



## Australian Government

Department of Sustainability, Environment,  
Water, Population and Communities



# ALPINE WETLANDS

- Alpine wetlands occur in Australia's mountain country.
- Provide homes to many rare and endangered plants and animals.
- Provide areas where many animals can find food or shelter during drought.
- Some were formed millions of years ago by retreating glaciers.
- Melting snow often remains the most important source of water.

### Alpine wetlands in Australia

There are many alpine wetlands in the highlands of New South Wales, Australian Capital Territory, Victoria and Tasmania.

Two internationally important alpine wetlands in Australia are the Ginini Flats Wetland Complex in the Australian Capital Territory and Blue Lake in Kosciusko National Park, New South Wales.

#### Ginini Flats wetlands:

- Ginini Flats wetlands contains sphagnum or peat moss.
- Sphagnum bogs are important for filtering water, 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.

#### Did you know?

The peat at the Ginini Flats wetlands is estimated to be over 3000 years old.

#### Blue Lake, high in the Snowy Mountains:

- Blue Lake 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 is home to many rare plants and animals including mountain galaxias.

#### Did you know?

Sphagnum can hold 20 or more times its own weight in water.



## Plants and animals

- As the sphagnum moss in alpine bogs dies and decays, it turns into peat.
- Peat is a mixture of dead plant materials and when dry it can be burned like coal.
- People in many countries used peat as an important source of fuel.
- The endangered northern corroboree frog lives and breeds in some alpine wetlands like the Ginini Flats Wetlands.
- Mountain galaxias are a small fish that are able to survive in extremely cold conditions.
- Mountain galaxias are the only native fish that are found above the snowline during winter.

## What can you do?

- Investigate what AuSSI (Australian Sustainable Schools Initiative) schools are doing to become more sustainable with their water use. Many of these schools are implementing 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. See <http://www.environment.gov.au/education/aussi/>.
- Investigate alpine regions of Australia on Google Earth (<http://www.google.com/earth/index.html>).

## Threats facing alpine wetlands

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

Threat	Impact
Cattle grazing.	Increases erosion and the amount of sediment in water.
Weed invasion.	Reduces the space for native plants.
Mining and harvesting of peat and sphagnum moss.	Reduces habitat.
Fire.	Severely damage peat and bog areas reducing habitat.
Introduced animals including horses, rabbits, foxes and pigs.	Trample and dig large areas in their search for food.
Unsustainable tourism and recreational use.	Damage the vegetation and contaminate the wetlands.
Climate change.	A small increase in temperature can cause the loss of some alpine wetlands due to less snowfall and snowmelt and the increased frequency of fire.





## ARID WETLANDS

- Many arid wetlands are dry for most of the time and then fill with water after rain and often remain wet for long periods afterwards.
- Arid wetlands include swamps, salt pans, clay pans, lakes and springs.
- The water and plants of arid wetlands provide habitat for many animals and birds.
- Arid wetlands support animals that have adapted to survive through dry times.

### Arid wetlands in Australia

- Arid wetlands occur in outback Australia where it is very dry.
- 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.
- There are many salt lakes and mound springs in the arid zones of Australia.

### Lake Eyre in South Australia:

- Lake Eyre is the world's largest salt-lake, covering about 9690 square kilometres.
- When it fills, it supports many native fish like bony bream and golden perch
- When filled with water, it becomes a breeding site for enormous numbers of waterbirds, including Australian pelicans.

### Did you know?

The salt crust found at Lake Eyre weighs about 400 million tonnes.

### Mound Springs:

- Mound Springs are unique arid wetlands, formed by water from underground when it 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
- Many are found in the Great Artesian Basin, the world's 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.



## Plants and animals

- Plants growing in arid wetlands include saltbush and bluebush.
- River red gum and coolibah trees grow around the edges of freshwater lakes and claypans.
- Many plants were important for food, shelter, bags, nets, and medicines used by Indigenous Australians.
- The burrowing frog survives long dry periods by burrowing deep in the mud.

