Seagrass-Watch news

Issue 27 • November 2006

As another year comes to a close, we can look back over a successful year of monitoring and some significant achievements. Now in it's eighth year, the program has welcomed new participants in Australia, Fiji, Solomon Islands and Thailand. Additionally it has welcomed several countries including India, China, and more recently Singapore, Eritrea, and Bangladesh. The program has also seen the website updated and the newsletter go colour.

In this issue you can read reports from several of the regions & countries currently participating in the program, as well as some new ones. Get an update on the Reef Water Quality project. Read about Tetepare Island and the status of seagrass in the Eritrean Red Sea. Catch up on the NCEAS Global Seagrass Futures Initiative and how Seagrass-Watch is assisting. You'll also find some interesting articles on saltmarshes, acorn worms, and seagrass research. With the southern summer approaching, there's also an article on seagrass sensitivity to UV radiation. Don't forget to check out the website, as the gallery and news pages are regularly updated. Everyone at Seagrass-Watch HQ wishes all watchers and supporters a happy new year and safe holiday season. We look forward to another year of achievements in 2007!!!

What's inside:

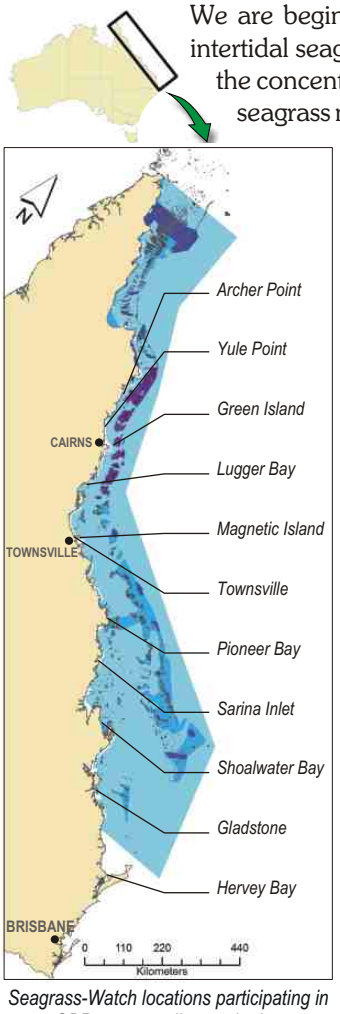
Great Barrier Reef Water Quality Marine monitoring wraps up for another year

David Haynes and Joelle Prange (Great Barrier Reef Marine Park Authority) report

Australian Government
Great Barrier Reef Marine Park Authority

The second year of the Reef Water Quality Protection Plan Marine Monitoring Programme has successfully wrapped up for 2006 and a big thank you goes to the Seagrass-Watch volunteers who gave up their time to assist with the monitoring over the last two years.

The information collected is starting to provide a comprehensive picture of the status of water quality and inshore Reef ecosystems. We are beginning to have a Reef-wide picture of intertidal seagrass health as well as information on the concentrations of pollutants such as diuron in seagrass meadows.



Seagrass-Watch locations participating in GBR water quality monitoring

The data collected off the North Queensland coast following cyclone Larry showed most meadows are in a good position to recover from disturbance based on information collected by Seagrass-Watch volunteers on meadow seed bank counts.

Next year we will look to expand the programme to include monitoring of meadow temperature and light levels using data loggers and we will have additional sampling at intertidal meadows on offshore islands.

Marine Monitoring reports describing the data collected to date will be available at the start of 2007 from www.gbrmpa.gov.au or by phoning the Great Barrier Reef Marine Park Authority on (07) 4750 0700.

Looking into the future, a Marine Monitoring Programme website is currently being developed and will be online by the end of the year.

"I'm doing my bit to look after it!"

