

Exploring Local Wetlands... Everyone Can!



A Resource and Activity Package for Schools

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GREAT BARRIER REEF
MARINE PARK AUTHORITY



Exploring Local Wetlands...

Everyone Can!

While most North Queenslanders know something about wetlands and what they look like, many are unaware of their immense value to our environment, our lifestyle and economy.



Wetlands occur in many different forms. On the coast, they can exist as coral reefs, seagrass meadows, mud flats, shorelines, estuaries and saltmarshes.

Inland they may be flowing streams, billabongs, ephemeral lakes, dams or urban wetlands.

Each has its own unique ecosystem of plants and animals that depend on the wetland for food, water and shelter.

In the tropics, wetlands are vital waterways that reflect the health of catchments.

They are an essential part of the corridor linking the catchment with the coast.

Wetlands may also be areas of great beauty where people enjoy the scenery and gather for recreation. In all their forms, wetlands are very special places.

However, wetlands are under pressure. Since European settlement, many have been altered or destroyed for land uses such as urban development and agriculture.

Of those that survived the initial onslaught, many are now being degraded by land clearance, filling, stock grazing, dumping of refuse and littering. Surface water runoff contaminated by pesticides, fertilizers, herbicides, detergents and petroleum products is changing the natural balance of wetlands.

To protect and conserve wetlands we need to understand them and learn how to manage them wisely. Much work is already being done to conserve and manage wetlands in Queensland.

The North Queensland Wetlands Festival and its partners promote the appreciation, conservation and sustainable use of wetlands through research, training and education.

'Exploring Local Wetlands...Everyone Can!' is a timely and exciting opportunity to provide immediate and ongoing support for schools in assisting young people to become aware and actively involved in the most important challenge: to care for, and improve the quality of our wetlands.

For enquiries or to order copies of **'Exploring Local Wetlands...Everyone Can!'** please contact:

- Public Information Unit
Great Barrier Reef Marine Park Authority
Phone: (07) 4750 0700
Email: info@gbbrmpa.gov.au
- Conservation Volunteers Australia
Phone: (07) 4721 4077
Email: dreid@conservationvolunteers.com.au
- Townsville City Council
Environmental Management Services
Phone: (07) 4727 9310

Introduction

The year 2003 is the International Year of Freshwater.

International World Wetlands Day is on 2 February of each year. The theme for 2003 is "No Wetlands – No Water".

This theme is apt for the Burdekin Dry Tropics. The Burdekin Falls and Ross River Dams are each unique in their own way, and two of the most significant artificial wetlands in northern Australia. The water they supply ensures the ecological sustainability of the Lower Burdekin and Townsville – Thuringowa communities, economy and environment. We are totally dependent on wetlands and water.

Coastal communities, their economy and environment are dependent on wetlands and water.

Due to the significance and diverse nature of our local wetlands, we have decided that '**Exploring Local Wetlands...Everyone Can!**' is a more appropriate theme for schools willing to take up the challenge of wide reaching components for a number of Key Learning Areas and to achieve broad, exciting, and often hands-on, activities and learning outcomes.

Wetlands

What is a wetland?

Wetlands are land areas either temporarily or permanently covered by water, including underground water (and each of their ecosystems). Wetlands include all fresh water-bodies and coastal waters that are less than six metres deep at low tide.

They are important in the water cycle as storage areas for water runoff and potential recharge zones for groundwater. Wetlands occur in many different sizes, forms and places: from small springs to sweeping beaches, freshwater to hyper-saline, and from inland to coastal and marine locations.

Marine and coastal zone wetlands

Marine habitats like coral reefs, seagrass meadows, mudflats, mangrove estuaries, rocky marine shores and sand, shingle or pebble beaches are common forms of marine wetlands found in and around the Great Barrier Reef.

Mangrove swamps, salt marshes and estuaries are breeding and nursery grounds for many coastal and marine creatures. More than 75% of commercial fish species spend some part of their life cycle in these habitats.

The Great Barrier Reef comprises a variety of wetland habitats and the Great Barrier Reef Marine

Park Authority uses a range of approaches to protect the integrity of the entire Great Barrier Reef ecosystem.

Ramsar Sites

Australia currently has 63 wetlands listed under the International Convention on Wetlands - 'The Ramsar Convention,' (after Ramsar, Iran, where the convention was agreed in 1971).

Six sites are located in Queensland and three on or near the Great Barrier Reef (Shoalwater and Corio Bays, Bowling Green Bay and most recently the Coral Sea Reserves (Coringa – Herald and Lihou Reefs and Cays).

Inland Wetlands

Inland wetlands are often fresh surface and groundwater water-bodies, but may also be brackish or saline, especially if dryland or irrigation salinity is a problem.

