further information and references

- Queensland Wetlands Program education products: http://www.epa.qld.gov.au/wetlandinfo/site/spreadtheword/GBR.html
- Be Crocwise Teaching and Learning Resource Kit: http://www.nt.gov.au/nreta/wildlife/becrocwise/info/pdf/BeCrocwise_T&LKit.pdf
- Kakadu National Park: http://www.environment.gov.au/parks/kakadu/
- Moreton Bay: http://www.derm.qld.gov.au/parks/moreton-bay/culture.html
- Dugongs: http://www.gbrmpa.gov.au/corp_site/key_issues/conservation/natural_values/dugongs





Appendix Seven – Teachers' information on inland riverine wetlands

Many wetlands in Australia are connected by rivers. These are called riverine wetlands. Riverine wetlands are found along the edges of rivers, streams and creeks and include floodplains, marshes, lakes and billabongs.

Inland riverine wetlands provide breeding and feeding habitats for many plants and animals, such as reeds, waterbirds and fish. These wetlands also are important for absorbing, recycling and releasing nutrients and trapping sediment.

Inland riverine wetlands in Australia

Most of Australia's riverine wetlands are in eastern Australia where the rainfall is higher and there are more rivers. Australia's inland riverine wetlands have evolved to cope with the country's dry, but highly variable climate. These wetlands can act as environmental buffers by providing refuges for wildlife during drought and storing flood waters during floods.

The Murray-Darling Basin has many inland riverine wetlands. One important Murray River wetland is the Barmah-Millewa Forest. When the river floods, water covers the floodplain and the area forms a huge wetland with the forests amongst it. The Barmah-Millewa Forest is Australia's largest river red gum forest and the biggest ecosystem of river red gums in the world.

River red gums can grow 45 metres tall and provide nesting hollows for birds such as galahs, sulphur-crested cockatoos, gang-gang cockatoos, cockatiels and superb parrots.

The Murray-Darling Basin is also home to the Murray cod, Australia's largest freshwater fish. Murray cod prefer areas that have deep waterholes with cover from large rocks, fallen trees, stumps, clay banks and overhanging vegetation. Murray cod are a nationally threatened species.

Platypus in the Tidbinbilla River, ACT (A. Tatnell and DSEWPaC)

Platypuses also live in many inland riverine wetlands. They eat worms and small crayfish, finding food by using special sensors in their bills that detect small electrical currents produced by their live food.

In northern Australia, many of the riverine wetlands dry out completely over the dry season (April–October), while others keep water in them all year round. These permanent waterholes are extremely important habitats for wildlife during the dry season as a source of water and food. For example, seed-eating birds, such as the colourful Gouldian finch, need access to water to survive.

The dry season even reduces the river flows of large rivers such as the Fitzroy River in Western Australia and the Daly River in the Northern Territory. Pig-nosed turtles live in the freshwater rivers and creeks of northern Australia. They have flippers for feet, making them one of the best freshwater turtles adapted for aquatic life.

Threats facing inland riverine wetlands

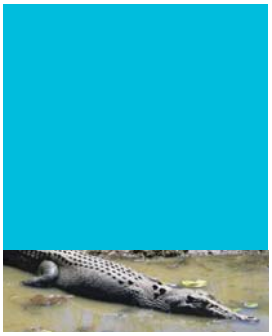
There are many threats to inland riverine wetlands including:

- reduced river flows from climate change, unsustainable water regulation and extraction
- introduced animals, such as horses, pigs and buffalo eroding river banks and destroying plants
- introduced fish, such as carp
- weeds
- pollution from urban, industrial and agricultural products, and
- unsustainable livestock grazing around waterways.

Further information and references

- Sustaining River Life: http://www.sustainingriverlife.org.au/
- Murray–Darling Basin Authority, Education resource, Basin Kids: http://www.mdba.gov.au/services/education-resources
- Victorian wetlands: Resources for Teachers and Students: http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/5A5AA094C0F869F1CA2576FE0013470FFE0726F7820140FDCA25770C001B88D8
- Inland rivers and floodplains: http://lwa.gov.au/files/products/river-landscapes/pf020260/pf020260.pdf
- Murray-Darling Basing wetlands: http://www2.mdbc.gov.au/nrm/water_issues/wetlands/
- Platypus: http://www.australianfauna.com/platypus.php

Katherine River, NT (A. Fox and DSEWPaC)





Appendix Eight – Teaching Resources

For extension work and to assist student research, the following internet resources and wetland-relevant curriculum may be helpful:

Suitable for students ☺

Suitable for teachers 🕮

Australia-wide

Australian Water Education Toolkit: http://www.environment.gov.au/water/education/index.html 🕮☺

Centre for Environmental Education Australia: http://www.ceeaustralia.org/frog-zone-schools.asp 🕮