### Did you know?

In many arid areas, mound springs are the only permanent water source. As a result, mound springs are often sites of significant cultural heritage to Indigenous Australians. Many include painted and engraved rock art, scarred trees, stone artefacts, wells, grinding grooves, and food and fibre resource sites.

## Threats facing arid wetlands

Arid wetlands are vulnerable to numerous threats.

Threat	Impact
Introduced grasses and other weeds.	Displace native species and create a greatly increased fuel load for wildfires.
Unsustainable water extraction.	Removes water available to sustain the specialised ecosystems.
Grazing by domestic and introduced animals.	Damages soil structure and vegetation and causes erosion.
Unsustainable tourism.	Compacts soil and causes erosion.

## What can you do?

- Investigate what AuSSI (Australian Sustainable Schools Initiative) schools are doing to become more sustainable with their water use. Many of these schools are implementing 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. See <http://www.environment.gov.au/education/aussi/>.
- Investigate Lake Eyre on Google Earth (<http://www.google.com/earth/index.html>).





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## COASTAL AND MARINE WETLANDS

- Coastal wetlands include sand or pebble shores, estuarine lakes and lagoons, coastal floodplain forest, dune swamps, mudflats, coastal lakes, coastal floodplains, 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 greatly valued for tourism and recreation.
- Coastal wetlands also provide important habitats for migratory waterbirds.

### Coastal and marine wetlands in Australia

- Australia is one of the world's largest islands, with a coastline stretching about 36 000 kilometres.
- Extensive areas of seagrass meadows, mangrove stands, salt marsh and sand and mud areas provide a diverse range of habitats for many species.

#### Eighty-mile Beach in Western Australia:

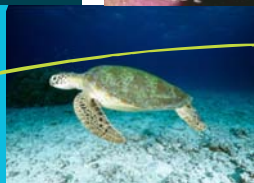
- Eighty-mile Beach is an internationally important coastal wetland located in the Kimberley region of Western Australia.
- It is one of the major arrival and departure areas for migratory shorebirds visiting Australia.

#### Did you know?

Over 300 000 waterbirds from 20 different species visit Roebuck Bay in Western Australia each year making it one of the most important areas in the East Asian-Australasian Flyway.

#### Coral Reefs:

- Coral reefs are well known marine wetlands.
- 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.
- Corals are colonies of tiny animals that are dependent on the food produced by microscopic algae (zooanthellae), that live within them, to survive.
- Many nationally threatened animals in Australian waters depend on coral reefs and sea grass beds to survive.
- The Great Barrier Reef's network of reefs is home to thousands of species.



## Plants and animals

- Green turtles often nest on tropical beaches or islands, such as the beaches in Ashmore Reef, an internationally important wetland. They graze on seagrasses, marine algae (seaweeds) and some sponges.
- Migratory shorebirds 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.
- Marine algae (also known as seaweed) is extremely important for shallow marine environments as they oxygenate the water by using sunlight to make food and oxygen (this is called photosynthesis).

### Did you know?

The temperature of the nest determines what gender the green turtle hatchlings will be. Colder temperatures produce males and warmer temperatures create females.

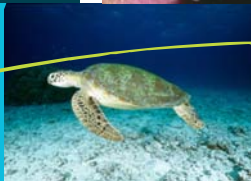
## Threats facing coastal and marine wetlands

Coastal and marine wetlands are vulnerable to numerous threats.

Threat	Impact
Climate change.	Increases sea temperatures, cyclones and storm surges.
Over-fishing.	Reduces biodiversity.
Pollution from urban, industrial and agricultural waste.	Flow into coastal waters and can poison animals and plants.
Unsustainable recreation and tourism use.	Damage habitats.
Destructive fishing practices.	Damage habitats and reduce biodiversity.