Inland wetlands may be flowing (lotic) or still (lentic) water-bodies. Many inland wetlands are presently (January 2003) drying out and rely on a regular Wet season to support water quality and in-stream values (for aquatic plants and animals).

Farm (Cropping and Grazing) Wetlands

Wetlands on farms act as a buffer between land management practices and waterways.

For example, wetlands may filter out fine sediments and nutrients (from fertilizers and animal wastes) and also cane juice, before they reach the waterway.

Many farmers are rehabilitating their wetlands (e.g. by fencing off water-ways from stock and pest animals, by planting riparian strips or by replanting wetlands with local and native plants) to ensure improved water quality and habitat values.

Wetlands on farms also buffer the effects of floods by holding excess water for a short time and so reduce the height and length of flooding downstream. Wetlands provide diverse habitats for plants, birds and animals, many of which 'earn their keep' by feeding on agricultural pests.

Wetlands make a farm a more interesting and pleasant place for people to work and live.

Urban Wetlands

These wetlands are an integral component of the urban environment and include creeks, streams and ponds as well as constructed artificial wetlands. The urban waterways are important treatment systems and provide diverse habitat corridors for birds, animals and plants within a built environment.

Constructed urban wetlands in Townsville / Thuringowa are examples of innovative ways of stilling and cleaning floodwater. These Smart Ponds have a mechanical system (Gross Pollutant Traps – GPTs) to catch large debris, a basin to allow sediments to settle (and later be removed) and a filtration zone of plants and / or rocks for the polishing of stormwater.

Plants can be used as bio-accumulators as they trap excess nutrients and other pollutants. These plants accelerate the removal of contaminants and greatly improve the look of the area. These plants are regularly removed and young plants planted to replace them.

This system of stormwater management is called a Treatment Train. In addition to engineering, mechanical and biological means to improve water quality, the success of the Treatment Train starts with each of us.

Treatment Trains, on a large scale, refers to the community's role as a key player in our catchments. There is a direct link between any littering or pollution from homes, streets and shopping centers, to our wetlands and coast, using drainage lines.

We can reduce our impacts on water quality (stormwater and thus coastal waters) by our day to day actions.

See the later Section '**What You Can Do To Help Improve Water Quality**'.

Important Wetlands

The Commonwealth Government has also compiled a Directory of Important Wetlands in Australia. Queensland has 165 wetland areas with the Great Barrier Reef, which has at least 8 different classes of wetland habitats, being by far the largest. A significant number of the Queensland wetlands are also found immediately adjacent to the Great Barrier Reef coast including wetlands such as the Burdekin-Townsville Coastal Aggregation, Goorganga Plains, major bays, river deltas and floodplains. Ross Dam is recognised by Environment Australia as a wetland of national significance.

Other Significant Local Wetlands

Apart from the internationally significant Bowling Green Bay, each of the major floodplains of the Dry Tropics (Burdekin, Haughton, Ross and Black Rivers) and the Herbert Rivers, have very extensive and important wetlands, apart from the major waterways themselves.

In the Burdekin and Herbert many extensive wetlands are downstream of the Bruce Highway. However the Townsville and Thuringowa areas have more accessible and better known wetlands. These include Paluma and Ross Dams as well as the Town Common, South Bank West Point to Cackle Bay

mangroves and Serpentine and Oonoonba Lagoons. There are numerous sites along the small and short coastal streams.

Wetland issues

Issues affecting the health and long-term future of wetlands include:

- Clearing of native vegetation and draining of wetlands for expanding development activities
- Cumulative impacts of changes to water flows and drainage in river catchments
- Poor management of irrigation water allowing the rise of saline groundwater
- Excessive use of fertilizer, pesticides and herbicides in catchments and their loss to wetlands and their potential for cumulative impacts on wetland ecosystems
- Impact(s) of inappropriate recreational activities (boating, crabbing, fishing, off-road vehicles) on vegetation and the physical environment
- Spread of introduced plant (weed) species and poor management of excess native surface water plants
- Poor management of fire, allowing the increase of bulky weeds and continuing loss of native vegetation
- Predation on native animal species by feral animals
- Use of wetlands for green waste and rubbish dumping

Specific marine and coastal issues affecting the future of those wetland and mangrove environments include:

- Clearing of native vegetation and draining of wetlands (especially mangroves and Melaleuca) for expanding development activities, particularly coastal developments and agriculture
- Disregard of recreational and commercial fishing regulations
- Poor quality water entering the coastal and marine environment from storm water and waste water discharge

- Engineering works that interfere with tidal flow
- Spread of exotic marine species
- Oil and chemical spills

For additional information visit:

- www.ea.gov.au/water/wetlands
- www.epa.qld.gov.au/environment/school/wetlands/
- www.conservationvolunteers.com.au/revive

