



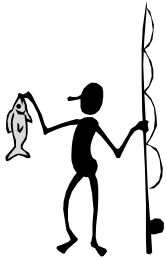
Sarina Catchment Schools Program Activity Book



"Caring for Our Coasts"

Proudly supported by:





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Sustainable Fishing

Delivered by Great Barrier Reef Marine Park Authority



Coastal Ecosystem interactions

Delivered by Sarina Landcare Catchment Management Association



What Landcare Means To You

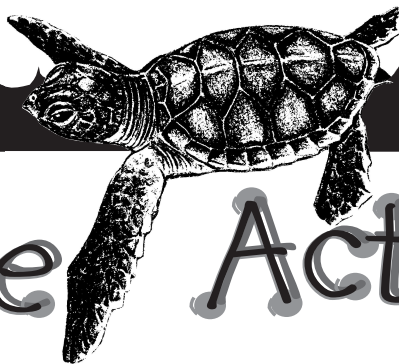
Delivered by Sarina Landcare Catchment Management Association

Acknowledgements

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- **Great Barrier Reef Marine Park Authority**
(Carolyn Thompson, Katie Finch)
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- **BMA Community Partnerships Program** via "Sarina Community Coastcare" Program
- **Mackay Regional Council** via the Natural Environment Levy



Challenge Activities

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Challenge

Can your classmates guess your Animal X?

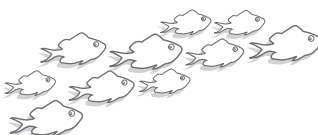
What does the word sustainable mean?

When measuring a fish, you measure from the tip of its...
to the tip of its ...

Investigate the legal-size limits and bag limits for the following seafood favourites.

Seafood	Minimum Size	Maximum Size	Bag Limit
Flathead			
Whiting			
Mangrove Jack			
Mud Crab			
Barramundi			
Red Emperor			
Coral Trout			

What is the reason for Barramundi having a maximum size limit?





Challenge Activities

Sustainable Fishing - Page 2

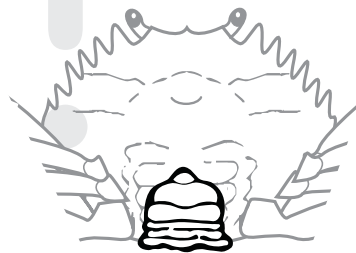
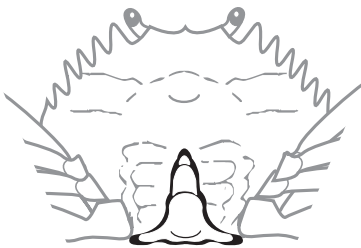
Why are bag limits so important?

One important rule to remember when crabbing is, only take legal-size Bucks and all Jennys, no matter how big they are, have to be thrown back.

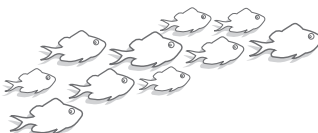
What is the difference between a Buck and a Jenny?

Why is it so important that all Jenny's are thrown back?

The two pictures below show the undersides of crabs. Which one is the Buck and which one is the Jenny?



Make a list of the things that could or should be done to insure the sustainability of seafood.



Ecosystem Interactions

By Sarina Landcare Catchment Management Assoc. Inc.



Courtesy of 'Ecosystem Awareness Games', Sea Country Gardians, GBRMPA.

The aim of the game is for participants to become aware of the different interactions taking place in an ecosystem. These interactions might be between living or non-living things.

