

HEALTHY WATERWAYS

Because we're all in the same boat



the crew member's GUIDE

to the health of our waterways



Ecological
health and
water quality
management
in the Moreton
Bay catchment
– Queensland
Australia

the crew member's
GUIDE
to the health of our waterways



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Ecological health and
water quality management in
the Moreton Bay catchment –
Queensland Australia

by the Moreton Bay Catchment
Water Quality Management Strategy Team



Published by the Moreton Bay Catchment Water Quality Management Strategy Team
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SECTION 1

Introduction



The Moreton Bay catchment is one of the most attractive environments in the world. The land, rivers, bay and sea form a delightful partnership that is supportive of every aspect of our lifestyle. In fact, our cities and towns are situated where they are now, largely because of the historical attractions of the rivers and bay.

A cry for help

This catchment has supported its people for many thousands of years but it has had to work a lot harder during the last few decades. From a population of a few thousand, it now supports millions of people, and the strain is starting to tell. While the Moreton Bay catchment may not have a voice, it is definitely sending us messages that things are out of balance and that it needs help.

In one part of the catchment, there are piles of rotting, stinking weed building up on once popular beaches. Fishermen are having the skin stripped from their legs and hands by a fierce and mysterious blue-green algae.

Sediments are choking our rivers and the western bay, cutting down the light that reaches the sea bed. This kills the seagrass and robs the prawns, fish and dugongs of vital food and breeding grounds.

The sea turtles and dugongs of Moreton Bay are being driven further away from the mainland. While each fact in itself is alarming, together they add up to a cry for help.



We're all in the same boat

It's a fact that we are all in the same boat. Everyone who lives in the Moreton Bay catchment contributes to the condition of our waterways, just by the fact that they are here. But there are two sorts of people on this boat: there are passengers and there are crew members. Which sort of traveller are you?

Are you a passenger or a crew member?

Passengers are people who are just along for the ride; they don't need to worry about the journey or the condition of the boat. They get on and off and see themselves as having no impact on the waterways.

Crew members, on the other hand, care for the ship and what it is going through. They need some sort of idea about where they are going and why. If there are problems on the journey, they need to get involved to sort them out. The big question is – are you a crew member or a passenger, and how can you tell?

Would you answer a cry for help?

The Moreton Bay catchment is sending out distress signals. Think about how you feel about that. If that stirs you in any way, if that makes you feel like you want to do something personally to help, then you are a crew member just waiting to sign up and this guide is for you.



This book is a guide

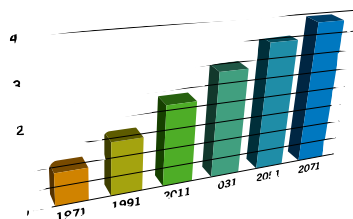
This book is a guide to the voyage we're taking and what we need to do if we are going to arrive at our destination in good condition. It will also give you a feeling for why the journey is important and an idea of the direction we're heading in.

You'll understand more about why we're travelling this way and learn the duties you'll need to perform. This guide will also give you an idea of where we've been in the past, the exciting destination we're headed for, and what we need to do to ensure we're going to get there.

The two things you need to join the crew

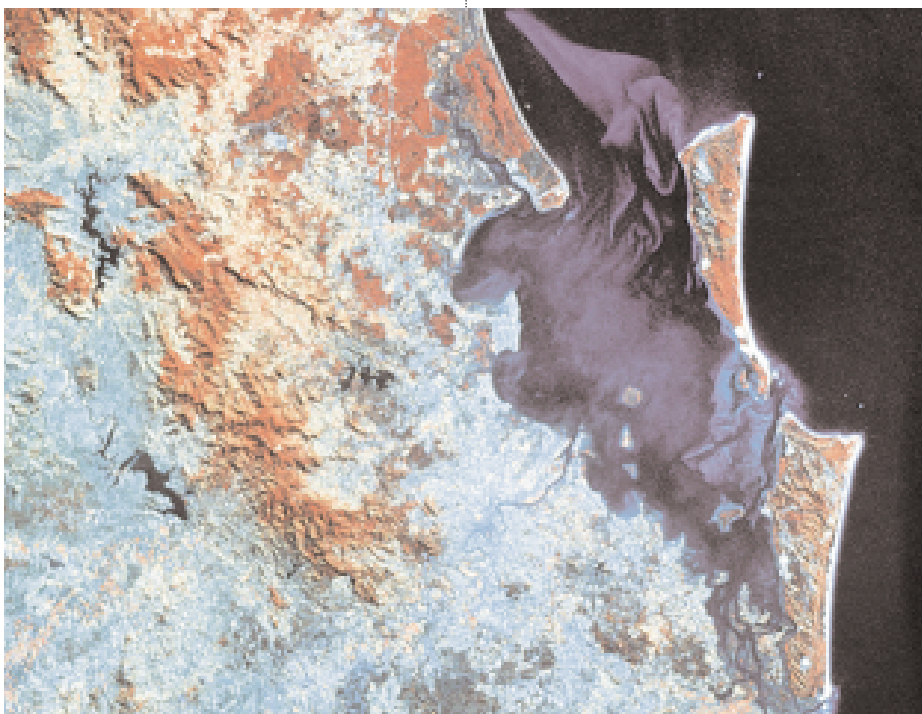
To upgrade from passenger to crew member, you need two special qualifications. The first is you need to live in the area of Queensland you see on the map below.

Estimated population growth



1 Is this where you live?

The Moreton Bay catchment is an area of about 19,700 square kilometres and it supports one of the fastest-growing populations in Australia. It is home to about 60 per cent of the Queensland population and there are already more than two million passengers and crew members in the area. As you can see in the population figures, there's also a long queue of people waiting to get on board.



AUSTRALIAN CENTRE FOR REMOTE SENSING

Landsat image of Moreton Bay and catchment

2 Do you use water in any of the following ways?

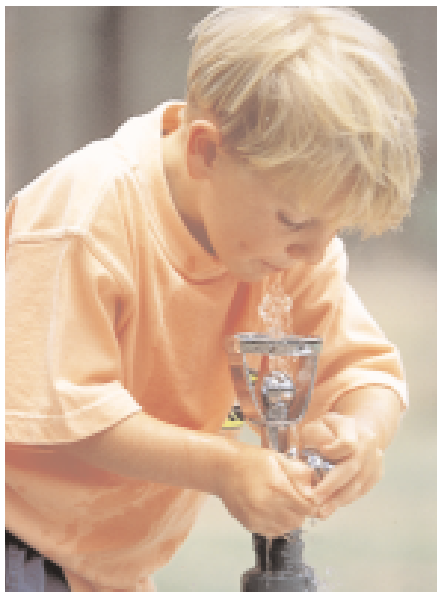
The second requirement for enlistment is that you use water in some way. Check out the following list to see if you qualify.

1	 <p>i) Are you someone who uses water personally... eg drinking, bathing or using a toilet?</p> 
2	<p>ii) Do you use water in some other way around the house... eg washing clothes or the car or the dog or watering the garden?</p>  
3	  <p>iii) Do you enjoy some water-based fun... eg swimming, fishing, sailing, canoeing or other water sports?</p>
4	 <p>iv) Do you like travelling on the water or visiting special water places or special water creatures?</p> 

If the answer to any of the above questions is yes, then you obviously have a personal interest in keeping our waterways healthy. The water you use comes from this catchment, so it makes sense for you to join the crew and make sure our waterways stay healthy.

Are you crew material?

If you live in the Moreton Bay catchment, you use water in any way and you feel the need to respond to the distress signals we are getting from around the catchment, then you are crew member material and we want you to join the Healthy Waterways crew. You'll find details about how to sign on for the journey in the last chapter of this book.





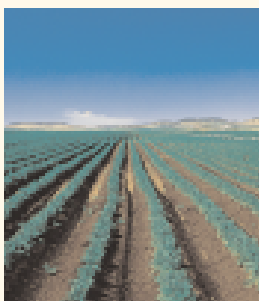
An extract from the Foreword to the *1998 Waterways Management Plan* by
Rod Welford, Minister for Environment and Heritage, Minister for Natural Resources
 and Chair of the Brisbane River Management Group Policy Council

Catchment Comment



BRISBANE CITY COUNCIL

For too long we have tended to turn our backs on our most life giving arteries, our rivers. Today, we realise that river systems need to be carefully nurtured and properly managed.



DEPARTMENT OF ENVIRONMENT AND HERITAGE

We are at last beginning to take an holistic approach to their care by giving attention to whole river catchments – from the source to the sea. We have begun to realise that to sustain our waterways and have them as vibrant contributors to the quality of our lives, we have to restore the ecological balance of both land and water.

The Brisbane River and Moreton Bay catchment supports more Queenslanders than any other. We use its water to give ourselves and our land a drink. We travel on its surfaces for business and pleasure, and we expect it will continue to support and enhance the quality of our recreational and commercial pursuits well into the future.

Common sense and science now tell us that our current levels of use are not sustainable and that we, as a whole community, have a responsibility to take all measures necessary to pass on a healthy and energetic system to our children and their children.



DEPARTMENT OF ENVIRONMENT AND HERITAGE



Most people are unaware that we all live in a waterway catchment. A catchment is an area of land bounded by natural features, such as hills, from which all stormwater flows to a common low point such as a creek, lake, river or bay.



SECTION 2

The journey

So what sort of voyage will prospective crew members be signing on for?

How far are we going? And how long will it take to get there?

Well, we are heading towards something called 'Healthy Waterways'.

We imagine this as a place where we can swim safely in our rivers and bay, eat the seafood we catch, and drink our fill of the waters around us. This is a place where we want to live – a place that we will be proud to hand over to our children and their children.

It's a journey that will take quite a few years, as there is much to be accomplished, and we have set an arrival date for the year 2020.



Dugong in Moreton Bay

HEALTHY WATERWAYS LIBRARY



Mangrove forest, Caboolture River

DEPARTMENT OF ENVIRONMENT AND HERITAGE



The Healthy Waterways vision

Crew members have lots of different interests and do lots of different things, so we need a common goal to keep us all heading in the right direction. Current crew members have expressed this vision for Moreton Bay, its land catchments and waterways.

"Moreton Bay and its waterways will be a healthy ecosystem supporting the livelihoods and lifestyles of residents and visitors."

You and your family can share this vision and make it something that is important to you.

To achieve the vision, we need to maintain the good things we already have and improve the things that need attention. We have to want to make things better.



An extract from an address by **Councillor Jim Soorley**, the Right Honourable Lord Mayor of Brisbane at the River Symposium, Brisbane River Festival 1998

Catchment Comment

From Sydney to Sinai nothing is more important than the quantity and quality of water. Water makes Earth special. And water is sacred in many cultures.

Hindus bathe ritually in the holy Ganges River.

Native Americans believe rivers to be the Great Spirit's daughter.



Oxley Creek

DEPARTMENT OF ENVIRONMENT
AND HERITAGE

To Christians, water symbolises purification.

Aboriginal culture and survival shows a deep respect for, and understanding of, water.

What does it say about a culture that turns a healthy river into a mine and a sewer?

- 500 megalitres of treated sewage are dumped daily into the river and bay.
- Nutrients from stormwater run-off and treated sewage would grow algal scums in the river if sunlight could penetrate the muddy waters.
- In other words, if it weren't for the 50,000 truck loads of mud we put into the Brisbane River each year, a stinking algal scum would stretch from the Bremer to the bay.
- We may be disgusted by roadside open sewers in poorer countries but the Brisbane River is little more than a sewer at the moment.
- In dry weather, about a third of the river's flow is sewage effluent,

carrying three tonnes of phosphorous and six tonnes of nitrogen daily into Moreton Bay.

- Dredging and gravel washing contribute about ten per cent of the mud in dry weather.
- Chemicals from industry, agriculture and homes are daily discharged into the river, or washed in by rain along with all the filth and rubbish of our society.

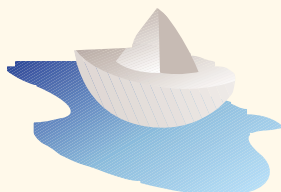
Clearly, our culture does not respect water.

The first 'mirror' was probably our reflection in still water.

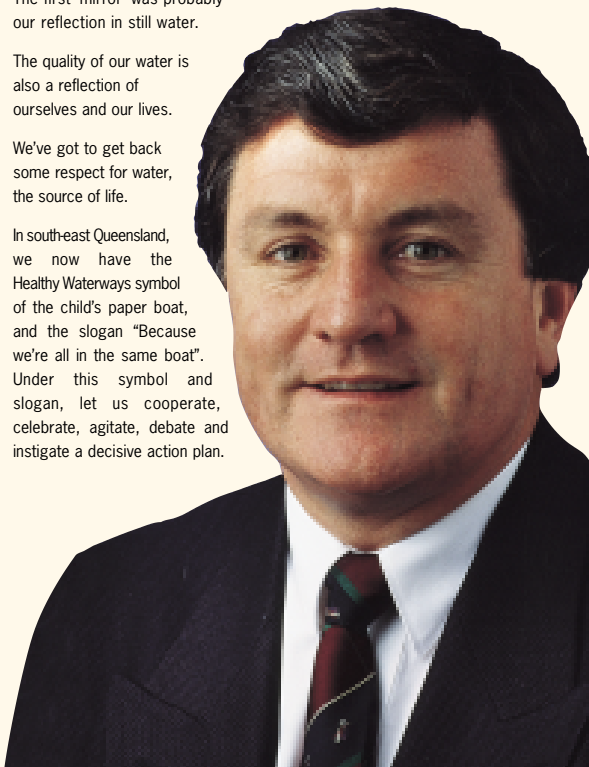
The quality of our water is also a reflection of ourselves and our lives.

We've got to get back some respect for water, the source of life.

In south-east Queensland, we now have the Healthy Waterways symbol of the child's paper boat, and the slogan "Because we're all in the same boat". Under this symbol and slogan, let us cooperate, celebrate, agitate, debate and instigate a decisive action plan.



If we do this now, next century's child will sail her paper boat safely on any creek, river or beach. And Brisbane will still be the only place on Earth where herds of dugong can graze on seagrass against the backdrop of a city skyline.



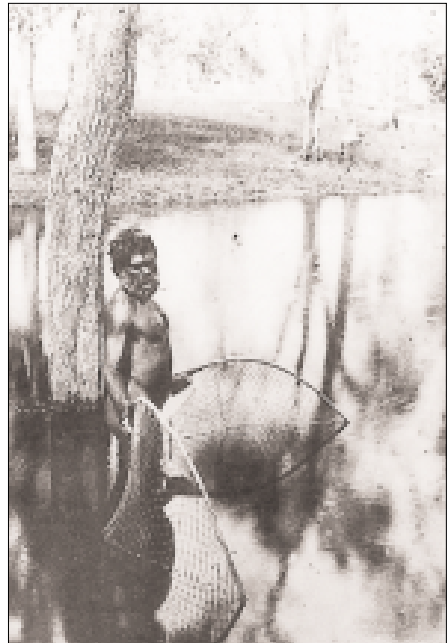
BRISBANE CITY COUNCIL

Voices from the past

To understand the scope of the work that needs to be done, let's take a look at how things used to be, compared to what they are now.

For the original people of the Moreton Bay catchment, there is a long line of strong association between the land and its people. For instance, researchers from Griffith University in Queensland have found evidence of aboriginal habitation at Wallen Wallen Creek south of Dunwich. At the base of a large sand dune, they found artifacts that are over 21,000 years old.

This find is listed in the book *Minjerribah – An Indigenous Story of North Stradbroke Island*. The book contains dreaming and creation stories for the North Stradbroke and Moreton areas as well as descriptions of the lifestyle that was possible in these bay and island areas that were quite rich in food sources. There is a continuing, close interaction between the land and its people.



'King Johnny Boat of Deception Bay' with fishing nets

QUEENSLAND MUSEUM



Aboriginal fishing party near Brisbane

QUEENSLAND MUSEUM



JOHN OXLEY LIBRARY

John Oxley's original charts of the Moreton Bay region

It appears that food and water were not equally distributed throughout the catchment. According to accounts in *The Brisbane River Story*, inlanders “needed to be more mobile in order to garner a variety of foods in a generally less productive environment. They gathered at large base camps near rivers and lakes in the winter and dispersed during the summer”.

Even back then, a continuous supply of fresh water seems to have been an issue.

“The river and its tributary creeks became salty as far upstream as Goodna. And the aborigines dug wells in swampy areas to provide a continuous supply of drinking water.”

In September 1824, Oxley and Cunningham saw signs of drought along their journey upstream of College’s Crossing. Cunningham also noticed that the wells near Breakfast Creek were drying up. There was only a “little water of so brackish and turbid a quality as not to be under any circumstances drinkable”.

Generally, at the time of white settlement, at least in the area around the Brisbane River catchment, there was an abundance of food and wildlife thanks to the quality and health of the water. Consider these comments taken from early settlers and quoted in the *Brisbane River Story*.

*"While along the river bank were
the water lily in thousands ...
of glorious hue"*

*"The black swans or 'Marutchi'
were often seen on the river"*

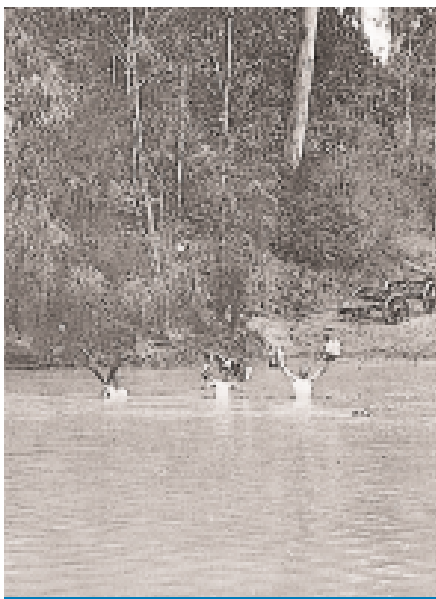
*"The scenery along the river is
picturesque, with wide sloping
banks on either side, crowned
with lofty timber"*

*"The Brisbane and other rivers abound
with excellent fish of various kinds"*

"The river was always clear and clean looking"

One aspect of the wonder and bounty of eastern Moreton Bay is highlighted in an extract from Thomas Welsby's book *Sport and Pastime in Moreton Bay*.

"The late Fred Campbell (son of Tinker Campbell) ... saw a herd of dugong that extended from near the beacon almost to the lower sandhills on Moreton Island, a distance, at the least of three miles, the width being some 300 yards. ... When I asked him the number he saw, he said he was afraid to make any computation save that there must have been several hundreds of them, all feeding quietly in about two fathoms of water."



Crossing the Brisbane River 1912 style

JOHN OXLEY LIBRARY



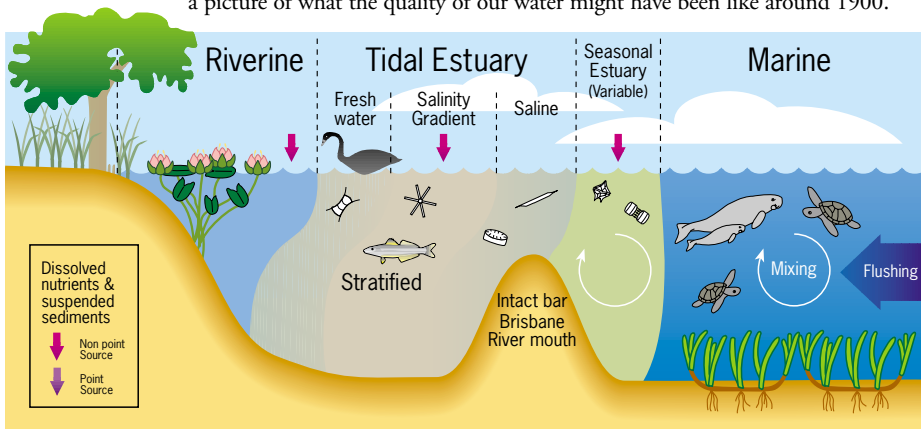
Oxley Creek in 1925

ROYAL HISTORICAL SOCIETY OF QUEENSLAND



Historical water quality

From observations like these and other existing historical data, scientists have been able to reconstruct a picture of what the quality of our water might have been like around 1900.



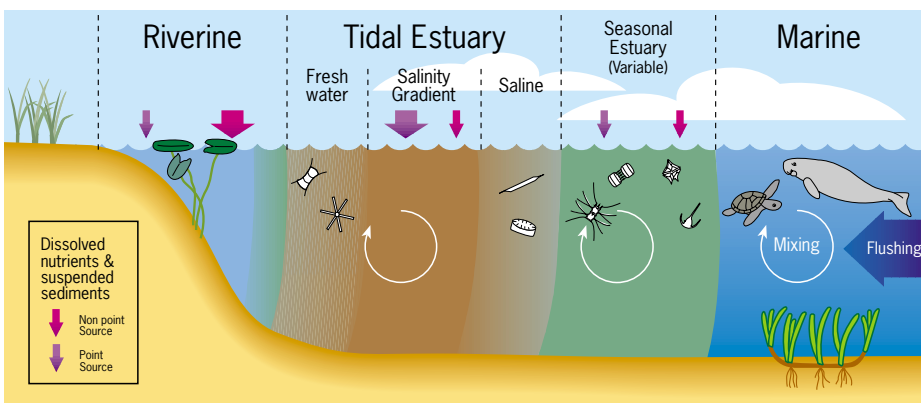
What's happening here?

This is a representation of the waterways of the Moreton Bay catchment as they may have existed around 1900. There was a variety of riverbank plant and animal life, including the black swans or 'Marutchi', and there were fish in the rivers. The bar

at the mouth of the river protected the riverine (fresh water) and tidal estuary (salt water) regions of the river from excessive tidal movement. There was a limited amount of human-made waste being added to the system.

Today's water quality

If you extend the scenario to our waterways today, you get an understanding of the extent of the problems we face.



What's happening here?

This is a representation of the same system around 1997. The riverbank vegetation is greatly reduced and the black swans and fish are mostly gone. The bar at the river mouth has been removed and strong tidal currents contribute to the

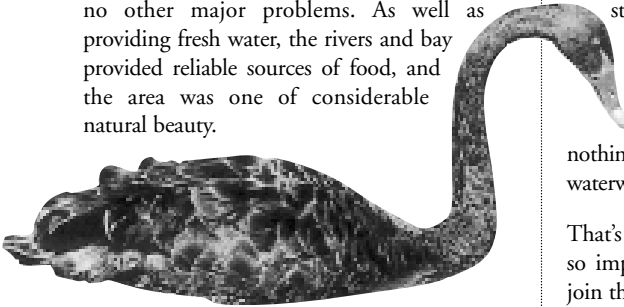
high turbidity in the river. A major increase in the amount of nutrients pumped into the tidal and seasonal estuary regions has resulted in a decline in the water quality. More turbid water in the seasonal estuary has cut down the light to the sea bottom, which in turn restricts the growth of seagrass.

