Issue 36 • March 2009

Seagrass-Watch

The official magazine of the Seagrass-Watch global assessment and monitoring program

Carbon

seagrass, sequestration & stewardship

Seagrass-Watch
Local eyes Global wise

In this issue:

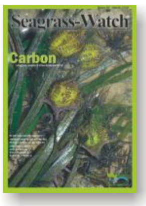
From the editor

2009 is off to a successful start, with some enthusiastic groups even sampling at night. The New Year also kicked off with several training workshops to build the capacity of volunteers and Land & Sea Rangers from Torres Strait and Cape York Peninsula.

In this issue you can read about the role our productive seagrass meadows play in sequestering carbon and how stewardship activities can offset our carbon footprints.

Read how seagrass is attracting tourists in Broome (Western Australia), but how groups are campaigning against the eradication of seagrass at tourist resorts in the Maldives. There is also an article on a survey examining seagrass condition from the uplifting of Nias island after the earthquakes and tsunamis in 2004 and 2005.

In this issue you'll also find articles on the SeaSearch program monitoring *Posidonia australis* in Victoria and how students in Fiji spent their Valentines Day. You'll also find our regular updates from groups in Torres Strait, Townsville and the Great Sandy Strait. You can even learn about the sawfish which shares coasts and estuaries with our seagrasses.



COVER: *Enhalus acoroides* with fruit (Labrador, Singapore). Photographer Ria Tan, www.wildsingapore.com

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Seagrass-Watch acknowledges the Traditional Owners on whose sea country we monitor

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NEXT ISSUE OUT JUNE 2009

Carbon, carbon everywhere

Carbon is one of the most abundant elements in the Universe and is a component of all organic compounds, many of which are essential to life on Earth. The source of the carbon found in living matter is carbon dioxide (CO_2) in the air (atmosphere) or dissolved in water.

Carbon is continually cycling through living things, on the land, in the ocean, and within the atmosphere. It can move quickly or it can remain trapped for eons. In animals it moves rapidly from birth to death and decomposition, whereas carbon from some plants can become locked in sediments and soils for thousands of years.

Oceans play a key role in this global cycling of carbon, particularly the coastal margins. This is because of their high primary productivity rates, relatively high nutrient concentrations, and extensive coverage of the earth's surface. In turn, high coastal margin productivity provides the basis of the energy for fishery production worldwide.

Carbon dioxide is one of the greenhouse gases that we read about almost every day. Human activity has increased the carbon dioxide concentration of the atmosphere by 30% from pre-industrial concentrations. CO_2 concentrations now average 270 parts per million (ppm) and are expected to rise to 450 ppm by 2065, and possibly higher by 2100. These CO_2 increases are likely to have dramatic impacts on global climate, global carbon cycles, ocean circulation, biotic diversity, and marine ecosystem function.

Green plants are the chief agents of carbon dioxide fixation through the process of photosynthesis: carbon dioxide and water are converted into simple carbohydrates and oxygen. During this process, oxygen is released; in the aquatic environment it literally bubbles out of the plants and through the water, providing oxygen for fish and other animals living nearby. During the growing season in daylight hours, plants take in carbon dioxide, and at night, the plants release carbon dioxide. On cloudy days, in the dormant season, plants do not readily take in carbon dioxide and may in fact release it.

As well as providing an important habitat for a great variety of marine species, seagrasses play a role in protecting our planet from the increasing build up of carbon dioxide. They can act as a "carbon sink", sequestering (absorbing) carbon dioxide from the atmosphere. When this carbon becomes trapped for long periods in sediments it helps to slow down the effects of global warming.

Carbon sequestration is the long-term storage of carbon in living and dead vegetation and the soils and sediments. Studies have found that coastal seagrass systems can build sediment carbon if restored. This carbon is stored for long periods. The rate of sequestration appears to be rapid over the first few years and up to 40 years following restoration. Furthermore, observations of seagrass detrital pathways indicate that export of seagrass biomass to deep areas of estuaries as well as the coastal ocean may sequester more carbon.

It is estimated that coastal seagrass meadows sequester between 0.012 to 1.33 metric tons of carbon per hectare per year ($t\,C\,ha^{-1}\,yr^{-1}$). The amount of CO_2 that is sequestered by seagrass differs greatly and depends on the species, whether it is fast or slow growing, the local environment, and the time of year. For example, the below-ground components of the Mediterranean species *Posidonia oceanica* can be preserved within the sediment for up to 5000 years. In the tropics, it could be assumed that species such as *Enhalus acoroides* would also be significant carbon sinks because of their substantial below-ground structures.

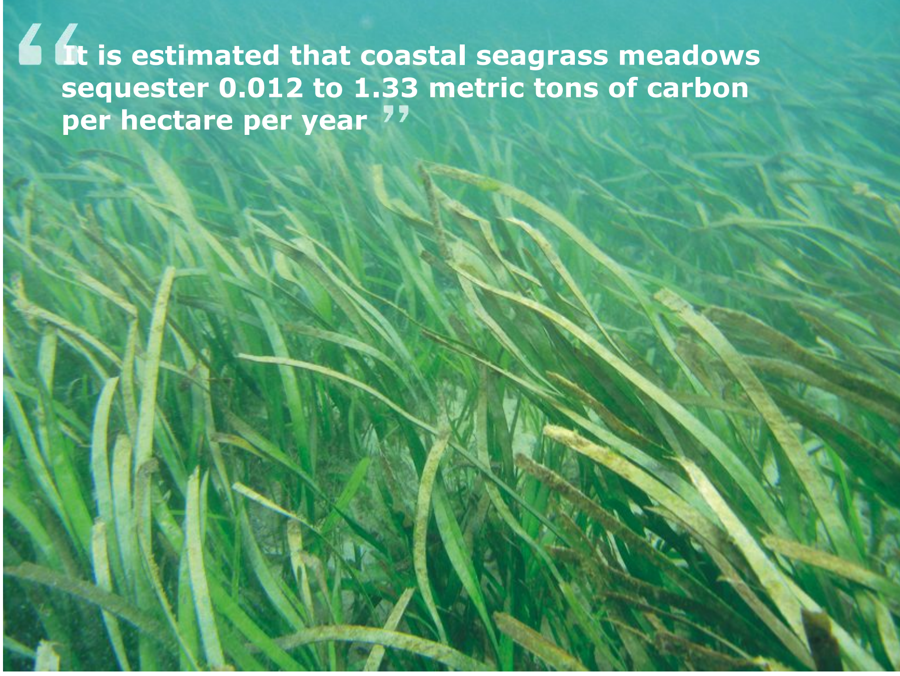
Your carbon footprint

Certain activities like driving, flying, or using electricity, emit carbon dioxide. You can calculate your personal CO_2 equivalent or carbon emissions related to your activities using "Carbon Footprint Calculators" which are offered by various websites (*preferably independently reviewed*).

kilograms of CO_2 emitted per item each year

desktop PC: 145 | digital camera: 8 | washing machine: 69 | tumble dryer: 689 | television: 248 | sound system: 75 | microwave: 81 | toaster: 24 |dishwasher: 271 | refrigerator: 540 | ceiling fan: 52 | VCR: 29 | room AC: 395 | laptop PC: 44 | electric water heater: 1,626 | PC monitor: 52 | pool pump: 678 | indoor lighting: 1,029 | hair dryer: 25 | MP3 player: 3

Once you know your carbon footprint, you can reduce it by practising energy-efficient behaviour - particularly when it comes to heating, cooling, insulation, lighting and travel. Alternatively, in some cases you can purchase offsets from accredited CO_2 abatement projects.



"It is estimated that coastal seagrass meadows sequester 0.012 to 1.33 metric tons of carbon per hectare per year"

Carbon Offsets

Carbon offsets are a critical piece of the solution to global warming because they push investments into new technologies and programs that make a difference today. A carbon offset (also know as carbon credit) is a financial instrument representing a reduction in greenhouse gas emissions. Offsets fund projects that remove carbon dioxide from the atmosphere. A carbon credit is one metric ton of sequestered carbon. Within the European Union, carbon credits have been traded since 2006, with the price currently around US$10 per tonne of carbon emitted. It is expected that this price will grow to well over US$40 throughout the next decade, making renewable technologies a truly viable alternative to fossil fuels.

You can buy carbon offsets over the internet, however, buyer beware. You should use independently reviewed and accredited offsets (see www.carbonoffsetwatch.org.au). Also, Government registries provide details of accredited abatement certificate providers and the ownership and status of abatement certificates at any point in time.