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For more information about Seagrass-Watch, visit
http://www.seagrasswatch.org

WORLD SEAGRASS ASSOCIATION

Assoc. Prof. Michelle Waycott (President WSA) reports

The World Seagrass Association is a professional group which works towards the improvement of scientific knowledge, protection and effective management of seagrass ecosystems around the world. At present, members come from more than 15 countries and membership continues to grow with every meeting of the International Seagrass Biology Workshop series. The 7th such meeting, held in Zanzibar (Tanzania) in October this year was a great success. Queensland's Seagrass-Watch scientists have been pivotal in getting the association up and running over the past 6 years. Dr Rob Coles (DPI&F) was foundation Secretary to the association. Rob has played an important role in that he managed to take the idea of the association and make it an incorporated body, set up the website with volunteer support from friends and colleagues, and kept the association running across all the major continents. Len McKenzie, our Seagrass-Watch program leader, has been Treasurer for the last couple of years. With the voting in of a new committee, Michelle Waycott (me) has now become President of the association, Len is Secretary and Rob is a member of the general committee. We look forward to new opportunities to improve the status of seagrass around the world. If you are interested in the WSA, please visit our WWW site or contact us for more information. Dr Michelle Waycott, email: michelle.waycott@gmail.com

In Zanzibar, a few Seagrass-Watch scientists from the past and present (left to right), Rob Coles, Stuart Campbell, Karen Vidler and Jane Mellors

NCEAS Global Seagrass Futures Initiative... What is it?

Assoc. Prof. Michelle Waycott (JCU) reports

In 2004 the 6th International Seagrass Biology Workshop was held in Townsville. At this workshop, where Seagrass-Watch had a very high profile, it was recognised that the significant monitoring effort made around the world by volunteers, scientists and environmental managers, needed to be coordinated into a review of the status and trends of seagrass habitats globally. Funding to conduct this synthesis was obtained through the National Centre for Ecological Synthesis and Analysis (NCEAS) based at the University of California Santa Barbara in the USA. Four meetings were planned and we have had two of these already. The first meeting resulted in a paper entitled "*A contemporary crisis for seagrass ecosystems*" to be published in BioScience early in 2007. Right now we are compiling seagrass monitoring data from many different sources, including a summary of data Seagrass-Watchers have collected, to assess the global trend in seagrass habitats. We will report on our outcomes in the middle of 2007. Watch this space!

Global Seagrass Futures NCEAS working group October 2006. Left to right: Gary Kendrick, William Dennison, Carlos M. Duarte, Frederick Short, Suzanne Olyarnik, Tim Carruthers, W. Judson Kenworthy, Robert Orth, Susan Williams, Kenneth Heck, James Fourqurean, Michelle Waycott, Randall Hughes (not present)

Sunburnt Seagrass Are Seagrasses Sensitive to UV radiation?

Catherine Walsh (Honours student, JCU)

Just like terrestrial plants, seagrasses need three major requirements for growth and survival: light, carbon and nutrients. Light is the major limiting factor for marine plants as it is essential for photosynthesis, which is important for the survival for all plants. Although seagrasses depend on light to survive, just like humans too much light and ultra violet radiation can be harmful.

Sensitivity to UV radiation may influence seagrass depth distribution, with the more hardy seagrass species growing in intertidal areas which are subjected to a high level of exposure and UV light at low tide. UV light is not such an issue for deep-water seagrasses as the harmful concentrations disappear within the first centimetre or so. UV radiation affects plant physiology including DNA, proteins and membranes, with consequent reductions in;

- photosynthesis
- growth
- leaf area
- seedling growth
- dark respiration
- ion transport
- primary production.

There are generally two strategies adapted by plants for coping with UV radiation:

1. protecting UV-sensitive tissues from the damage before it happens, and
2. recovery from the damage after exposure.

The most common means for seagrass to protect themselves and adjust to harmful UV levels is to accumulate UV protecting compounds within their leaves. The most common of these being UV absorbing pigments. These pigments, such as chlorophyll *a* and *b* and carotenoids, can accumulate rapidly in response to high UV conditions, within 24 hours.

Although ephiphytic growth reduces the amount of photosynthetically available light for seagrasses, it has been found that there are some benefits to epiphytic cover, as it provides a shield against UV light. This is most important for *Halophila* species as it is extremely sensitive to UV radiation.

Despite the involvement of clever chemical and photosynthetic responses, seagrasses, just like human, get sunburnt too! This 'sunburn' involves pigment loss or destruction, resulting in a colour change, from green, to brown, to black!