Our system is in decline

There is written, photographic and anecdotal evidence that the waterways were once much cleaner than they are today. Fishing, sailing and particularly swimming used to occur to a much greater extent in the Brisbane River. Seagrass and dugong used to be seen in Bramble Bay and near the mouth of the Pine River, where today there is none. The river sections of our waterways used to have much more river bank plant and animal life, including the black swans.

Our water quality has declined

Historical reference gives a clear picture of a healthy, robust waterways system. While it was affected by flood and drought, there were no other major problems. As well as providing fresh water, the rivers and bay provided reliable sources of food, and the area was one of considerable natural beauty.



AUSTRALIAN MARINE CONSERVATION SOCIETY



Vessels stranded in Botanical Gardens, 1893

AUSTRALIAN MARINE CONSERVATION SOCIETY

The health of our waterways is under threat

Over the last three years, a large team of investigating scientists has carried out an intensive study into the health of our waterways and Moreton Bay itself. Their findings prove the health of the bay and rivers is in decline. The impact of people on our bay and waterways is unsustainable. If we do nothing to change our actions, the health of our waterways system will decline even further.

That's why this journey is so necessary and so important, and that's why we need you to join the crew.



Yachting on the Brisbane River, 1897

JOHN OXLEY LIBRARY



SECTION 3

Water. Where does it come from? Where does it go?

If you ask young children where milk comes from, some will answer “from the carton” or “from the shop”. There’s no link between the product and the source. The same thing can happen when you ask about water. It’s obvious to them. “Water comes from the tap. You just turn it on and it’s there.”

The delivery system for water into our homes is hidden. Most of us never think about pipes running into and out of our homes. It’s all handled for us, so we never have to worry about it – and if something goes wrong, we call a plumber.

Healthy water coming in

Water flows through the catchment into creeks and rivers and is contained in lakes by major holding dams. These dams control the release of water downstream. Water is then piped from the dam to a treatment station where impurities are allowed to settle and some chemical treatment is carried out to improve the quality and health of the water.

The driest continent in the world

Contrary to popular belief, we are not a water-rich nation. In fact, Australia is the driest continent in the world. It also suffers from an extremely variable rainfall.

It then travels through a system of pipes until it gets to the pipe that runs into your house.

Water going out

So where does the water go when it goes down the drain? How is it treated to remove the various impurities that we’ve added? It is important to understand that there are two different and quite separate disposal systems: wastewater and stormwater.

What happens to wastewater?

Wastewater is the water and all the other stuff that goes down the drains inside your home.

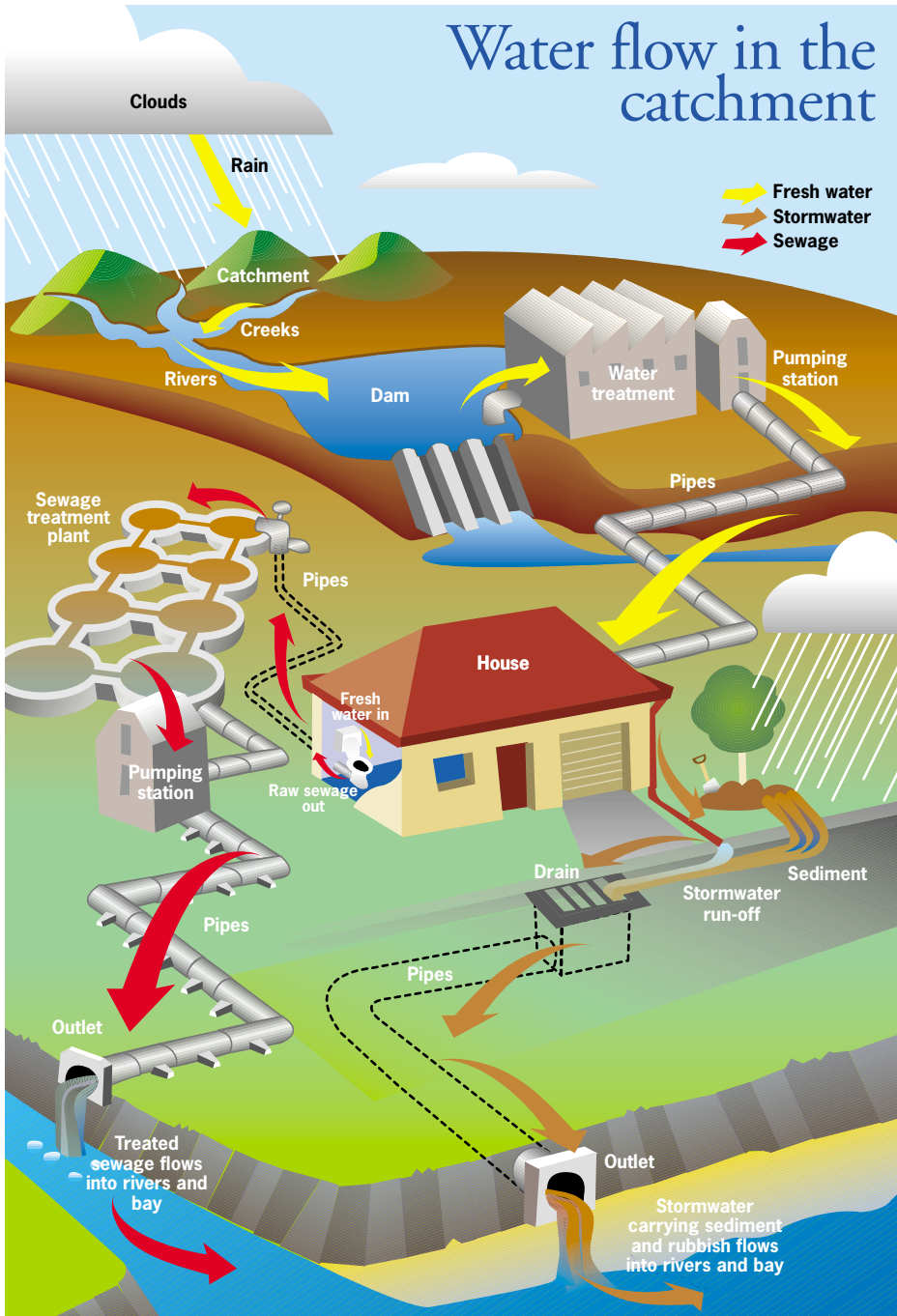
Water from the toilet, the bath and shower, the sink, dishwasher and the laundry is called wastewater.

Wastewater is treated before it goes back into the system. It is piped and pumped to a treatment station where some of the impurities are sieved and settled out and the

health of the water is improved before it is pumped back into the creeks or rivers and flows into the bay.



Samsonvale Dam





BRISBANE CITY COUNCIL

Luggage Point Sewage Treatment Plant

What happens to stormwater?

Stormwater is water that falls on your roof or driveway or on the lawns or roads. This is the water that ends up in the stormwater drain system. There are over 2000 kilometres of stormwater drains in the Brisbane metropolitan area alone. This is a totally different system and most water that goes through this system is not treated.



Stencilling 'Dump no waste – flows to creek'

BRISBANE CITY COUNCIL

"Dump no waste – flows to creek"

More and more of the concrete edges to our stormwater drains carry the words "Dump no waste – flows to creek". This is an important reminder that if you pour oil or paint or other toxicants down the drains, there is no treatment process to remove them before they wash out into the bay to harm our plant and sea life.

From your backyard – straight to the bay

Some people believe our creeks and rivers are dirty because of what happens upstream – that the rubbish in the bay has nothing to do with them. That's not the case. Everything is connected and it all starts in your backyard – wherever you are. All the rubbish that is dropped on the streets, all the dog droppings and used oils and chemicals, all the excess soapy water from washing your car, all the excess fertilisers and pesticides and all the lawn clippings, almost everything that gets washed into the stormwater drains ends up in the bay.

What can I do about it?

Every one of us can do something to improve the health of our creeks, rivers and bay. Later in this book, there is a list that shows the things you can do to increase the health of our waterways. For now it's enough to understand the difference between stormwater and wastewater. Wastewater is treated. Stormwater is not. So dump no waste into the stormwater drains because it flows to the creek and eventually into the bay.

One of the main food sources for our precious Moreton Bay turtles is jellyfish. However, jellyfish can easily be confused with floating plastic bags.

If the turtle eats this plastic 'jellyfish', it can easily suffocate and die.

The 10 most common items of litter found in the bay

1 Plastic supermarket bags

2 Cigarette butts

3 Plastic straws

4 Chips and lolly wrappers

5 Little bits of polystyrene

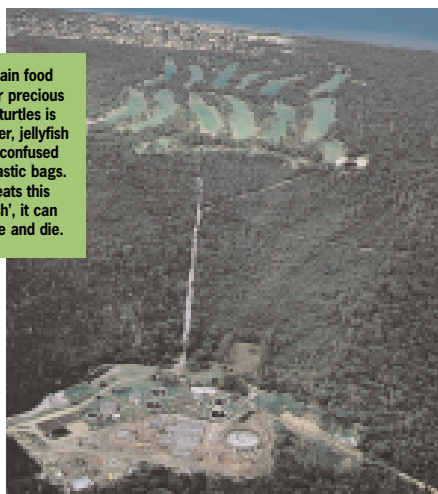
6 Pieces of glass

7 Bottle caps and lids

8 Glass drink bottles

9 Aluminium cans

10 Little bits of paper



Bribie Island Sewage Treatment Plant

DEPARTMENT OF ENVIRONMENT AND HERITAGE



Stormwater outflow

DEPARTMENT OF ENVIRONMENT AND HERITAGE

Wastewater (from your toilet, bath, laundry, dishwasher etc) is **treated** before it goes back into the natural system. **Stormwater** is **not treated**. What goes into the stormwater drains in your street ends up in the bay. So what goes on in your backyard has a very important bearing on the quality of our water and our environment.



SECTION 4

Water quality – Water quantity

The two main issues in relation to the future of our waterways are the quality and quantity of water that will be needed to satisfy future demand. So what are the principal issues that affect each of these elements?

Water quality

You might think that in this day and age of scientific marvels, the quality of our water can be guaranteed. Surely, we can treat our water to such an extent that it no longer matters how healthy the water is when it arrives at the treatment plant. That is not the case. We need stable systems to provide ongoing supplies of healthy water.

Water systems can break down

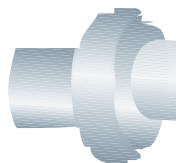
If the pressures become too great, then healthy catchment and waterways systems that have flourished for generations can break down. The consequences are frightening – and it can happen in Australia.

“Don’t drink the water unless it’s been boiled”

Australians who travel overseas often avoid drinking the local water to avoid the danger of getting sick. But, in recent times, very large water supplies in Australia have also been contaminated and entire communities affected. It can and it does happen and when it does, there is no easy or quick cure.

Just imagine you woke up one day to hear on the radio that every drop of our water had to be boiled before it could be used. Not just for one day – but for week after week, month after month. How would that affect the quality of our life?

There is work to be done to make sure that this does not happen in our catchment, particularly as we live in such a rapidly growing area.



Camping, Kangaroo Island



Fishing, Pumicestone Passage

Water quantity

In south-east Queensland, people seem to believe we live in a water-rich environment. You can turn on the tap, and water just keeps coming out. But our region is one of the fastest growing in Australia. Think for a moment about the pressures this growth places on our catchment system.



Yabbie pumping, South Stradbroke Island

More people

If you think about our catchment as being roughly the same shape and size for the last 6000 years, then 100 years does not seem like a long time. But in terms of human impact, the period from 1930 to 2030 will represent more change and a greater threat to our waterways than all the other years combined.



Fishing trawler, Bramble Bay

More demand for healthy water

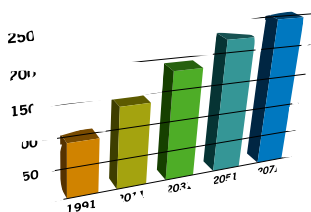
To give yourself an idea of how much water will be needed in the near future, look at the population figures on page four and multiply that number of people by the amount of water you use each day.



More land needed for housing

Where are all these extra people going to live? This additional demand for housing will mean more urban sprawl, more intensive land use, more clearing of river and creek banks and catchment areas, more natural bush areas stripped and more suburban and rural run-off being pumped into our creeks and rivers.

Estimated population density growth

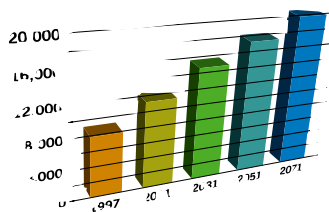


Yet, in 1998, it was estimated that only 14 per cent of the land in the Moreton Bay catchment remained undeveloped.

More sewage to be treated

How much sewage is treated now and what treatment capacity will be needed by 2031? The logistics are staggering.

Estimated sewage treatment output



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Will we always have enough water?

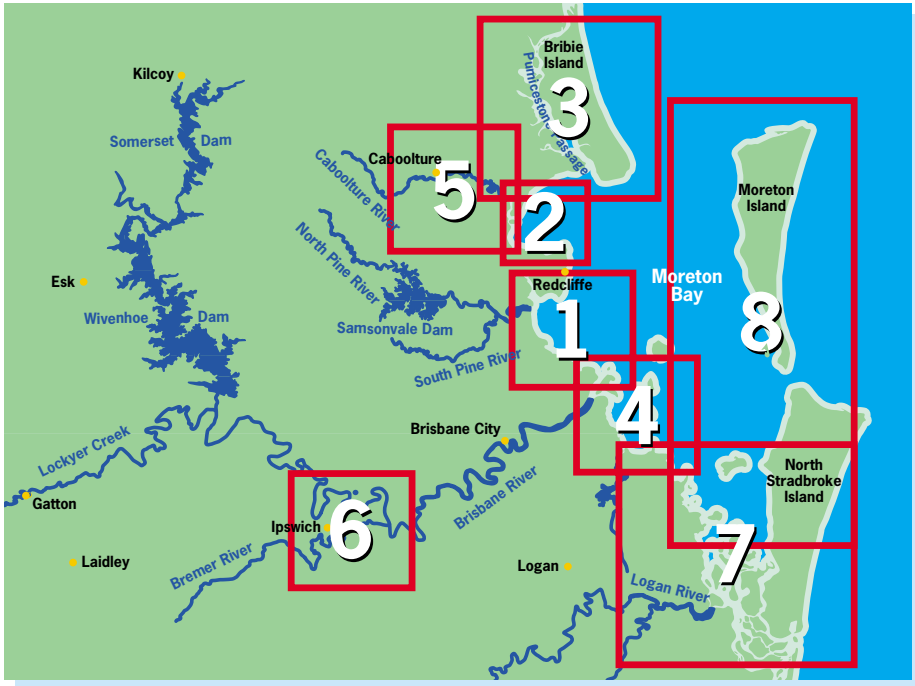
We live in one of the fastest growing areas in Australia. This rate of growth raises important questions for the future. Will we always have enough drinking water? Will the quality of our water decline? And what impact will this growth have on the balance of the natural environment?

Just as we all use water, we all have an interest in making sure our waterways stay healthy. It's easy to see how important a part they play in the way we live and the quality of our life.

All passengers and crew members need to understand one clear fact. If our waterways get 'sick', we'll get sick too! So what state of health is our system in right now? Let's take a look around the catchment and get an idea of the current health of our waterways.

SECTION 5

Moreton Bay catchment report card



The Moreton Bay catchment is an area of over 19,700 square kilometres.

How do we make a meaningful assessment of its ecological health and water quality.

One simple way is to travel to eight specific locations around the catchment and look at what is happening, look at the science that has been done and talk to the locals and get some feedback from them. You'll notice these sites are from the lower estuaries and the bay. They were chosen because they have been the subject of intense scientific investigation.

The next phase of scientific investigation begins in December 1998 and covers the upper catchment areas in significant detail but there is some information on two interesting sites in the upper catchment.

Why have a report card?

A report card is useful because we can revisit each location in years to come. We can look at the existing mark and evaluate what sort of a difference we are making in positive as well as negative terms.



What is an 'A'?

We have given each of the eight areas a mark from 'A' to 'F' – with 'A' being the highest and 'F' being a failure. The man in charge of the team 'handing out the marks' is one of the key members of the scientific research effort, Dr Bill Dennison. Before you sit for any assignment you need to know what gets you an 'A' and what means you fail. Here's Bill to explain it for you.



Dr Bill Dennison, University of Queensland

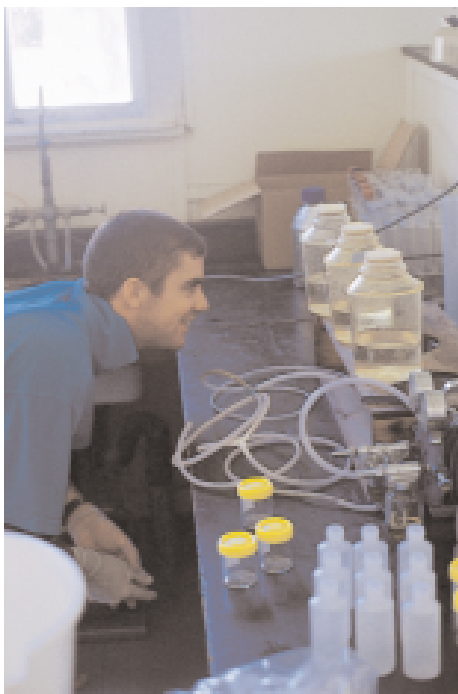
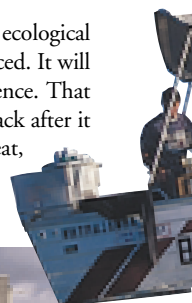
MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND



Seagrass monitoring, Department of Environment and Heritage

DEPARTMENT OF ENVIRONMENT AND HERITAGE

"To rate an 'A', an area has to have an ecological system that is productive and is balanced. It will be a stable system, with strong resilience. That is, it will have the ability to bounce back after it has been exposed to any sort of threat, whether that threat is from human or other influences such as major floods.



Scientists, North Stradbroke Island



MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND



Scientists, North Stradbroke Island

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“It will also exhibit what we call ‘bio-diversity’, which means there is a large number of different kinds of living things. When you examine an ‘A’ class area, you’ll find a diverse range of microscopic, plant and animal life all existing in a healthy system that is in harmony with what is going on around it.

“To help you understand why biological diversity is so important, think of a locust plague. A plague involves a huge number of living things in a thriving productive situation but the system is not in balance. One form of life is dominating at the expense of everything else. As you’ll see on our tour, there are systems in the bay with massive amounts of life and growth but in just one or two microscopic forms. Not only is that not healthy, it is evidence of a system that is ‘out of balance’.

“As systems get out of balance they start to be less supportive of the microscopic, plant and animal

life that would normally inhabit the system. We’ll be looking for natural and introduced factors that reduce the effectiveness and productivity of the system. These show up as imbalances at all levels of the system and result in a degraded environment. As these factors become more evident, the report card mark for that section decreases from ‘A’ through to ‘F’.

What is an ‘F’?

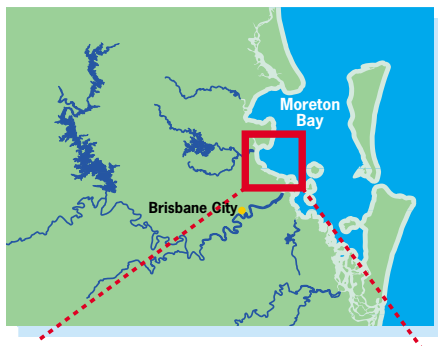
“An ‘F’ means that the natural system has not only declined, it has failed. It is not functioning well and there is little or no bio-diversity. It is out of balance and is not ecologically healthy.

“That does not mean that it can’t improve its mark but it is certainly in need of serious attention.

“So let’s get out there and get our hands muddy and our feet wet and take a look for ourselves at what’s happening around the Moreton Bay catchment.”



Test Site 1 – Bramble Bay



Where to stand – The end of the Sandgate Pier.

What can you see?

The first thing you notice is that the water is brown, and even though we know it's quite shallow here, you can't see the bottom. There aren't many pleasure craft around today but you can see some prawn trawlers in the distance.

Why is the water so brown?

The bay is quite shallow here. What's happening is that the wind together with the tide is constantly forcing the re-suspension of fine mud particles from the sea bottom, up and over again in the water so they never really settle out. That's why everything looks so brown and muddy. It doesn't have to be a strong wind to do this – in fact, any sea breeze will keep that mud circulating.



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Where to stand – Sandgate Pier



Hays Inlet

Where does this mud come from?

A lot of the sediment or mud has washed into the bay from the rivers, and it simply is not meant to be here. Sediment is one of the major negative forces affecting the Moreton Bay system.



If you're wondering how much sediment arrives in the bay each year, imagine 50,000 trucks lined up with full loads, waiting to dump them into the bay.

Everything is connected

Where this sediment comes from is a very good example of how everything in our catchment system – all the creeks, all the rivers – is totally connected from the top of the catchment to the bottom of the bay. While we don't yet know the source of all the mud, we do know it comes from a combination of the following elements.

- **Urban run-off** – this is sediment that comes with the stormwater that pours untreated into the creeks and rivers and then travels down into the bay. This is water from our streets and suburbs complete with dog droppings, soil and grass and leaves as well as litter. It includes soil washed away from building sites and road works.
- **Catchment run-off** – this is the sediment that travels down from the farms and grazing areas of the catchment, complete with all the fertilisers and nutrients that might remain after years of exposure. None of this material belongs in the bay and, when it gets there in such volumes, the natural system can't deal with it.

There's poor flushing

Bramble Bay is a natural backwater. It's a long way from any interaction with clean sea water, and the sediment in the water here goes around and around for days before leaving the area.



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Algal bloom, Bramble Bay and Hays Inlet

That's not the bay's fault, it's always been affected by its distance from the open sea but it does mean any contaminants don't get out as quickly as we'd like them to.

What's that green stuff?

If you talk to the locals, or spend a bit of time in this area, you'll understand that the water is capable of turning green overnight and can then turn back just as quickly. This is a massive biological 'factory', with phytoplankton chewing up the high quantities of nitrogen in the sewage effluent that flows into the bay from the treatment plants at Luggage Point, Pine Rivers and Hays Inlet. This results in a massive amount of growth for a purpose we don't understand. It's a real sign that the system is 'out of whack'.

The sewage nutrient factor

How many litres of treated sewage effluent flow into the rivers and bay each day? Each day, Brisbane's ten sewage treatment plants alone discharge about 300 million litres of treated sewage effluent.

The nutrients in this sewage effluent, the elements that are left in the sewage effluent when it is piped out of the sewage treatment plant, do not belong in the bay. Sewage nitrogen is a major contributor to the health problems of the natural system. To make things worse, because of the distance from the open sea and the resultant poor flushing, these nutrients tend to stay around for a long time.

There are a total of 30 sewage treatment plants in the lower catchment area.