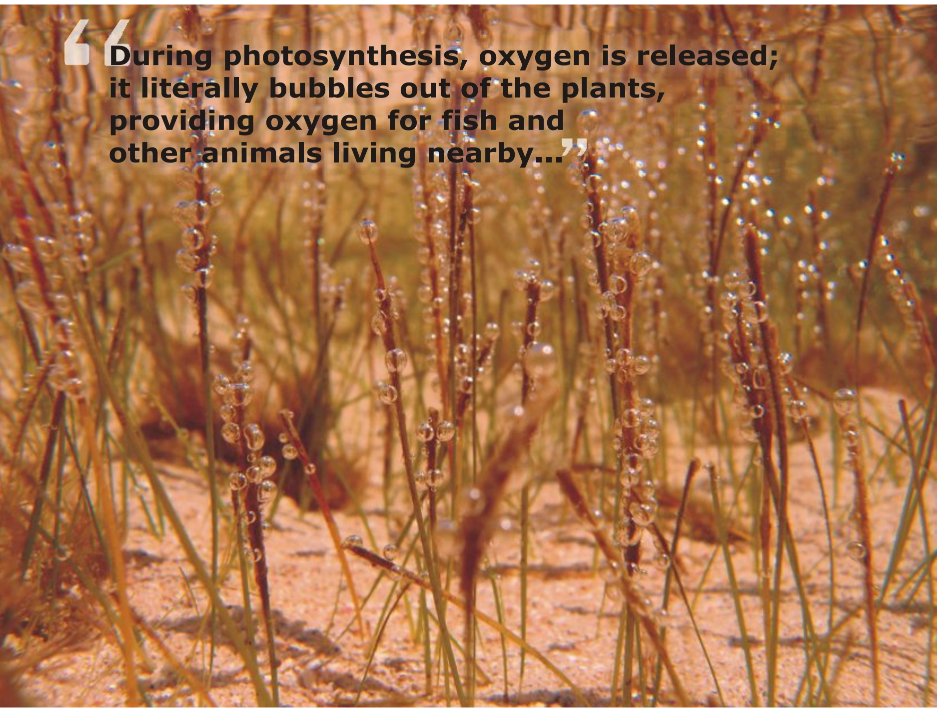
The Australian Government is currently establishing a Carbon Pollution Reduction Scheme as part of an effective framework for meeting the climate change challenge (see www.climatechange.gov.au). A national carbon offset standard will be developed to give consumers confidence in the integrity of carbon offset products they purchase. The standard will provide guidance on what constitutes a genuine, additional voluntary offset credit, set requirements for the verification and retirement of such credits, and provide principles for calculating the emissions of an organisation, product or service which could be offset.

Offsets are generally created by generating electricity from renewable sources such as wind or solar, putting wasted energy to work via cogeneration or capturing carbon dioxide in plant soils/sediments. One type of offset is carbon stewardship.

Carbon stewardship offsets are financial incentives to carry out actions to protect existing natural habitats with high conservation and carbon sequesting value (biodiversity improvements).

Because coastal seagrass systems are large carbon sinks, these ecosystems, among others, may mitigate the effects of our greenhouse gas emissions. For example, the amount of carbon sequestered by a hectare of seagrass is equivalent to the carbon emissions of a medium sized (4 cyl) car travelling 50 to 5,425 km per year (*based on rates presented earlier*). People can invest in maintaining or repairing these important ecosystems as a way to reduce or offset the amount of total carbon dioxide emitted from their activities (ie carbon footprint).

Globally, there are currently few non-profit organisations that focus on seagrass conservation, restoration and outreach campaigns to reduce our impacts on coastal nearshore systems. Stewardship offsets could be in the form of preventing conversion of tidal lands to another uses, restoring degraded seagrass meadows, or conserving threatened seagrass meadows through stewardship activities. Conservation and restoration of seagrass meadows could be accomplished in the long term through outreach campaigns that could affect local regulation of upland (catchment) uses. They could also be the regulation of recreational boating and moorage, as well as community mapping and monitoring efforts. To make a difference, we must all work together.



"During photosynthesis, oxygen is released; it literally bubbles out of the plants, providing oxygen for fish and other animals living nearby..."

Article by Len McKenzie & Richard Unsworth
Photography Len McKenzie & Rudi Yoshida

Townsville, Australia

Successful start for 2009

Article by Naomi Smith.
Photography Jane Mellors, Naomi Smith & Townsville Seagrass Volunteers

Cockle Bay, Magnetic Island

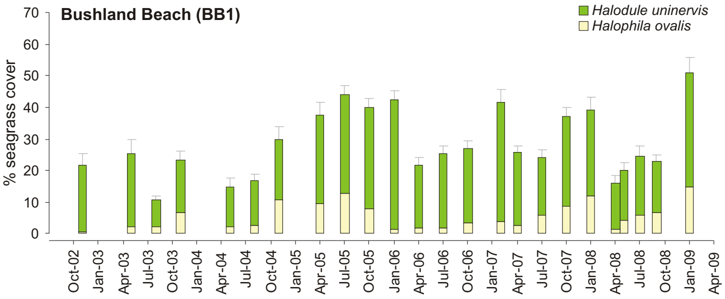
Above: Sampling Shelley Beach
Below: Braving the weather, Bushland Beach

Seagrass-Watch monitoring in the Townsville region got off to a great start for 2009. A total of five sites have been successfully completed: four sites were monitored in January and one site in February.

The four sites in January were monitored over three days as the lowest tides were during the late night/early morning.

We kicked off the year at Shelley Beach in the very early hours of Saturday 10th January. Sue Mulvany led the team of 11, everyone armed with a headlamp or torch, out into the field. Unfortunately, even with the extremely low tide there was still a bit of water lying around. The blow-outs still existed at this site so there were many quadrats with zero seagrass coverage. When seagrass was present, it was significantly higher in cover compared to the last monitoring. It was a successful event and everyone who attended enjoyed themselves. Luckily the mozzies and the rain stayed away!

The next morning was another midnight monitoring, but this time at Bushland Beach. Eight brave women, led by Jacky from Northern Beaches Rotary, battled the darkness and the rain to successfully complete this site. Overall the seagrass cover was higher than previous and many seeds were recorded. A light logger and its wiper unit were also collected and a replacement deployed as part of Reef Rescue Marine Monitoring.



Then it was off to Magnetic Island for daytime monitoring at Cockle Bay. We had to work quickly as the tide only dropped to bootie height for an hour. With the water any higher the visibility was too low. This site was dominated by *Cymodocea serrulata,* but there was a recorded increase in *Halodule uninervis* present. As with Bushland Beach, a light logger and its wiper unit were collected and replacement deployed.

Then it was time for our last night time sampling for the year and it was one of our wildest ones yet. Picnic Bay was hit with wild winds and showers of rain, this was the start of what ex-Tropical Cyclone Charlotte had in store for the Townsville area. This site is dominated by the wide and narrow variations of *Halodule uninervis*. It was nice to find a few seeds here and interestingly they were all found at the 50 metre end of the transects.

In February the second site at Shelley Beach was monitored by Mike, Iony, Naomi and first timer Cameron. We were lucky enough to have the rain stay away for the afternoon but, unfortunately, with all the rain that we had had previously, it meant that our site was not completely exposed on the low tide. This meadow was dominated by narrow *Halodule uninervis* with other species present, such as, *Zostera capricorni* and *Halophila ovalis*. For the first time *Cymodocea serrulata* made it into one of our quadrats. We had previously only ever seen this species in small patches on the walk out to our site. Compared to the last monitoring conducted in October 2008, the seagrass cover had decreased while the epiphyte cover increased. Seeds (predominately half seeds) were found within every core.

Thank you to all those that participated in these day and night time monitoring. For the next Townsville sampling dates (which I can assure you will be during the day!) check out the Seagrass-Watch website. Happy Seagrassing!

Great Sandy Strait, Australia

Strait into monitoring

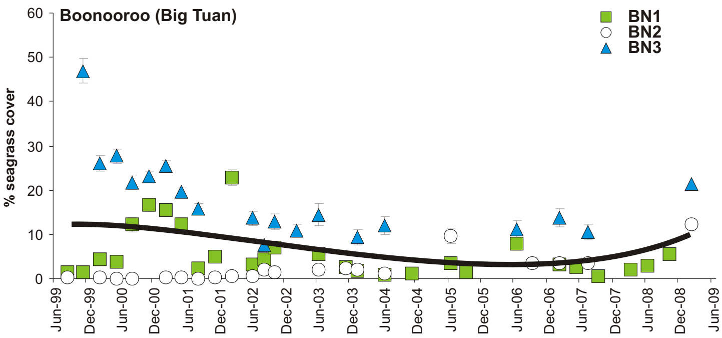
Article by Gordon Cottle.
Photography Len McKenzie & GSSFFW

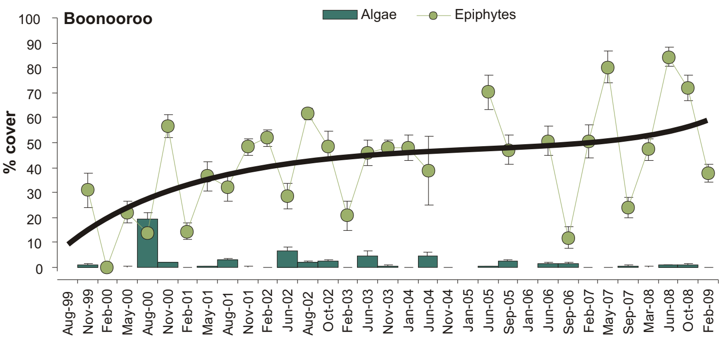
Pelican Bay, Great Sandy Strait

The year started with displays of our efforts, to engage volunteers for assistance in 2009. On World Wetlands Day I gave a display in cooperation with Wetland Care Australia and Cooloola Coastcare Association (our EnviroFund sponsors). This resulted in offers of two new local volunteers.