What You Can Do To Help Improve Water Quality

- Be waterwise– use less water
- Clean up after your dog. Put it in a bag, and bin it
- Never dispose of chemicals, paint, thinners or oil down the sink, or into drains or waterways
- Use fertilisers in moderation if you must use them at all (Cuts down on phosphates, nitrates, etc in our waterways)
- Avoid over-watering gardens and lawns
- Compost and recycle as much as you can
- Use fewer plastics. Reuse and recycle plastics
- Carefully dispose of plastics – they easily blow away
- Choose ‘green products’
- Ensure roof gutters and downpipes are connected to stormwater drains, not to sewers
- Wash the car on a grassed area using a bucket of water rather than the hose
- Fix oil and petrol leaks, and dispose of the oil properly
- Use a bike rather than the car. Bike it!
- When fishing collect bait bags, unwanted line and other waste, and bin them
- Stow it, don’t throw it. Sort wastes on board and bin or recycle them on shore

Ideas for use in the classroom

View the enclosed photographs in the Photo File at the rear of this resource and:

- Discuss the variety of wetland types
- Exchange information about the different types of animals and plants seen
- Make predictions about their role in the ecosystem
- Write character descriptions for the species featured
- Sketch/draw a version of a favourite section of a selected photograph. Share these drawings in class meetings, discussing content, choice and use of colour, and why the wetland type was chosen
- Talk about the wetlands and their biodiversity
- Discuss ways in which people pollute, degrade or irresponsibly use a wetland environment and what effects this can have on the wetland
- Describe and draw a preferred future for the wetland environment and its plant and animal species
- Identify good practice in maintaining a healthy wetland environment. Devise a code of good practice for others to follow
- Talk about human activities on or around wetlands that can impact on them. Draft ideas to address the issues and make recommendations. Seek out what should and should not be done and possible alternatives. Design leaflets, posters, announcements and advertisements promoting best environmental practices when on, in or near wetland areas

Wetlands have been called 'nature's kidneys' because of their capacity to filter out nutrients, particularly nitrogen and phosphorus. Wetlands also buffer the effects of floods by holding additional water for a short time, thereby reducing the height and period of flooding downstream.

Wetlands are an integral part of whole catchments, and are important to the total water balance. Below is Swans Lagoon, Millaroo in the Upper Burdekin Floodplain.



- As a class, visit a local wetland or view photographs, slides or a video about wetlands. Talk with the students about wetlands, their value and uses. For example wetlands:
 - Provide storage and drainage areas for water
 - Act as flood mitigation basins
 - Have an ability to recycle "waste" if not overloaded
 - Provide scenic value, visual contrast and enhance the quality of the landscape
 - Support unique and diverse animal and plant populations
 - Are breeding grounds for native animal and plant species
 - Are essential habitats for migratory and nomadic birds
 - Contribute substantially to the food chains of animal and plant species
 - Provide recreational places for communities
 - Offer education and scientific opportunities for study of ecological principles

- During the class visit or after viewing wetlands encourage students to undertake some of these analytical activities:
 - Identify the community of the wetland environment
 - Describe two issues that the wetland ecosystem may face, as a result of human activities and natural occurrences
 - Predict the consequences of negative human and natural impacts on wetlands
 - Talk about the wetlands as a natural resource
 - Describe any evidence of animals in, on or around the wetland
 - Describe the animal type which is the dominant group represented at the wetland site
 - List the habitat of animals observed
 - Describe the site's location; e.g. on flat land, on sloping ground, sheltered, exposed
- As a class, visit a local urban stormwater treatment system or view photographs, slides or a video. Talk with the class about the value of urban stormwater treatment systems. For example encourage students to discuss issues such as:
 - What wetlands are they trying to protect?
 - How do they treat stormwater?
 - Where is the catchment for the system? Visualise and produce an urban-based catchment map
 - What are the land uses? E.g. residential, industrial, reserve, vacant land
 - What are the types of pollutants?
 - Where do they come from?
 - These are called end of pipe systems – What does this mean?
 - Are these systems all we require to protect the water quality of wetlands?
 - Do YOU have a role?
- Read the information sheet **What is a wetland?** (See pages 2 and 3) Use information to make comparisons with ideas gained during the visit to the wetlands. As a class talk about the different types of wetlands and the role they play on farms, in residential areas and coastal fringes.
- Find out if the local council has a policy about developing or maintaining wetlands.
- Imagine what the wetland would have been like in 1790 before European settlement. In small groups, discuss how this place might have changed in the last 200 or so years e.g. the habitat, its fish and bird life, water quality, or salinity levels.
- Visualise a pocket of wetland wilderness in the future, as either a sustainable, innovative system which can remove litter and pollutants and recycle stormwater as water for irrigation, for lawns and playing fields, or as a dumping ground littered with burnt –out wrecks of cars, plastic bags, bottles and utensils. Imagine it silted up with mud. Discuss how and why this area has changed in the last 200 years since development. Discuss how the dumping ground might be restored to a functioning wetland.
- Illustrate before, now and future scenes of wetlands. Display in the school, local library, council chamber, or publish in the local newspaper.
- Use role-play and discussion to explore issues such as the need for urban, inland, coastal and marine wetlands in conjunction to the need for further housing, industry and recreation. Consider how groups with diverse interests, such as environment, recreation, tourism, fishing, industry, agriculture, local government and local community could work together to reduce destruction and impacts on either urban, inland coastal and marine wetlands.