Growth for no good reason

The glint of bright green over by the shore is an algal growth we call 'sea lettuce', and you'll find it lining the shore around here and Woody Point. It's here because of the sewage nutrients – particularly nitrogen – and while it is not harmful in its own right, it smothers the other algae and stops them doing the work they are supposed to do in the natural scheme of things.

Let's jump in the water

If you walk in to Bramble Bay up to your knees, you can't see your feet. That means there is poor light penetration. The bottom at first is sandy and firm. As you go out a bit, it gets muddier and muddier. If you go under the water, all you'll see is a thin veneer of green fuzz on top of the mud.

No seagrass

Underwater, you'll scarcely see your outstretched hand in front of your face. The absence of light means seagrass cannot grow here. No seagrass means there can be no dugongs and no turtles. It also means there is no breeding and spawning ground for fish. There are, however, lots of worms, and as you go further out, there are lots of prawns. They seem to love the mud areas in the centre of the bay and a lot of our local prawns are caught here.



Mangrove forest, Brisbane River mouth

The importance of seagrass to a flourishing marine environment can't be over-stressed. Seagrass has to be able to 'see' the sun before it can grow but it can't grow in this muddy water.

A favourite recreational area

Historically, this was a favourite area for swimming and fishing. There have been seagrass meadows in Bramble Bay within living memory. It has changed over the years from a biologically rich and abundant area to a degraded system. In fact, it's changed from a swimming pool to a mud hole.

Where the big ships go

Looking back towards Nudgee Beach, you can see the port cranes towering in the sky in the distance, and out to sea you can make out the big ships queuing up to come into port.

One worry about the very big ships is that when they travel empty, they load up with ballast water from the sea at their last port. This extra mass keeps them stable while travelling. When they arrive near Brisbane, the ballast water has to be pumped out into the bay before the ship can take on new cargo. Many problems can result if the ballast water discharged into the bay contains living organisms or pollutants.

The question is: who knows what micro-organisms are being added to our already unbalanced system? Work is being done now to regulate the dumping of ballast waters into the bay.

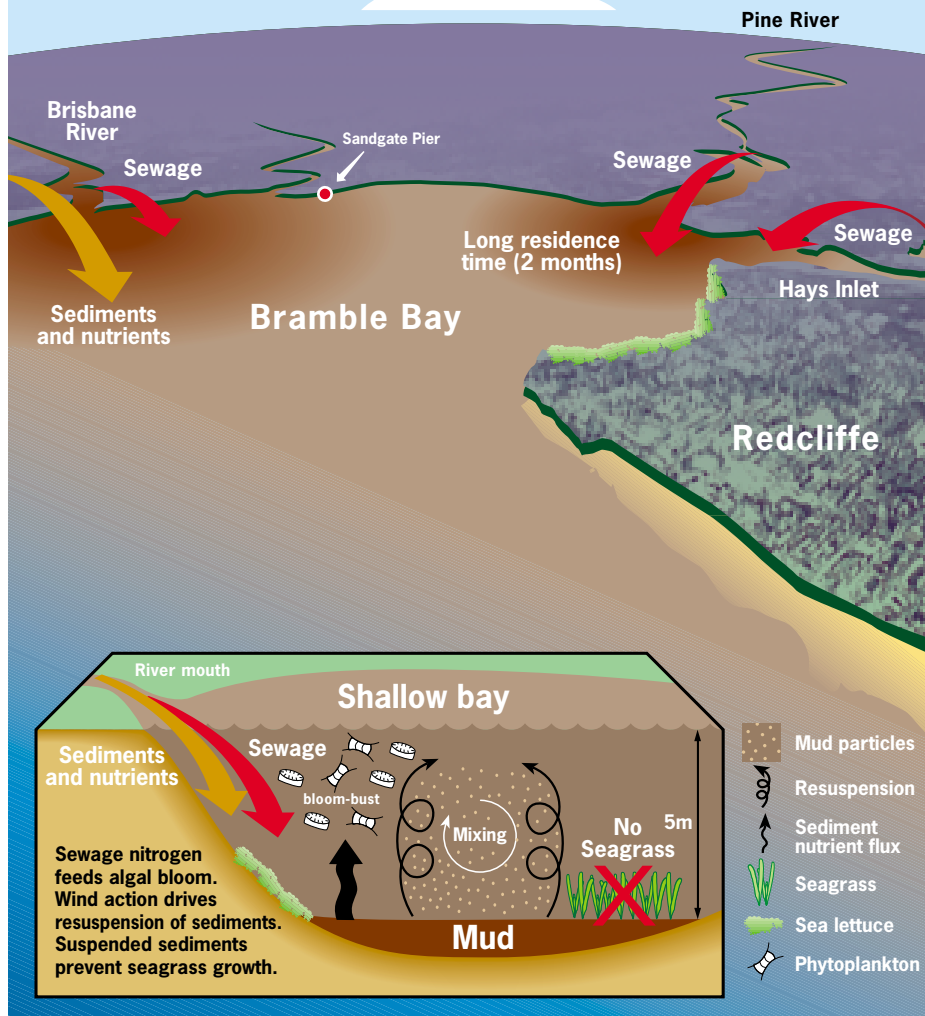
The mangroves are flourishing but ...

Over at the mouth of the Brisbane River, there's a huge clump of mangroves near where the sewage effluent pours into the sea. They are thriving on the nutrients in the effluent. Mangroves are the 'kidneys' of our system. They act as a filter for the nutrients and are doing their job well.

The bad news is that if you take a look inside, they are absolutely saturated with nutrients, so while they are healthy, they just can't handle any more. They're full, and so the nutrients just pour on past, unfiltered, into the bay.



Bramble Bay



What's happening here?

A lot of sediment or mud flows down the rivers and into the bay. It's quite shallow and the wind and tide constantly force the re-suspension of fine mud particles. Everything looks brown and muddy. There's little flushing. Poor light penetration means no seagrass. No seagrass means limited marine life in the area.

Nutrients in the sewage effluent that flows into the bay from the treatment plants are consumed by phytoplankton in massive quantities. The water is capable of turning green overnight. These 'bloom-bust' cycles are a sure sign the system is not balanced.

Report card mark for Bramble Bay

F

Human impact on the natural system in Bramble Bay has been such that the system has failed and continues to fail. It can't cope with the pollutants that pour into it every day. It has lost its natural ability to function effectively.

Reasons for this failure include:

- the massive amounts of mud/sediment arriving in the bay;
- the constant re-suspension of that sediment by tide and wind that keeps the water 'muddy' and makes it impossible for sunlight to reach the sea bottom;
- the total absence of seagrass;
- the added sewage nutrients that drive the massive 'bloom-bust' phytoplankton growth cycles that can turn the water green overnight; and
- very poor tidal flushing because Bramble Bay is a long way from the sea, so what's in the water tends to stay there for months.

We need to understand that Bramble Bay is always going to do it tough because of its geographical position. It sits at 'the end of the pipe' and it has little or no water exchange – what comes there, tends to stay there.

Encouraging factors

There is not much good news. As you'll read later, lots of activity is underway to reduce the stress on the natural system and encourage it to function better. As a whole catchment, we have to face the fact that Bramble Bay is a failed system and that it will be tough to lift its grade in the years ahead.

This is not a local problem. This failure affects everyone in the catchment. The stormwater and sediments and sewage nutrients that end up in Bramble Bay don't just come from the local area, they come from all over the catchment. That's why it will take a whole catchment effort to make any substantial improvement in the quality of water.

Future science

A major investigation is planned into the mud/sediment in Bramble Bay.

Before we can improve the situation, we need to reduce the flow of sediments and nutrients into the bay. Before we can do that, we need to know exactly where the sediment is coming from. That identification task is scheduled for the 1999-2001 scientific study in the catchment.



Bramble Bay

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Test Site 2 – Southern Deception Bay



Where to stand – Scarborough Point, looking across the southern end of the bay towards the Glass House Mountains.

What can you see?

The first thing you notice is that we are looking at a whole lot of muddy water.

You can see lots of mangroves, especially around the mouth of the Caboolture River, and that's good for the system. There are lots of rocky outcrops here, and if you want to go out and study algae in the field, this is the place to go. A lot of the rocks are covered with masses of red, green and brown algae.

But where has all the seagrass gone?

The bad news is you won't find any seagrass in Deception Bay. All the seagrass was lost in 1996 and we're not exactly sure why. It's believed the loss is linked to a major flood in that year. After the flood, there was a massive increase in the amount of mud that flowed out into the bay.

We experienced the biggest loss of seagrass ever, in recent times. To understand how much seagrass has been lost in this area, think of 3450



Where to stand – Scarborough Point



Mangrove forest, southern Deception Bay

football fields grouped together. One year they were covered in seagrass and the next year they were bare.

Seagrass is not just a critical food supply for dugong, turtle and fish, it is also an important schooling and breeding ground for a lot of other marine life. A loss of that proportion is very significant. As yet we are not aware of any seagrass returning to this area of the bay.



Pink mangrove lobster

A model of good health

One of the major scientific tools that has been developed is a fully operational computer model for Moreton Bay that allows scientists and planners to see how what's in the system moves around – how long things stay in place (residence time) and how different elements are affected by the impacts of tide and wind.

Just hanging around

This table gives you an indication of how long a contaminant might stay in a particular area before being flushed out to sea.

Area	Residence Time
Near ocean boundaries	less than 1 day
Deception Bay	65 days
Waterloo Bay	70 days
Bramble Bay	80 days
Southern Moreton Bay	80 days
Middle reaches of Brisbane River	120 days

Effective computer modelling has been used to help predict the effects of various management actions on water quality. Scenarios have been run for both wet and dry periods for the years 2010 and 2020 reflecting changes in land use and population. This data has helped define what needs to be achieved in terms of total system management.

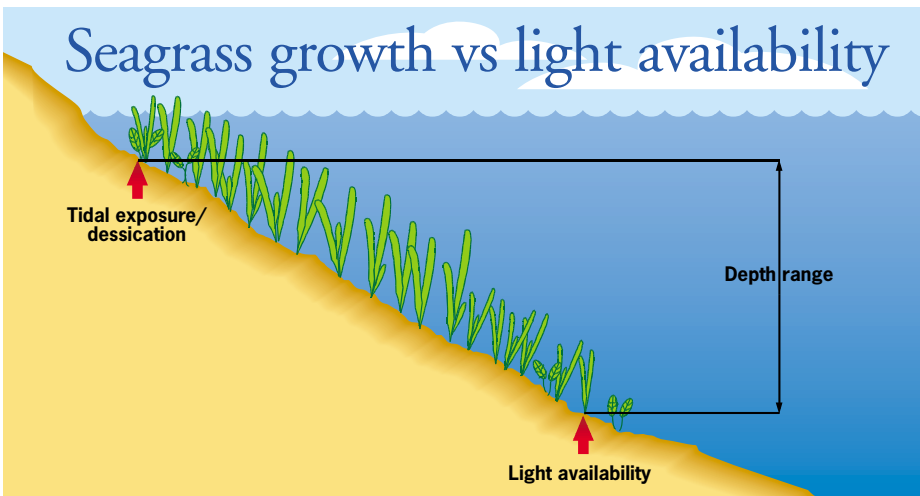


Let's jump in the water

If we move out over the rocky breakwater and the mud, and ease our way into the water, the visibility is very low. It's very muddy, and that means the seagrass has little chance of re-establishing itself.

No sewage plume from the river

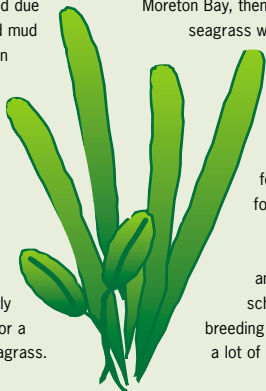
As we move on out, we notice there are no phytoplankton blooms. Thanks to the combination of nitrogen removal at the sewage treatment plant, the discharge of sewage effluent



What's happening here?

In order to grow, seagrass needs sunlight. The depth at which seagrass can successfully grow is therefore directly affected by the ability of light to penetrate the water. If water declines in health and becomes browner or more turbid due

to suspended mud particles, then less light can penetrate. This reduces the depth at which the seagrass can grow. A decline in water quality can be directly responsible for a decline in seagrass.



This is thought to be the principal reason behind the major seagrass losses in Deception and Bramble Bays. The map shows the relative size of those losses. However, if water quality improves as it has in southern Moreton Bay, then it appears

seagrass will return of its own accord. Seagrass is a critical food source for dugongs, turtles and fish, and is an important schooling and breeding ground for a lot of marine life.

Seagrass distribution





Mouth of Caboolture River

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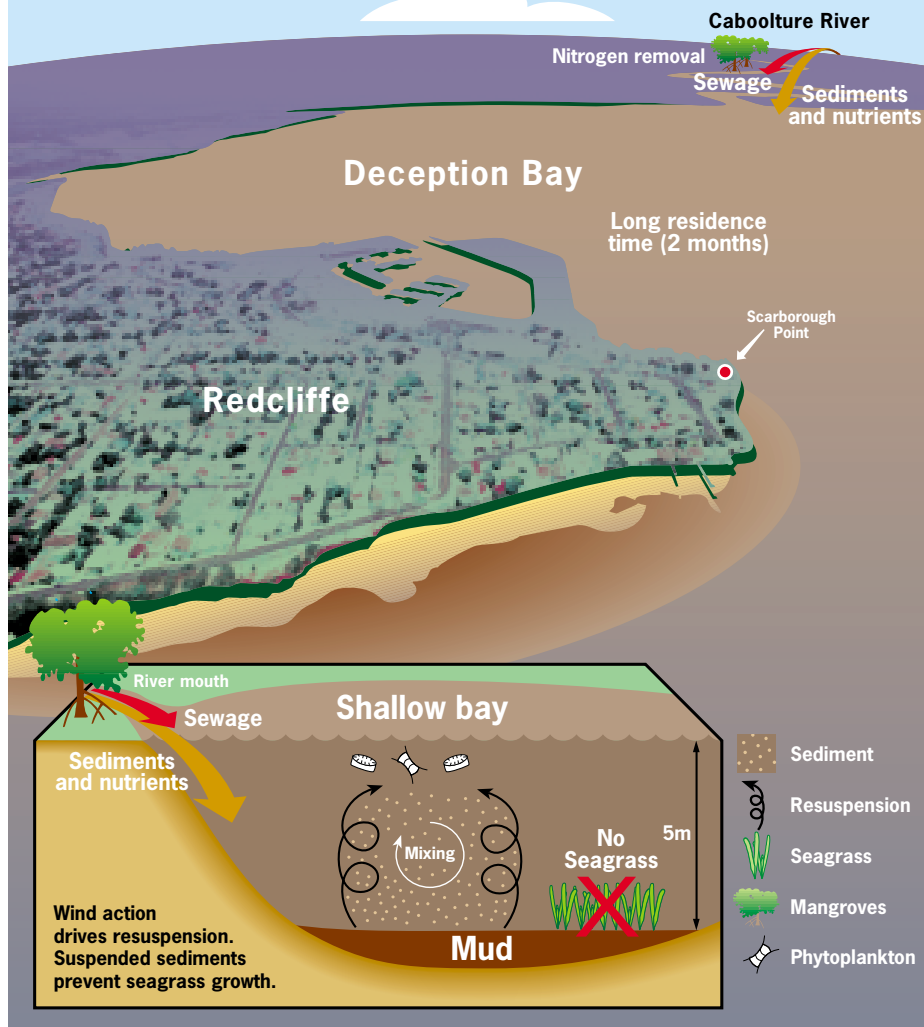
upstream instead of at the mouth of the river, and the natural influence of the river itself, there is very little sewage nitrogen flowing into the bay. There are big blue jellyfish everywhere. They exist in huge numbers in the western bay and we don't know why.

When you look at the water at night, you can see a sparkling bio-luminescence caused by the

microscopic life in the water. It clings to your oar blade as you move through the water. It's evidence that the system is rich in dinoflagellates. These are primitive microscopic organisms that do not support a healthy marine environment.



Southern Deception Bay



What's happening here?

There is no seagrass in southern Deception Bay. All the seagrass was lost in 1996. It's believed the loss is linked to a major flood. The water is still muddy which means the seagrass has little chance of re-establishing itself. There is no sewage plume from the Caboolture River and little sewage nitrogen flows into the bay.

The system in this area is rich in dinoflagellates. These primitive microscopic organisms do not support a healthy marine environment. In fact, in the right conditions they can form toxic algal blooms. There is little flushing.

Report card mark for southern Deception Bay

C → D

The ecological health of the natural system in Deception Bay does not rate a pass mark and the unfortunate thing is that it has fallen away even further in recent years due to the sudden disappearance of the seagrass.

It is not in as poor a condition as Bramble Bay but it is another area that is low in natural ecological health. It is also very slow moving, very turbid, and pollutants stay in the system for a long time. There is very little flushing.

Encouraging factors

Action is being taken across the catchment to reduce the amount of sewage nitrogen that is coming into Moreton Bay but this section of the bay is already relatively clean so it does not stand to benefit as much as other areas. It will benefit most from actions which reduce inflow of sediments and toxicants.

Future science

A lot of work needs to be done to trace where the sediment is coming from and why it is arriving in the bay in such large amounts. Only by finding out where it comes from can we hope to do something about reducing it, because once it is here, it stays for a long time. And it is threatening the health of our system.



Beachmere and southern Deception Bay

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Southern Deception Bay

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Test Site 3 – Northern Deception Bay & Pumicestone Passage



Where to stand – On Bribie Bridge.

What can you see?

The good news is that if you look down here, you can see some seagrass and occasionally you will catch a glimpse of a turtle or a dugong in the area. There are lots of amateur and professional fishermen around Bribie Island and there are fish being caught, although if you talk to the professionals, they'll tell you they are doing it tough.



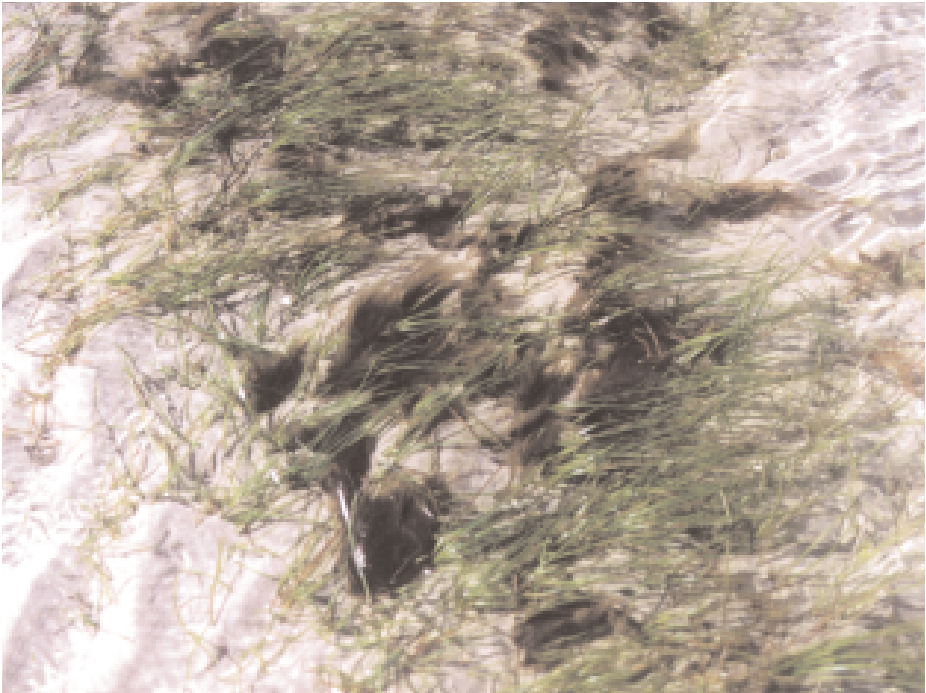
Seagrass beds, northern Deception Bay

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Where to stand – Bribie Bridge



Lyngbya, settled on seagrass beds

The curse of the 'mermaid's hair'

If you look down at the seagrass in the water, you will see thin dark strands attached. It's known as 'mermaid's hair' but it might be more appropriately called 'mermaid's curse' because right now it represents the biggest single challenge to ecological health in this part of the catchment.

Every so often, floating tufts of this cyanobacterial (blue-green algal) growth break away and float off with the tide. If you look over to the beach, you'll see large clumps of it piled up and rotting. It also fouls crab pots and fishing nets. And it stinks!

On occasion, local councils have been forced to use bulldozers to clean up these large piles of rotting matter on the beach. This stuff is dangerous as it causes people's skin to blister and chases away the fish and crabs.

A significant health risk

The scientific name of this cyanobacteria is *Lyngbya* and one theory is that it blooms because the water has a high concentration of iron, which may come from exposed acid sulphate soils. Building developments in low-lying areas can expose acid sulphate soils. Unless preventative action is taken to manage the soil, the exposure can cause acid to leach into the waterways, resulting in very high iron levels in the water. Sometimes after rain, you can see an orange tinge in the water flowing from a creek at the southern end of Bribie Island.

But whatever causes *Lyngbya*, it is a total toxic mess. It attacks the hands and legs of fishermen, peeling off the skin and leaving them red and scaly. As well as causing severe dermatitis, it produces asthma and eye irritation.



There's more of it, and it is blooming more often. Where once it used to bloom from January to March, there is evidence that blooms now last all year. All this has only happened in the last ten years or so!

A real threat to nature

Lyngbya smothers its victims. Clumps settle on the seagrass, which results in the seagrass being deprived of oxygen and light. It kills the seagrass and eventually floats away to rot somewhere else. It leaves behind a patch of bare ground in the seagrass bed and it smells bad.



Lyngbya, piled up and rotting on the beach

MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND



Farmlands, Deception Bay catchment

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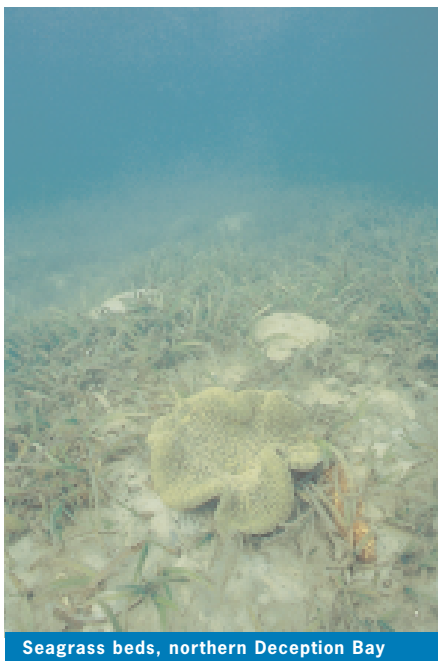
Where you find *Lyngbya*, you won't find fish. It's so full of toxins that nothing will eat it. It just grows and rots. This is a very severe warning sign that we are dealing with something that has thrown the system totally off balance.