On Sunday, 1st February, I presented my "Seagrasses in the Great Sandy Strait" display to the General Meeting of the Volunteer Marine Rescue Flotilla 21, Boonooroo. The reaction and response was immediate and pleasing, with the offer to use their smaller vessel *Jupiter*, with two volunteers, to conduct seagrass monitoring at any of our "boat only" sites. We currently use the Flotilla's vessel *Pride of Maryborough* for our Boat Patrols.

The initial trip using *Jupiter* was on 8" March, when Robyn, Mike and Gabby (with skipper Stuart and crew Eddie) went to Boonooroo (BN3) for the first time since July 2007. The site overall looked very healthy with seagrass cover from 15 to 35%. The seagrass was predominantly *Zostera capricorni* with some *Halophila ovalis.* The blades were clean with a low (5%) epiphyte cover.



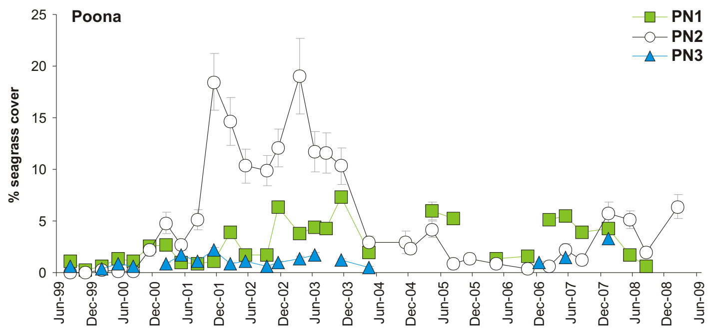


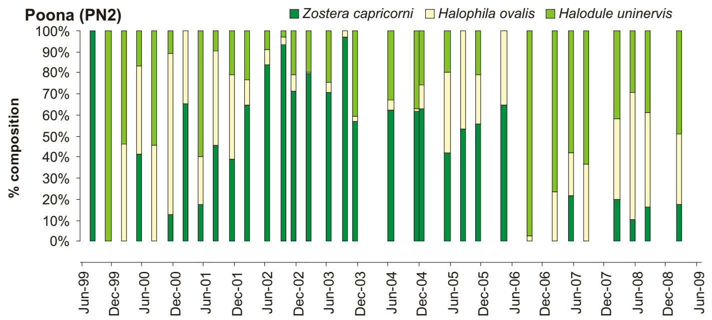
Returning to the Tuan channel on the way back from BN3, the team visited BN2. They were greeted by the best cover we have ever recorded, a good average of 15 to 25%, where many times previously there has been nothing. Again mostly *Zostera capricorni* but with epiphyte to 80%.

In late February, Robyn, Helen, Gabby, Mike and Steve were joined at Poona (PN2) by Helen's son Paul and visiting Portugese biologist Carla Pocheco. The site continued its overall recovery with new seagrass growth in every quadrat, albeit with high epiphyte cover. There were also extensive dugong feeding trails throughout

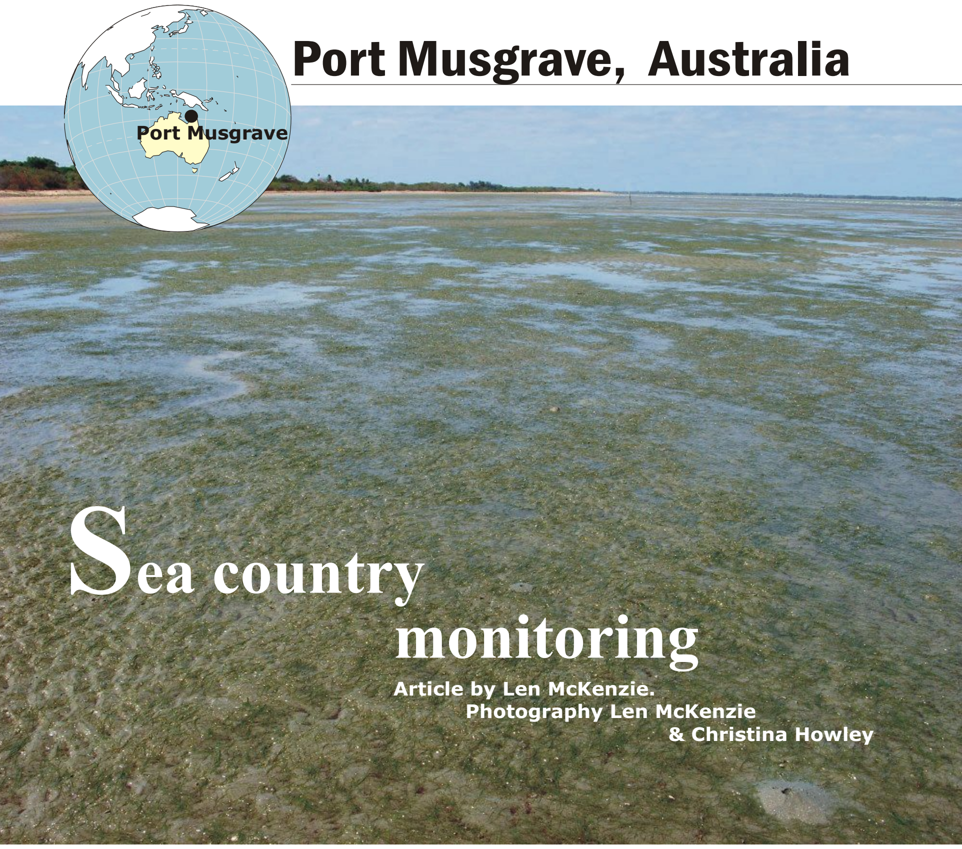
In early March, Amy and I monitored Tinnanbar (TN2) and were joined by Vivienne Griffen and Dennis Etheridge from Cooloola CoastCare. The overall seagrass cover was very similar to November 2008 with a general mix of *Zostera capricorni*, *Halodule uninervis* and *Halophila ovalis.* The leaves were very clean (no epiphytes) and there were many feeding holes with exposed rhizomes.

We had planned to monitor TN3 and BN1 this quarter, but with Tropical Cyclone Hamish bearing down we had to abandon efforts due to the appalling weather conditions.





Port Musgrave, Australia



Sea country monitoring

Article by Len McKenzie.
Photography Len McKenzie & Christina Howley

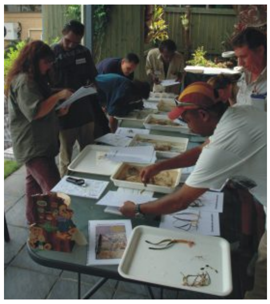
Port Musgrave is a shallow, almost enclosed, estuary about 90 kilometres north of Weipa on the west coast of Cape York Peninsula - just 200 kms from "the tip" - Australia's most northerly point. The small Aboriginal community of Mapoon lies on the southern shore of the estuary.

Previous studies have identified significant areas of seagrass on the intertidal banks and subtidal waters at Port Musgrave. Of particular note, isolated patches of *Halophila tricostata*, a deepwater species and endemic to northern Australia, was found in 3-7m depth off the coast immediately north of Port Musgrave. Meadows of *Halodule uninervis*/*Halodule pinifolia* and *Halophila ovalis* occur on the intertidal banks. *Enhalus acoroides* occurs in the shallow waters on the seaward edge of the banks, and *Halophila decipiens* is found in the deeper waters. The site is frequented by dugongs as lots of grazing trails have been observed.

Mapoon community is situated on the traditional lands of the Tjungundji people. Around 280 people live in Mapoon and there are 4 Aboriginal Rangers. The Indigenous Land and Sea Rangers work with the Traditional Owners to run projects that look after, manage and take control of traditional country. Aboriginal Ranger programs empower communities to keep country and culture healthy, generate positive social, economic, environmental, and cultural outcomes, and maintain strong connection to country for future generations.

One of the projects the rangers work on is sea turtles. There are four species of marine turtles which forage and nest on the eastern beaches of the Gulf of Carpentaria. They are the Green, Olive Ridley, Hawksbill and Flat Back turtles. Sea turtles on Western Cape York are in real decline, with nesting populations threatened with extinction. Adult animals are being entangled and drowned in ghost nets and a large population of marauding feral pigs are predating over 95% of nests on some beaches. Part of the Cape York Turtle Rescue strategy is to develop effective and culturally acceptable conservation and management measures in the region.