For example:

CONTEXT: Wetlands are often subject to competing land use claims from a range of people: Often the uses cannot be reconciled, but sometimes compromises are possible.

PROCESS: Divide the class into three user groups and a fourth whose role, as a council, is to make a decision concerning the management of the wetland area. Give each group a fact file to use to construct their arguments. (See below). Each group presents its case, both vocally and in writing at a council meeting in which the council members are called upon to justify an acceptable compromise.

Group 1 : Conservationists

- The wetland is a habitat for many migratory bird species.
- The wetland is a nursery for many fish species.
- The wetland is an important educational resource.
- The wetland purifies storm water run-off by removing pollutants.
- Development of the land may lead to the release of acid from the soil to the sea.
- Visitors come to the area to experience the wetland, thereby putting money into the local community.

Group 2 : Recreational Users

- The wetland is an excellent fishing ground. No decline in fish numbers have been noticed.
- The local fishing industry is worth \$15 million per year and also employs people in the fish-processing trade.
- During evenings the wetland is used by hundreds of walkers. Many enjoy the pastime.
- During the day many visit and walk observing wildlife.

Group 3 : The Developers

- The wetland could be filled to provide the site for a \$40 million resort, with boating facilities.
- The development would provide employment for young people at this time of high youth unemployment.
- Investment would boost local industry.

Debrief after the simulation and assess points raised and feelings expressed during the simulation. Give students material to read about these issues in the world today.

- Design a survey to gauge a community's awareness of the value and environmental benefits of wetlands. Possible areas that might be covered by the survey are:
 - Age range and gender of the respondent
 - Awareness of what a wetland is and the importance of different plants and animals in wetlands.
 - Use of wetlands. How often? What for?
 - How would you rate these environments? Criteria? E.g. aesthetics, alternative use of park, wildlife habitat, water use (irrigation), picnicking, flood detention, water quality improvement, land value appreciation.
 - Issues facing wetlands. Most significant. Least significant?
 - Resolution of the issues?

Many other areas could be covered within the survey. It is important that you design the survey so that the completion of the survey requires minimum time by the respondent. To enable ease of processing data, the survey should not require extended answers.

Simply ticking the correct box or choosing the appropriate answer are easily understood methods for data collection.

An example that might be used with a community living near a wetland appears on the following page.

An example:

Wetland Survey

1. Gender Male Female
2. Age Range: <10 11-15 16-20 21-25 26-30
 31-35 36-40 41-45 46-50 >50
3. How close do you live to this water environment?
 <1km 2-5km 6-10km 11-15km >15km
4. How often do you visit this wetland water environment?
 daily weekly monthly yearly other: _____
5. What features attracted you to this environment?
 aesthetics tranquility the water plants
 Recreation facilities: balance ecosystem flooding
 Passive eg picnicking wildlife habitat other
 Active eg walking, cycling, boating
6. List in order of preference three activities you undertake at this water environment.
 1. _____
 2. _____
 3. _____
7. How would you rate this water environment? Circle the appropriate number.
 Healthy 1 2 3 4 5 Degraded
8. List in order of importance three major issues associated with this wetland water environment.
 1. _____
 2. _____
 3. _____
9. Who is responsible for the management of this water environment?
 local council nearby school state government
 federal government don't know other _____
10. In what ways would you be prepared to become involved with the management of this wetland water environment?
 modify any activities that may have a negative impact on the environment
 join a community group eg 'Friends of the Parks'
 lobby the government other
 participate in a clean-up day participate in a planting day

- Undertake a Wetland Media Watch. Investigate a local or state wetland. Collect a series of newspaper and journal articles about wetlands. Explore local councils and government departments for public information in the form of brochures and pamphlets.