## What can you do?

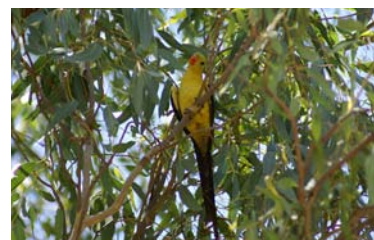
- Investigate what AuSSI (Australian Sustainable Schools Initiative) schools are doing to become more sustainable with their water use. Many of these schools are implementing actions such as installing rainwater tanks that have been connected to the school toilets or gardens or working with their communities to reduce pollution entering stormwater drains and impacting on local waterways. Some schools are partnering with their local communities to conserve local wetlands: <http://www.environment.gov.au/education/aussi/>.
- Investigate Eighty-mile Beach and coral reefs using Google Earth (<http://www.google.com/earth/index.html>).





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# ENVIRONMENTAL WATERING

## Why do we need healthy rivers?

Healthy rivers are vital to the health and survival of many plant and animal species as well as to farming communities, towns and major cities.

People use water from Australia's rivers and wetlands for activities like watering crops, drinking, washing, and flushing toilets. But, sometimes, we take out too much water and the rivers become unhealthy.

Australia is a country that has many dry areas and often lots of droughts. If we take too much water out of the rivers, they start to dry up. When rivers stop flowing and gradually become drier, the water can become unhealthy for humans to use. Many fish, birds, animals and plants are also affected as they lose the food, shelter and clean water provided by the river.

## What can we do to help keep our rivers healthy?

Just like you need blood flowing through your body to keep you healthy, rivers need some water flowing through them. When there is not enough rain, we can help the rivers stay healthy by returning water to waterways that have become too dry.

To help keep the rivers healthy, the Australian Government is buying water from farmers who want to sell their water and putting it back into the rivers in the Murray-Darling Basin.

The water the government buys is called environmental water.

Environmental water is released from dams into rivers and wetlands. This means that birds, fish, animals and plants can continue to live in and around the rivers and the water stays clean and fresh for people to use.

### Did you know?

**So far, the Australian Government has put back enough water into our rivers to fill 80 000 swimming pools or 200 billion milk cartons. Now that's a lot of water!**

## Where has the environmental water gone?

Environmental water is going to rivers and wetlands in the Murray-Darling Basin. The Murray-Darling Basin is a network of rivers across Queensland, New South Wales, Victoria and South Australia. Three million Australians use water from the Murray-Darling Basin so it is very important that the Basin's rivers stay healthy. This water is often used help to produce food that is distributed across the whole country.

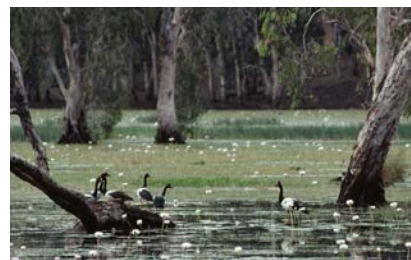
Water has been returned to places like Yanga National Park in New South Wales, Hattah-Kulkyne Lakes in Victoria and Lake Albert in South Australia. Both Hattah-Kulkyne Lakes and Lake Albert are part of internationally important wetlands. Waterbirds, frogs, insects, river red gum trees, and many other plants and animals live and breed in these wetlands.





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# ESTUARINE WETLANDS

- An estuary occurs where a river meets the sea.
- Wetlands connected with this environment are known as estuarine wetlands.
- The water has a mix of the saltwater tides coming in from the ocean and the freshwater from the river.
- They include tidal marshes, salt marshes, mangrove swamps, river deltas and mudflats.
- They are very important for birds, fish, crabs, mammals, insects.
- They provide important nursery grounds, breeding habitat and a productive food supply.
- They provide nursery habitat for many species of fish that are critical to Australia's commercial and recreational fishing industries.
- They provide summer habitat for migratory wading birds as they travel between the northern and southern hemispheres.

### Estuarine wetlands in Australia

#### Kakadu National Park, Northern Territory:

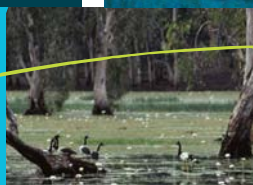
- Kakadu has four large river systems, the East, West and South Alligator rivers and the Wildman river. Most of Kakadu's wetlands are a freshwater system, but there are many estuarine wetlands around the mouths of these rivers and other seasonal creeks.
- Kakadu is famous for the large numbers of birds present in its wetlands in the dry season.
- Many wetlands in Kakadu have a large population of saltwater crocodiles.