You will need:

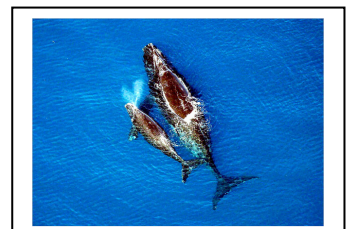
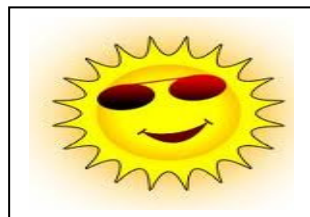
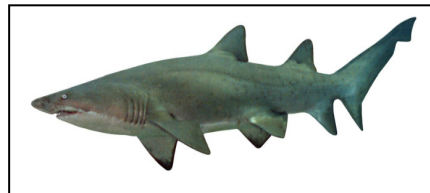
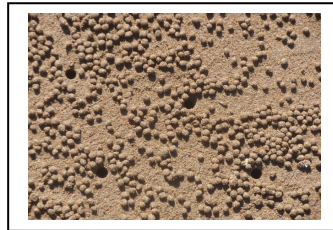
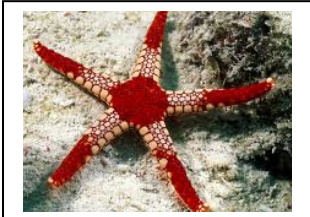
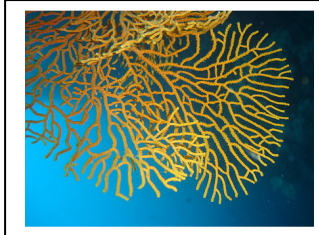
- A ball of string
- Labels for each participant

How to play:

- Each participant chooses something from the local environment they would like to be – sun, grass, rain, fish, cat, snake, water, tree, turtle, person, flower, soil. Each participant needs to be a different thing in the environment.
- Label each participant so that everyone in the circle can see what they are.
- Give the ball of string to the first participant. They hold onto the end and throw the ball to a thing in the environment they interact with. That person then holds the piece of string and throws the ball of string to something they can interact with to form a connection, and so on. For example, the fish can throw the string to the water, the water can throw the string to the tree, the tree can throw the string to the sun, the sun can throw the string to the flower, the flower can throw the string to the bird. This can keep going until all interactions within the circle have been used up.
- To extend the activity, ask participants to state what the relationship or interaction is as they throw the ball of string. For example, when the fish throws the string to the water, the fish states "I need water to live in", and the water then states "I give water to trees" and throws the string to the water and so on. This extension encourages the participants to think about what the relationships and interactions are.
- Once participants have played the game and understand the interactions going on, discuss what will happen parts of the environment are removed. For example, if the water dries up or becomes so polluted the fish cannot live there anymore? And if the fish cannot survive there anymore, what food will be available for local animals and people who catch fish as a part of their job?
- The game can be played representing several different ecosystems. Leaders could allow participants to choose what they will be, or to teach participants about a specific ecosystem, leaders could assign each participant a set living or non-living thing from that ecosystem.

Ecosystem Interactions Activity

Draw a line between the living and non-living things that interact and write along the line how they interact eg. Food, Shelter.



Associated ecosystems

The rainforest habitat, and some other ecosystems along tropical shores, are outside the scope of this book, but overlap, intergrade or grow right behind the Australian tropical seashore.

Mangroves

The term 'Mangrove' refers to both a type of plant and an ecosystem. They tend to develop best in muddy estuaries, but they can also grow right on tropical beaches. When they grow in stands they make up a distinctive, easily recognized ecosystem (and are the subject of their own upcoming "Ecosystem Guides" book.) Unusually among flowering trees and plants, mangroves are defined by their ability to grow in the tidal zone on the edge of the sea. The mangrove community is often also characterized by patterns of zonation, with certain species living on the landward edge, while others tend to live on the seaward side. Some of the species that are found regularly by themselves along the tropical shore are identified in the 'Plants' chapter in this book.