For each article or source of information, complete the following:

- Note the source and date of the information.
- Summarize the information in point form.
- Identify the environmental scene or issue discussed.
- If an environmental problem is identified, state the cause of the environmental problem.
- Research the problem identified, using suitable references from your school resource centre or library.
- Describe the likely effects of the problem on:
 - Water quality
 - Animals and plants
 - The landscape
 - The people
- List the references used to answer question 5.
- Share findings with the class.
- Display findings in the school or local council chambers.
- Increase the awareness of how human activities can have an impact on wetlands. Design a brochure or pamphlet for a wetland that includes the following:
 - Map showing location of wetland
 - Description of area and catchment including landuse (geology / socio-economic status)
 - Major plant and animal species found in the area
 - Special features of the area e.g. walking paths, rare plants or animals, educational facilities
 - Benefits of the Wetland e.g. flood basin, property values
 - Activities that can be undertaken in the area
 - Regulations that exist for the area
 - Environmental problems faced by the area and catchment
 - Threats to area e.g. road corridors, pollution, housing development
 - Management and conservation practices employed in the area and how to improve these
 - Strategies for individuals to protect and improve the environment
 - Roles of different plants in wetlands.
 - Include diagrams, photographs and drawings where possible.
 - Share completed pamphlet with the NIE section of your local newspaper or local councils, community groups and state departments.

Wetland References and (Other) Resources

Waterways / Wetlands and Coastal / Marine

"A Directory of Important Wetlands in Australia" 3rd Edition (2001) Natural Heritage Trust and National Wetlands Program, ISBN 0 642 54721 1
Environment Australia, Freecall Community Information Centre: 1800 803 772

Bennett I. "Australian Seashores" Angus & Robertson
NB: adapted from (the classic) W.J. Dakin's "Australian Seashores"

"Biodiversity Conservation Australia" Strategy 2001 –2005
Environment Australia, Freecall Community Information Centre: 1800 803 772

Bryden M, Marsh Helene, Shaughnessy P. (1998)
"Dugongs, Whales, Dolphins and Seals. A Guide to the Sea Mammals of Australasia" Allen & Unwin, 599.5099 BRY

Burchmore J.J, Pollard D.A, Middleton M.J. & Williams R.J.
(1993) "Estuarine Habitat Management Guidelines"
NSW Fisheries

Cribb AB. (1996) "Seaweeds of Q. A Naturalist's Guide"
Q. Naturalists' Club Inc. 579.8809943 CRI

Hammond L.S. and Synnot R.N. (1994) "Marine Biology"
Longman Cheshire.

Marine Education Society of Australasia (MESA)
www.mesa.edu.au "Field Activities for Coastal and Marine Environments" Available toll free: 1800 803 772 or
www.environment.gov.au/marine/coastnet
(Annual) Seaweed Activities.

Information from:

- www.mesa.edu.au
- Gould League www.gould.edu.au
- Kids and Water (Marine Conservation and Safety)
www.wetpaper.com.au/kids&water
- Wetpaper www.wetpaper.com.au

Mitchell P. "101 Key Ideas – Ecology" Teach Yourself Books,
577 MIT

Natural Resources & Environment (Victoria)
"Wetlands – Resource Materials for Teachers"
KLA Levels 5 and 6. **Section 1:** Introduction,
Section 2: Background Information, **Section 3:** Student Activities, **Section 4:** Glossary, **Section 5:** References
Download www.nre.vic.gov.au
Purchase customer.service@nre.vic.gov.au
Waterway & Floodplain Unit (1999) "An Index of Stream Condition: User's Manual"

Sherwood J. (1999) "An Introduction to Estuaries"
Deakin University.

Short J.W. & Potter D.G. (1987) "Shells of Q & The GBR.
Marine Gastropods" RBA 594.309943 SHO

Underwood A.J. & Chapman M.G. (1993) "Seashores A Beachcomber's Guide" UNSW Press, 574.52638 UND

Vegetation

Anderson E. (1993) "Plants of Central Queensland" DPI,
581.9943 AND

Lovelock C. "Field Guide to the Mangroves of Queensland"
Australian Institute of Marine Science

Lamp C and Collet F. (1989) "Field Guide to Weeds in Australia" Inkata Press, 581.6520994 LAM

Romanowski N. (1998) "Aquatic and Wetland Plants" (Non-Tropical Australia) UNSW Press

Romanowski N. (2000) "Planting Wetlands and Dams" (Practical Guide) UNSW Press 577.680994 ROM

Sainty G.R. and Jacobs S.W.L. (1994) "Waterplants in Australia – a Field Guide" Third Edition
Sainty and Associates. NB: 4th edition in print, further information www.sainty.com.au

Stephens K.M. and Dowling R.M. (2002) "*Wetland Plants of Queensland*" CSIRO Freecall: 1800 645 051,
Email: publishing.sales@csiro.au,
Website: www.publish.csiro.au

Wightman G. "*Mangroves of the Northern Territory*"
Northern Territory Botanical Bulletin No. 7
ISBN: 0 7245 1896 7 ISSN: 0314-1810