Murrary-Darling Basin

Sustaining River Life: http://www.sustainingriverlife.org.au/ 🕮

Murray–Darling Basin Authority, Education resource, Basin Kids: http://www.mdba.gov.au/services/education-resources 🕮☺

Australian Alps

Australian Alps Education Kit: http://www.australianalps.environment.gov.au/learn/index.html 🕮

Australian Capital Territory

Ginninderra Catchment Group teaching resources: http://www.ginninderralandcare.org.au/category.php?id=49 🕮

New South Wales

Biodiversity teachers guide: http://www.environment.nsw.gov.au/resources/education/biodiversityteachersguide3.pdf 🕮

WetlandCare Australia's education resources: http://www.wetlandcare.com.au/education_archive.asp ☺

Wetlands Environmental Education Centre: http://www.wetlands.eec.education.nsw.gov.au 🕮

Storm water teaching guide: http://www.environment.nsw.gov.au/stormwater/hsieteachguide/ 🕮

'Our environment, its a living thing': http://www.livingthing.net.au/index.htm 🕮

Queensland

Queensland Wetlands Program Education Resources: http://www.epa.qld.gov.au/wetlandinfo/site/spreadtheword/GBR.html 🕮☺

WetlandCare Australia's education resources: http://www.wetlandcare.com.au/education_archive.asp 🕮

Reef Education Network : www.reef.edu.au 🕮☺

Reef Beat Education Program: http://www.reefed.edu.au/home/reefbeat 🕮

Victoria

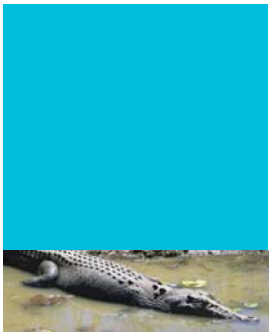
Victorian wetlands: Resources for Teachers and Students: http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/5A5AA094C0F869F1CA2576FE0013470FFE0726F7820140FDCA25770C001B88D8 🕮

Wildscape: http://www.wildscape.com.au/ ☺

Appendix Nine – Paper Animals

The Ramsar Convention's Secretariat has produced a collection of do-it-yourself animals for past World Wetlands Days. These are available for download on the following web pages:

Do-it-yourself turtles	
Do-it-yourself marine turtle	http://www.ramsar.org/pdf/wwd/8/cd/turtle-marine-color-e.pdf
Do-it-yourself freshwater turtle	http://www.ramsar.org/pdf/wwd/8/cd/turtle-fresh-color-e.pdf
Colour in version of 'Do-it-yourself freshwater turtle'	http://www.ramsar.org/pdf/wwd/8/cd/turtle-marine-to-color1.pdf
Do-it-yourself turtle instructions	http://www.ramsar.org/pdf/wwd/8/cd/instructions-e.pdf
Do-it-yourself fish	
Do-it-yourself fish:	http://www.ramsar.org/pdf/wwd/7/wwd2007_fish_rainbow.pdf
Colour in version of 'Do-it-yourself fish'	http://www.ramsar.org/pdf/wwd/7/wwd2007_fish_to_color.pdf
Do-it-yourself fish instructions	http://www.ramsar.org/pdf/wwd/7/wwd2007_fish_howto_e.pdf
Do-it-yourself frogs	
Do-it-yourself frog	http://www.ramsar.org/pdf/wwd/9/cd/wwd2009-frog1-e.pdf
Colour in version of Do-it-yourself frog	http://www.ramsar.org/pdf/wwd/9/cd/wwd2009-frog2-e.pdf
Do-it-yourself frog instructions	http://www.ramsar.org/pdf/wwd/9/cd/wwd2009-frog-instr-e.pdf
Do-it-yourself bird	
Do-it-yourself bird	http://www.ramsar.org/pdf/wwd/10/wwd2010_aa_bird_e.pdf
Other paper activities	
Kaleidocycle	http://www.ramsar.org/pdf/wwd/10/wwd2010_aa_kaleidocycle_e.pdf
Do-it-yourself dragonfly face-mask	http://www.ramsar.org/pdf/wwd/11/WWD2011-mask-masque-mascara.pdf






Appendix Ten – Wetland Education Centres

Australian Capital Territory

Tidbinbilla Nature Reserve
Off Paddy's River Road, via Cotter Road (Weston Creek) or Point Hut Crossing (Gordon), Australian Capital Territory
Phone: (02) 6205 1233
Web: http://www.tidbinbilla.com.au/

Email: tams.tidbinbilla@act.gov.au

New South Wales

Bicentennial Park Education Centre
Sydney Olympic Park, New South Wales
Phone:02 9714 7888
Email: BookingsVC@sopa.nsw.gov.au