Tropical Rainforest

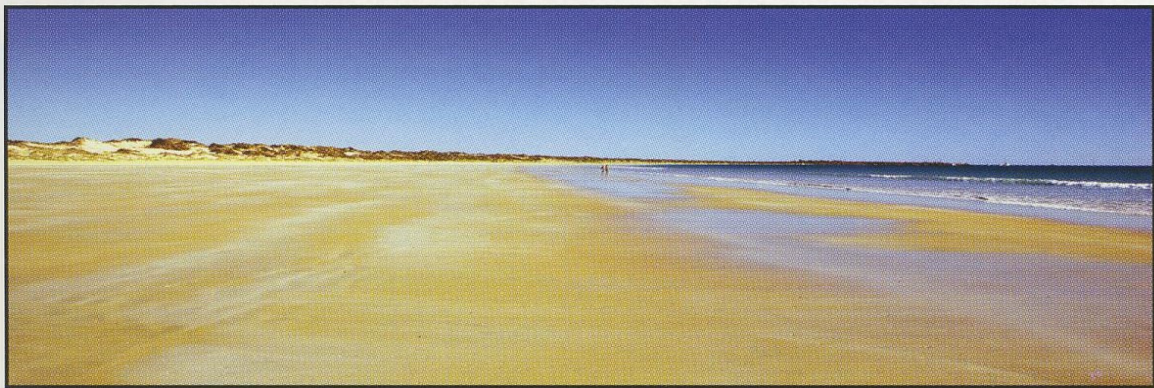
Tropical rainforest requires areas of consistently high rainfall within the tropics. Their characteristics include a multi-layered and complete canopy, a relatively sparse understorey, a predominance of vines and buttress roots. Tropical rainforest can grow on a variety of soils, and some of the coastal rainforest is found overlapping onto sandy beaches. It sometimes grades into the *Littoral Forest* of the seashore; which itself is usually considered a type of rainforest. For much more detail on this ecosystem refer to the Ecosystem Guide book "Tropical Rainforest of Australia".



Sand & Mud beaches

The long white sandy beach is the image many visitors often have of the tropical seashore. The reality is somewhat different. There are many different types of sands and beaches. On the more typical large grained beaches of the tropics, the soft sand is often interspersed with sharp coral. On some beaches it may in fact be made up entirely of coral (for more details about the composition of the sand, refer to the chapter on 'Geology'). Tropical beaches are not all that conducive for obvious life. They are exposed and therefore hot. Their shifting substrate of sand in the intertidal area means they are bare of large plants (if plants do colonize the beach, it may develop into a mangrove ecosystem, covered in another 'Ecosystem Guide'). Many of the larger animals that are seen here are just occasional visitors, such as some shore birds or breeding sea-birds. The obvious resident animals are often scavengers that wait for debris to wash up from the adjacent ocean, such as ghost crabs. But there is also a range of smaller animals at the surface of the sand, and an even larger range of tiny microscopic animals just underneath.

Pictured below: sandy intertidal area along Cable Beach, West Australia.



In areas of higher tide or in protected bays, finer sand and mud will accumulate. These seashores are much richer in life within their fine-grained substrate. They subsequently attract many more of the feeding shore birds. These softer seashores in more protected estuaries commonly end up with mangrove forests growing on their edge.

Pictured below: feeding waders on the famous Cairns mudflats, along the esplanade, Queensland.