So next time you're out on the seagrass meadows, and you see patches of brown or black leaves, you may be witnessing seagrass sunburn.

HAVE YOU SENT YOUR DATA TO HQ??

If not, your data cannot be used for regional and global assessments

Torres Strait Update

Torres Strait sites have been monitored twice since the last newsletter. In August there was a great turn out by Year 11 Marine Studies classes despite the early morning starts. Mr Kocho's class adopted TI1 while Mr Hughes class turned out to monitor TI2. An added treat (?) was being filmed by the national public television broadcaster SBS (Special Broadcasting Service) at TI2. The documentary was on the prevalence of diabetes in the Torres Strait. Seagrass-Watch was filmed as it depicted the youth of Torres Strait being actively involved outdoors.


Could this be our big break?? SBS filming Seagrass-Watch at TI2

Monitoring at Horn Island relied on the normal crew of Ina, Stacee, Kristie and Kinam. After a moonlit ferry ride, the girls were ready to do battle with the mud at HI1 as the sun rose.


Dawn start at Wongai Beach. Jane directing on ground activities

Well if we thought that the August field trips were early, November was even earlier and with the added excitement of monitoring on a rising tide. At HI1, the regular crew of high school students, were joined by Andrew, Billy, Elizah (Kaiwalagal Indigenous Rangers) and Miya (Regional Natural Resource Management Facilitator, Torres Strait Regional Authority). The rangers caught on quickly and ably assisted with the monitoring. TI2 monitoring was a race against the tide, but the experienced team of Jane, Kinam, Catherine and Beccie took it in their stride. Thanks to Mr Hack who turned up at the eleventh hour to save our tape measures from becoming completely immersed. Monitoring at TI1 was supported by the Year 12 Multi Strand class who not only collected the data but also taught and mentored the Year 7s from Boigu and Dauan Island. They were visiting TI High as part of their high school orientation.


Billy, Elizah and Miya enjoying the early morning at HI1


Stacee and Mr Denzin lead the Boigu and Dauan Island high school orientation class in the field


The November team at TI1- TI high School, Boigu Island State School, Dauan Island State School and Seagrass-Watch HQ (Townsville team)


Presenting Seagrass-Watch to Hammond Island rangers.

While in the Torres Strait, Jane Mellors (Seagrass-Watch HQ) also visited Hammond Island to discuss potential sites for monitoring with the Hammond Island Indigenous Rangers. She also visited Dauan Island Primary School and talked to the students about seagrass biology and ecology. Getting to Dauan is no easy task - you must fly to Saibai Island in an eight seater plane, catch the bus/ute to the waterfront, then get a dinghy across to Dauan Island (25 minutes away with glimpses of the New Guinea coastline) - who says watching the grass grow is boring!!!!!!!!


Above: Lets talk about seagrass! Grade 5&6 Dauan Island Primary School. Right: Dauan Island, a granite island, only 4km from the Papua New Guinea

Seagrass Travel Award


Kristie, Kinam and Shenade get up close and personal with the Airlie Beach dugong

Kristie McNamara and Kinam Salee were the recipients of this year's TI High School seagrass travel award. The girls traveled from Thursday Island to assist in the Reef Water Quality Protection Plan Marine Monitoring Program (RWQPP MMP) at several seagrass sites around Townsville, Airlie Beach and Sarina Inlet. While on the trip they met Shenade Muller, another student who regularly contributes to the Seagrass-Watch and RWQPP in Townsville. The girls not only worked hard, they shopped hard and even managed some sight seeing. All in all it was a great experience for them as they got to witness other types of seagrass meadows along the Queensland coastline and to see how Seagrass-Watch protocols are being used within another programme dealing with water quality issues within the Great Barrier Reef Marine Park World Heritage Area.


Above: Kinam and Kristie experience the seagrass at Picnic Bay, Magnetic Island

Below: The RWQPP team (Shenade, Naomi, Kristie and Kinam) at Sarina, SI2.