Web Sites

Cleveland Bay Consortium:
www.clevelandbayconsortium.com

Coastal Wetlands:
www.env.qld.gov.au/environment/school/wetlands/w.html

Coastcare: www.environment.gov.au/marine/coastcare

Conservation Volunteers Australia:
www.conservationvolunteers.com.au

CRC Reef Research Centre:
www.reef.crc.org.au Email: info@crcreef.com

Department of Primary Industries, Queensland,
phone 13 25 23 (local call)
DPI Note – Mangroves, download from
www.dpi.qld.gov.au (search "mangroves")
Nature's "Nautical Nurseries" for Upper Primary,
www.dpi.qld.gov.au/extra/nnn/default.html
Fact Sheet Themes - **Theme 1:** Habitat Introduction,
Theme 2: Food Chains, Webs & Pyramids,
Theme 3: Connectivity
EDFISH resources, visit www.dpi.qld.gov.au/fishweb
Module Series includes: Mangrove, Seagrass,
Freshwater Habitat
Seagrass Watch Information
Email: seagrass@dpi.qld.gov.au
Phone (07) 4035 0100 or 132523

Endangered Plants List (Queensland)
www.env.qld.gov.au/environment/plant/endangered/wie.html

Estuarine Processes

Environment Australia has released "*Environmental Water Requirements to Maintain Estuarine Processes*".

The report can be downloaded at:
www.ea.gov.au/water/rivers/nrhp/estuarine/index.html

Exotic Pest Fish

Control of Exotic Pest Fishes - An Operational Strategy
http://www.dpi.qld.gov.au/fishweb/9091.html
http://www.dpi.qld.gov.au/fishweb/1347.html
www.qld.gov.au/fishweb/2610.html
www.qld.gov.au/fishweb

Fish Kills (Queensland)

Queensland EPA now has a good and useful record of fish kill incidents. The direct link is
http://www.epa.qld.gov.au/cgi-bin/w3-
mysql/environment/science/water/mysqlwelcome.html?pag
e=fishkills.html all on one line or go to
http://www.epa.qld.gov.au/ select Fish Kill Incidents, then
Fish Kill Reports, then Fish Kill incidents.

Gould League Catalogue Phone: 03 9532 0909
www.gould.edu.au Check "*Coastal Photo Survey*",
"*Australian Guide to Seashores*", and more

Great Barrier Reef Marine Park Authority
www.gbrmpa.gov.au Visit "*Student Projects*"
The Great Barrier Reef is a popular topic for school
projects. The entire GBRMPA website is packed with
fascinating information about the Reef. If you can't find
what you need, please contact: info@gbmpa.gov.au

Landcare & Catchment Management (Queensland):
www.landcareqld.org.au

Land & Water Australia: www.rivers.gov.au

Land and Water's Rivers Arena (Fact Sheets, Guidelines,
CDs). Email: public@lwa.gov.au

Local Marine Advisory Committees:
www.gbrmpa.gov.au/corp_site/management/
consultation_community_involvement.html

National Land and Water Resources Audit has released its report '*Australian Catchment, River and Estuary Assessment 2002*'. The report, partly managed by the Coastal CRC, is now online at:
www.audit.ea.gov.au/ANRA/coasts/docs/estuary_assessment/Est_Ass_Contents.cfm

National Land and Water Resources Audit's catalogue, "*Australian Natural Resources 2002*", is available free at: www.environment.gov.au/atlas The document is on-line, however, only for browsing, not download (http://audit.ea.gov.au/ANRA/data/docs/national/Data_Contents.html). Copies may be obtained by faxing 02 6257 9518 or emailing: <mailto:info@nlwra.gov.au>.

Revive Our Wetlands (Conservation Volunteers Australia and BHP Billiton) Prime Minister's Award for Excellence! For more information visit www.reviveourwetlands.net.au

"*RipRap*" (River and Riparian Lands Management Newsletter): www.rivers.gov.au

River Health Manual
Australia-wide assessment of River Health: Queensland AusRivAS Sampling and Processing Manual is available online at www.ea.gov.au/water/rivers/nrhp/manual-qld/index.html

Stormwater

www.ea.gov.au/coasts/pollution/usi/index.html
(USI = Urban Stormwater Initiative)
www.stormwater.asn.au
CRC Catchment Hydrology
<http://www.catchment.crc.org.au/news/>
EPA NSW (and you can download their excellent resource materials) www.epa.nsw.gov.au

Sugar Industry and Water Quality: www-sugar.jcu.edu.au/

Valuing Ecosystems Services:
www.rainforest-crc.jcu.edu.au/quest

Water Quality Targets

Environment Australia have included an online section related to water quality targets, which has been designed to assist regional groups identify the environmental values of water, and to set appropriate water quality targets for their catchments and regions. The site is located at www.ea.gov.au/water/quality/targets

Waterwatch

National: www.waterwatch.org.au
Queensland: www.qld.waterwatch.org.au

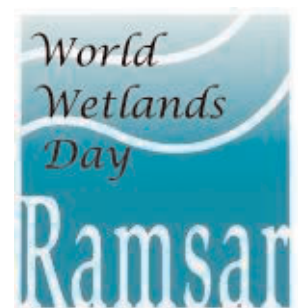
Exploring Local Wetlands...Everyone Can!