Shell

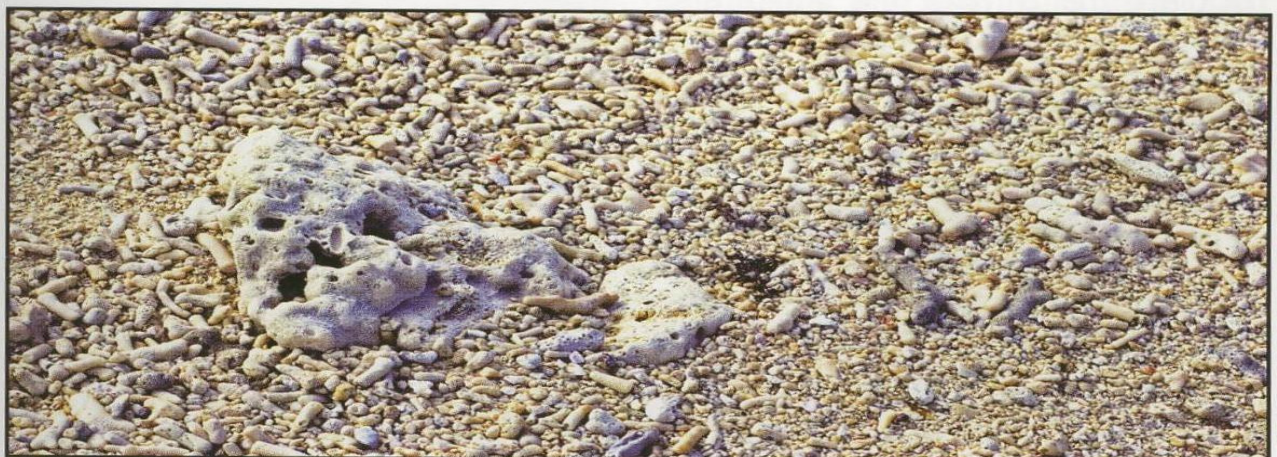
Many molluscs extract dissolved chemicals out of the surrounding saltwater to make calcium carbonate for their shells. But they make it into the mineral *aragonite*; the same composition as calcite, but a different structure.

Seashell remains also make up a large part of many tropical beaches. The amount of shell varies: some are virtually intact or broken up into just a few chunks, making it difficult to walk, but great for seashell collecting. But for the most part the fragments of shell are broken into small bits and mixed in with the sand. The amount of matter dominated by shell also varies: some beaches are made up almost entirely of shell fragments, resulting in the many named 'Shelly Beach' (es) around Australia's coast.



Coral sand

Many visitors to the tropical seashores along Australia are disappointed when they first walk on a beach, due to the presence of large bits of hard coral that can be such a nuisance for bare feet. This is not all bad. For one thing, it gives the beachcomber a chance to both examine the structure of coral, and also gain an appreciation of the different species through the variation of types found on the sand. Also, and more importantly for coastal formation processes, this coral does eventually get broken down into beautiful clean sand. Entire chunks of coral may get washed up, sometimes with the polyps still alive and colourful. The corals have extracted and combined chemicals to make calcium carbonate into the mineral *calcite* for their external skeleton home. Their death, or departure of the polyp, is known as 'bleaching', as the coral skeleton turns white. Exposure to the sun and air bakes the skeletons even whiter and they eventually break down into yellow-white sand.