Time to jump in the water

If we jump in and swim from the passage out towards the sea, we travel down a long shallow gradient and eventually come to large areas of seagrass. There is some algal growth that is increasingly competing with the seagrass but the overall health of the environment outside the *Lyngbya*-effected areas is good.

There is good tidal flushing and mostly good visibility. You can usually see for several metres, although occasionally the water will appear pitch black due to the extreme turbidity.

There are good crab and fish populations but if you listen to the locals, it appears to be only a shadow of what it used to be before the bridge linked the island to the mainland.



Seagrass beds, northern Deception Bay

DEPARTMENT OF ENVIRONMENT AND HERITAGE

“Major growth – major pressures” Catchment Comment

from Peter Oliver, Senior Program Extension Officer, Department of Natural Resources, Queensland



Tidal flats, Pumicestone Passage

DEPARTMENT OF ENVIRONMENT AND HERITAGE

We now have farmers, fishermen, householders and commercial people starting to talk to each other, and starting to understand that if we lose what's precious around here, people won't come. And if people don't come, everyone loses.

Pumicestone Passage is subject to major urban growth pressures. All land uses create downstream problems if they are poorly managed – especially urban development.

We have to do a much better job with erosion and sediment control, stormwater management and effluent treatment and disposal. Acid sulphate soils are also a problem in our low-lying areas. I don't think we've yet got our act together on this. We tend to be reactive rather than proactive.

In the past, people have seen the health of the Passage declining and have blamed other people, like farmers or local councils. Their observations are important but through catchment management groups, more people are realising it's time to stop finger-pointing and sort out what we are doing on our own patch, what we have in common and how we can work together for our own good and for the benefit of our surroundings.

Whether we live on Bribie Island, on a farm, or in the suburbs, the water links us together.

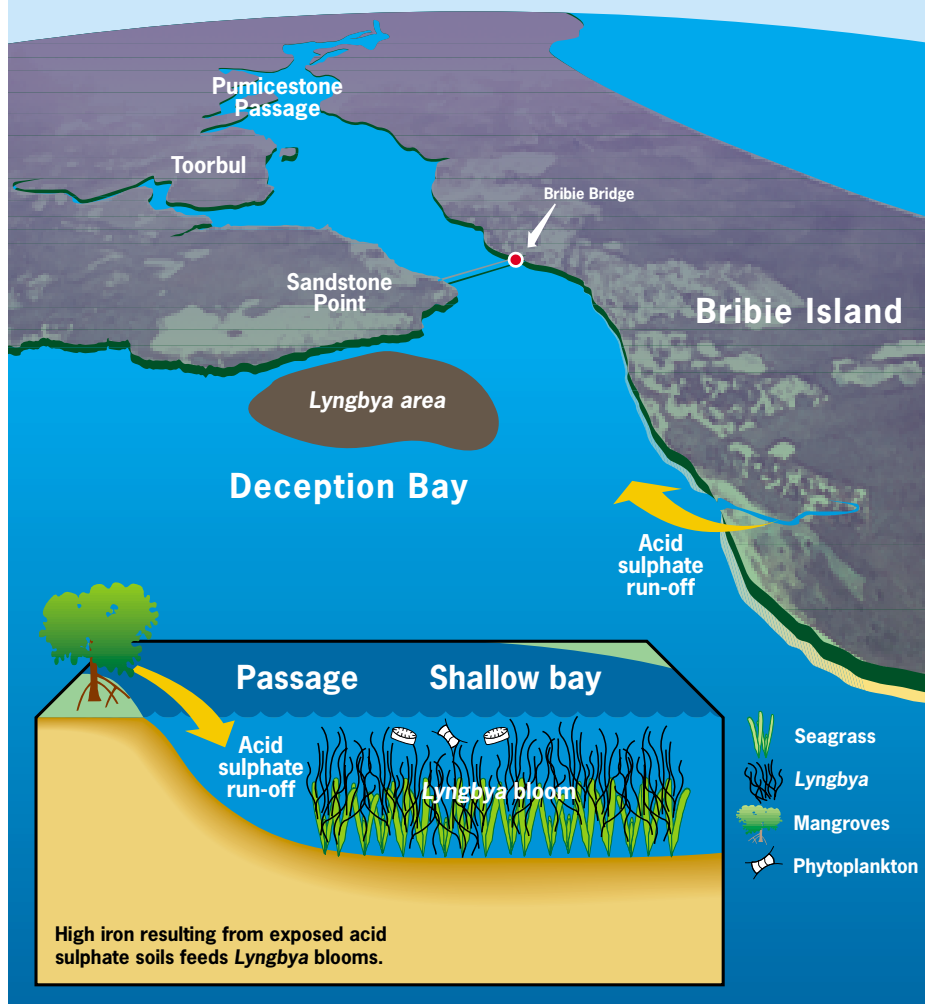
We held a workshop on Bribie Island recently where people from the development and earthmoving industries were able to talk and listen to local fishermen who are being directly affected by the Lyngbya (blue-green algal) blooms. And that was very positive.



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Northern Deception Bay & Pumicestone Passage



What's happening here?

A major threat to this area is the toxic blue-green algal growth called *Lyngbya*. One theory is that it blooms because of the high concentration of iron in the water that may come from exposed acid sulphate soils in this area of the bay. After rain, you can sometimes see an orange tinge in the water flowing

from a creek at the southern end of Bribie Island. There are large areas of seagrass but some algal growth is competing with the seagrass. The overall health of the environment outside the *Lyngbya*-affected area is good. There is good tidal flushing and mostly good visibility.

Report card mark for northern Deception Bay & Pumicestone Passage

C→D

This is an area of Moreton Bay that is deteriorating before our eyes.

It is getting worse as it faces its most hostile invasion ever.

What was an extremely productive and visually pleasing environment is now under threat in a very obvious and unpleasant manner. Piles of rotting, foul smelling vegetation cannot be swept under the carpet. The seagrass is under threat and the fish and coral populations are depleted.

Encouraging factors

The most encouraging factor is that the decline is being actively investigated and solutions sought.

Future science

Lyngbya has been targeted by the scientific team as the major toxic threat to ecological health and water quality, and a scientific task force has been assembled to investigate it as a matter of urgency and report on any measures that can be taken to limit its growth and reduce its potential impact.



Mangroves, Pumicestone Passage

DEPARTMENT OF ENVIRONMENT AND HERITAGE



MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND

Lyngbya – target of further research



Test Site 4 – Waterloo Bay



Where to stand – Manly Boat Harbour, at the gate of the Royal Queensland Yacht Squadron.

What can you see?

This is a very pretty spot. In the foreground you can see boats gently swinging and rocking in the harbour and a little further out you can see sails lazily sweeping across the bay. When you visit on a weekend and see all these boats in action, you get another indication of just how important our bay is as a focus for recreation and relaxation.

If you look out further you can see the shapes of Green, King and St Helena Islands. It's a lovely aspect and a very active area of the bay.

Looking pretty good

If you look around the bay, you'll see lots of mangroves, particularly around the mouth of Lota and Tingalpa Creeks. Right off-shore you'll find a seagrass meadow with an occasional dugong in attendance.

The foreshore is muddy but the water is quite clear. If you put your whole arm down into the water, you can usually see down to your fingers.

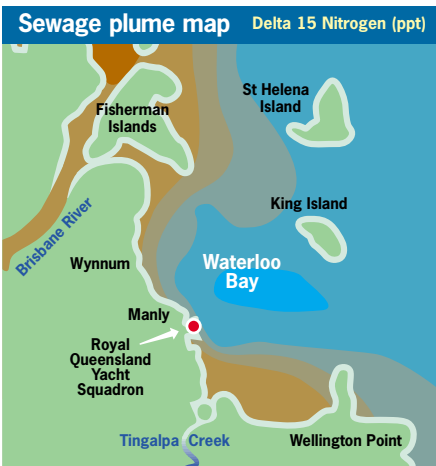


Where to stand – Manly Boat Harbour

Hanging in the balance

All in all, this is an area that is still productive. When you move further out into the bay, you'll even find coral formations and cleaner water. But the presence and the effect of humans is evident here too. Off to the left, you can see the industrial activity around Fisherman Islands and see the worm diggers on their hovercraft digging for bait worms.

You might see the dredge that travels out into the bay every day to pick up the sand that is being mined there and carried back up the river to be used by industry. If you look across to the mouth of Tingalpa Creek, there is a distinct sewage plume as treated effluent is pumped into the bay.



What's happening here?

In September 1997, scientists investigated over 100 sites in rivers and in the western and southern areas of Moreton Bay. Distinct sewage plumes were evident emerging from the Brisbane River, Hays Inlet and the Pine and Logan Rivers.

A small but significant plume from Tingalpa Creek was also noted.

There was no sewage plume in Deception Bay.



Commercial worm digging, Fisherman Islands



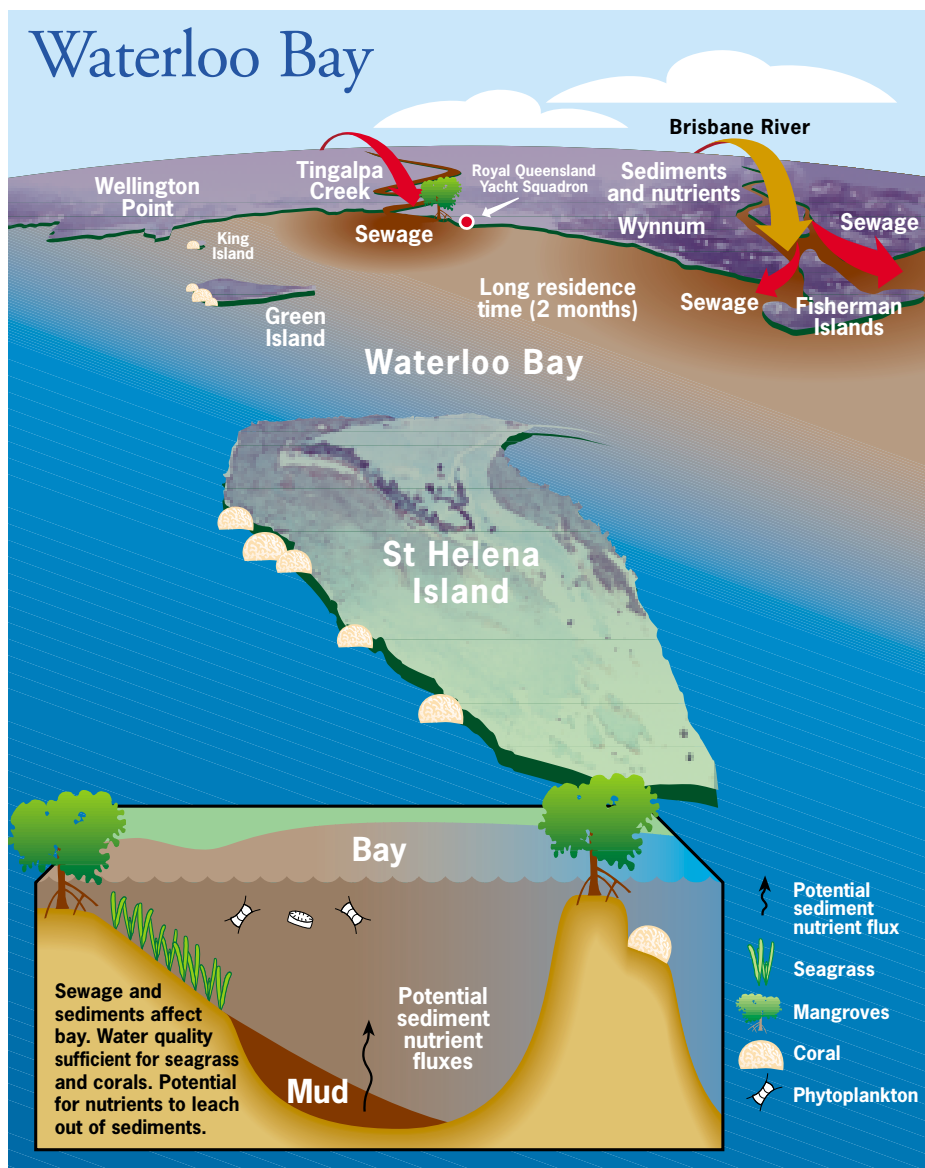
Tidal seagrass flats, Wynnum

Jump in for a swim

If you look closely at what is happening in the water, you get the impression that everything is finely poised. The system hangs in the balance, and over the next couple of years it will go one way or the other.

Even the sediment particles in the water seem to hang rather than circulate. Certainly the system supports life but you wouldn't describe that life as abundant or diverse. If you talk with the locals, they'll give you an idea of how things used to be around here not so long ago.





What's happening here?

The foreshore is muddy but mostly the water is quite clear. You'll see lots of mangroves around the bay. At the mouth of Tingalpa Creek there's a distinct sewage plume where treated effluent is pumped into the bay. Right off shore you'll find a seagrass meadow with an occasional dugong in attendance.

Further out into the bay, there are coral communities and cleaner water. The system is finely balanced and we need to ensure the first warning signs of any movement in the wrong direction are detected.

Report card mark for Waterloo Bay

C

The future health of this area of Moreton Bay is at a crossroads – it could improve or it could get worse. The concern is that if it gets worse, we will cross a threshold and the system will decline in health to a point from which it will be impossible to return. The 'C' mark might seem a little hard but the fact is that the life support systems aren't robust or productive enough to warrant a higher score.

This is an area that is very important to a lot of people. Down here, the waterways and the bay are a major asset to the local lifestyle, and bay issues seem to have a high profile.

There are definite human impacts on the condition and quality of the water but there is also a strong understanding that the bay needs to be protected and improved.

Encouraging factors

The area has been the subject of a lot of human activity but has shown resilience. The idea of protecting and improving the health of the bay seems to be strongly supported by some areas of the local population.

Future science

There is an intensive 'watching brief' for Waterloo Bay. The system is poised and we need to ensure the first warning signs of any movement in the wrong direction are detected. We suspect it's ready to tip and that must not be allowed to happen.



Sailing, Waterloo Bay

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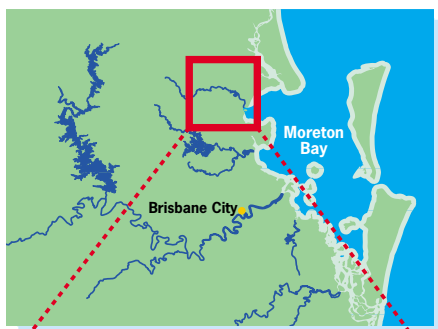


Tingalpa Creek, Waterloo Bay

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Test Site 5 – Caboolture River



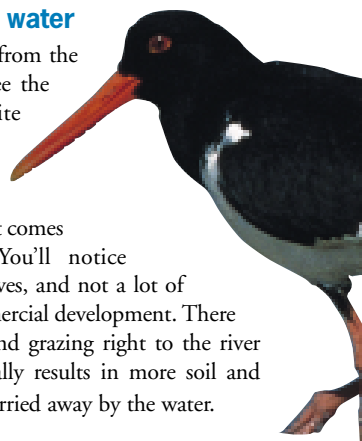
Where to stand – On the bridge, where the Bruce Highway crosses the river.

What can you see?

The Caboolture River is a very good example of just how hardworking and important a river is to the community that surrounds it. Just up-river from where we are standing, there's a weir. From the upstream side of the weir comes the main water supply for the area. Downstream of the weir, the treated effluent from the sewage treatment plant flows back into the river.

Shallow green water

If you look down from the bridge, you can see the water looks quite green and still. It's a shallow river and the major flushing movement comes from the tide. You'll notice clumps of mangroves, and not a lot of industrial or commercial development. There is some farming and grazing right to the river banks, which usually results in more soil and sediments being carried away by the water.

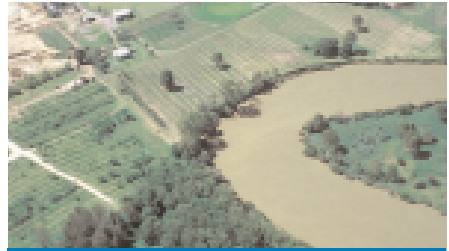


HEALTHY WATERWAYS LIBRARY

Where to stand – Bruce Highway bridge

Jump in the water

Towards the mouth of the river, the bottom is sandy and shallow, and the encouraging news is that by the time the river flows into the bay, the sewage nitrogen has almost totally disappeared. The combined result of nitrogen removal at the sewage treatment plant, and natural processing in the river means there is no sewage plume coming from the river.



Caboolture River

MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND

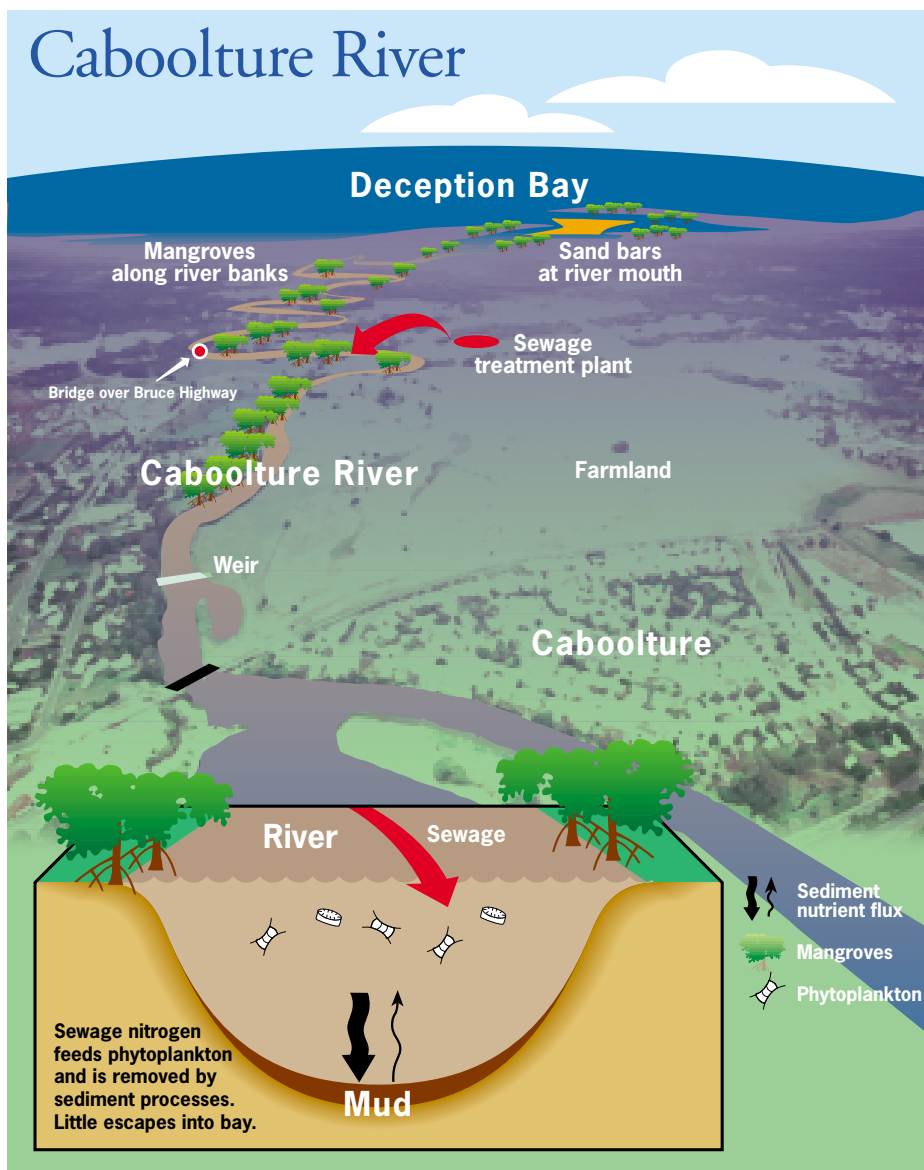


Mouth of Caboolture River

MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND



Caboolture River



What's happening here?

Water in this area of the Caboolture River looks quite green. It's a shallow river and the major flushing movement still comes from the tide. Sewage effluent is pumped into the river upstream but the combination of nitrogen removal at the

sewage treatment plant and natural processing by the river system is very effective. By the time the river flows into the bay, the sewage nitrogen has been almost totally removed, which means there is no sewage plume coming from the river.

Report card mark for the Caboolture River

C

This is a very hard working system and the local population is very dependent on the river to carry water into and take wastewater out of the community. While this is not an energetic waterways system, it is a system that still seems to have some internal balance and integrity.

It is coping with our demands for the moment but it is located in an area with a fast-growing population. How much more demand can it meet?

Encouraging factors

The Caboolture River is not adding any strange ingredients to the soup that we know as western Moreton Bay. So it is not causing bloom-bust algal growth cycles in Deception Bay.

Future science

Stage three of the major scientific investigation being carried out in the Moreton Bay catchment will move upstream from the bay and the mouths of the rivers to the upper catchment areas.



Caboolture River weir

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River bend

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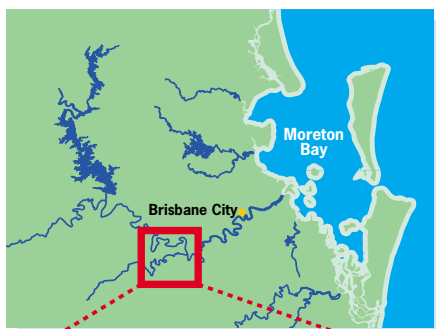


Caboolture River snaking to the bay

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Test Site 6 – Bremer River



Where to stand – Cribb Park, Ipswich.

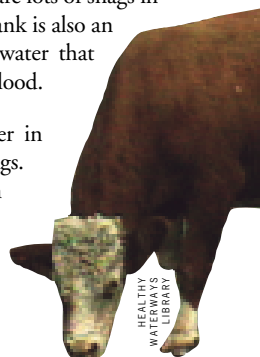
What can you see?

Cribb Park is an attractive park on the banks of the Bremer River. Although the park is quite delightful, the water is not. The water is extremely turbid. It is dense greenish brown in colour and not very pleasant on the nose.

Steep grassy banks

The steep banks are cleared of trees, probably due just as much to previous floods as to any systematic clearing, and there are lots of snags in the water. The height of the bank is also an indication of the volume of water that can pass down here during a flood.

There is lots and lots of litter in the water and stuck on the snags. An occasional water hyacinth floats past. This is an introduced species that has multiplied dramatically in the upper catchment and represents a competitive threat to remaining native vegetation.



Where to stand – Cribb Park

Tidal sloshing

Yes, even this far up from the bay the river is still tidal but nothing much gets scoured out and flushed away. The water just sloshes backwards and forwards. If you were to jump in the water here, you would find the bottom is coated with a thick black oozing slippery mud.

This 'oozy' mud is dreadful to get off your shoes or canoe paddles and is treacherous to walk across. It has gone 'sour', in that the healthy bacteria that can process some of the excess nutrients are overwhelmed and there is little processing in the mud. The water has very high bacterial activity and an abundance of phytoplankton. The phytoplankton are not very productive, however, and have a low diversity. The small sea-fleas in the river are also not very diverse and include fish-eating species.