Great Sandy Strait Fauna and Flora Watch

Gordon F Cottle reports

A most productive and interesting four months since the July report, with a boat trip to Reef Islands (courtesy of Paul Bailey) on 8th July, with Robyn, Pat and I in idyllic weather conditions. At RI1 new, clean grass cover was slightly down on 2004, with readings of 15/25/30%. At RI3 again new growth up to 32%. Travelling back between the two islands on the incoming tide we counted at least twenty turtles on the surface with dozens more beneath us, in crystal clear water. On the 9th, Paul, Robyn and family surveyed RI2 with cover of 30-40%, and extensive feeding trails throughout

In late July I made contact with Maree Prior (Cooloola Coastcare) and Sue Arthur a teacher at Tin Can Bay State School, where we hope to commence monitoring during Term 2007.

On 20th August a long awaited boat trip to Brown's Gutter, where we were able to monitor BG3 with *Zostera capricorni* 15-20%, and BG2 on the same day, with cover of 25 - 30%, up on 2004. An interesting find of a previously unrecorded patch of *Halophila spinulosa*, and a most exciting spotting of a live vibrant sea creature, variously identified as a baler shell, a sea hare and a Spanish dancer (my preference), having seen the swirling movement of the "skirt"

Above: Browns Gutter, August 2006. Right: Baler shell

Maree Prior and I looked at Tin Can Bay site TBl on the 21st, but apart from thousands of mud whelks, soldier crabs, and crushed shell, there was no visible grass.

September 9th was spent at Poona PN2 which was worse than in April, with 27 of 33 quadrats showing sparse or no grass, whereas, in September, 2003, 13 quads had cover from 15 to 35%, and 16 with cover from 2 to 12%, very disturbing trend. This information has been sent to CSIRO with mud samples.

On the 24th Robyn and family WALKED to Boonooroo BN2, a feat in itself, and reported excellent *Zostera capricorni* cover approaching the site, although the site itself was fairly bare This bank is a popular yabby pumping area.

Lucy, Sarah, Robyn and Matthew. The Baileys at BN2

Over the weekend of 6th October we monitored PNl, recording abundances of 5%, well down on previous visit, with a noticeable absence of crustacean and worms.

A boat trip to BGl, which, as usual, was mostly bare, with the patch of *Zostera* at transect 2 spread over four quadrats with 20-25% cover. At Tinnanbar TN1 showed improved cover of 30%, up from April.

Hanne Larsen, Gordon Cottle and Maree Prior. Photo by Janet Heath

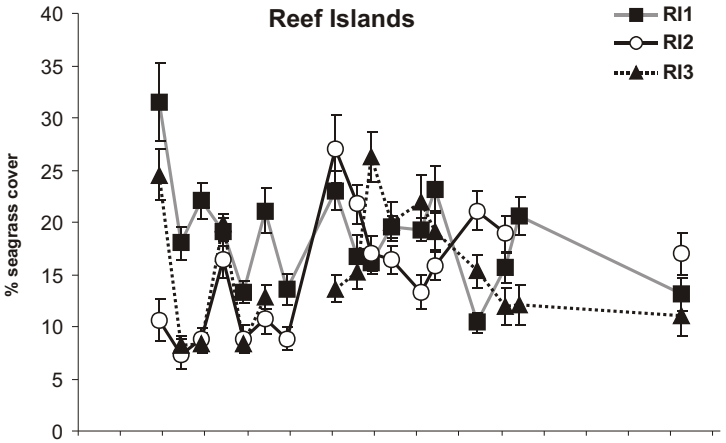
On November 3rd I was very pleased to welcome back Hanne Larsen, an original seagrass "watcher", and with Maree Prior and local news reporter Janet Heath in attendance, visited Pelican Bay PBl for the first time for all of us. A very comfortable site to monitor, although with little grass.