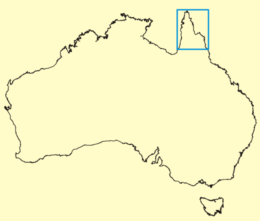
To ensure the long-term survival of sea turtle and dugong populations, the Rangers have expressed an interest to assess and monitor seagrass habitats in the region.



In early March 2009, Aboriginal Rangers from Mapoon and Napranum attended a Seagrass-Watch workshop (Level 1) in Cairns, at the Northern Fisheries Centre. The workshop included seagrass identification, background on seagrass ecology, the importance of seagrass and how to monitor seagrasses using the Seagrass-Watch protocols. The workshop also brought participants up-to-date on what was happening to seagrass from around the globe. The field session was held at Yule Point, where participants got a chance to put into practice what they had learnt in the classroom and monitored a Seagrass-Watch site.

Seagrass-Watch HQ will continue to work collaboratively in partnership with the Land & Sea Rangers from Mapoon and across northern Australia. The Mapoon Rangers hope to begin monitoring their own sites in the very near future, once suitable meadows have been identified from a detailed baseline mapping exercise which will be conducted in Port Musgrave in early April.

Cape York Peninsula



Cape York Peninsula is the northernmost extremity of Australia, projecting into the Torres Strait between the Gulf of Carpentaria (west) and the Coral Sea (east). From its tip at Cape York it extends southward in Queensland for about 800 km, widening to its base, which spans 650 km from Cairns (east) to the Gilbert River (west). The peninsula is sparsely populated, although there are Aboriginal reserves on both coasts.

Although no area on earth is unaffected by human influence, Cape York Peninsula is located in one of the least impacted regions globally. It is considered an area of exceptional conservation value and the marine coast has social value as sea country to Aboriginal people, for which fish, turtle and dugong are staple foods.

Extensive seagrass meadows are present in the waters surrounding Cape York Peninsula. The Queensland Department of Primary Industries & Fisheries (DPI&F) originally mapped seagrasses along the eastern coast in 1984 and the west coast in 1986. Since then, issue focussed fine scale mapping and monitoring has been conducted in several locations, such as ports (eg Weipa and Cape Flattery) or areas of high conservation significance (eg Shelburne, Margaret, and Bathurst Bays).

Approximately 1,568 km^2 of seagrass meadows have been mapped in Cape York Peninsula in coastal waters down to 10m depth. Significant deepwater meadows have also been found to depths of 60m on the east coast in the Great Barrier Reef lagoon.

At present only three Seagrass-Watch sites are currently monitored in the Cape York Peninsula: two sites at Archer Point (see issue 53) and one at Naprunum (with the Nanum-Wungthim Land & Sea Centre).

Torres Strait, Australia

Capacity building

Article by Jane Mellors.
Photography Jane Mellors & Len McKenzie

Sampling on Horn Island

A training workshop was held at the Thursday Island Bowls Club on March 4. It was well attended with rangers from Mabuyag Island, Kaurareg Nation, Dugong and Turtle Project officers from Horn Island and Mer, Catchment and Coastal Officers from the Cape York NRM, a Landcare Officer from Mer, TSRA LSMU ranger mentors and students and teachers from Tagai College Secondary Campus.

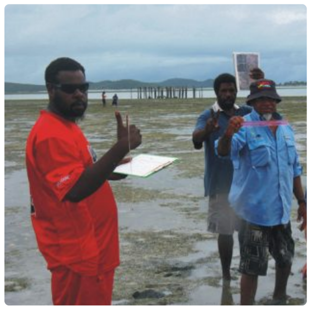
Feedback on the workshop was generally about how informative the sessions were as people didn't realise there was so much to know about seagrass and its habitat. The younger participants voted the GPS exercise the most fun, while the older participants thought the identification activity was the highlight.

Many thanks to Kelly Chaillon for secretariat support (*and for going the extra yards into the mud!*) and to QBFP Thursday Island for transportation.

During the workshop we ran a mock Seagrass-Watch activity on the Rugby League Oval, however the real test to our knowledge came with the actual monitoring at our established sites in the Torres Strait.

Wongai Beach, Horn Island was the first site we monitored after the workshop. Nothing like being thrown into the mud end!!! The rangers stuck to the transects, while other participants did the seed monitoring. Seagrass cover was high, as was algae cover. *Zostera* (Zc) is starting to show up all through the site now. Seed counts were down a bit, but definitely a highlight was all the *Halodule* (Hu) flowers that started emerging late in the afternoon.

Read more, from the schools page 14



> **"Now I understand the importance of seagrass, especially for our dugongs and turtles.."**

> **"I did not realise that Seagrass-Watch was world wide, and there were so many species of seagrass in the Torres Strait.."**

> **"When I go back to my area, I will get the community more involved in Seagrass-Watch.."**

Broome, Australia

Eco-tourists and seagrass

Article by Fiona Bishop.
Photography Broome Seagrass Monitoring Project & Len McKenzie

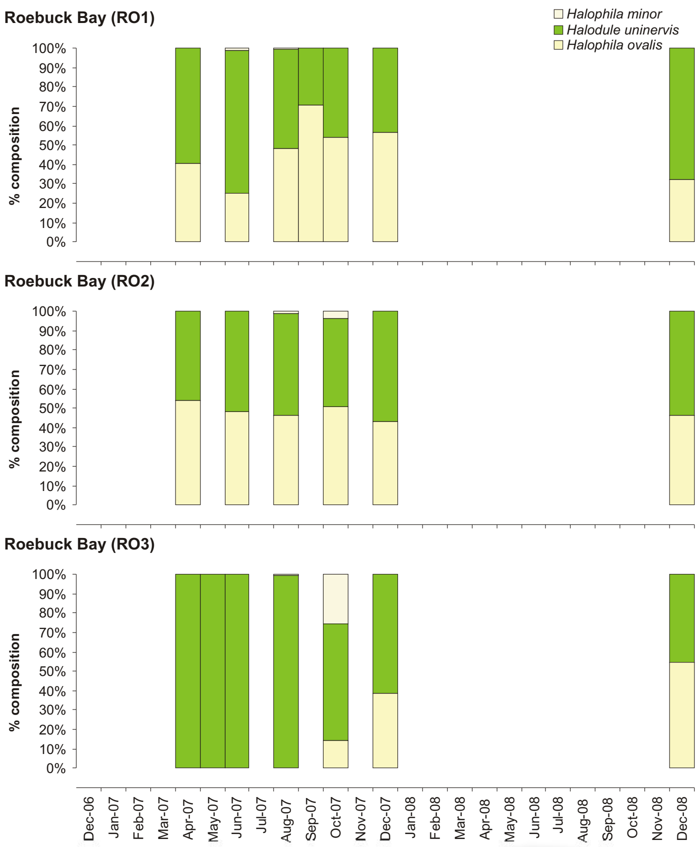
Roebuck Bay, Broome

Tourists are planning their holiday to Broome to coincide with seagrass monitoring sessions in Roebuck Bay.

Broome community Seagrass Monitoring Project coordinator Fiona Bishop said she has received increasing numbers of queries from people living outside the Kimberley region, who are planning to visit the popular holiday destination and would like to add value to their trip by going seagrass monitoring.

"Former Broome residents, university students and others with an interest in the environment and science are some of the people planning their visit around seagrass monitoring periods," Ms Bishop said.

Left: Dugong feeding trail
Above: Volunteers monitoring Roebuck Bay



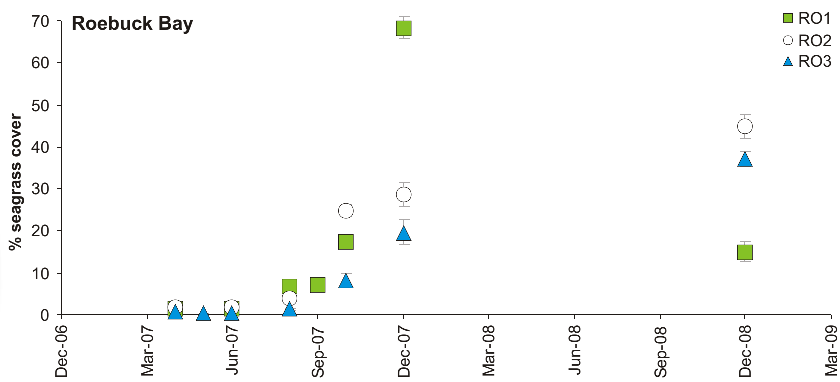
"The fact that people are planning their trip to coincide with seagrass monitoring demonstrates an increasingly widespread awareness of the importance of seagrass, and it is heartening that people are so keen to participate in monitoring."

One of the highlights for volunteers during a recent monitoring session was the number of dugong feeding trails visible in the seagrass meadows of Roebuck Bay.