Junction of Brisbane and Bremer Rivers

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Bremer River Sewage Treatment Plant

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Extreme turbidity

If you were to put your arm in the water here and lower it so the water was half way up your forearm, you would not be able to see your fingers.

The fact is that the river at this point is largely a waste collection and dispersal channel. As the water flows along, it appears that the river system has no real net affect on anything in the water. No nitrogen is removed, no health factor appears to be improved. The banks are just acting as a conduit for what is flowing through.

If you look at where most of the flow of the water comes from, you will see why this is the case. There is some stormwater input and some natural drainage from the surrounding catchment but the majority of the flow consists of industrial processing discharge and treated sewage effluent.



Abattoir on the Bremer River

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Bremer River – extreme turbidity

HEALTHY WATERWAYS LIBRARY

Catchment Comment

Councillor John Nugent, Mayor of Ipswich City and Chair, Moreton Bay Catchment Water Quality Management Committee

Water has always been important to me

One of the reasons I have always been so aware of the importance of water is that I grew up on a dairy farm and we relied entirely on water for the quality of our life. If it rained, the crops grew and the cows ate, and that had a direct effect on the way we lived.

I've lived around here since 1946

Back in those days the river was even dirtier than it is now. We used to have woollen mills and gas works and other industry on the river, and anything they didn't want often went straight into the river.

Bringing back the river

We know a lot more about the river and the sources of contaminants and toxicants today but we still need to know more about things like chemicals, salts and bacteria. However, while you can't correct the unsavoury practices of many years overnight, we do have an ongoing program to bring back the quality of our river to as close as possible to what it used to be.

The way nature intended

Council has a commitment to clean up and restore our river banks. We have a long-term plan to remove all the noxious weeds and exotic plants from the banks and replace them with the original species that were in this vicinity over 100 years ago. After all, that was how nature first designed the system to minimise silting, flooding and erosion and keep the balance between water flora and fauna. So it makes sense to put things back the way they were.

Disappointing

I am still personally disappointed at the people who dump plastic bags and bottles and rubbish in the bush and who don't seem to know or care that the first decent rain we get washes everything into the river system. We have to keep trying to get the message across that everyone is responsible.

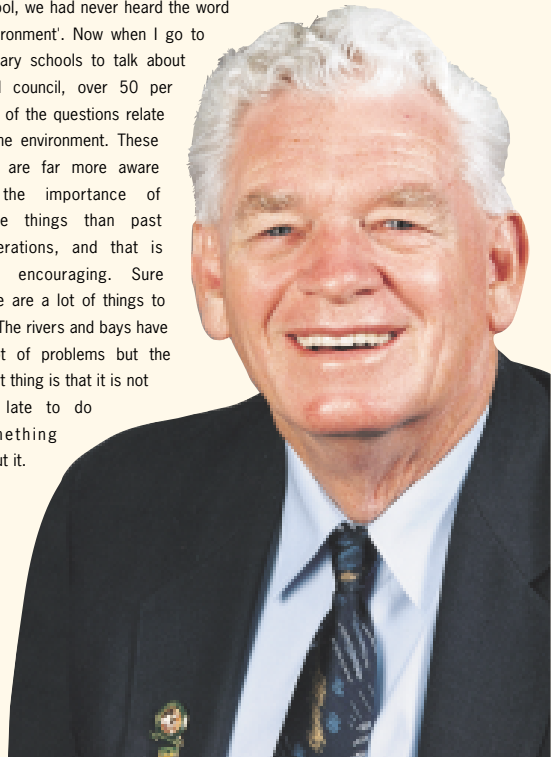
A sense of hope

But the main sense of hope I get is that school kids coming up through the education system are more aware than we ever were. When I was at school, we had never heard the word 'environment'. Now when I go to primary schools to talk about local council, over 50 per cent of the questions relate to the environment. These kids are far more aware of the importance of these things than past generations, and that is very encouraging. Sure there are a lot of things to do. The rivers and bays have a lot of problems but the great thing is that it is not too late to do something about it.



City of Ipswich

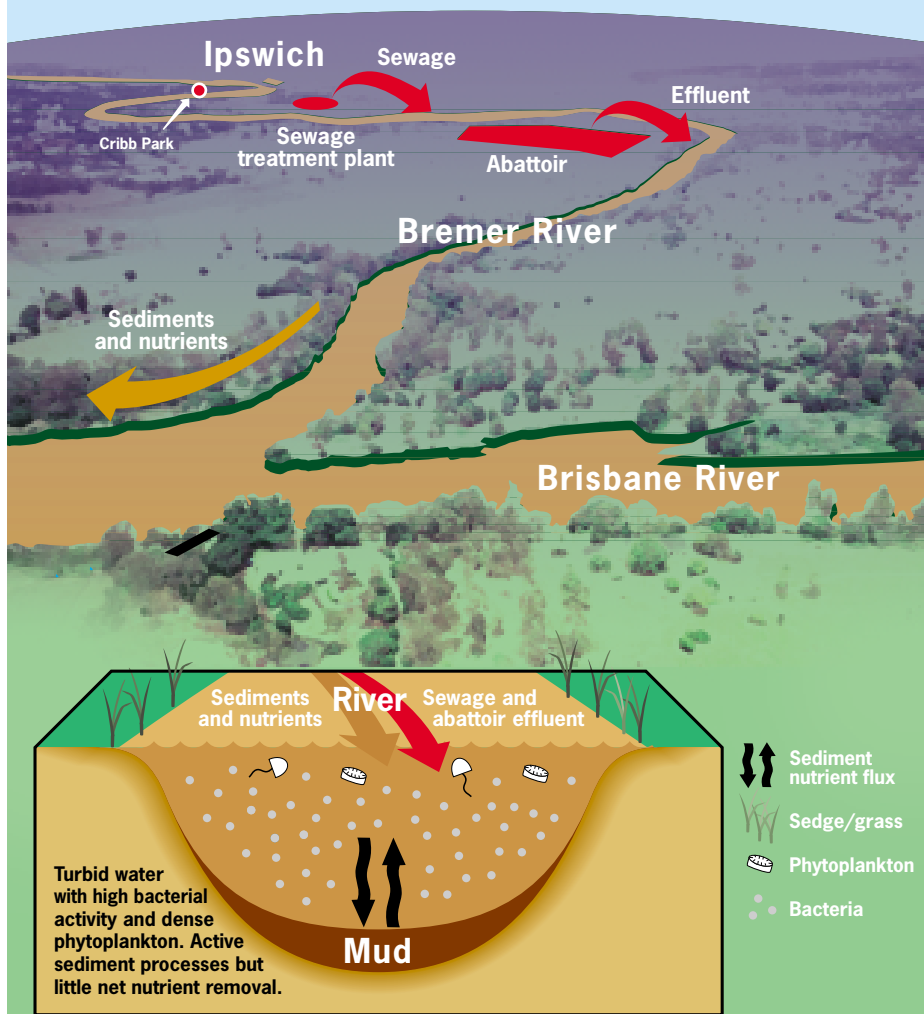
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Bremer River



What's happening here?

The water in this section of the Bremer River is extremely turbid. It is a dense greenish brown in colour and it smells. The bottom of the river is coated with a thick black oozing slippery mud. The water has extremely high bacterial activity. As yet, scientists don't know why the bacteria dominate the

system rather than the phytoplankton. The river system has no net effect on anything passing through. The banks are just acting as a conduit. The river flow is still affected by the tide, however this does not lead to effective flushing. In dry periods the river can become a 'lake', with essentially no flushing.

Report card mark for the Bremer River

F

The river at this point is largely a waste collection and dispersal channel. Even though it has been treated, the human and industrial waste flow has overloaded the natural system to the point where it has failed, and this impact is worsened by the fact that the system is extremely turbid and poorly flushed. The ecological health and water quality rating here would have to be among the very lowest in the entire catchment.

The current condition of the system is not entirely due to the impact of human civilisation. A major factor is the episodic and periodic nature of the water flow. In dry periods, the river becomes like a lake and nothing moves. When nothing moves, pollutants cannot be flushed. This river is paying the penalty for poor flushing.

Encouraging factors

The area is supported by one of the most proactive local councils and they are working very closely with the scientific team to contain the impact and attempt to improve conditions over time.

Future science

We need more scientific investigation here. We need a greater understanding of why things are as they are. For instance, it is surprising that bacterial activity dominates the system rather than phytoplankton. A lot more science is required before we know exactly what is happening and how we can help.



Bremer River Sewage Treatment Plant

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Bremer River snaking through farmland

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Test Site 7 – Southern Moreton Bay



Where to stand – Take the vehicular ferry to Russell Island. Drive down to the southern end of the island to Rocky Point and look toward the mouth of the Logan River.

What can you see?

If you stand in front of the big clumps of mangroves on the southern end of Russell Island, you can look across to the mouth of the Logan River. It's a couple of kilometres away but there's no development here, so on a clear day you can see across to the hard-packed sand bar at the mouth of the river.

You may see prawn trawlers working the mouth of the river. There's an occasional sail boat and speed boat enjoying the conditions in the bay and at most times of the year, you'll find lots of fishermen.

What's the water like?

Even over here the water looks fairly brown, and that's not a good thing. Brown water is usually a sign that there is something in the system that is not as it should be. If you waded out into the water up to your knees, you can see your toes but that's about the limit.



Where to stand – Rocky Point



Southern Moreton Bay islands

MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND



Mangrove trees killed during the hail storm

MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND

As you look around, you are instantly struck by the towering sand hills of Stradbroke Island, and if you look over to the Canaipa Passage you can see areas where the water looks cleaner and bluer.

The best news in the bay

One of the most exciting events in the entire Moreton Bay catchment is happening right here before your eyes. The seagrass that was lost in the late 1980s and early 1990s is slowly coming back. And this is not due to a re-planting program.

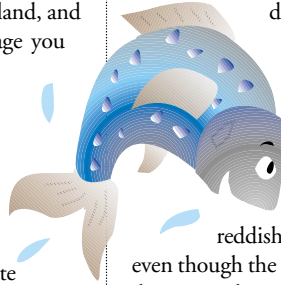
This is natural regeneration. So, why has this happened? While we don't know for sure, it seems there must have been some improvement in the local water quality. This may be due to better flushing in the area due to some changes caused by heavy sea action around the Jumpinpin Bar.

It gives us all a lot of hope because it shows if you can improve the water quality in an area where seagrass has been lost, the chances are that it can regenerate itself.

Jumping in at the mouth of the Logan River

The bottom of the river mouth is quite sandy but it gets muddier and muddier as you move out into the bay. There's certainly fine-grain

mud travelling down the Logan River and being deposited in the bay but there is not as much sewage nitrogen, compared to Bramble Bay.



Some areas at the bottom of the bay are dense with stringy bits of blue-green algae, and there are some reddish pigment varieties. However, even though the seagrass is starting to return, the dugong and turtles have not come back.

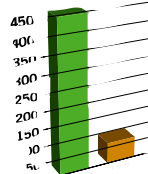
Mangroves – dead and alive

The immediate landscape is dominated by the mangroves and there is case study evidence here of the important role they play in the ecological health and the marine life cycle of our bay.

If you look over to Cobby Cobby Island you'll see a swathe of dead mangroves. This was caused by a hail storm. Scientists found that fewer fish

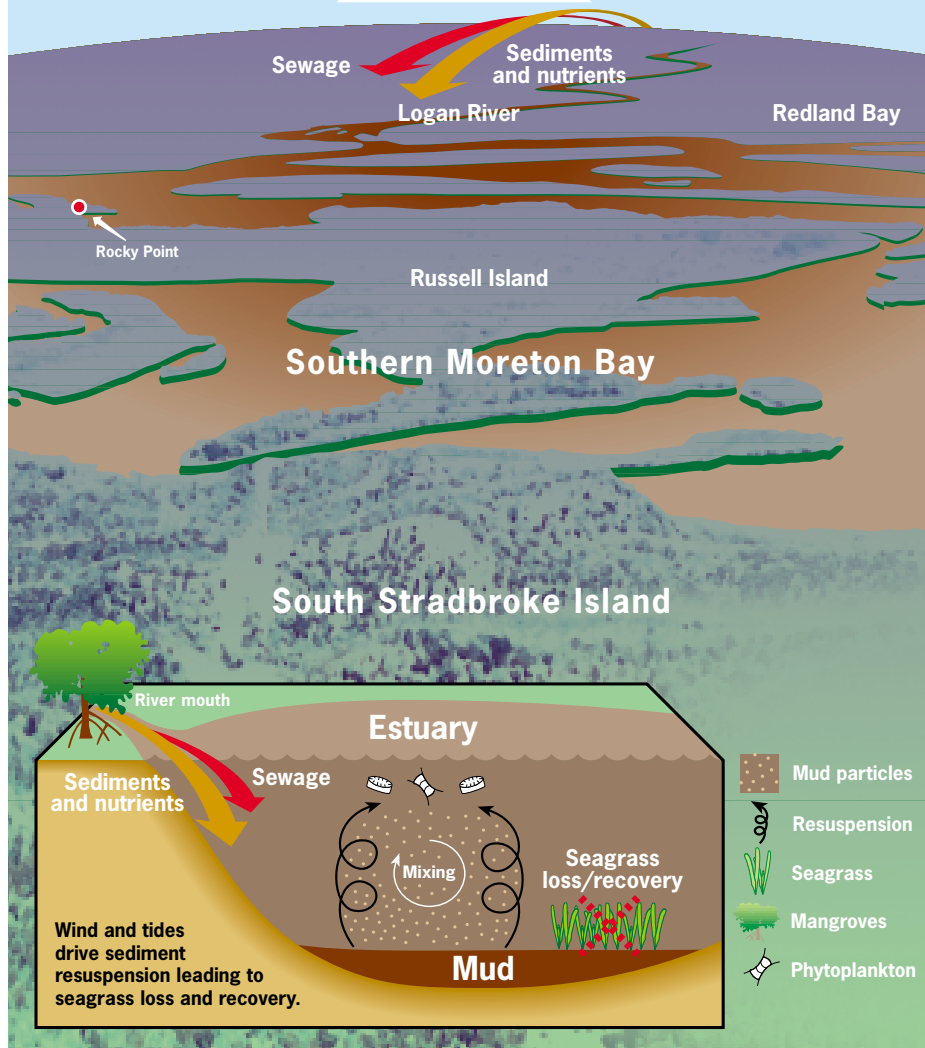
were using these areas of dead mangroves than were using the nearby healthy areas. This underlines the importance of mangroves as a breeding ground and nursery for our fish population.

Cobby Cobby Island fish populations





Southern Moreton Bay



What's happening here?

At the mouth of the Logan River, the bottom is quite sandy but it gets muddier as you move out into the bay. Fine-grain mud is travelling down the Logan River and being deposited in the bay. But there is little sewage nitrogen being deposited. The water quality for the area has improved. The seagrass

banks that were lost in the late 1980s and early 1990s are starting to return. The region is flushed mainly through the Jumpinpin Bar and supports large schools of fish and bird colonies. The fact that the seagrass has returned of its own accord is a very encouraging sign to everyone working to improve water quality.

Report card mark for southern Moreton Bay

C → B

The big news is that the seagrass is returning. The region supports large schools of fish and bird colonies and the human impact on this area of the bay appears to be limited and under control for the moment. The fact that the seagrass has returned of its own accord is tremendously encouraging to everyone who is working to improve water quality. The water quality for this area has actually improved.

Encouraging factors

This area has an improved report card mark, and that is extremely encouraging.

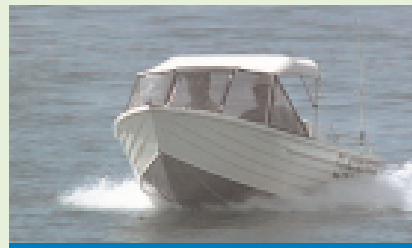
Future science

An initial study of the Logan-Coomera area was funded by four local councils and was completed in 1994. It provided a plan for management of wastewater discharges and ongoing environmental monitoring in the area. The next phase of this scientific work will be linked into the catchment-wide scientific investigation being undertaken as part of Healthy Waterways.



Mouth of Logan River

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Recreational boating

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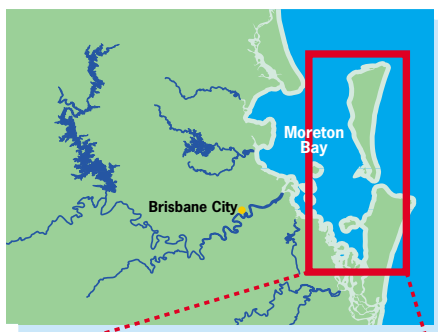


Seagrass recovery, Logan River mouth

MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND



Test Site 8 – Eastern Moreton Bay



Where to stand – Amity Point on the tip of North Stradbroke Island.

What can you see?

This is one of the most encouraging and exciting examples of good ecological health across the catchment. When you stand at Amity Point and look back to the mainland, apart from the city skyline in the distance, you could be seeing the same diverse and abundant collection of plant and animal life that would have been seen 150 years ago.

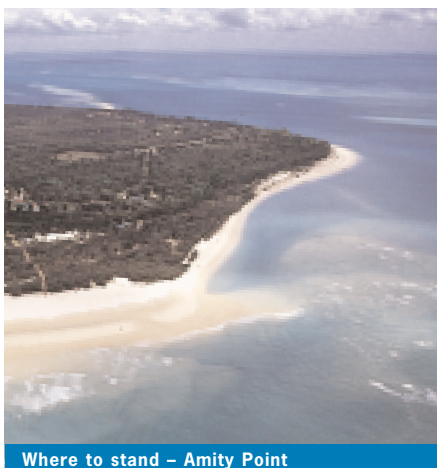
An abundance of life

From here, you can look out and enjoy the mangroves and the rookery and the thousands of sea birds. It's estimated that the foreshore and wetland areas are the seasonal home to more than 25 per cent of Australia's known bird species.

You'll see dugongs feeding and dolphins frolicking and even the occasional whale. As you watch all this happening, it's worth taking a moment to think that this is maybe the last place in the world that you'll find a large dugong population living in sight of a major city.



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Where to stand – Amity Point

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Eastern bay seagrass banks and Moreton Island



What's happening here?

This is a vital and healthy ecological system in good balance. The strength of the currents and tides provides maximum flushing action and interaction with the ocean. Nothing around here stays in the same place in the water for long. Strong currents and dramatic water interaction with the sand result in changes in the channels and shifting sands.

Extensive seagrass beds and large populations of dugong, turtles, birds and fish are in evidence. This active vital system is showing little sign of degradation. This region is now protected to a large degree by the fact that some areas have been proclaimed national and/or international wildlife parks and reserves.

As nature intended

Soldier crabs dash along the island foreshore. Oysters grow on the commercial racks. Amateur and professional fishermen ply their timeless trade and the sea still gives up its bounty. The strength of the currents means maximum flushing action and interaction with the ocean. Nothing around here stays in the same place in the water for long.

Strong currents – strong waters

You can see water rushing through the South Passage. The scattered ship wrecks in the area are testament to the fact that this is a very active and aggressive system. The big ships no longer come anywhere near here, one of the main reasons being that shifts in sand banks have changed the navigation channels.

This is an area of very strong currents and a lot of dramatic interaction with the land that results



Soldier crabs on tidal seagrass flats, North Stradbroke Island

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in a certain amount being reclaimed by the sea each year. (The local joke on the islands is that if you own a block of land two or three streets back from the coast and you wait long enough, nature will eventually turn it into a waterfront block for you).

Report card mark for eastern Moreton Bay

A

This is the benchmark for the rest of the system. That is not to say that Bramble or Deception Bay were ever crowded with the same amount of jostling marine life but the fact is they were once as healthy as this in their own right.



Dugong and calf, eastern Moreton Bay

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Encouraging factors

Eastern Moreton Bay is an example of what Healthy Waterways is all about. Here we have an active vital system that is showing little, if any, sign of degradation. It is now protected to a large degree because some areas have been proclaimed national and/or international wildlife parks and reserves.

Future science

Ongoing study of this area is vital. It is our insurance policy for the eastern bay.

By understanding what is happening here, we have an example of a healthy system in the bay as a guide for any future restoration activity in the western bay.



SECTION 6

A report card for the whole Moreton Bay catchment

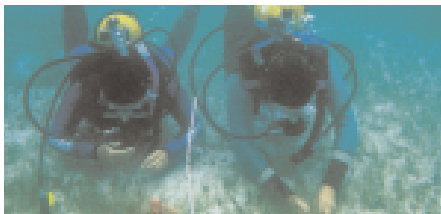
We've looked at eight different locations across the catchment and although specific areas do have specific problems, we would have to say that there is still an enormous amount to be very proud of and to protect.

We don't know as much about the upper catchment as we would like to but further major research programs are underway, and the focus of these scientific tasks is moving inland and upstream.

Test Site 1 – Bramble Bay	F
Test Site 2 – Southern Deception Bay	C→D
Test Site 3 – Northern Deception Bay & Pumicestone Passage	C→D
Test Site 4 – Waterloo Bay	C
Test Site 5 – Caboolture River	C
Test Site 6 – Bremer River	F
Test Site 7 – Southern Moreton Bay	C→B
Test Site 8 – Eastern Moreton Bay	A
Whole of Moreton Bay catchment	B

Certainly in the bay itself, which has been the subject of a major study, there is a marked contrast in conditions. If you sail from Deception Bay to Amity Point, you'll see a wide range of water conditions but the great news is that the system as a whole is still intact.

You are still in the middle of one of the most prolific fishing grounds in Australia. You'll see turtles and large banks of healthy seagrass. Overall, we give our catchment a 'B' but you can see why we all need to work to maintain and improve what we have. We are definitely all in the same boat.



Scientists, eastern Moreton Bay

MARINE BOTANY GROUP, UNIVERSITY OF QLD



Mangrove forest, North Stradbroke Island

MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND



Farmlands in view of bay, Redland Bay

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SECTION 7

Investigating the broader catchment

The next stage of the scientific study will move north, south and west to investigate the health of other waterways around the catchment. While country areas might seem a long way away to some, they really are as close as your kitchen. There are creeks and rivers you know nothing about that provide many of the things you eat and drink.

Take a trip up Kilcoy Creek

Mary-Lou and Shane Gittins are dairy farmers from the Kilcoy area. Mary-Lou describes how important a creek can be to both the local and broader community.

“Kilcoy Creek is about 25 to 30 kilometres long, starting up in the Mount Langley area. As you travel down the creek, you'll find beef and dairy farms, some small orchards growing plums and

citrus fruit, and then there's small crops like strawberries, bananas and capsicum.

“As well as that you'll find some peanuts, a deer farm, turf farms, horse studs and small land holders, many with improved and irrigated pasture – and there's a town centre of between 1500 to 2000 people.