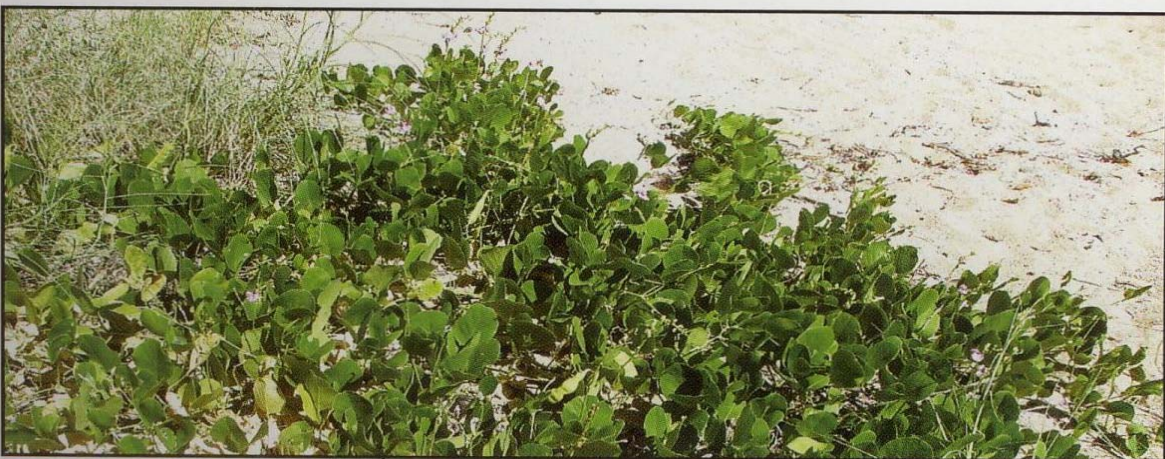


Sand dunes & the herbaceous strand

This vegetation type is usually found at or just above the high tide mark. It represents the lower limit of terrestrial plant growth near the ocean's edge. This zone tends to be fairly harsh, as it is exposed and nutrient poor. It is usually consists of the lowest and hardiest of vegetation, including grasses, herbs and prostrate vines. Even such small clumps of vegetation do have ecological functions. They are usually the first 'pioneer' plants to establish themselves on new islands, and stabilize the growing terrestrial edge of the seashore. And despite their small stature, on bare coral islands they may be the only protection offered for nesting seabirds and their young.



Species typical of this habitat include various grasses, daisies, and creeping prostrate vines such as the 'morning-glory' *Ipomea* and legumes *Vigna marina* and *Canavalia rosea*.



Plant material

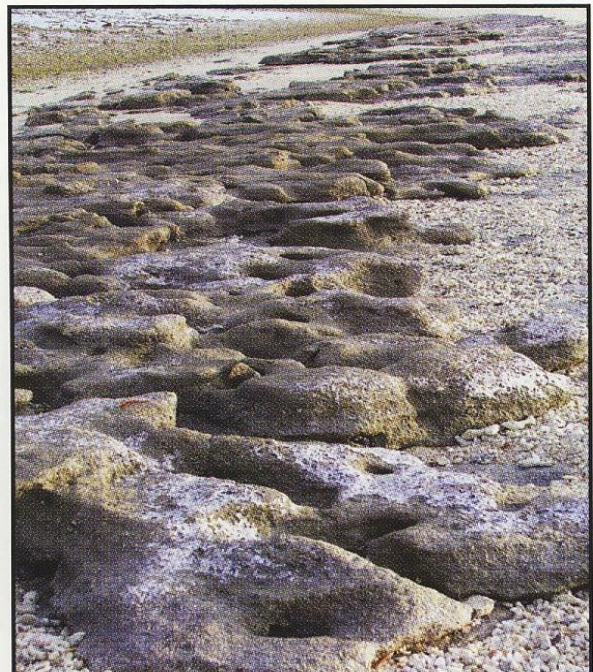
While much of the obvious biological material in tropical sand beaches is broken down from animals, there are also biological sources. These include various algae, such as the encrusting coralline algae, as well as regular growing forms such as *Halimeda* (pictured). The bleached broken down material from this algae is quite light and fluffy, like flakes of styrofoam.



'Beach Rock'

'Beach Rock' is also known as 'cay sandstone' and 'phosphate rock'. It forms on tropical coasts where there is nearby coral reefs. At first glance it appears to be some sort of granite or even volcanic rock. With its grey colour and flatness it also resembles cement (which is closer to what it actually is). It is yet another type of biologically based sedimentary rock, a reaction of the sand, water and life on the seashore. It forms when the chemicals that were used to construct the hard parts of shells, coral and other marine animals and plants, is dissolved by rain and runs into the sand where it eventually cements together (Martin 1995). Bird droppings may also contribute to the mix, with phosphate from guano resulting in *phosphatization* of the sand into rock (Hacker 1990).

Geologically speaking, this is a very fast event. The evidence of this rapidity can be seen in the remains of animals trapped in the rock. Whereas most true fossils are remains that have been replaced by minerals over many years, the remains in beach rock are the *actual* old shells and corals. There is sometimes even evidence of recent technology, such as metal and wreckage, cemented into the rock. The fast formation and hardness of beach rock is important in the development and stabilization of coral cay and other smaller sand islands.