"People get very excited, especially those who have never seen dugong trails before. They are amazed that only hours earlier, when the tide was high, dugongs had been feeding, leaving behind their distinctive trails. They are fascinated when I tell them that dugongs can eat about 30 kilograms in a day, which is equivalent to about sixty lettuces. Volunteers also loved the idea that dugongs and seagrass have a mutually beneficial relationship, each aiding the other's survival," Ms Bishop said.

The seagrass project is funded by the Australian Government's Envirofund and the Port of Broome, and is co-managed by Environs Kimberley and the Department of Environment and Conservation.

Fiona Bishop points out a dugong trail to volunteer Pam Jennings



Health indicator

Article by Hugh Kirkman.
Photography Jonathan Stevenson

> *Posidonia australis* has undergone dieback since the 1970s and the potential for continued loss is a concern for park managers and fishermen alike.

In January this year I had the opportunity to help with seagrass monitoring in Corner Inlet, Victoria. On Saturday I worked with Parks Victoria Ranger Jonathon Stevenson and Parks Canada exchange ranger Art Laurensen to sample a site near the Franklin River mouth. On Sunday a volunteer, Steven Dodd from the local community joined us and we completed three sites in the Bennison Channel.

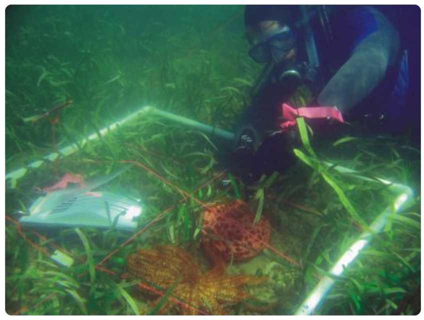
Corner Inlet is the only *Posidonia australis* site in Victoria and there are enormous beds of *Heterozostera nigricaulis*, *Zostea muelleri* and *P. australis* growing there. The Inlet also has some saltmarsh and mangrove (*Avicennia marina*) and along one edge is bordered by the Wilson Promontory National Park.

Posidonia australis is crucial to the health of the Inlet and has long been recognised by local fishermen as a key habitat for a variety of fish species. The presence of *P. australis* in Corner Inlet led to the establishment of the Corner Inlet Marine & Coastal Park in 1986 and the Corner Inlet Marine National Park in 2002. *P. australis* has undergone dieback since the 1970s and the potential for continued loss is a concern for park managers and fishermen alike. Corner Inlet has a number of rivers draining an extensive catchment containing a variety of agricultural, forestry and rural township practices. It is believed that catchment impacts may be responsible for the observed dieback.

Parks Victoria, in conjunction with The People and Parks Foundation, has been monitoring *Posidonia australis* in Corner Inlet, Victoria for four years. The program is part of the state wide Sea Search program, aimed at getting community volunteers involved in monitoring Victoria's marine national parks, marine sanctuaries and other marine protected areas.

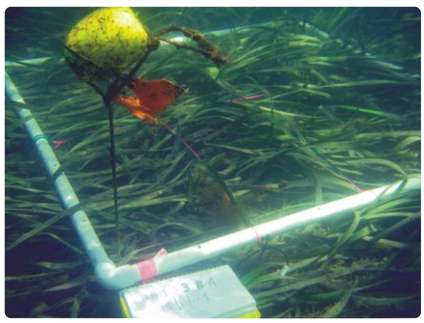
The Corner Inlet community seagrass monitoring project is coordinated by Parks Victoria Ranger Jonathon Stevenson (Jono). He has had help from volunteers and is using a method adapted from Seagrass-Watch to gain data on seagrass health and abundance. The project has concentrated on *P. australis* because of its importance in the Corner Inlet system.

Posidonia australis has a uniqueness to Victoria in that it is abundant in easily accessible shallow meadows. In other parts of Australia it is unusual for this species to be exposed at most low tides but in Corner Inlet large banks can be seen exposed at low tide. It is easier for volunteers to work without SCUBA, snorkelling or walking in shallow water.



The monitoring is done at two permanent quadrats along a transect 20-25 m long. The first quadrat is at the edge of the meadow and the second quadrat inside the meadow. Two subsurface buoys are placed at each quadrat for the quadrat to fit on diagonal corners. The quadrats are divided by wire into eight sub-quadrats and data are taken from three of these. The data include epiphyte cover, shoot density and the length of three leaves. Jono was pleased this weekend that we managed four sites. Further summer monitoring is scheduled for February.

More volunteers are needed to cover this vast area and the usual request for long-term commitment from these volunteers is always there. Jono's adaptation of the Seagrass-Watch methods is necessary because he wants to cover more meadows and larger areas and cannot with the extra time involved with full Seagrass-Watch methods. All sites require boat access which is another limiting factor.



This weekend was the end of the fruiting period for *P. australis* and the remains of the fruit were floating around with a few seedlings still attached. *Halophila ovalis* was having a highly reproductive year with many ovaries floating around and in drift on the beach.

More information about the Corner Inlet or the Sea Search program can be found at www.parkweb.vic.gov.au or www.seasearch.org.au.

Kuda Huraa, Republic of Maldives

Raising awareness

Article by Lucy Gwen Gillis.
Photography Maldives Seagrass Team

Nyhad and Lucy monitoring Kuda Huraa's seagrass

Here in the Maldives I work closely with PADI dive masters who come from the local island of Buda Huraa. My aim is to involve as many Maldivians as possible so that Seagrass- Watch can then develop in other locations. October 2008 was the first monitoring that has been done in the Maldives; each observation period will be completed every six months.

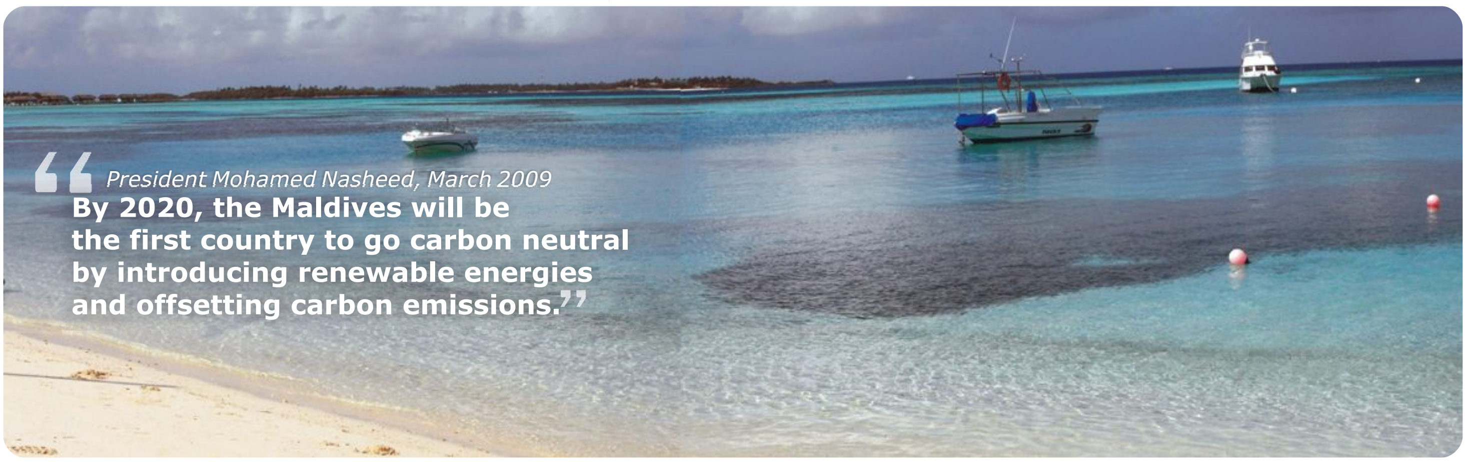
The exercise was accomplished with a standard intertidal monitoring pattern along the beach using SCUBA equipment. Only two seagrass species were present in the monitoring site: *Syringodium isoetifolium* and *Thalassia hemprichii*. Seagrass cover was 18.9 ±5.8% and dominated by *S. isoetifolium* (59%). Although *Thalassodendron ciliatum* is present nearby, it was not within the monitoring site.

In the Maldives seagrasses are seen as an invasive species and as such many resorts have an agenda for destroying the plants. At Kuda Huraa the Marine Biology team has convinced the resort not to take steps to kill the seagrasses until we have documented these sensitive ecosystems.

Seagrasses have increased in area due to eutrophication in the water. Through Seagrass-Watch we hope to correlate any modifications in growth patterns with chemical changes in the water column. Our team here feels that these issues must be addressed before the seagrass are eradicated. We hope to be able to work with the Four Seasons to ensure that the seagrasses are managed in an appropriate way.