“All the water to constantly maintain all those activities comes from one catchment – from one creek. So you can imagine how important that creek is to the community. Without that water, nothing grows.

“And after all that effort, Kilcoy Creek flows into Somerset Dam, so it also contributes water (what little dribbles are left) to the rest of the catchment.”



LOCKYER CATCHMENT CENTRE

Junction View, Tenthill Creek sub-catchment



Junction View, Tenthill Creek sub-catchment

LOCKYER CATCHMENT CENTRE

Water is more precious here

There is no doubt that further up the catchment, people treat water with a much greater sense of importance. To most city dwellers, wet weather is little more than an annoyance. It doesn't usually affect how much you produce or how much you earn. To country people, no rain can mean no income. That different view of the importance of water can affect how people feel about each other.

Andrew Davidson is Lockyer Catchment Coordinator for the Lockyer Catchment Centre.

Andrew believes there is still work to be done to help different groups across the catchment understand each other.

“We do have a rural/urban division in the catchment and that is a barrier to understanding. Urban people need to become more aware of the contribution the farming community makes to the economy and lifestyle of the whole catchment. At the same time, farmers are becoming more aware of the role they play in the health of Moreton Bay.



Changes in the weather

“While we have some of the most fertile soils in the world, the rain doesn't seem to be falling like it used to. When agricultural activity intensified in the 1950s, it seems it was a time of above-average rainfall. Now, we seem to have long periods of drought followed by a major flood event.

Isolated and dry

“The dry weather conditions have had a major impact on our creeks and rivers. It places even more pressure on the creeks that are still running while other creeks have ceased to flow during the dry times.

“Some of the upper catchment creeks are fed by natural springs and run-off from mountain ranges and have water in them throughout the year, however Lockyer Creek itself only runs into the Brisbane River during a flood. While the Lockyer catchment is isolated from the Brisbane River and Moreton Bay for most of the time, when it does flood, lookout, a lot of water flows out of the Lockyer.

A variety of creeks

“The creeks of the Lockyer are many and varied. Some are deep with steep banks, while others are fairly wide with lots of gravel in the bottom. Creeks in the upper catchment areas usually have much steeper gradients. This means that when flooding does occur, the water has a large amount of energy and can cause severe erosion and damage to infrastructure.

Local positive activity

“Many of the creeks are well-vegetated and have good conservation values, providing homes and food sources to a large variety of wildlife as well as swimming holes and picturesque spots for picnics. The creeks also play a valuable role in the recharging of the extremely valuable underground water system which is the key source of water for agriculture.

“As well as water for agriculture, the creeks hold a romantic spot in many people's hearts and the community is keen to improve and maintain their health. There are active creek programs in the Lockyer, and strategic management plans for



Blackfellow Creek upstream of Junction View



LOCKYER CATCHMENT CENTRE

Mt Sylvia, Tenthill Creek sub-catchment

some reaches of the creeks have been developed. These management programs are aimed at revegetating banks to try and reduce some of the impact of the next flood event.

“The Lockyer Valley community is growing increasingly aware of the fact we are all in the

same boat and we are keen to work together with everyone in the Moreton Bay catchment to look after all creeks and rivers. In the Lockyer Valley this starts with our own creeks because they are the life blood of the catchment.”

Future science

In the next stage of scientific investigation in the Moreton Bay catchment, the scientific team will investigate some issues identified by stakeholder groups as well as look for links to existing questions that still need to be answered.

Issues that need to be addressed include:

- How much of a riparian (creek or river bank) zone do we need to maintain or restore to generate continuing good ecological health?
- How much natural, environmental flow is needed to promote good ecological health?

- Where is the nitrogen and phosphorus coming from?
- Where is the sediment coming from?
- What are the sources of turbidity?
- Where are the metals such as iron coming from and how are they being transported through the system?
- What are the relative impacts of grazing, farming, commercial and residential development in relation to wastewater and stormwater issues?
- How can we effectively and economically reuse wastewater across the catchment?

Future science findings will be published in future editions of the *Water Quality Management Strategy* and the Scientific Report.



SECTION 8

The time to take action is now!

That's not such a bad report card... is it?

So we have our report card, and we scored a 'B'. That's not too bad is it? It's the sort of report card you can take home and not get into trouble about. So why do we need to take action now? What's the fuss?



Creek-bank vegetation, upper catchment

DEPT OF ENVIRONMENT AND HERITAGE

Our water quality is in decline

The fact is the catchment used to get an 'A'.

And in the not too distant past, it would have rated a 'B+'. Now it rates a 'B'.

The water quality is in decline, and that's not scare mongering; it's a fact.

The scientific, anecdotal and historical evidence all adds up to the fact that the water quality is not as good as it used to be. For that reason, we need to take action now, to maintain what is good and improve what has suffered.

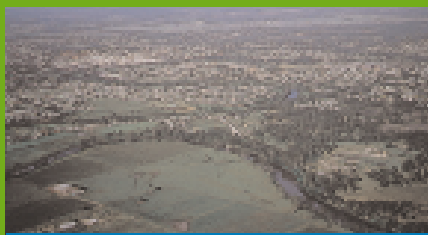
The importance of timely action

Just how serious is our position? Consider this extract from a discussion paper on the current conditions in Moreton Bay.

"We are approaching a nutrient threshold in Moreton Bay. If we cross it, it may be impossible to ever recover to a healthy bay. Large remaining areas of seagrass would be lost and consequently so would fish, birds, turtles, dugong and other important parts of the ecosystem. Preventative action now can avoid enormous losses in the future. There is time but there isn't a lot of time.

"The economic cost of such a decline in the bay's ecological health would be enormous:

- commercial fishing is worth \$33 million annually;
- recreational fishing – \$200 million (Moreton Bay provides 13 per cent of Queensland's fish catch);
- aquaculture – \$27 million;
- tourism – \$5 million;
- commercial fishing jobs are already being lost in the bay due to algal blooms possibly resulting from high iron in acid sulphate run-off. Acid sulphate is released when particular waterlogged soils are disturbed. Acid sulphate also directly affects the health of fisheries.



Logan River Sewage Treatment Plant

DEPARTMENT OF ENVIRONMENT AND HERITAGE

"The debate is not about WHETHER we need to address these problems, it is about WHEN and HOW. It is about timing and technology and it is about cooperation. The biggest barrier is not the money or the technology but gaining the cooperation of all levels of government, business and the community. We must resolve competing interests and this will require strong leadership and vision."

While there is urgency, it is not too late to make a difference to the future we will enjoy in our lifetimes. This is great news because not every bay in the world is so fortunate. Bays like the mighty Chesapeake on the eastern coast of the United States have been virtually fished out and the systems reduced to about ten per cent of their former productivity.

For bays like Chesapeake, there is almost no hope of recovery

Not only is the whole system in decline, the combination of human-made pollutants and toxic organisms in the water have started producing a major biological hazard. It's a toxic algal bloom (*Pfiesteria piscicida*) and it's a foul smelling, corrosive and highly dangerous substance.

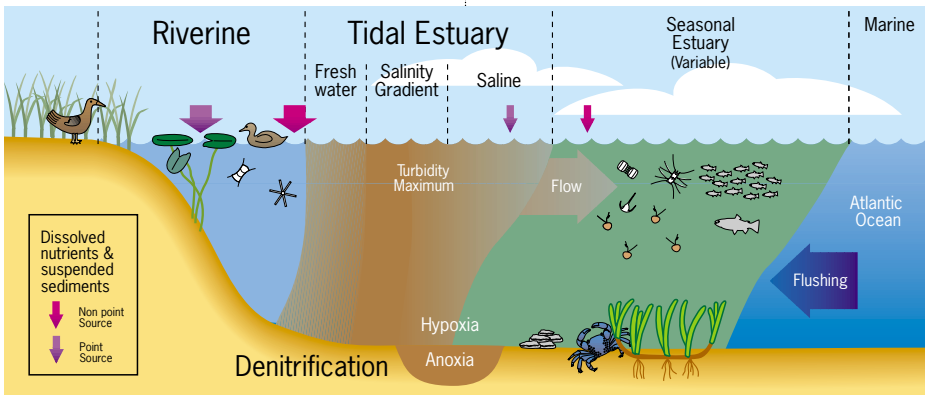
Scientists who study this deadly growth need to wear 'space suit' protection and work in elaborate sealed systems, just to look at a sample under a microscope. Imagine the impact this growth is having on the open seas and to the seagrass and marine life as a whole.

This is not science fiction. This is happening right now in America.

For this extraordinary bay, it seems it is too late to turn back the clock.

But for us there is still time

It is not too late for us to make a real contribution to the health of our waterways. Already there is a lot being done by active crew members all over the catchment. Let's look at the actions that are already making a difference.



What's happening here?

This is a representation of Chesapeake Bay as it is today. Where the skies were once black with birds and the seas teemed with fish and oysters, only remnants of the original populations now remain.

There is little chance this bay can be restored to anything like its original condition. In fact, it will be a struggle to stop further decline, particularly in the face of the new toxic intrusion.



SECTION 9

From issues to actions

One thing has emerged very clearly. If we are to reach our Healthy Waterways goals by the year 2020, we will all need to work together. The quality of water in the bay can be influenced by events hundreds of kilometres away, so there is little point in trying to address one issue in isolation.

Everything across the catchment is related to everything else. To maintain the good things we have now and halt any further decline in our water quality will require a coordinated, cooperative, whole-community approach.

The good news is that in the Moreton Bay catchment, a collective approach to establishing what needs to be done and then doing it is already well underway.

We start with the science

Thanks to the multi-million dollar scientific investigation that is still going on across the catchment, we know more about our estuaries, rivers and bays than ever before.



Dr Bill Dennison on the bay with council representatives

MARINE BOTANY GROUP, UNIVERSITY OF QUEENSLAND

This growing understanding of the issues helps define the specific actions that need to be taken.

The science team has kept in close contact with State and local government, the community and industry groups. Major decisions affecting the health of our waterways have already been made as a direct result of the scientific findings.

A personal navigation warning

When you first look at everything that needs to be done, it can seem quite overwhelming – even depressing. The fact is we do still have time to get things done. The community as a whole is more focused and committed than ever before. After all, there are a couple of million potential crew members to come on board. You'll see why we need everyone to sign on.



Turning scientific findings into cooperative actions

Environmental strategist Peter McMahon has worked closely with the scientists and a group of technical specialists to collect and collate the list of actions that are needed to protect and improve our water quality.

“It’s a good process. The scientific team identifies the major issues to be addressed. Community consultation identifies issues of concern to the community and a sense of priority. Issues are then addressed at meetings with technical specialists from local authorities, State government and industry.

“The actions needed to address the issues and the associated costs and community priorities are established. Technical feasibility and local council priorities are also taken into account. A set of actions is then defined and agreed across the group, and work commences.

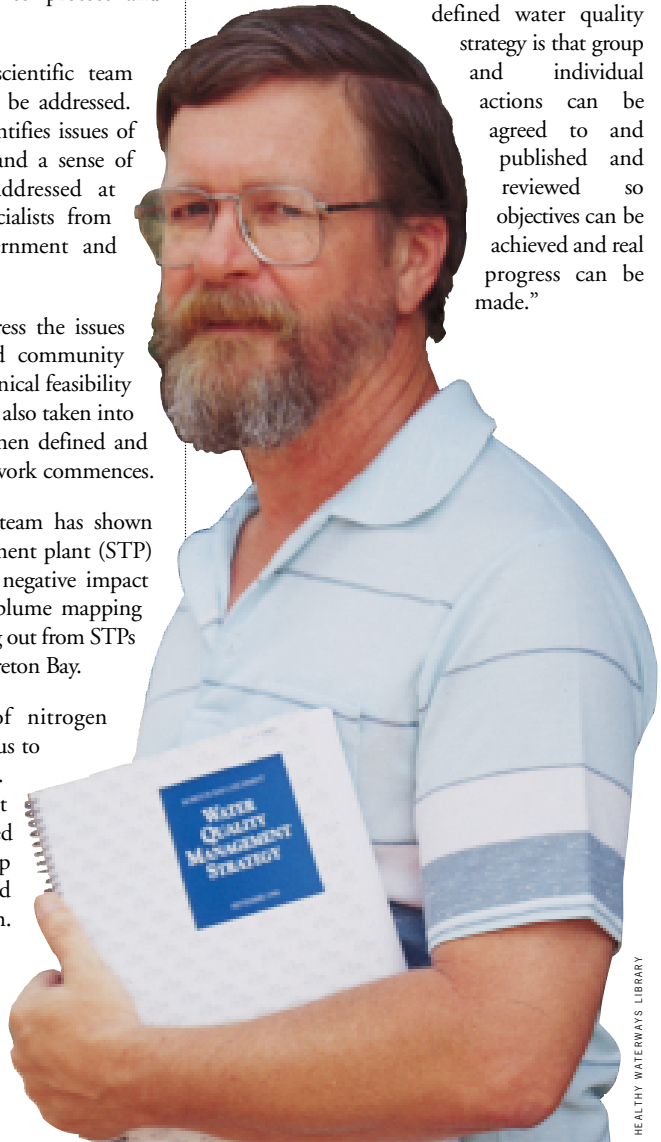
“For example, the scientific team has shown that nitrogen in sewage treatment plant (STP) discharges is having a major negative impact on the western bay. Sewage plume mapping has identified plumes streaming out from STPs into western and southern Moreton Bay.

“To reduce the amount of nitrogen flowing into the bay requires us to upgrade the treatment plants. Now, STPs are run by different local authorities and we needed a group agreement – a group consensus about what needed to be achieved and by when. This has now been agreed to, the upgrades are planned and/or underway, all of which means a major improvement to our waterways.

The advantages of a ‘whole-of-catchment’ approach

“There is always a danger that precious money spent fixing problems in one area will be negated by actions elsewhere in the catchment.

The advantage of a clearly defined water quality strategy is that group and individual actions can be agreed to and published and reviewed so objectives can be achieved and real progress can be made.”



Peter McMahon, Water Quality Strategy Coordinator



Who's who in the crew?

When you join the crew, you'll find yourself joining a lot of very enthusiastic crew members who are committed to the Healthy Waterways vision. Working right beside you will be local authorities and State government departments. The Federal Government is also playing its part, providing vital funding for continued scientific exploration and analysis.

Let's meet some of the more experienced crew members and look at some of the projects they are already involved in and have committed to in the years ahead. We don't have space here to look at all the planned actions but it's good to see who has already joined the crew and is now on board in a big way.



Di Tarte, Australian Marine Conservation Society, signing the Healthy Waterways pledge

DEPARTMENT OF ENVIRONMENT AND HERITAGE

The founding crew members for the *Water Quality Management Strategy* were:

Local authorities

Caboolture Shire Council

Pine Rivers Shire Council

Redland Shire Council

Redcliffe City Council

Ipswich City Council

Brisbane City Council

State government departments

Department of Environment and Heritage

Department of Natural Resources

All these crew members are continuously involved in many initiatives to improve water quality and ecological health. Some major group actions include the following.

Wastewater reuse and sewage treatment

- investigation and implementation of wastewater reuse schemes;
- improved sewage treatment facilities; and
- plans to reduce sewer overflows and industrial pollutants and unnecessary flows entering sewers.

Stormwater management

- subdivision approvals that include stormwater management;
- urban stormwater quality management plans; and
- stormwater quality monitoring.

Catchment management

- support and participation in Integrated Catchment Management;
- development of catchment management plans for other areas;
- vegetation management and protection;
- community riparian vegetation restoration projects; and
- Riparian Protection Permits for native vegetation management.

Other programs

- ambient water quality monitoring programs; and
- environmental flow provision.

SECTION 10

Healthy Waterways actions

Caboolture Shire Council

Wastewater reuse and sewage treatment

To protect the Caboolture River and the environmentally sensitive Moreton Bay Marine Park, Caboolture Shire Council:

- spent \$9.5m in 1997 to upgrade the South Caboolture Sewage Treatment Plant;
- will complete another \$8m upgrade of the plant in 1999;
- spent \$9m up to 1998 to upgrade the Burpengary East Sewage Treatment Plant;
- will decommission the North Caboolture Sewage Treatment Plant in 1998; and
- has upgraded the Bribie Island Sewage Treatment Plant and called tenders for a further upgrade in 1999.

Within 12 months, all of council's sewage treatment plants have been upgraded to the State government's Biological Nutrient Removal Standard of 5 mg/L total nitrogen and most plants will be upgraded to an even higher standard in the interest of the environment.

Council has also instigated a study into wastewater from rural residential areas. Wastewater reuse options are being investigated for further reduction of loads to the Caboolture River and Deception Bay.



For this and every generation

HEALTHY WATERWAYS LIBRARY

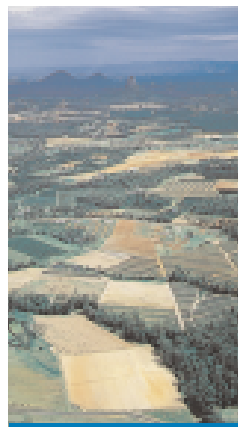
Stormwater management

Council is developing plans for urban stormwater quality management, and has funded and supported various stormwater management devices including a "demonstration site for a constructed wetland" and stormwater quality devices, such as pollutant traps.

Catchment management

Council has:

- budgeted \$70,000 in 1998 for a Catchment Wise Officer to carry out structured community education programs with schools and all sectors of the business community and industry. The "Adopt a Waterway Program" carried out in conjunction with local schools is a vital part of this successful community education program;
- employed an Environment Officer Catchment Management to develop programs to protect and restore the aquatic environment in both natural and developed areas;
- supported the formation in 1993 of the Caboolture Region Integrated Catchment Management Program which focuses on environmental education;
- worked closely with the Department of Natural Resources and permanently houses a Senior Program Extension Officer, Catchment Management and Land Care; and
- been a member of the Pumicestone Passage Regional Catchment Coordination Association which has finalised a Catchment Management Strategy Program for the Pumicestone Region.



Farmlands, Pumicestone catchment

DEPARTMENT OF ENVIRONMENT AND HERITAGE



Pine Rivers Shire Council

Wastewater reuse and sewage treatment

To protect the North and South Pine River and Bramble Bay, council:

- will upgrade Brendale and Murrumba Downs Sewage Treatment Plants to 5 mg/L total nitrogen in 1999 and 2000 at a cost of \$15m;
- is investigating expansion of the current ten per cent reuse from the Brendale Sewage Treatment Plant;
- has established a wastewater reuse scheme that reuses 100 per cent of the Dayboro Sewage Treatment Plant effluent; and
- is developing an Integrated Environmental Management System for the whole shire to better manage water quality.

Stormwater management

Council:

- has developed stormwater quality management plans;
- is building stormwater treatment infrastructure, such as constructed wetlands; and
- includes stormwater management actions in subdivision approvals.

Catchment management

Council:

- has developed Environmental Corridor Policies to protect riparian vegetation; and
- is involved in the development of the Integrated Catchment Management plan for the Pine River.



Sewage treatment plant

HEALTHY WATERWAYS LIBRARY

Other activities

Council:

- monitors water quality at 46 sites; and
- spent \$200,000 on waterway enhancement in 1997.

Redland Shire Council

Wastewater reuse and sewage treatment

To protect Tingalpa Creek, Waterloo Bay and western Moreton Bay, council has:

- upgraded Thorneside and Capalaba Sewage Treatment Plants to 5 mg/L total nitrogen in 1997 and 1998 at a cost of \$13m;
- established wastewater reuse schemes to irrigate 15 per cent of Capalaba's effluent on a turf farm; 100 per cent of Cleveland effluent on land and 20 per cent of Victoria Point effluent on the Redland Bay Golf Course; and
- planned further upgrades at Cleveland and Point Lookout Sewage Treatment Plants in 2000 and 2004.

Stormwater management

Council has:

- stormwater management actions in development approvals including temporary erosion and sediment controls during construction and permanent ones after construction; and
- commenced a study into urban stormwater management.

Catchment management

Council has:

- Vegetation Protection and Management Plans; and
- a Strategic Plan which identifies conservation, riparian and foreshore areas.

Other activities

Council is:

- collaborating with the Department of Environment and Heritage in a joint water quality monitoring program;
- carrying out biological and chemical monitoring of Tingalpa Creek; and
- negotiating a Native Title Agreement with Quandamooka Land Council.

Redcliffe City Council

Wastewater reuse and sewage treatment

To protect Hays Inlet and Bramble Bay, council:

- will spend \$21m to upgrade Redcliffe Sewage Treatment Plant to 5 mg/L total nitrogen by 2005; and
- is currently investigating reuse options to further reduce loads.

Stormwater management

Council is currently investigating rubbish and sediment removal from stormwater flows.

Other activities

Council is collaborating with the Department of Environment and Heritage in a joint water quality monitoring program.

Ipswich City Council

Wastewater reuse and sewage treatment

To improve water quality in the Bremer and Brisbane Rivers, council:

- has upgraded treatment at Bundamba Sewage Treatment Plant to 5 mg/L total nitrogen;
- has reduced nitrogen levels at Goodna and Carole Park Sewage Treatment Plants at a cost of \$7m and \$4.5m;
- has implemented wastewater schemes to reuse 40 per cent of Carole Park effluent on Wolston Park and Gables Golf Courses (\$4m) and 90 per cent of Karana Downs effluent on a golf course;
- has undertaken a biosolids management strategy; and
- is investigating reuse of Bundamba effluent and 2 ML/d industrial reuse of Carole Park effluent.

Council has additional proposals, subject to the findings of the Strategy, for:

- reducing total nitrogen output at Goodna (\$5m);
- a major augmentation of Tivoli in 2000-1 (\$15m); and
- reducing nutrients output at Bundamba in 2002-3 (\$7m) and Carole Park in 2003-4 (\$0.7m).

Stormwater management

Council has:

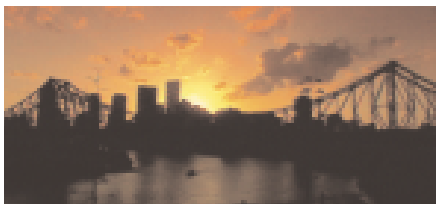
- begun monitoring stormwater run-off loads; and
- included stormwater management actions in development approvals for construction and land development.

Catchment management

Council is actively involved in the Bremer River Catchment Management Strategy, 1997 and Ipswich Rivers Trust for weed eradication.

Other activities

Council monitors water quality at 33 sites in the Brisbane and Bremer Rivers.



The River City

HEALTHY WATERWAYS LIBRARY

Brisbane City Council

Wastewater reuse and sewage treatment

To improve water quality in Moreton Bay, Brisbane River estuary and tributary creeks, council has agreed to:

- spend \$15m to upgrade Luggage Point Sewage Treatment Plant to 10 mg/L total nitrogen by 1999;
- spend \$10m to upgrade Oxley Creek Sewage Treatment Plant to 12 mg/L total nitrogen by 2001;
- spend \$4.5m to upgrade Inala Sewage Treatment Plant to 5 mg/L total nitrogen and 2 mg/L total phosphorus by 2002;
- achieve sustainable total load equivalent to 10 mg/L total nitrogen by 2002;
- achieve sustainable total load equivalent to 5 mg/L total nitrogen by 2005; and
- investigate improving treatment or diverting Bracken Ridge and Sandgate effluent to Luggage point Sewage Treatment Plant at a cost of \$18m.