#### Did you know?

**Jabiru build large, two-metre wide platform nests high in trees. The nests are made up of sticks, branches and lined with rushes, water-plants and mud.**

#### Moreton Bay, Queensland:

- Moreton Bay has significant mangrove habitat.
- The estuary supports fish, birds and other wildlife for feeding and breeding.
- Seagrasses in Moreton Bay provide food and habitat for dugong, turtles, fish and crustaceans.





## Plants and animals

- Saltwater crocodiles live in estuarine and freshwater wetlands of northern Australia. During the wet season, they can be found in freshwater swamps and rivers. In the dry season, they move downstream to estuaries where there is more water. Saltwater crocodiles eat fish, such as barramundi, and other live prey.
- Jabiru are often seen in the wetlands of Kakadu National Park. Jabiru eat meat and wade through wetlands trying to catch frogs, lizards and insects.
- Australia has the highest diversity of temperate seagrass in the world.
- Dugongs, which are also known as sea cows, grow to about three metres long and weigh up to 400 kilograms.
- Migratory wading birds, such as curlew, sandpipers, snipe and knots fly from the northern hemisphere to feed at many of Australia's estuaries, such as at the Hunter River in New South Wales, during the summer.

### Did you know?

Dugongs can eat up to 30 kilograms of seagrass a day. When they feed, they eat whole plants.

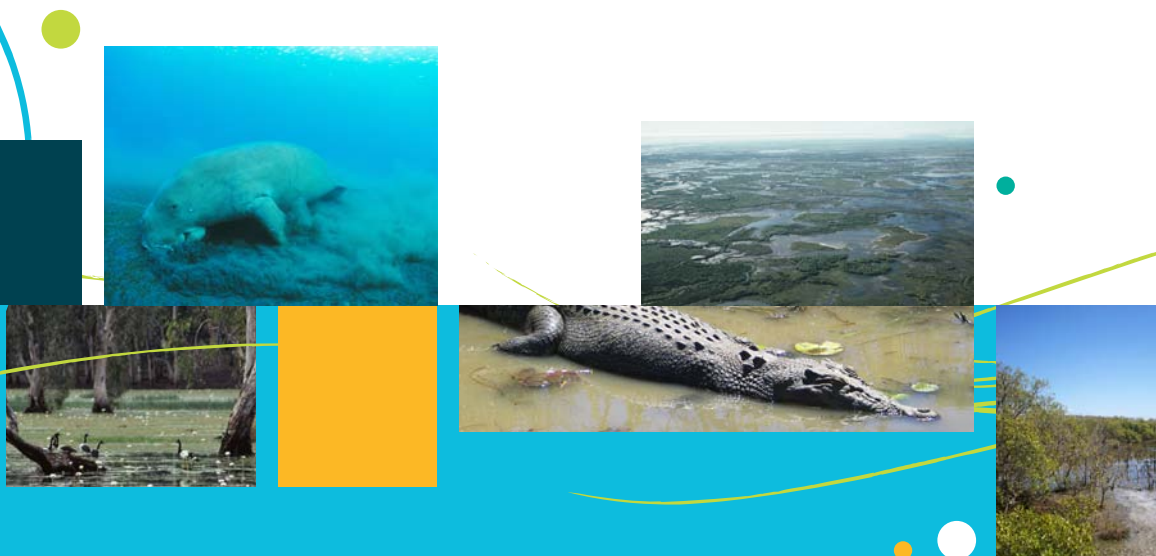
## Threats facing estuarine wetlands

Estuarine wetlands are vulnerable to many threats.

Threat	Impact
Dredging.	Destroys seagrasses.
Pollution from urban, industrial and agricultural products.	Washes into waterways and can poison animals and plants.
Over-fishing.	Reduces diversity.
Climate change.	Increasing storm surges and sea level rises.
Unsustainable recreational activities.	Disturbs habitat and damages ecosystems.