PhotoFile

Peruse the following photos of wetlands and use them to support student project work.



International World Wetlands Day
February 2nd, annually



Animals of Wetlands



Care needed for yourself

Estuarine Crocodile
Crocodilus porosus



Care needed for the
animal (turtle nesting)

Green Turtle, Heron Island
Great Barrier Reef

Beautiful Wetlands



Sunset on the
Bohle River, Thuringowa



Burdekin River overflow
"Reedybrook"
Upper Burdekin

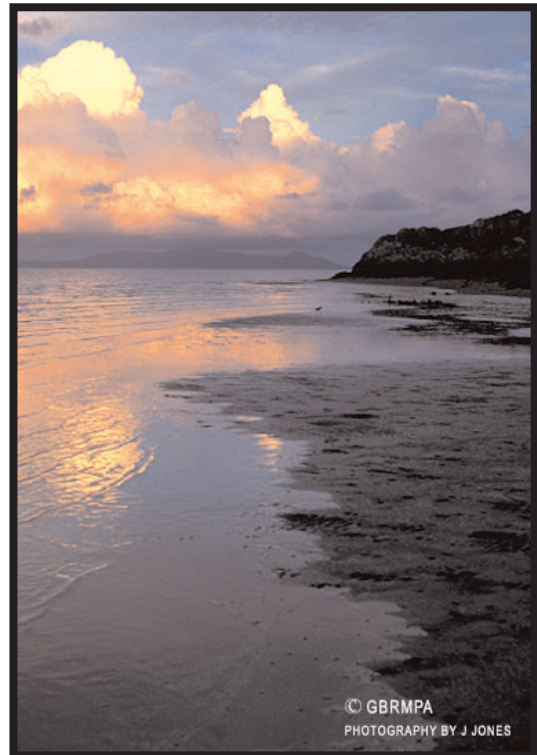


Waterlily
(*Nymphaea gigantea*)
Upper Burdekin

Beautiful Wetlands



Hinchinbrook Channel
Hinchinbrook Island



Heron Island
Great Barrier Reef



Late in the evening
Northern Australia

Biodiversity of Wetlands Vegetation



Mangrove and
saltmarsh plants,
Haughton River delta
Cungulla



Mix of aquatic
freshwater plants
Home Hill



Mix of mangroves
Great Barrier Reef

Biodiversity of Wetlands Vegetation



Stilt mangrove seedling
South Mission Beach



Mix of in-stream and
surface plants
Lower Burdekin
Floodplain

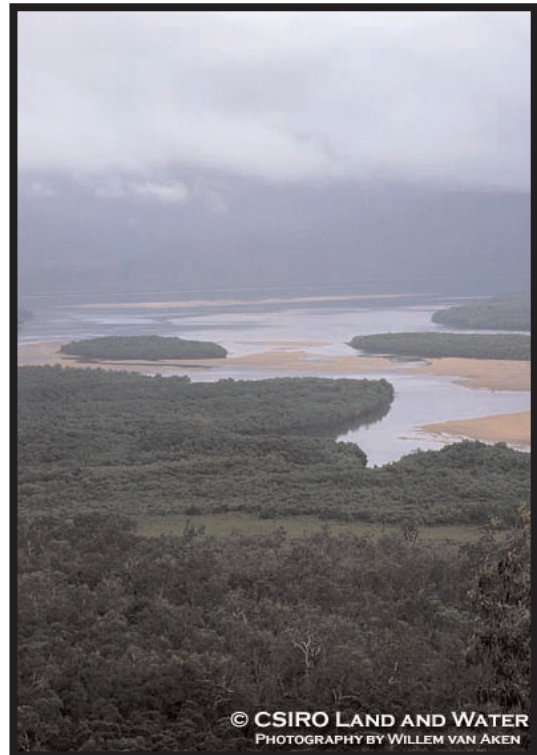


Waterlilies
Upper Burdekin

Coastal – Estuarine Wetlands



Rollingstone Creek estuary
Balgal Beach



Hinchinbrook Channel
Herbert River estuary



Diversity of mangroves
Hinchinbrook Channel
North of Ingham

Coastal – Freshwater Wetlands



Inkerman Lagoon
“Inkerman Station”