Predators

Predators are the top of the food chain. The larger, vertebrate predators tend to be noticed along the tropical seashore. Perhaps the most obvious, successful and most common are the various species of birds. Because most birds fly, they require energy and cannot afford slow processing plant-based diets; thus they usually have a protein rich diet of other animals. Birds are fast and usually have good eyesight, thus they make very efficient predators along the seashore zones. It is common to see birds like Eastern Reef Egrets hunting for bait fish and other smaller fish that hide in the shallows. Other avian predators include more 'classic' hunters, such as the birds of prey; White-bellied Sea Eagle, Brahminy Kite and Osprey. There are also smaller predators such as Sacred Kingfishers that may perch in nearby trees, then dart out to catch their prey on the sand, mud, or reef flats, before flying back. Of course, predation occurs on a smaller, less dramatic scale along the tropical shores, from fish, to predatory molluscs drilling into other shells.

Pictured: Egrets are one of the most persistent and common hunters along the Australian tropical shore.



Predators as scavengers

Some of the classic birds of prey species that are thought of as primarily mighty hunters are actually also scavengers. Coastal birds of prey such as 'White-bellied Sea Eagles' and 'Ospreys' are probably good examples of this. They are efficient predators and successful hunters, but also scavenge from seashores, and dead animals washed ashore make up an important portion of their diet. The shortness of the feathers on the neck of the Osprey only re-enforces this; as with most vultures, this helps avoid getting bacteria getting into their feathers when sticking their feeding head into dead bodies. Many seabirds that are effective pelagic hunters will also scavenge off the seashores. These species often have a well developed sense of smell, a feature that is relatively rare in birds; this has developed to detect their prey out to sea, but can also be used to find washed up carrion.

Scavengers

In some tropical seashore situations the base of the energy pyramid is not plants, but detritus. Detritus is then the food for scavengers. In the shallow waters of the intertidal zone, such scavengers include the hermit crabs and ghost crabs. The latter will often come out of their holes at night to feed on decaying organisms. Other crustaceans, such as the Bubbler Crabs, are virtually filter-feeding through the sand for organic debris between the grains. Many of the nutrients are merely things that get washed in from the sea, including dead animal remains, such as washed up carcasses of sea-jellies and fish, and plant-like materials such as seas grass and algae. Other nutrients are brought in by nesting sea turtles, for some of the hatchlings die in or near the nest. Birds such as gulls and turnstones may also come into feed off such dead material. The latter species in particular is known to eat a wide range of food off the beach, from dead animals to faeces.

Pictured: hermit crabs scavenge off a washed up piece of seaweed



What Landcare Means To You



Catchment Safari

Who is the Catchment/Landcare Group in your area?

What is a catchment?

Who lives in a catchment?

Different environments in our Catchment and what lives there:

Habitat	What types of plants will you find here?	What animals will you find here?	What land uses do you see here?
Mountain ranges			
Woodland and grassland			
Dams			
Riparian areas (near creeks, rivers and gullies)			
Floodplains			
Wetlands			
Beach scrub			
Mangroves			
Seagrass beds			
Reef			

What Landcare Means To You



List 5 Landcare-type of activities (hint: what ways that you can protect, conserve and rehabilitate your local environment?)

1. _____
2. _____
3. _____
4. _____
5. _____

Let's create a poster to show "what Landcare means to you":

BACKGROUND INFORMATION

What is a catchment?

A catchment is an area where water is collected by the natural landscape. In a catchment, all rain and run-off water eventually flows to a creek, river, lake or ocean, or into the groundwater system.

Natural and human systems such as rivers, bushland, farms, dams, homes, plants, animals and people can co-exist in a catchment. Our daily activities affect the health of our catchments. The first step to protect our catchments is to better understand our impact on them.