Sewage effluent reuse for irrigation

DEPARTMENT OF ENVIRONMENT AND HERITAGE

Existing wastewater reuse schemes include:

- 50 per cent of Fairfield effluent used for irrigation;
- 1ML/d of Inala effluent used for irrigation of Oxley golf course; and
- Gibson Island effluent is used on the Royal Queensland Golf Course.

Council is also investigating further load reduction through potential wastewater reuse including:

- industrial reuse of up to 20 ML/d from Gibson Island;
- irrigation of an additional 1 ML/d from Inala;
- industrial reuse and irrigation of 6 ML/d from Luggage Point;
- irrigation of 2 ML/d from Wacol; and
- industrial reuse of 1 ML/d from Wynnum.

If achieved, these options have the potential to increase reuse to five per cent of Brisbane's STP wastewater.

Stormwater management

Council has developed the Urban Stormwater management Strategy, 1997 that establishes catchment management plans, stormwater management plans and local stormwater management plans.

Monitoring of stormwater loads has been implemented at four sites and the effectiveness of different stormwater treatment devices is being tested at a number of locations.

Stormwater management actions are included in development approvals for construction and land development.

Council is presently budgeting \$2m a year for stormwater management projects.

The Backyard to Bay campaign includes information and education material for householders, and erosion and sediment control for residential building sites.

Catchment management

Council has a number of initiatives including Vegetation Protection Orders, Voluntary Conservation Agreements and bushland acquisition.

Council has also developed the Boondall Wetlands Reserve Management Plan and catchment management plans for:

- Breakfast and Enoggera Creeks;
- Norman Creek;
- Nundah and Downfall Creeks;
- Moggill Creek;
- Bald Hills Creek; and
- Lota Creek.

Department of Environment and Heritage

Wastewater reuse and sewage treatment

The Department is responsible for review of wastewater reuse schemes and licensing of sewage treatment plants and major industrial discharges under Environmental Protection legislation.

Stormwater management

The department is responsible for review of urban stormwater management under the Environmental Protection Policy for Water and has developed a model plan for urban stormwater quality management.

Catchment management

The department:

- provides substantial support to the Brisbane River Management Group (BRMG) which is responsible for coordinating and establishing long-term river management arrangements for the Brisbane River catchment, which makes up two-thirds of the Moreton Bay catchment;
- has been involved in SEQ 2001;
- developed the Moreton Bay Zoning Plan;
- is responsible for permitting within Marine Parks; and
- supports the Oxley Creek Catchment Management process through the BRMG.

Other activities

The department:

- carries out ambient water quality monitoring in the Strategy area, including coordinated monitoring with local governments;
- is involved in introducing ballast water management into Moreton Bay; and
- has budgeted \$4m to set up a Waterways Management Sub-Program, and manage the Healthy Waterways public relations and education campaign through the BRMG.



Moreton Bay Marine Park Rangers

DEPARTMENT OF ENVIRONMENT AND HERITAGE

Department of Natural Resources

Wastewater reuse and sewage treatment

The department has a number of initiatives including:

- Property Management Planning;
- Study into wastewater reuse in the Lockyer Valley;
- South-east Queensland Water and Wastewater Management and Infrastructure Study; and
- Queensland Effluent Reuse Strategy.

Stormwater management

The department is lead agency for the Catchment Land Use Implementation Program under the 1998 Waterways Management Plan.

Catchment management

The department supports Catchment Coordinating Committees throughout the Strategy area, including Lockyer, Bremer, Oxley Creek, Pine Rivers, Caboolture and Pumicestone Passage.

Environmental flows

The department is:

- developing the provision of environmental flows through Conditions to Operate and a Water Allocation and Management Plan for the Logan River.
- lead agency for the Water Entitlements and Flow Implementation Program under the 1998 Waterways Management Plan. Part of this involves scientific studies to develop environmental flow provisions for the Brisbane River.

Other activities

The department has a number of initiatives including:

- Waterwatch and WaterWise;
- ambient water quality monitoring in freshwater streams and dams;
- Land and Water Management Plans for irrigators;
- Riparian Protection Permits for native vegetation management; and
- Agricultural Code of Practice being developed by the Queensland Farmers Federation.



SECTION 11

Major milestones on the voyage to 2020

A lot of work has gone into charting our course towards the year 2020. Here's a list of the major achievements needed to deliver the Healthy Waterways vision.

1998 – 2000

- implementation of administrative arrangements for cohesive and effective catchment, river and bay management
- significant reduction in pollutant loads (especially nitrogen) from the major sewage treatment works at Luggage Point
- further nitrogen removal from other key sewage treatment plant discharges
- industry action to reduce impact of industrial discharges, where required
- cessation of extractive dredging in tidal reaches of the Brisbane River
- implementation of environmental management plans for navigational dredging in the Brisbane River and Moreton Bay
- development of a Regional Extractive Resource Management Plan for the bay, rivers and catchment area
- continued development of stormwater management infrastructure in major urban areas
- development of plans to restore marine habitats and riparian corridors in priority areas
- better monitoring of ecological health of Moreton Bay and its estuaries and
- implementation of risk management procedures for ballast water discharges in Moreton Bay.

2001 – 2007

- best practice nitrogen removal from all treatment plants and improved treatment for other pollutants, such as phosphorus and pathogens

- reduced sewer overflows and impacts from urban stormwater discharges in the major urban areas
- increased levels of wastewater reuse and development of agreed infrastructure plans for major water supply and wastewater management works
- stakeholder agreements and government support for effective land management strategies to reduce land degradation and waterway pollution
- effective water supply management for all agricultural, industrial and urban users
- provision of environmental flows from major water storages
- improved fisheries and
- implementation of plans to restore marine habitats and riparian corridors.

2008 – 2020

- best practice wastewater treatment achieved at all municipal and industrial wastewater treatment facilities
- high level of wastewater reuse contributing to secure water supply for agricultural, industrial and urban growth needs
- major reduction in pollutant loads from urban stormwater and rural catchments
- restored marine habitats and riparian corridors and
- restoration of sustainable in-stream ecology in all waterways.

Management actions

The management actions that are needed to achieve the vision have been identified and responsible agencies have undertaken to:

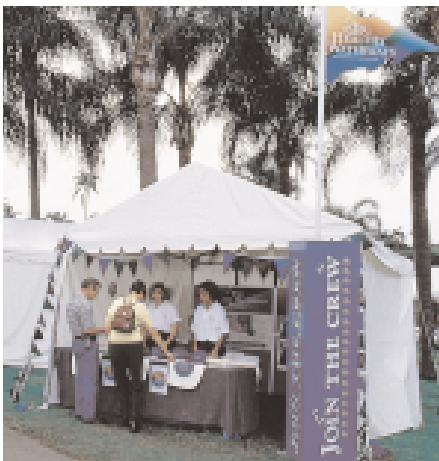
- implement agreed management actions in designated time periods and
- include these undertakings in their strategic planning and day-to-day decisions.

To find out more

If you'd like to know more about the ecological health and water quality issues that have been identified as requiring action and which actions have been agreed to across the catchment, borrow a copy of the Moreton Bay Catchment Water Quality Management Strategy from your local library.



Barry McIntosh, Chair, Industry and Community Advisory Group, signing the Healthy Waterways pledge



Brisbane River Festival visitors sign the Healthy Waterways pledge

The following organisations have been involved in the development of the Water Quality Management Strategy to date.

Australia Meat Holdings Pty Ltd
 BP Refinery (Bulwer Is) Ltd
 Brisbane City Council
 Brisbane River Management Group
 Caboolture Shire Council
 Caltex Refineries (Qld) Ltd
 Department of Environment and Heritage
 Department of Natural Resources
 Department of Primary Industries
 Department of Tourism, Sport and Racing
 Esk Shire Council
 Gatton Shire Council
 Incitec Ltd
 Ipswich City Council
 Laidley Shire Council
 Pine Rivers Shire Council
 Port of Brisbane Corporation
 Queensland Transport
 Redcliffe City Council
 Redland Shire Council

Many other community, industry and government groups and individuals are actively involved in the quest for Healthy Waterways and the list is growing all the time.

**For more information
 contact the
 Healthy Waterways
 Website:**

<http://www.brmbwms.qld.gov.au/healthywater>



SECTION 12

What will you do to help?

Every one of us leaves a footprint on the beach.

Every one of us has an impact on the health of our waterways.

It is the sum of the actions that we all take together that will ultimately determine how healthy our waterways will be.

Everyone has a part to play at every level of our community.

You can make a difference in everything you do. You can choose to reduce the amount of water you use. You can make a decision as a group or a family to use less water and work out ways to do that effectively. You can examine the contents of (and the packaging around) the things you buy that affect our environment, and question manufacturers and retailers about the things they are making and selling.

Most importantly, you can get involved at a local community level and work to influence all levels of government to keep a clear focus on the things that matter to the health of our waterways.

There is no single 'right' answer

No single group has the complete answer to everything that needs to be done.

We must come together as a catchment and put our cards on the table. The farmers and the fishermen, the land developers and the scientists, the planners and the entrepreneurs, the indigenous people and the technicians must all meet and contribute and decide. To avoid the issues is to lose the vision.

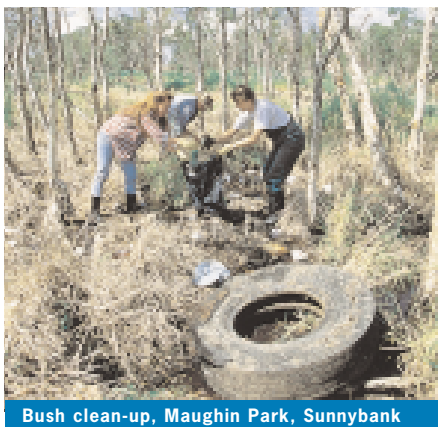
"Moreton Bay and its waterways will be a healthy ecosystem supporting the livelihoods and lifestyles of residents and visitors."

You, your group and your family can share this vision and make it something that is important to you.



Sewage outlet pipe, Logan River

DEPARTMENT OF ENVIRONMENT AND HERITAGE



Bush clean-up, Maughin Park, Sunnybank

DEPARTMENT OF ENVIRONMENT AND HERITAGE



Dump no waste – flows to creek

DEPARTMENT OF ENVIRONMENT AND HERITAGE

Simple, effective and positive things you can do to help right now

1 Understand that you are directly connected to the waterways

Understand that what you choose to do affects the quality of water in your catchment area.

2 Understand that all waterways are connected

Anything you leave in your backyard flows into the local stormwater drain and ends up in the bay. Everyone and everything from the farms at the top of the catchment to the people and animals in the bay are very much in the same boat.

3 Help stop litter from entering our waterways

This will reduce the mess on our foreshores as well as help protect wildlife which suffocate when they get tangled in plastic. To stop litter, you need to put your rubbish into the right bins and not drop it on the ground where it will be washed into the drains and flow into the waterways to finish up out in the bay. Cigarette butts are a major source of pollution in our waterways.

4 Help stop nutrients from entering our waterways

Nutrients, such as nitrogen and phosphorus, cause algal blooms which reduce the amount of oxygen in the water. This makes life harder for seagrass and the fish, turtles and dugong that depend on it. You can reduce nutrient pollution in three easy ways:

- **Wash your car on the lawn.** This allows the nutrient-rich soapy water to fertilise the grass. The grass filters out nutrients for its own use. If the soapy water just goes down the drain, it will travel straight through the stormwater system into our waterways. Remember, stormwater is not treated. What goes down the drain flows into the creeks.

So are you going to be a passenger or a crew member?

So now you know. We're all in the same boat. And you can see where we are headed and how much needs to be done to get us there on time and in good condition. Are you prepared to become a crew member?

How to join the Healthy Waterways crew

If you are not already an official member of the Healthy Waterways crew, and you would like to help preserve and protect the waterways of the Moreton Bay catchment, sign the pledge that came with this book and send it back to us. We'll keep you informed of developments in the Healthy Waterways campaign.

If the enlistment form is no longer attached to the book, simply call the Healthy Waterways Hotline on (07) 3227 7767 and ask for a "Join the crew" membership form to be sent to you. When you sign the membership pledge, you will be giving an undertaking that you are prepared to carry out the simple but effective measures listed below.



- **Put your garden clippings** and kitchen scraps in a covered compost bin. Never hose them down the drains.
- **Wrap your dog's droppings** and put them in the bin.

5 Help stop sediments from entering our waterways

Sediments are soils and mud that wash off into the waterways. Muddy water stops sunlight reaching the seagrass beds. If there is no light, there can be no seagrass. Less seagrass means less food for dugong and turtles and fewer breeding grounds for our fish.

- **Keep exposed dirt to a minimum** so it doesn't wash away in the rain.
- **Sweep up dirt** and put it in the garden, rather than hose it down the drain. This might seem



Catchment tree planting

DEPARTMENT OF ENVIRONMENT AND HERITAGE

like such a little thing to do but if 300,000 families each hose one bucket of dirt into the drains each weekend, think how that mounts up over time.

6 Help stop toxicants from entering our waterways

Toxicants poison aquatic animals including prawns, crabs and fish – and these are animals which we sometimes eat. There are three important things to do here.

- **Reduce your use of fertilisers**, herbicides or insecticides and only use in dry weather.
- **Don't overuse lawn chemicals** as any excess will go straight down the drain.
- **Properly dispose of used oils**, paint, cleaners and other chemicals at your local council transfer station. Do not pour these deadly toxicants down the sink or drain.

Individuals can make a difference, groups can do even more

If you want to get involved in working at a local level, one of the first things to do is look around and see if there is a local Catchment Management group or Landcare group for your area. These groups of people get together because of their shared interest in local issues and their strong desire to act locally. They plan strategies for catchment areas and plan activities to protect and enhance local natural areas. Additionally, if you ever see anything or anyone polluting our rivers, creeks and bay, do something about it.



DEPARTMENT OF ENVIRONMENT AND HERITAGE

Beach clean-up, Moreton Island

Dr Tony Pressland, Regional Services Director, Department of Natural Resources, Queensland

Catchment Comment



Creek water quality monitoring

BRISBANE CITY COUNCIL

Landcare Groups

Landcare groups didn't really exist even 12 years ago. Now you'll find over 160 groups in Queensland, with memberships that range from around 20 to 30 to some with hundreds of committed people, all intent on addressing local issues and changing



HEALTHY WATERWAYS LIBRARY

Integrated Catchment Management Groups

In 1991, five catchment groups were launched as a pilot scheme across Queensland. Nobody really expected the program would gather the momentum that it has. More groups are started each year and most creeks and river areas now have a catchment management group. These groups plan strategies for catchment areas and decide on activities to protect and enhance the local natural resources. I belong to the Cubberla Creek catchment group and I find it very rewarding to see all the enthusiasm that people bring to the things we do, as well as being a part of what is happening in my local area.

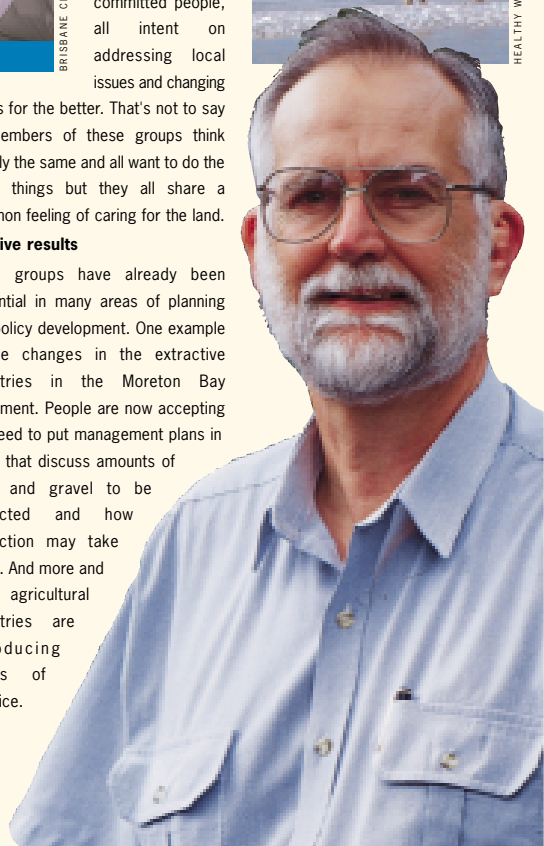
Bringing people together

Ideally, these groups provide the opportunity for people with various interests in an area to come together for planning discussions. A frank exchange of views may generate a lot of heat but it usually produces the best decisions.

things for the better. That's not to say all members of these groups think exactly the same and all want to do the same things but they all share a common feeling of caring for the land.

Positive results

Local groups have already been influential in many areas of planning and policy development. One example is the changes in the extractive industries in the Moreton Bay catchment. People are now accepting the need to put management plans in place that discuss amounts of sand and gravel to be extracted and how extraction may take place. And more and more agricultural industries are introducing Codes of Practice.



HEALTHY WATERWAYS LIBRARY



River snakes through farmland, upper catchment

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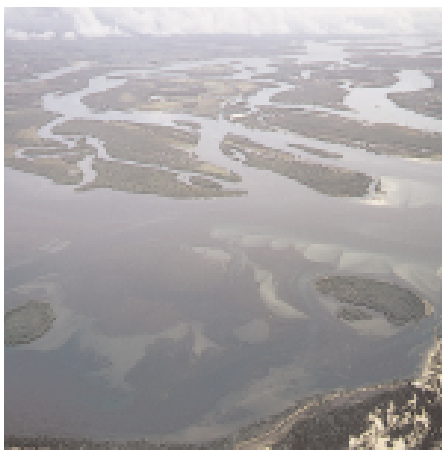
Oakey farmland

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What is a catchment?

If you are thinking about joining a catchment group, you might find the following information about catchments and their management plans of particular interest. It is reprinted here courtesy of the Brisbane City Council's Waterways Fact Sheets.

"Most people are unaware that we all live in a waterway catchment. A catchment is an area of land bounded by natural features, such as hills, from which all stormwater flows to a common low point such as a creek, lake, river or bay."



Southern Moreton Bay mangrove islands

DEPARTMENT OF ENVIRONMENT AND HERITAGE

What are Catchment Management Plans?

"Catchment management involves the community in the planning and management of natural resources in a catchment, so that these resources will continue to meet the needs of current and future generations. Catchment Management Plans (CMPs) are important tools in managing our waterways. They are strategic plans designed to manage a range of issues within the catchment, including water quality, water quantity and other associated issues." (Urban Stormwater Management Strategy, October 1997).

Catchment Management Plans recognise that land and water management are interconnected. They are developed in conjunction with the community to determine issues of high priority, required actions and 'environmental values' to be maintained and achieved in our waterways and wetlands.

As of October, 1998, ten Brisbane creeks have CMPs in place and the plan for Kedron Brook is underway.

Contact your Catchment Association or Landcare group

One of the best ways for you to become actively involved in waterway planning, management and rehabilitation is to seek out and join your local catchment group. You'll find the contact numbers for most groups listed in the Useful Contacts section in this book. If there is no catchment association for your area, why not think about starting one.

Annette Magee, Waterways Program Officer, Brisbane City Council

Catchment Comment

How to make a difference

Catchment groups are a chance for local people to make a genuine contribution. It's a place where you can have a real input into planning and managing your local environment. There are more than 30 catchment groups around the Brisbane area at the moment and all of them are looking for people to help and be involved.

From natural creek to concrete pipe

Let me tell you a bit about the amount of difference a catchment or local group can make. One of my particular interests is Kedron Brook and the different issues it faces. For those of you who don't know it, this is a natural creek that flows from natural surroundings straight into urban development. In part, it has been turned into little more than a floodway. And for reasons of flood mitigation, any restoration activity needs to be handled with care because the Brook still carries major volumes of water in heavy flow periods.

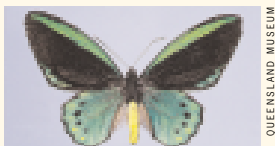
But at the same time, it is a very important location for wildlife. The area was famous for its butterflies, particularly a beautiful species called the Richmond Birdwing. So a group of people got together and talked and planned and after some investigation and research, work started in several places with the aim of restoring some degree of health to this waterway.

Back to the Brook

Pool and puddle sequences were designed. Trial plantings were made in flood-prone areas. Several areas were substantially re-planted. A lot of work was undertaken to enhance facilities and improve recreational and educational access.

And at the last count, the wildlife is coming back to the Brook. Fish and

groups that enrich their local community by giving their time, energy and enthusiasm to improve the condition and health of their local catchment area. Just think of the work that could be done if thousands of people were available every weekend in every catchment across the entire Moreton Bay area. It can happen.



Richmond Birdwing butterfly

QUEENSLAND MUSEUM

beetle counts are up and the water quality appears to be improving. The hard work of many dedicated people is paying off as the natural qualities of the Brook are enhanced without decreasing its role as a floodway.

Here for the long run

The Wildlife Preservation Society at Kedron Brook is just one of many



HEALTHY WATERWAYS LIBRARY



Join your local catchment management or local Landcare group

Where can I join other crew members?

Hard work at the grass roots level does make a difference. Here are some specific groups you can be involved with or access for further information.

CATCHMENT CONTACTS – HEALTHY WATERWAYS GUIDE

Australian Marine Conservation Society (AMCS) – Moreton Bay Branch

Anne Clarke, Diane Tarte, John Dobson
PO Box 3139
YERONGA QLD 4104
Ph: 07 3848 5235

Bayside Environment Network

Phillip Little
45 Bellevue Parade
LOTA QLD 4179
Ph: 07 3893 0109 (H)
07 3229 3730 (W)

Brisbane City Council – Waterways Program

Barry Ball – Manager Ph: 07 3403 4870
Ursula Kerr – Principal Waterways
Program Officer Ph: 07 3403 9054
Annette Magee – Waterways
Program Officer Ph: 07 3403 6554
Ross Young – Group Manager
Water Engineering, City Design
Ph: 07 3403 0423
GPO Box 1434
BRISBANE QLD 4001

Bribie Island Environmental Protection Association Inc. (BIEPA)

Len Baglow (President)
PO Box 350 BRIBIE ISLAND QLD 4507
Ph: 07 3408 8355

Brisbane Region Environment Council (BREC)

Michael Petter
PO Box 479
MORNINGSIDE QLD 4170
Ph: 07 3899 0537

Brisbane River Management Group (BRMG)

C/- Department of Environment & Heritage
PO Box 155 BRISBANE
ALBERT ST QLD 4002
Ph: 07 3227 7767

Moreton Bay Environmental Alliance

Mary Patchett
14 Moreton Avenue
WYNNUM QLD 4178
Ph: 07 3396 1285

Waterwatch

Jocelyn Bowden – State Coordinator
Resource Sciences Centre
Block A, 80 Meiers Road
INDOOROOPILLY QLD 4068
Ph: 07 3896 9737

Bald Hills Creek Catchment

Tinchi Tamba Wetlands Committee

Roy Sonnenburg (Chair)
93 Huet Street
NUNDAH QLD 4012
Ph: 07 3256 6952

Bremer River Catchment

Boonah and District Landcare Association Inc.