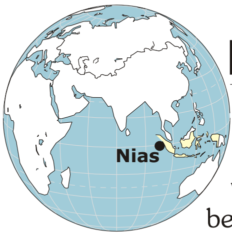
Kuda Huraa sand cay 1966

Kuda Huraa with resort 1999

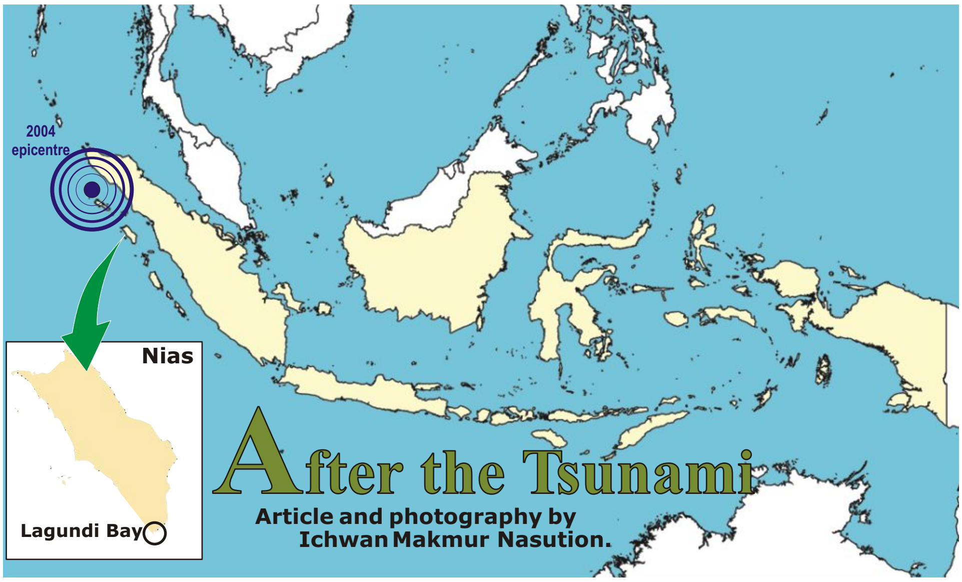


President Mohamed Nasheed, March 2009

“By 2020, the Maldives will be the first country to go carbon neutral by introducing renewable energies and offsetting carbon emissions.”



Nias, Indonesia



After the Tsunami

Article and photography by Ichwan Makmur Nasution.

Lagundi Bay used to be one of the areas where seagrass could be found on Nias Island. Located at the southern tip of Nias, this bay was a tourism area, however the earthquake and tsunami on 26 December 2004 changed all that.

Nias Island is located not far from the epicentre of the earthquake that caused the tsunami on 26 December 2004. It was also impacted by 8.7 magnitude earthquake on 28 March 2005.

On 2-3 March 2006 we conducted a survey in Lagundi Bay, Nias Island, to determine the condition of coastal ecosystems one year after the earthquakes and tsunami.

Two species of seagrass, *Thalassia hemprichii* and *Enhalus acoroides* were found during the survey, and were commonly reported in a poor condition. Land uplifting caused by the earthquakes appears the main factor that changed the seabed condition and also later affected the condition of the seagrasses in Lagundi Bay.

There are at least three major factors that can impact seagrass due to land uplifting:

1. Direct exposure to the air and sun light. This causes seagrass to dry (desiccate) and die. We found evidence of this during the survey, particularly the drying leaves of the *Enhalus acoroides* shoots.

Thalassia hemprichii covered by algae

2. Shallower water column. During the dry season, water temperatures can increase to the maximal limit which seagrass can tolerate. During the survey, shallow water seagrass leaves were reported rotting and slowly dying. Rotten *T. hemprichii* were commonly observed in very shallow water. The leaves had lost a lot of their chlorophyll and disintegrated when touched.

3. No water movement and circulation in the area. Seagrass needs good water circulation to grow. During the survey we found areas where the lack of water flow had resulted in a rapid increase of algae which were out competing (smothering) the seagrasses.

Algae now occupies this area where seagrass used to be grow

As the survey was conducted three years ago, we would like to revisit the region to understand the change of the seagrass meadows in this area. We would like to know whether it's completely gone or if there are some new colonies of seagrass in the bay.

Photos courtesy Kerry Sieh, 2006

On 26 December 2004, the Great Sumatra-Andaman earthquake with a magnitude of between 9.1 and 9.3, struck 250 kilometres north of the island of Nias. It resulted in the Boxing Day Tsunami, creating waves as high as 10 metres. 122 people were killed on Nias and hundreds more rendered homeless.

On 28 March 2005, the island was again hit by an earthquake with a magnitude of 8.7. Known as the Nias Earthquake, it was the second-most powerful earthquake in the world since 1965. At least 800 people were reported dead, with more than 2,000 casualties. Hundreds of buildings were toppled and many thousands were made homeless.

Before the Nias Earthquake, the southwestern coast of Nias island was slowly subsiding. After the 2005 earthquake, Nias's coastline has changed markedly. In some areas, the coast has moved over 50 m inland. In other areas, as much as a further 100 m of land is exposed from the sea. The uplift of land has been recorded as being as much as 2.9 m, elevating fringing reefs out of the surf zone and re-uniting the small islands.

Source: www.wikipedia.org

Chek Jawa and Sentosa

When it's low. We GO!

Article by Team Seagrass. Photography Ria Tan (Wild Singapore) and Team Seagrass

Enhalus acorodies flowering on Cyrene Reef

Chek Jawa monitored Jan 2009

Wet and windy Cyrene

It's been a busy start to 2009 for TeamSeagrass, we've not only managed to squeeze in our regular monitoring sessions, but also an exhibition! Here's a quick recap of what we've been up to.

Chek Jawa (10 Jan 2009)

We started with our first monitoring session at Chek Jawa on a lovely breezy afternoon, making our way over to Pulau Ubin on the zippy little bumboats. There hadn't been much rain in Singapore during December, which is uncharacteristic as this is typically the monsoon season. Most of Chek Jawa is covered with the *Halophila ovalis* and *Halodule*. A quick inspection of the Northern sand bar was made, to see how the special *Halophila beccarii* was doing. There were only a few patches of these tiny but tough seagrasses. Shufen checked the patch nearer the boardwalk and they too were being overgrown by the more abundant *Halophila ovalis*. Does *Halophila beccarii* do better when there is an influx of freshwater? Hmm...there's still a lot we need to find out about our seagrasses.

It was nice to see the patch of *Thalassia hemprichii* doing well. And one of the transects even had readings of this seagrass which is not very common on Chek Jawa. Elsewhere, the *Cymodocea rotundata* patch near the boardwalk seems to have spread out to cover a larger area. Shufen and Siti even found flowering *Halophila ovalis*.

But what was most delightful was the luxuriant and broad expanses of the beautiful *Halophila spinulosa*, which used to be abundant in the lagoon area, but wasn't spotted there for all of 2007 and 2008. It seems to be migrating slowly back into the lagoon area, and can be seen growing under the boardwalk, which is a special find for the visitors who bother to look down. Of course, the underwater cameras were whipped out to capture these beautiful seagrasses. We also found various creatures, but the most amazing was Kok Sheng's find of a special sea star!

Sentosa (12 Jan 2009)

The patch at Sentosa may be small, but never underestimate the amazing stuff you can find there! Most of the shore is a rocky beach, with intermittent patches of seagrass. The largest patch, made up of *Enhalus acoroides* and *Halophila ovalis,* is found growing on the sandy patch adjacent to the sea wall. We got wet beyond our knees because the tides seemed to be higher than predicted, but we managed to get the monitoring done. We were rewarded with the sightings of three small blue-spotted stingrays and even lived to tell the tale!

TeamSeagrass Exhibition at the Volvo Oceans Race Festivities (16 Jan 2009)

TeamSeagrass spent a very windy day at one°15 Marina at Sentosa for the Volvo Race special Scouts' marine outreach programme. The sailing boats stole the show with their sheer size, but our aim as part of the Scouts' marine outreach was to showcase what lies beneath the sea, which can be just as impressive.

With lots of posters and even our monitoring gear, the TeamSeagrass booth seemed to fascinate the visitors and we shared lots of stories and pictures of our wonderful seagrass meadows and what ordinary people can do for them. Thanks to Kok Sheng who collected the seagrass specimens on our last trip

Pulau Semakau and Cyrene Reef, Singapore

to Pulau Semakau, we had a nice tank of live seagrasses, which came in handy for showing features like the fact that they are flowering plants and it was a hit amongst those who like to get their hands wet! All things considered, it was a day well spent. Thanks to Tan Sijie, a scout and a seagrasser, who invited us to the event.

Pulau Semakau (7 Feb 09)

A small happy team headed out on the 7th February to check out the vast seagrass meadows on Pulau Semakau. Although these meadows lie next to our landfill and near major petrochemical plants on Pulau Bukom, the shore is still very much alive.

The meadows are vast and the team is spread out over more than a kilometre, monitoring the 3 sites. The *Enhalus acoroides* on Semakau were flowering, with little white specks (male flowers) found everywhere on the shore, in search of the larger female flowers to pollinate.

At PS3, Shufen points out that the sediment has disappeared as we can't even peg down the tape. So we wound it around the stake instead. We also noticed lots of sponges had started growing in the monitoring site. Is the seagrass moving? Has the sediment base changed? This is why monitoring is so vital to our seagrass meadows.