Healthy catchments provide:

- a source of clean drinking water
- unspoilt natural areas for recreation
- habitat for plants and animals
- healthy vegetation and waterways
- reliable and clean water for stock and irrigation
- opportunities for sustainable agriculture and industry.



We all live in a catchment. Catchments are ideal units to work with when looking at land use and management issues because everything is linked by water, and what happens in one part of a catchment area is likely to affect the rest of it.

For example, a soil erosion problem, on a farm near the top of a catchment area, may lead to silt and agricultural chemicals ending up in catchment creeks and rivers and eventually making their way out the ocean where they can severely damage coral reefs. Similarly, the soap you use to wash your car can travel down the stormwater drain, into our creeks and have a devastating effect on water quality.

How can you help keep our catchment healthy?

Actively participate in Landcare-type activities such as:

- Rehabilitating our natural areas – planting, promoting natural regeneration of local native plants
- Sustainable farming practices
- Pest management – controlling pest animals and plants including your pets
- Monitoring our natural areas eg. Water quality, biodiversity and vegetation health checks
- Reduce, Re-use, Re-cycle and compost
- Be energy and water efficient

- Learn about our natural areas (eg. waterways, wetlands and coasts) – their importance and how to protect them
- And much much more....

What is Landcare?

Landcare is an informal network of people and locally-based community groups who all have one thing in common: a desire to learn more about and care for the natural landscape in which they live and work.

Landcare was born through a historic agreement between the *National Farmers Federation* and the *Australian Conservation Foundation* in 1988. Since that time, several thousands of groups have sprung up all over the country, giving people the opportunity to come together for the benefit of our land, water and biodiversity.

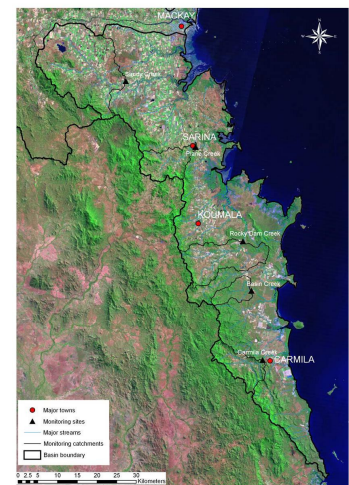
Who is your local Catchment/Landcare Group?

Sarina Landcare Catchment Management Association (SLCMA) operates within the Sarina Catchment.

Sarina Catchment

The Sarina Catchment Area is approximately 169,000 hectares. It is bounded in the north by Alligator Creek (near Hay Point), in the south to Cattle Ck (near Clairview) and in the west by the Connors Range. The eastern boundary is bordered by the Coral Sea.

A vision for the Sarina Catchment Area: *The Sarina Catchment Area is an economically viable region, which is ecologically sustainable and well regarded as a healthy place to live and work (SICM Strategy, 2001)*



Sarina Landcare Catchment Management Association (SLCMA) encourages and assists the local community in understanding, managing and retaining its natural resources and unique biodiversity.

SLCMA's objectives are to:

- Provide a forum for discussion on Natural Resource and Catchment Management issues.
- Promote sustainable solutions to Natural Resource Management (NRM) issues through strong community, industry and government partnerships.
- Prepare and implement priority action plans.

SLCMA undertakes a wide range of activities including:

- Providing technical advice to landholders regarding land management issues and planning eg. Peri-urban support program
- Coordinates educational and community awareness raising events eg. field days and workshops
- Coordinates on-ground projects eg. Community rehabilitation projects
- Providing opportunities for community members to become involved in Landcare activities eg. SLCMA Community Volunteer Program
- Operating the SLCMA Community Native Plant Nursery as a training facility for volunteers and youth as well as providing local native plants for local projects.

For more information visit: www.sarinalandcare.org.au