Coastal Environment Centre
Pelican Path Lake Park Road, North Narrabeen, New South Wales
Phone: (02) 9970 1675
Web: www.pittwater.nsw.gov.au/environment/cec
Email: cec@pittwater.nsw.gov.au

Hunter Wetlands Centre, Australia
Sandgate Road, Sandgate, New South Wales
Phone: (02) 4951 6466
Web: www.wetlands.org.au
Email: hwca@wetlands.org.au

Wetlands Environmental Education Centre
Located at Hunter Wetlands Centre, Australia (above)
Phone: (02) 4955 8673
Web: www.wetlands.eec.education.nsw.gov.au
Email: wetlands-e.school@det.nsw.edu.au

Manly Environment Centre –
41 Belgrave Street, Manly, New South Wales,
Phone: (02) 9976 2842
Web: www.mec.org.au
Email: mec@manly.nsw.org.au

The Aquatic Environment Education Centre at Wonga Wetlands
Riverina Highway (Howlong Rd), Albury, New South Wales
Phone: (02) 6023 8111
Web: http://www.alburycity.nsw.gov.au/www/html/515-wonga-wetlands.asp
Email: info@alburycity.nsw.gov.au

Northern Territory

Bowali Visitors Centre, Kakadu National Park
Arnhem Highway, Jabiru, Northern Territory
Phone: (08) 8938 1121
Web: www.environment.gov.au/parks/kakadu

Window on the Wetlands
Off the Stuart and Arnhem Highways, Northern Territory.
Phone: (08) 8988 8188
Web: www.nt.gov.au/nreta/parks/find/windowwetlands.html

Queensland

Boondall Wetlands Environment Centre
31 Paperbark Drive, Boondall, Taigum, Queensland
Phone: (07) 3403 1490
Web: http://www.brisbane.qld.gov.au/environment-waste/bushland-waterways/environment-centres/boondall-wetlands-environment-centre/index.htm
Email: bwec@brisbane.qld.gov.au

Clancy's Lagoon Visitor Centre
Pickford Road, Mareeba, Queensland
Phone: (07) 4093 2514
Web: http://www.mareebawetlands.org/

Walkabout Creek
Brisbane Forest Park, 60 Mount Nebo Road, The Gap, Queensland
Phone: 1300 723 684
Web: http://www.walkaboutcreek.com.au/

Tyto Wetlands
Ingham, North Queensland
Phone: (07) 4776 4600
Web: www.tytowetlands.com.au

South Australia

Banrock Station Wetland and Wine Centre
Holmes Rd, Kingston on Murray, South Australia
Phone: (08) 8583 0299
Web: www.banrockstation.com.au
Email: bscd@banrockstation.com.au

St Kilda Mangrove Trail and Wetlands
Point Wakefield Road, Salisbury, South Australia
Phone: (08) 8208 8172
Web: http://cweb.salisbury.sa.gov.au/manifest/servlet/page?pg=9043&stypen=html

Tasmania

Tamar Island Visitor Wetlands Centre
West Tamar Highway, Riverside, Tasmania
Phone: 03 6327 3964
Web: www.parks.tas.gov.au

Victoria

Coolart Wetlands and Homestead
Lord Somers Road, Somers, Bainarring, Victoria
Phone: 13 1963
Web: www.parks.vic.gov.au
Email: info@parks.vic.gov.au

Dharnya Centre
Sandridge Track, Barmah, Victoria
Phone: 13 1963
Web: www.parks.vic.gov.au
Email: info@parks.vic.gov.au

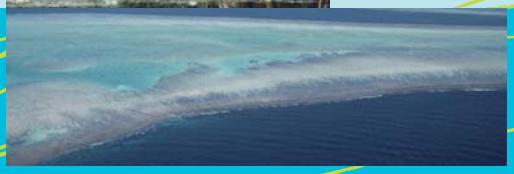
Serendip Sanctuary
Serendip Sanctuary, 100 Windermere Road, Lara, Victoria
Phone: 13 1963
Web: www.parks.vic.gov.au
Email: info@parks.vic.gov.au

Western Australia

Broome Bird Observatory
Crab Creek Road, Broome, Western Australia
Phone: (08) 9193 5600
Web: www.broomebirdobservatory.com
Email: bbo@birdsaustralia.com.au

Cockburn Wetlands Education Centre
184 Hope Road, Bibra Lake, Western Australia
Phone: (08) 9417 8460
Web: www.cockburnwetlands.org.au
Email: community@cockburnwetlands.org.au

Herdsman Lake Wildlife Centre
Herdsman Lake Wildlife Centre, Cnr Flynn St & Selby St, Wembley, Western Australia
Phone: (08) 9387 6079
Web: www.wagouldleague.com.au



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