And who says we only get puny fishes in our meadows? We found this large fish (some accounts claim it's a Queenfish) trapped in the shallows in the meadow at Semakau. It was possibly trapped there because of the long drift nets that are set up at Semakau. We found several that day, including an extremely long one with several crabs entangled in it.

Yes, it was THAT big, about 80cm long. The long measuring tape used by TeamSeagrass came in handy to show, without a doubt, that it was BIG. Eventually, Andy carried the fish and released it at the reef edge, where it swam away into deeper waters.

Cyrene Reef (9 Mar 09)

So the rain that was supposed to fall on our island over December and January came late, and the skies have been pouring every afternoon the past few days. A few hours before TeamSeagrass' trip to Cyrene Reef today, and the prognosis for the weather was bleak. A giant mass of wetness enveloped the entire island. And on other weather websites, there was the Mother of All Clouds which stretched from Sumatra to Johor. It didn't look good.

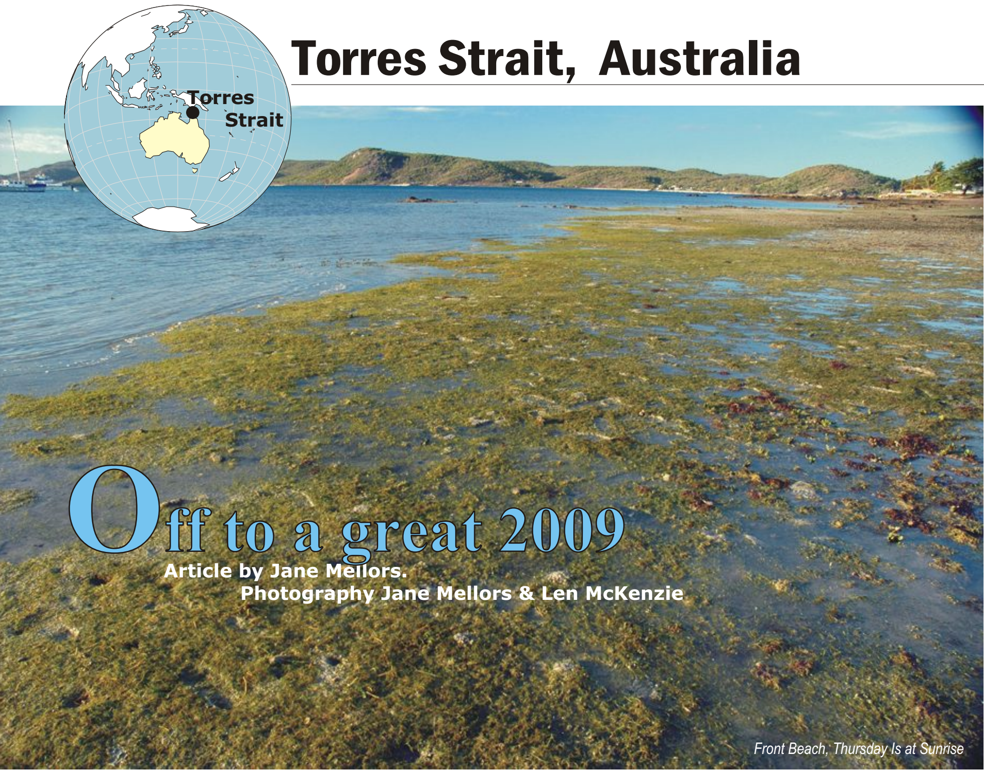
But for TeamSeagrass, the mantra is "When it's low, We GO!". So long as there's no high winds or lightning, which there wasn't, it's all systems go. Melvin was ready, we were ready, the tide was low. And so what if needly hard little drops of water were relentlessly falling from the sky.

The tricky landing is as usual, done with great style and safety, thanks to Melvin. And in no time, the Team was ashore, equipment all laid out and ready for action. Alas, on the way to our site, we noticed a lot of the seagrasses had black portions. Much like what the Seagrass Angels saw at Labrador. Were the seagrasses burnt by the very hot weather recently?

All to soon, the monitoring was done and we were off to explore this fantastic reef in the middle of a triangle made up of our world class container port at Pasir Panjang, and the petrochemical plants at Pulau Bukom and Jurong Island. Despite this, Cyrene Reef has not only vast living seagrass meadows, but also living reefs! With large hard and soft corals. Sadly, we came across several soft corals that appear recently broken off their hard mounts. Other disturbing encounters included many fish traps on the lush shores.

Aside from the fish traps, Cyrene is also next to a project involving massive dredging, laying of "small rocks" for some sort of communications or supply line between Jurong Island and Pulau Bukom.. Cyrene Reefs is also near the humungous reclamation project to build a new container terminal near Labrador Nature Reserve.

As the tide turned, the weather eased to a mizzle (miserable drizzle), we wait for Melvin and his boat to brave the now high waves to reach the shore. Ria again did the Dugong Dive to get into the boat, it's apparently a lot easier than trying to be ladylike and step in. All wet from splashing around getting back into the boat, it was freezing on the way home. Cyrene Reef is an amazing shore and we shall be back in a few months for our regular monitoring. Let's hope we have better weather then.



Off to a great 2009

Article by Jane Mellors.
Photography Jane Mellors & Len McKenzie

Front Beach, Thursday Is at Sunrise

Right: Back Beach monitored

Hammond Island

The Tagai College boats dropped us at the reef crest and we walked into our site (HD1) rather than out to it. It was interesting to note that the meadow closer to the reef crest was covered in filamentous green algae but was noticeably absent from the site. Ranger Loretta who lives at Hammond walked out and met us to help with the monitoring. As we don't collect seeds at this site, all hands were on deck for working on the transects. Seagrass cover was high, as was epiphyte cover. *Enhalus* (Ea) flowering was also recorded.

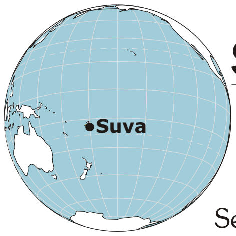
Thursday Island

After dodging showers of torrential rain, we managed to get Front Beach (TI2) monitored. The monitoring was undertaken by the Tagai College students. The students need a bit more practice with locating the sites using a GPS, and maybe a bit more compass work. When the site was located, they did everything from setting up the site to allocating jobs. Seagrass cover was up while seed counts were down. *Enhalus* (Ea) fruits were a common sight further out in the meadow, as were spent *Thalassia* fruits. The catch of the day were some super large yabbies.

It looked like we might not be able to survey Back Beach (TI1) as it bucketed with rain for most of Sunday. By Seagrass-Watch time the rain had stopped. We did have to wait a while for the tide to drop before venturing out. We had a core group of students turn out, with some comings and goings related to sport training. The Marrington family made it a family event. Once again the students took charge and sampling was conducted efficiently. We were all done in 40 minutes, luckily, as it was starting to get dark. *Enhalus* (EA) flowers and fruits were scattered through the site, and we even recorded an intact *Thalassia* (Th) fruit. We certainly got a work-out with our arithmetic and species id as we recorded *Enhalus* (Ea), *Thalassia* (Th), *Cymodocea serrulata* (Cs), *Halodule* (Hu), *Halophila ovalis* (Ho), *Cymodocea rotundata* (Cr), *Syringodium* (Si) and even one plant of *Halophila spinulosa* (Hs).

Front Beach team

Hammond Island



Suva, Fiji

Loving seagrass on Valentine's Day!

by Marco Tuimaka & Minami Orikasa (Year 7)
Photography Posa Skelton & ISS

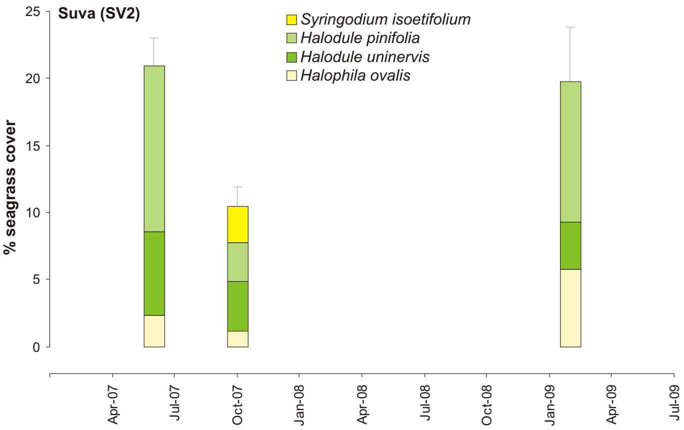
On Saturday the 14th of February most of the students and teachers in International Secondary School (ISS) Year 7 participated in Seagrass-Watch. We started at 11am in the Science Lab and began our training in how to preserve and observe seagrass for the international cooperation in conserving seagrass.