## What can you do?

- Investigate what AuSSI (Australian Sustainable Schools Initiative) schools are doing to become more sustainable with their water use. Many of these schools are implementing 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: <http://www.environment.gov.au/education/aussi/>.
- Investigate Kakadu National Park and Moreton Bay using Google Earth (<http://www.google.com/earth/index.html>).





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# INLAND RIVERINE WETLANDS

- Riverine wetlands are wetlands connected by rivers.
- They are found along the edges of rivers, streams and creeks and include rivers, floodplains, marshes, lakes and billabongs. They mostly have freshwater.
- Inland riverine wetlands provide breeding and feeding habitats for many plants and animals, such as reeds, waterbirds and fish.
- They are important for absorbing, recycling and releasing nutrients and trapping sediment.

### Inland riverine wetlands in Australia

- Inland riverine wetlands are mostly in eastern Australia where the rainfall is higher and there are more rivers.
- They have evolved to cope with the country's dry, but highly variable climate.
- These wetlands provide refuges for wildlife during drought.
- They can store flood waters during floods.
- The Murray-Darling Basin has many inland riverine wetlands. An example of an internationally important Murray River wetland is the Barmah-Millewa Forest.

### Barmah-Millewa Forest:

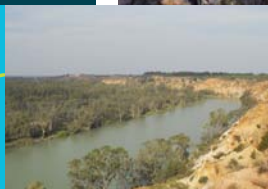
- When the river floods, water covers the floodplain and the area forms a huge wetland with the forests amongst it.
- It is Australia's largest river red gum forest and the biggest ecosystem of river red gums in the world.

### Did you know?

The Murray River is Australia's longest river at 2375 kilometres.

### Inland riverine wetlands of Northern Australia:

- Some dry out completely over the dry season (April – October), while others keep water in them all year round.
- Permanent waterholes are extremely important habitats for wildlife during the dry season for water and food. For example, seed-eating birds, such as the colourful Gouldian finch, need access to water to survive.
- The dry season reduces the river flows of large rivers such as the Fitzroy River in Western Australia and the Daly River in the Northern Territory.



## Plants and animals

- Platypuses 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.
- 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 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.
- 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.

### Did you know?

The platypus is a mammal that lays eggs. Male platypuses produce venom strong enough to kill a small dog or cat.

### What can you do?

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- Investigate the Murray-Darling Basin on Google Earth (<http://www.google.com/earth/index.html>).

## Threats facing inland riverine wetlands

Inland riverine wetlands are vulnerable to numerous threats.

Threat	Impact
Reduced river flows from climate change, unsustainable water regulation and extraction.	Damage to ecosystems.
Introduced animals, such as horses, pigs and buffalo.	Eroding river banks and destroying plants.
Introduced fish, such as carp.	Predate on native fish and cause water turbidity.
Weeds.	Displace native vegetation and alter habitat.
Pollution from urban, industrial and agricultural products.	Wash into waterways and can poison animals and plants.
Livestock grazing around waterways.	Damage water edges, trample vegetation and add nutrients to waterways.





## WETLANDS AND WORLD WETLANDS DAY

A wetland is an area of land where water covers the soil - even for only part of the year. They can be natural or artificial. The water in them can be still or flowing, fresh, salty or in-between (brackish). Wetlands are found in all kinds of places - along the coast, in the mountains, in dry inland areas, even underground. Many of them are connected by rivers. Some of the most common types of wetlands from different parts of Australia are described below.

### Marine and coastal wetlands

- **Coral reefs:** large underwater formations close to the surface of the water, created from the calcium carbonate skeletons of coral animals.
- **Beaches:** areas of sand, gravel or pebbles along the shore of the sea.
- **Lagoons:** areas of shallow water separated from the sea, or joined by a narrow channel to the sea.
- **Mangrove wetlands:** waterways dominated by mangrove trees that are found along the shores of estuaries.
- **Saltmarshes:** coastal marshes found in the intertidal zone between land and sea, dominated by salt tolerant plants like sedges and grasses.
- **Mudflats or tidal flats:** coastal wetlands that form when mud is deposited by tides or rivers.