Home Hill



Inland of Alva Beach, Ayr



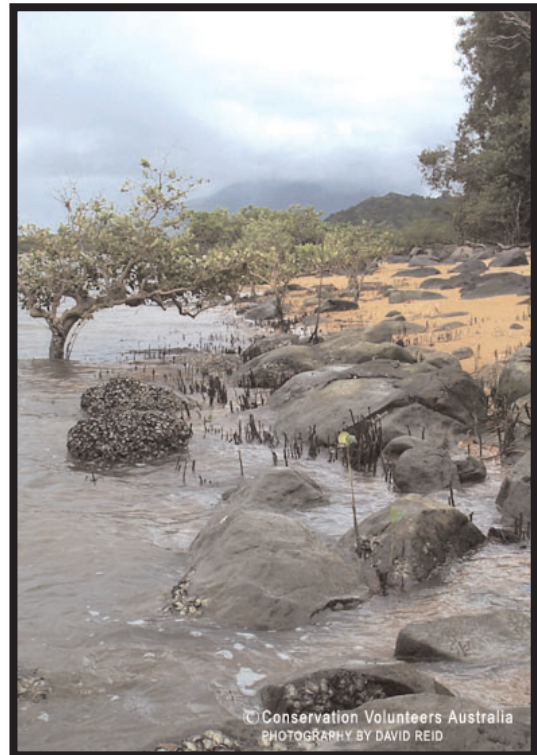
Riparian zone
Inkerman Lagoon
“Inkerman Station”
Home Hill

Coastal – Shore-line Wetlands



Variety of mangroves
grey mangrove breathing
roots (pneumatophores)
North of Tully River

Grey or white mangroves
and spider or stilt
mangrove seedlings
Tully River estuary



Eastern shore
Magnetic Island
Townsville

Inland Wetlands – Native plants



Water primrose
(foreground) Snowflake
(middle ground) Mix of
remnant riparian plants
Swans Lagoon, Millaroo



Snowflake (foreground)
Water primrose
(midground) Remnant
gums along bank
Swans Lagoon, Millaroo



Mix of surface and
in-stream aquatic plants
with good riparian values
“Reedybrook”
Upper Burdekin River

Mangrove Wetlands



Spider or stilt mangroves
Hinchinbrook estuary



Buttress roots of
cannonball mangrove,
and knee roots of large-
leafed orange mangrove
North Hull River NP



Spider or stilt mangroves
Tam O'Shanter Bay
South Mission Beach

Reef Wetlands



North West Island
Great Barrier Reef



Hoskyn Reef
Great Barrier Reef

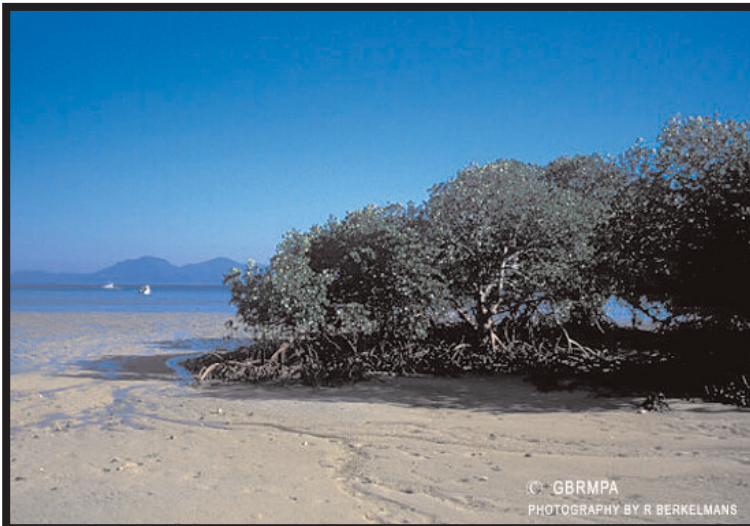


One Tree Island
Great Barrier Reef

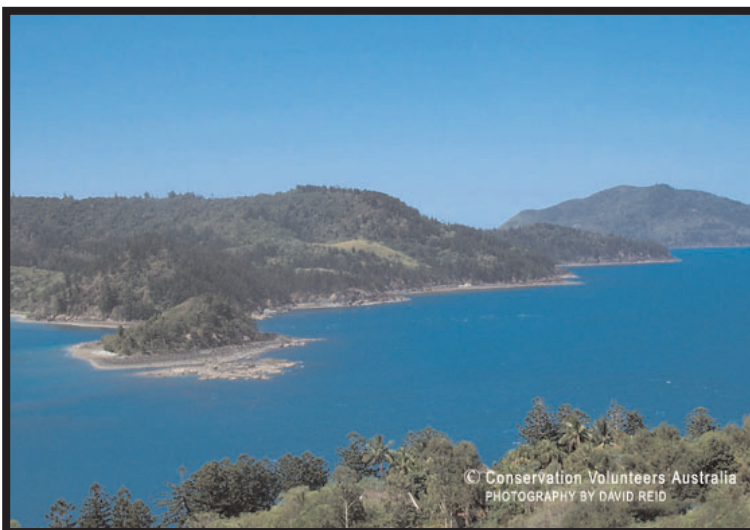
Scenic Wetlands



Hinchinbrook Channel
North of Ingham



Orpheus Island
Great Barrier Reef



Whitsunday Island
Great Barrier Reef