During our training we learnt about the types of seagrass that we can find in Suva. They are *Halodule uninervis* (HU), *Halophila ovalis* (HO) and *Halodule pinifolia* (HP). We also learnt about the different animals that benefit from the seagrass such as the turtles (eat seagrass), prawns, crabs and the different species of fish (live within the seagrass). Lastly we learnt about how to work out the percentage of the seagrass in the area we were observing. We also found out the types of things that damages seagrass such as boat anchors.

After the classroom session, it was time to go out into the field. About 200m from shore, we marked out our 3 transects (each 50m long). Each transect required 11 readings (areas where we observed the seagrass). While we were there we found a lot of algae, rather than seagrass, mainly because there were a lot of sewer pipes going out into the sea which was quite disappointing. We also found a lot of crabs, mud skippers, prawns, eels and a beached puffer fish. It was a long day in the sun and everyone was doing their best to finish their observations before 5:00pm which was the time we had to leave.

We wish to thank Miss Tora and Ms Howard for coming along on the day. A vinaka vakalevu to Miss Lee and Mr Hayduk for training us. They really made the learning fun!

Above: (L-R) Savannah, Emily, Delores, Julia and Courtney.
Right: Minami, Bella and Mele consult the expert, Posa Skelton (Seagrass-Watch Fiji local coordinator)



"Iolani Patterson
**It was fun and interesting.
We learnt about the environment."**

SAWFISH.. continued from page 16...

habitat for juvenile sawfish. The mangroves and seagrass meadows provide sanctuary from large predators such as bull sharks, hammerhead sharks, tiger sharks and crocodiles.

Four species of sawfish are found in Australia and two of these, the Freshwater sawfish (*Pristis microdon*) and the Green sawfish (*Pristis zijron*), are currently listed as Vulnerable under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Sawfish are threatened by a number of activities. Outside Australian waters, sawfish are hunted for their fins, flesh and other body parts, which are used in traditional medicines or sold as souvenirs. The greatest threat to sawfish survival globally is habitat loss from coastal development (dredging, mangrove removal, seawall construction, wears and waterway barriers) throughout the freshwater and inshore shallow coastal and estuarine areas important for sawfish survival.

Image courtesy of David Iliff

Animal facts

SawFish

Article by Stirling Peverell and Len McKenzie

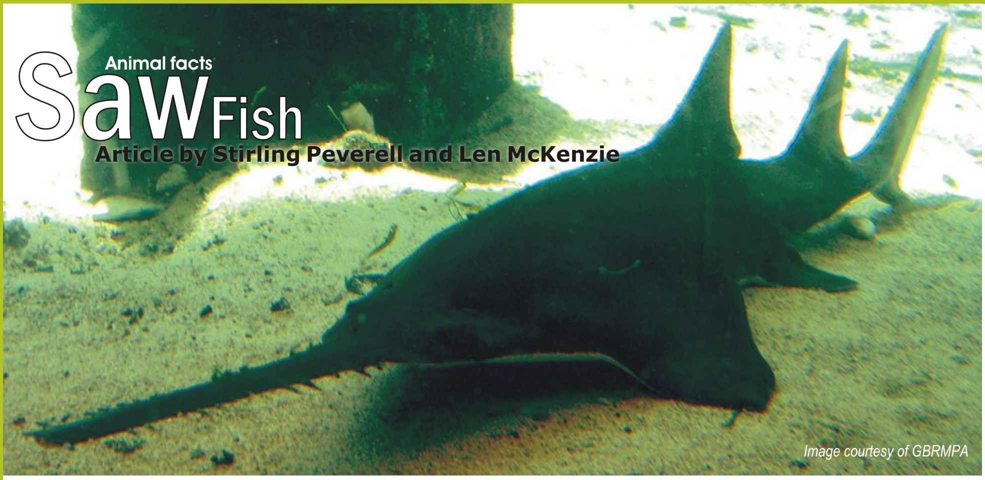
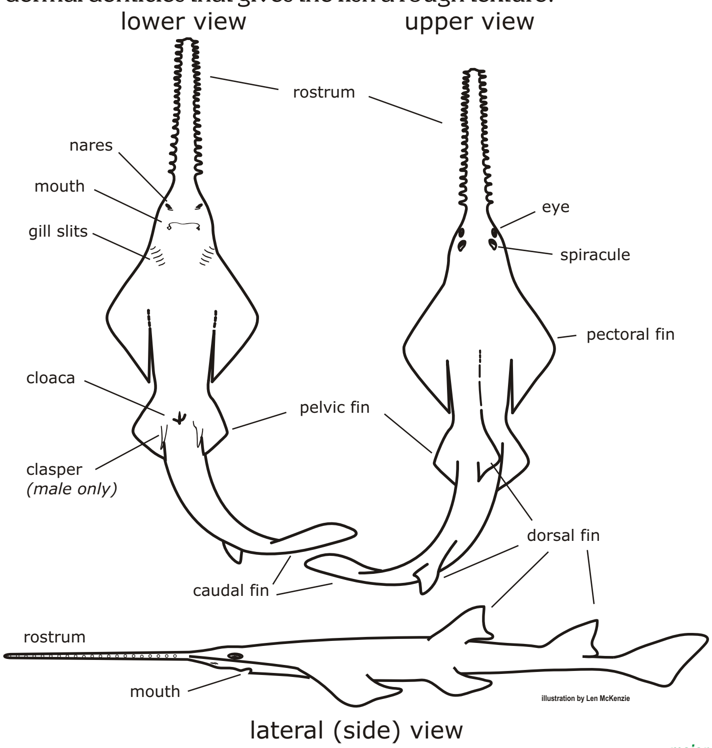


Image courtesy of GBRMPA

Sawfish are a unique type of ray (Batoid) that possess a large extended toothed rostrum, or saw as it is commonly called. Sawfish are usually found in freshwater rivers, estuaries, and coastal marine environments in tropical, subtropical and warm-temperate regions of the world. Some species move between fresh and salt water easily, but most are quite happy to sit on the bottom of shallow sandy or muddy habitats. In some parts of the world, sawfish are often found inhabiting seagrass meadows, particular when young.

Sawfish are members of the family Pristidae, from the Greek pristes meaning "a sawyer" or "a saw". There are seven recognized species of sawfish worldwide.

The sawfishes body is flattened and they spend much of their time lying on the sea bottom. Like rays, the mouth and nostrils (nares) of sawfishes are located on their flat undersides along with their gill slits. The mouth is lined with small, dome-shaped teeth for small fish and crustaceans which they first crush and then swallow whole. They are able to breathe while lying on the bottom by drawing in water to their gills through spiracles (large holes located behind the eyes). The skin is covered with tiny dermal denticles that gives the fish a rough texture.



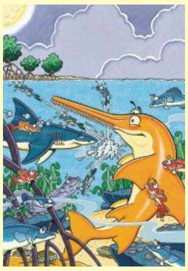
Sawfish are often confused with sawsharks, which also have saws. Sawsharks however are much smaller, have barbells on their rostrum, have alternating rather than evenly sized sawteeth, and also have gills on the sides of their head.

The most obvious part of a sawfish is its "saw" (rostrum). The "teeth" on the saw are in fact modified scales (denticles) and not real teeth. Although sawfish have reasonable eyesight, they rely on their highly sensitive rostrum for detecting the heartbeat and movement of buried prey. Small sawfish use the saw to grub along the bottom and uncover small crustaceans and fish. Large sawfish swim through schools of fish (eg blue salmon, mullet) swiping the saw to stun or impale fish. Sawfish have been observed wiping their saws on the bottom, removing fish that have been impaled on the teeth of the rostrum. Sawfishes have also been known to defend themselves with their rostrum.

A freshwater sawfish acoustically tagged and released by DPI&F in the Wenlock River 2007

Some sawfish species can live more than 25 to 30 years, and it is understood species of *Pristis* mature at approximately 8 to 10 years (3 metres total length). Sawfish give birth to live young, a term called vivipary. Sawfish pupping is thought to take place over the monsoonal wet season with litter sizes of around 12 pups, however it is unknown whether Australian sawfish give birth annually. Size at birth varies, depending on species, however individuals as large as 92 cm total length have been recorded. To protect the birthing mother all pups are born with a membranous sheath which covers the toothed rostrum. The rubbery sheath eventually disintegrates and the teeth harden allowing the pup to begin hunting. Shallow estuarine areas are important nursery

continued page 15



The Adventures of Sonya the Freshwater Sawfish

To draw attention to the charismatic sawfish and the threats to the species' survival, a children's book has been written by DPI&F sawfish researcher, Stirling Peverell.

The book, which is beautifully illustrated by Paul Lennon, leads young readers through the challenging first year of life when a young sawfish migrates many miles upstream from its estuarine birthplace. The story delivers an education and conservation message while illustrating threats such as habitat modification; illegal net fishing in rivers; and line fishing in freshwater waterholes. All proceeds from the sale of the book go to Project Sawfish, a non profit organisation that co-ordinates, facilitates and supports projects that aim to advance knowledge of animals that inhabit riverine, estuarine and near shore environments in northern Australia.

To purchase a copy, contact ryan@cairnsmarine.com