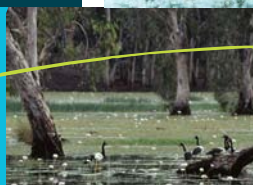
### Estuaries

Estuaries occur where the lower part of a river meets the sea. The water is tidal and can be salty or brackish. Estuaries are one big system but can have a diverse range of wetland types:

- **Mudflats or tidal flats:** coastal wetlands that form when mud is deposited by tides or rivers.
- **Mangrove forests:** waterways dominated by mangrove trees that are found along the shores of estuaries.
- **Saltmarshes:** coastal marshes found in the intertidal zone between land and sea, dominated by salt tolerant plants like sedges and grasses.

### Inland wetlands associated with rivers

- **Floodplains:** flat areas of land along the edges of rivers or streams that are prone to flooding.
- **Rivers:** large natural streams of water that flow into an ocean, lake, or other body of water and usually fed along its course by smaller streams.
- **Billabongs:** waterholes in old river channels which fill up during floods or heavy rains.
- **Swamps:** standing water for part of the year and support plants, like reeds, which have their roots underwater but grow above the surface.
- **Marshes:** similar to swamps but have waterlogged soils.
- **Lakes** are large, open, waterbodies larger than eight hectares.



## Arid wetlands

- **Salt lakes:** inland lakes that have become very salty or that have dried up completely through evaporation to form a crusty salt pan. There are many salt lakes in the arid and semi-arid zones of Australia.
- **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.
- **Ephemeral (or temporary) lakes, streams and waterholes:** fill up after rain but can be dry for long periods. Many wetlands in arid regions are ephemeral.

## Alpine wetlands

- **Bogs:** form on organic soils. They are mostly made up of sphagnum moss and are generally found in alpine areas
- **Alpine lakes and tarns:** formed by retreating glaciers and snowmelt.

## Why are wetlands important?

Wetlands are home to many plants and animals which all rely on each other for food and shelter. This is called an ecosystem. Wetlands are among the most valuable and productive ecosystems on earth. They are a great place for animals to live as they provide food, water, shelter and breeding areas for many different species of reptiles, birds, amphibians, mammal, fish, yabbies and insects. Coastal wetlands like estuaries and mangroves are especially important for the fishing industry because they provide a safe place for many types of young fish to grow up.

Wetlands have been described as nature's kidneys because they act as filters and recycle nutrients, trap sediments and can help to prevent pollution reaching our rivers and oceans. Wetlands also help to reduce the effects of flooding and prevent soil erosion.

## What is World Wetlands Day?

In the 1960s, people were worried about the loss of wetlands and waterbirds (such as ducks and swans) occurring in Europe. This led to the first international conservation agreement. On 2 February 1971 the Convention on Wetlands of International Importance was signed, in Ramsar, Iran. This is why the agreement became known as the Ramsar Convention. World Wetlands Day is celebrated on 2 February every year, to mark the signing of the Ramsar Convention. The Ramsar Convention aims to halt the worldwide loss of wetlands and Australia is a signatory to the Convention. Australia designated the world's first Ramsar site, Cobourg Peninsula in the Northern Territory in 1974.

## How can we protect and manage wetlands?

Wetlands can be cared for and protected through wise and sustainable use of their resources. Sustainable use refers to resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for generations to come. Wise use of wetlands refers to the maintenance of the ecological character of the wetland through sustainable use. An ecological character of a wetland is all the components (such as waterbirds), processes (such as water movement) and services (such as cultural services) of that wetland.

You can be involved in caring for your local wetland through getting involved in wetland conservation and management activities undertaken by your state government, local Natural Resource Management group, Catchment Management Authority or non-government organisation. Contact details and links to some of these organisations are available at: <http://www.environment.gov.au/water/topics/wetlands/managing/what-can-i-do.html>.