Mr Randy Winks
Lyndale MS 161
BOONAH QLD 4310
Ph: 07 5463 1756

Bremer Catchment Association Inc

Morris McInnes (President)
MS 126
HARRISVILLE QLD 4307
Ph: 07 5467 1296

Bremer Catchment Association Inc.

Roland Bendall (Secretary)
PO Box 418
ISPWICH QLD 4305
Ph: 07 3364 2903

Envirocare Ipswich Environment Network Inc.

Darryl Porsche (President)
PO Box 2230
NORTH IPSWICH QLD 4305
Ph: 07 3202 4232
Mob: 0418 772 819

West Moreton Landcare Group

Patti Semmens
PO Box 273
BOOVAL QLD 4304
Ph: 07 3816 0806

Bulimba Creek Catchment

Australian Marine Conservation Society – Moreton Bay Branch

Diane Tarte
PO Box 3139
YERONGA QLD 4104
Ph: 07 3848 5235

Bulimba Creek Catchment Coordinating Committee (B4C)

Heather Barnes (Secretary)
PO Box 5
CARINA QLD 4152
Ph: 07 3349 2363

Bulimba Creek Catchment Coordinating Committee (B4C)

Wayne Cameron (Field Officer)
33 Olivia Drive
CARINA HEIGHTS QLD 4152
Ph: 07 3849 5727

Mimosa and Bulimba Creeks Bushcare Group

Ann Bock
7 Hakea Street
SUNNYBANK QLD 4109
Ph: 07 3345 4820

SCRUB Catchment Care Group Inc.

Bruce Boundy
16 Ash Court
MT GRAVATT EAST QLD 4122
Ph: 07 3260 1131 (W)
07 3343 8057 (H)

Whites Hill/Pine Mountain Community Group

Heather Barnes (Secretary)
PO Box 5 CARINA QLD 4152
Ph: 07 3349 2363

Cabbage Tree Creek Catchment

Australian Marine Conservation Society (AMCS) – Moreton Bay Branch

PO Box 3139 YERONGA QLD 4104
Ph: 07 3848 5235

Boondall Wetlands Management Committee

Anne Beasley (Chair)
71 O'Quinn Street
NUDGEE BEACH QLD 4014
Ph: 07 3267 6293

Bramble Bay Consultative Committee

Laurie Jeays
107 Brighton Terrace
BRIGHTON QLD 4017
Ph: 07 3269 1671

Cannery Creek Catchment

Northgate Industry Catchment Care Group
Bib Hughes (Chair)
PO Box 643
SPRING HILL QLD 4004
Ph: 07 3831 3722

Northgate Industry Catchment Care Group
Paul Anderson
C/- IMEMS Pty Ltd
3 O'Farrell Avenue
NORTHGATE QLD 4013
Ph: 07 3266 8414

Cubberla Creek Catchment

Pullenvale Ward Office
Councillor Margaret De Wit
Kenmore Village Shopping Centre
Brookfield Road
KENMORE QLD 4069
Ph: 07 3403 5929

Sutling Street Revegetation Group
Jill Skattebol
8 Henry Street
CHAPEL HILL QLD 4069
Ph: 07 3378 5183

Waterwatch
Judy Nightingale (Waterwatch Coordinator)
PO Box 804
KENMORE QLD 4069
Ph: 07 3878 4581

Downfall Creek Catchment

Nundah/Downfall Creek Catchment Care Group
Peter Armstrong
C/- 815 Rode Road
McDOWALL QLD 4053
Ph: 07 3403 5937

Waterwatch
Rosemarie Matthew
(Waterwatch Facilitator)
C/- 815 Rode Road
McDOWALL QLD 4053
Ph: 07 3353 3266

Enoggera Creek Catchment

Save Our Waterways Now
Brian Sait
8 Myles Street
LAWNTON QLD 4051
Ph: 0419 783 748

Gubberley Creek Catchment

Gubberley Creek Bushcare Group
Annette Hall
20/60 Gubberley Street
KENMORE QLD 4069
Ph: 07 3378 8365

Ithaca Creek Catchment

Toowong Ward Office
Councillor Judy Magub
585 Coronation Drive
TOOWONG QLD 4066
Ph: 07 3403 2520

Kedron Brook Catchment

Habitat Brisbane Brisbane City Council
Jenny Leask (Revegetation Coordinator)
Windsor Park McDonald Road
WINDSOR QLD 4030
Ph: 07 3403 7173

Wildlife Preservation Society of Queensland (WPSQ) – Kedron Brook Branch
Michelle Lum
91 Jean Street
GRANGE QLD 4051
Ph: 07 3356 9431

Wildlife Preservation Society of Queensland (WPSQ) – Kedron Brook Branch
Greg Miller
60 Lydia Street
KALINGA QLD 4030
Ph: 07 3357 9009

Lambertia Creek Catchment

Lambertia Creek Environment Group
Kym Nicholls
7 Lambertia Close
MT GRAVATT EAST QLD 4122
Ph: 07 3343 3886

Lockyer Creek Catchment

Atkinson Buaraba Creek (ABC) Catchment/Landcare Group and West Moreton Landcare Group
Patti Semmens
PO Box 273
BOOVAL QLD 4304
Ph: 07 3816 0806

Brisbane Valley Koala Preservation Society
Jeny Calway
9 Adelaide Street
ESK QLD 4312
Ph: 07 5424 1788

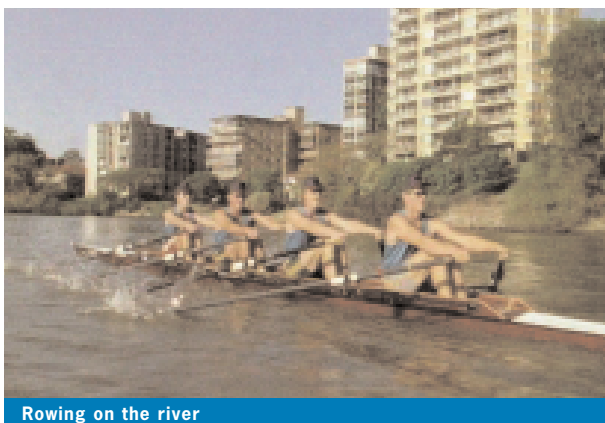
Friends of the Bush
Carol Bussey
MS 454
LOWOOD QLD 4311
Ph: 07 5427 9253

Gatton Shire Council
Phil Bambrick
(Manger, Engineering Services)
Brad Domrow (Community Services)
David Hecksher (Planning and Development Services)
PO Box 82
GATTON QLD 4343
Ph: 07 5462 4000

Laidley Shire Council
Chris Payne (Chief Executive Officer)
Locked Mail Bag No 1
LAIDLEY QLD 4341
Ph: 07 5465 1166

Lockyer Catchment Coordinating Committee
Andrew Davidson (Catchment Coordinator)
Lockyer Catchment Centre
PO Box 61
FOREST HILL QLD 4342
Ph: 07 5465 4400

Lockyer Watershed Management Association Inc.
Max Roberts (Secretary)
PO Box 392
GATTON QLD 4343
Ph: 07 5462 3000 Mob: 017 850 813



Rowing on the river



Murphys Creek Landcare Group

Roger Weise
PO Box 90
HARLAXTON QLD 4352
Ph: 07 4630 5401

Logan/Coomera/Albert Catchments

Logan and Albert Rivers Management Coordinating Committee

Daryl Low Choy
C/- School of Environmental Planning
Griffith University
NATHAN QLD 4111
Ph: 07 3875 3543

Logan and Albert Catchments Monitoring to Management Project

Geoffrey Smith (Project Officer)
Waterwatch
RATHDOWNEY QLD 4287
Ph: 07 5544 1377

Logan City Council

Michelle Hennessey
(Senior Waterways Officer)
PO Box 266
WOODRIDGE QLD 4114
Ph: 07 3826 5308

Logan City Council

Helen Wallace
(Logan City Council Waterwatch Coordinator)
PO Box 226
WOODRIDGE QLD 4114
Ph: 07 3826 5145

Logan Coomera and South Moreton Bay Regional

Wastewater Management Study
Rob Fearon (Senior Environmental Officer)
C/- Department of Environment & Heritage
PO Box 155 BRISBANE
ALBERT ST QLD 4002
Ph: 07 3224 8574

Logan River Water Allocation Management Plan (WAMP)

Department of Natural Resources
Dale Bell
GPO Box 2692
BRISBANE QLD 4001
Ph: 07 3224 2928

Lota Creek Catchment

Lota Creek Catchment Committee

Bob Ashdown
PO Box 9049
WYNNUM PLAZA QLD 4178
Ph: 07 3893 0323

Mimosa Creek Catchment

Mimosa and Bulimba Creeks Bushcare Group

Ann Bock
7 Hakea Street
SUNNYBANK QLD 4109
Ph: 07 3345 4820

Moolabin Creek Catchment

Moolabin Creek Rehabilitation Group

Robyn Smart
31 Gow Street
YEERONGPILLY QLD 4105
Ph: 07 3235 3958 (W)
07 3848 1607 (H)



Stormwater quality improvement device (SQID)

Moggill Creek Catchment

Moggill Creek Catchment Management Group

Councillor Margaret De Wit
C/- Pullenvale Ward Office
Kenmore Village Shopping Centre
Brookfield Road
KENMORE QLD 4069
Ph: 07 3403 5929

Moggill Creek Catchment Committee

Gordon Grigg
PO Box 657
KENMORE QLD 4069
Ph: 07 3365 2471

Norman Creek Catchment

Norman Creek Catchment Coordination Committee (N4C) and Waterwatch

Damien Madden
32 Jackson Street
COORPAROO QLD 4151
Ph: 07 3398 5386

Norman Creek Freaks

Ph: 07 3891 5686

Nundah Creek Catchment

Nundah/Downfall Creek Catchment Care Group

Peter Armstrong
C/- 815 Rode Road
McDOWALL QLD 4053
Ph: 07 3403 5937

Waterwatch Facilitator

Rosemarie Matthew
C/- 815 Rode Road
McDOWALL QLD 4053
Ph: 07 3353 3266

Oxley Creek Catchment

Oxley Creek Catchment Association Inc.

Cathy Ellis (Coordinator)
C/- PO Box 155 BRISBANE
ALBERT ST QLD 4002
Ph: 07 3227 7739

Oxley Creek Environment Group and Waterwatch Coordinator

Diana Dawson
PO Box 212
SHERWOOD QLD 4075
Ph: 07 3379 9921

Pine Rivers Catchment (North and South)

Dayboro Landcare Group

Gary Bradley (President)
Dayboro Road
RUSH CREEK QLD 4521
Ph: 07 3425 1109

North and South Pine Rivers Integrated Catchment Association Inc. (NASPRICA)

Michael Chessels (Chair)
PO Box 2066
STRATHPINE CENTRAL QLD 4500
Ph: 07 3846 4999

**North and South Pine Rivers
Integrated Catchment Association Inc.
(NASPRICA)**

Peter Hayes (Coordinator)
PO Box 2066
STRATHPINE CENTRAL QLD 4500
Ph: 07 3205 0932

Pine Rivers Shire Council

Jim McEvoy
(Manager, Environmental Services)
PO Box 70
STRATHPINE QLD 4500
Ph: 07 3205 0646

Samford Landcare Group

Kerry Walker (Secretary)
Basin Road
SAMSONVALE QLD 4520
Ph: 07 3289 9206

Pullen Pullen Creek Catchment

Pullen Pullen Creek Catchment Group

Councillor Margaret De Wit
C/- Pullenvale Ward Office
Kenmore Village Shopping Centre
Brookfield Road
KENMORE QLD 4069
Ph: 07 3403 5929

Pumicestone Catchment

**Bribie Island Environmental Protection
Association Inc. (BIEPA)**

Len Baglow
PO Box 350
BRIBIE ISLAND QLD 4507
Ph: 07 3408 8355

**Caboolture Region Integrated
Catchment Management Group Inc.**

Cameron Traill (Secretary)
C/- Caboolture Shire Council
PO Box 159
CABOOLTURE QLD 4510
Ph: 07 5495 0279

Department of Natural Resources

Peter Oliver
(Senior Program Extension Officer)
C/- Caboolture Shire Council
PO Box 159
CABOOLTURE QLD 4510
Ph: 07 5495 0314

Friends of Lagoon Creek Group Inc.

Trevor Ferguson (President)
1 Whittington Road
CABOOLTURE QLD 4510
Ph: 07 5495 6129

Greening Australia – Queensland

Stuart Neal (Extension Officer)
C/- Caboolture Shire Council
PO Box 159
CABOOLTURE QLD 4510
Ph: 07 5495 0226

Toowong Creek Catchment

Toowong Creek Working Group

George Lewis
581 Moggill Road
CHAPEL HILL QLD 4069
Ph: 07 3371 1233

Toowong Ward Office

Councillor Judy Magub
585 Coronation Drive
TOOWONG QLD 4066
Ph: 07 3403 2520

Upper Brisbane River Catchment

**Brisbane Valley/Kilcoy Landcare
Group and Waterwatch Coordinator**

Mary-Lou Gittins (Secretary)
PO Box 82
KILCOY QLD 4515
Ph: 07 5497 1018

**Brisbane Valley/Kilcoy
Landcare Group**

Bruce Lord
(Landcare Coordinator – Upper Brisbane)
Glen Reach
LINVILLE QLD 4306
Ph: 07 5424 8145

**Brisbane Valley/Kilcoy
Landcare Group**

Cherry Williams
(Landcare Coordinator – Upper Stanley)
Woolmar Road
KILCOY QLD 4515
Ph: 07 5497 2472

Crows Nest Shire Council

Ian O'Donnell (Chief Executive Officer)
Geoff Patch (Mayor)
PO Box 35
CROWS NEST QLD 4355
Ph: 07 4698 1155

Crows Nest Shire Landcare Group

Gabrielle Gossow (Chair)
Oaken Pine MS 26
CROWS NEST QLD 4355
Ph: 07 4698 4136

**Emu Creek Catchment Landcare
Group**

Michael Fyffe (Chair)
PO Box 798
DARLING HEIGHTS QLD 4350
Ph: 07 4631 2809 (W)
07 4698 8163 (H)

Esk Shire Council

Danny Mullins (Chief Executive Officer)
Jean Bray (Mayor)
PO Box 117
ESK QLD 4312
Ph: 07 5424 1200

Kilcoy Shire Council

Ian Slader (Chief Executive Officer)
Alex Brown (Mayor)
PO Box 83
KILCOY QLD 4515
Ph: 07 5497 1600

Nanango Shire Council

Ross Hollands (Chief Executive Officer)
Reg McCallum (Mayor)
PO Box 10
NANANGO QLD 4615
Ph: 07 4163 1307

North East Downs Landcare Group Inc.

Peter Crawford (Project Officer)
PO Box 199
OAKLEY QLD 4401
Ph: 07 4691 1499

**Oaky Creek Landcare Group
(Kooralgin)**

Peter Hunter
MS 353
COOYAR QLD 4402
Ph: 07 4163 9135

Rosalie North Landcare

Bill Hansen (President)
John Barber (Secretary)
MS 638
YARRAMAN QLD 4614
Ph: 07 4163 9125 (Bill)
07 4163 8575 (John)

Rosalie Shire Council

Clint Webber (Chief Executive Officer)
Noel Strofeld (Mayor)
PO Box 50
GOOMBUNGEE QLD 4354
Ph: 07 4696 5311

**South East Queensland
Water Board (SEQWB)**

Carla Kinross (Environmental Scientist)
PO Box 236 BRISBANE
ALBERT ST QLD 4002
Ph: 07 3850 3158

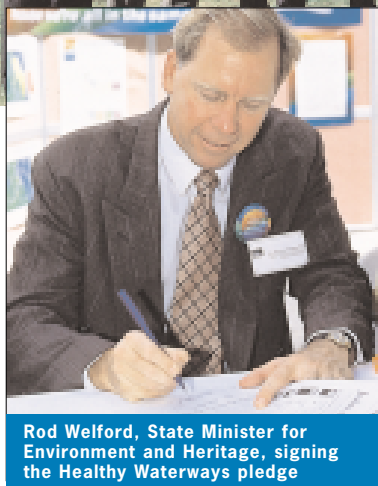
Wynnum Creek Catchment

**Wynnum Creek Catchment Group,
Bayside Environment Network**

John Amprimo
161 Wynnum Esplanade
WYNNUM QLD 4178
Ph: 07 3393 3041



DEPARTMENT OF ENVIRONMENT AND HERITAGE



DEPARTMENT OF ENVIRONMENT AND HERITAGE

Local leaders launch Healthy Waterways

A framework for the management of the waterways of the Brisbane River and Moreton Bay catchment, published by the Brisbane River Management Group.

Demonstrating a single-minded purpose

Stakeholders can use the Healthy Waterways logo on their material to demonstrate to the community and other stakeholders that they:

- understand the issues;
- are aware of what needs to be done;
- will work in a cooperative manner with other stakeholders to achieve a collective vision;
- are aware that “we’re all in the same boat”; and
- choose to be crew members, not just passengers along for the ride.

The overall aim of the Healthy Waterways campaign is to inspire and remind all elements of community, government and industry to take continued action to protect and enhance the waterways of the Moreton Bay catchment.

For further information about promotion, education or marketing opportunities, contact the Brisbane River Management Group, which is managing the Healthy Waterways public relations and education campaign on behalf of everyone. Phone the Healthy Waterways Hotline on (07) 3227 7767.

Who or what is ‘Healthy Waterways’?

‘Healthy Waterways’ is a name and a logo that symbolises cooperation by government, industry and the community for a common purpose. It is used by all participating groups to give a clear, single focus to all the actions being taken now and into the future to preserve and improve our waterways.

As well as the major subject of this particular guide, the issue of ecological health and water quality, Healthy Waterways also embraces the closely associated areas of livability and lifestyles, livelihoods and resources and waterways celebration.

All these Healthy Waterways issues are discussed in the *1998 Waterways Management Plan* –

Glossary

Acid sulphate soil	waterlogged soil containing minerals that are converted into acid when exposed to air
Bacteria	microscopic life that lives virtually everywhere on earth
Coral	a plant and animal that live together and create a limestone skeleton
Cyanobacteria	(blue-green algae); primitive life form that grows in both fresh water and sea water which often contains toxins
Dugong	air-breathing sea mammals that feed on seagrass
Ecological health	the ability of an ecosystem to be productive, biologically diverse, and resilient to change
Ecosystem	the environment and the plants and animals that live in it
Environment	the soil, water and air that surround us
Estuary	water that is partially influenced by both the ocean and fresh water
Mangrove	salt-tolerant trees that live in the inter-tidal zone
Nutrients	the chemical elements that plants need to grow; in particular nitrogen and phosphorus
Phytoplankton	minute plants that float in the water
Riparian	beside a waterway
Salinity	the amount of salt in sea water
Seagrass	flowering plants that grow totally submersed in sea water
Sea turtles	air breathing marine reptiles that live in sea water
Sediments	soil that has been eroded from land and ends up at the bottom of the rivers or bay
Sewage	water containing waste material from toilets, sinks and showers
Sewage effluent	sewage that has been treated to remove as much of the material as possible and is released into the environment
Waterway	any creek, stream, river or bay

Notes

Join the Crew!

If you'd like to join the Healthy Waterways Crew, read the words that follow, sign the pledge and mail your contact details to us.

I want to join the Healthy Waterways Crew and help conserve and protect the waterways of the Moreton Bay catchment. I make the following Healthy Waterways pledge and I will also encourage my family and friends to protect our waterways.

- ☐ To help stop LITTER entering our waterways – I will:
 - ~ put rubbish in a bin and NOT on the ground where it will be washed into our waterways when it rains.
- ☐ To help stop NUTRIENTS entering our waterways – I will:
 - ~ wash the car on the lawn to let the nutrient-rich soapy water fertilise the grass and NOT let it run down the stormwater drains into the waterways
 - ~ put garden clippings and kitchen scraps in a covered compost bin and NOT hose them away
 - ~ wrap my dog's droppings and put them in the bin.
- ☐ To help stop SEDIMENTS entering our waterways – I will:
 - ~ minimise exposed dirt so it doesn't wash away in the rain
 - ~ sweep up dirt and put it on the garden and NOT hose it down the drain.
- ☐ To help stop TOXICANTS entering our waterways – I will:
 - ~ only use fertilisers, herbicides and insecticides when necessary and only in dry weather
 - ~ NOT overuse lawn chemicals
 - ~ recycle and/or properly dispose of used oil, paint, cleaners and other chemicals at my local Council Transfer Station and NOT pour them down the sink or drain.

Keep your pledge for future reference. Fill in your details below, cut out and send to:

Healthy Waterways Crew Forms, PO Box 155, Brisbane Albert Street Qld 4002
For more information, phone (07) 3227 7767.



Name
Address
..... Post Code
Phone Email
Signed
Special Interest in Waterways
.....

Would you answer a cry for help?

The waterways of the Moreton Bay catchment support millions of people, and the strain is starting to show. Scientists investigating these waterways have found they are in decline and it is clear that current human impacts can't be sustained.

What have the scientists found?

How healthy are our waterways?

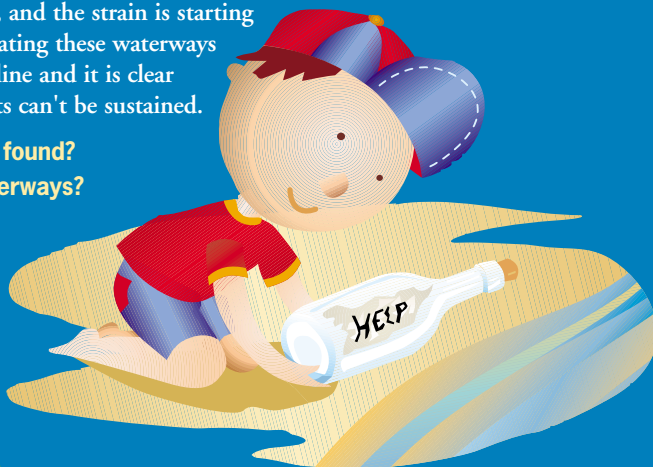
What are the issues?

What are the actions?

What's being done?

What's still to be done?

How can you make a difference?



This book is your guide

This book is a simple guide to the current state of health of our waterways and what needs to be achieved if we are to maintain and improve their health for the benefit of generations yet to come.