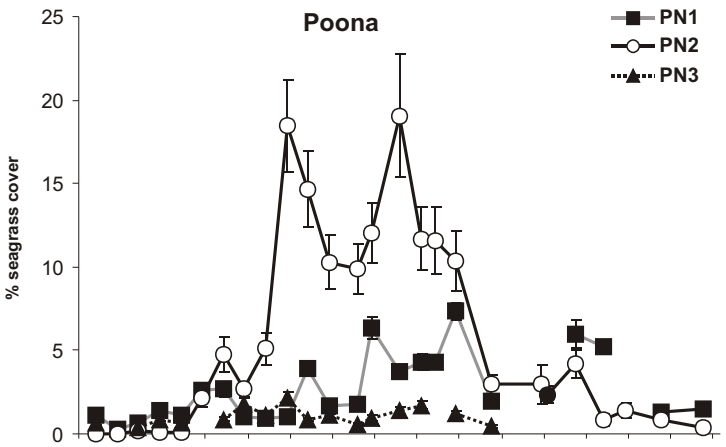
On Saturday 4th Robyn, Pat, Hanne and I went to Tinnanbar TN3, which is usually a long walk, but a recently opened track took us within 400 metres of the site. Cover was 5 - l5%, considerably lower than in May (up to 40%). The weather conditions were atrocious, a 35 knot northerly gale and squalls, so we made an early exit as we saw the approach of a thunder storm.

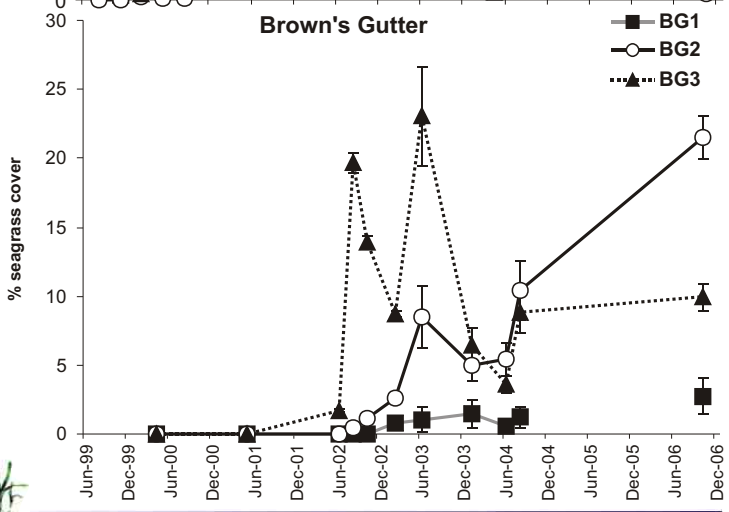
On the Sunday Robyn, Pat and I returned to Tinnanbar to TN2 in balmy sunshine with no wind! This site also showed a serious decline, with no feeding trails, which were especially noted in May. A quick walk to Poona PNI on Monday to pick up a heat sensor rounded off a busy, tiring weekend.

Pat Cottle and Robyn Bailey on site, TN2

A big "THANK YOU" to every one for their efforts.







Shelley Beach

Sue Mulvany (TTSW Local Coordinator) reports

The Shelly Beach, Site 1 Seagrass-Watchers

Brilliant to have had such a great turnout to our Shelley Beach (Sb1) site in October. I've got to admit that when reading the newsletters I think how easy we have it right now compared to some other Seagrass-Watch groups who are battling less than ideal conditions, including quicksand and murky water! At this time of the year it is a pleasure to be at our pretty site.

After a run through the risk assessment sheets we proceeded to the beach, after noting the necessity to append with regard to hazards of green ants up legs of short shorts. (??) On a more serious note, I found myself more conscious than usual of stingray depressions after Steve Irwin's recent tragic end, perhaps a timely reminder to always proceed with awareness and caution, and to take seriously the risk assesment which summarises the dangers associated with our activity. Temperatures in the high 20's were perfect and the low tide fell mid-afternoon which made life all very pleasant and convenient. Little change in seagrass coverage was observed at the site compared to the previous monitoring in July. Only *Halodule uninervis* was recorded, and about one third of the quadrats had 0% cover. Dugong poo was observed in the vicinity.

The next monitoring will be around late January/early February with precise times to be advised. Thanks to all our watchers and welcome to our new members. October monitoring included: David, Steve and Beth, Dick, Mike, Barry, Jason and Michelle, Ruth, Sibylle, Brooke, Yumiko, Naomi, Posa, and Sue.

Above: August SB2, Seagrass-Watch team. Right: Turtle at Shelly Beach

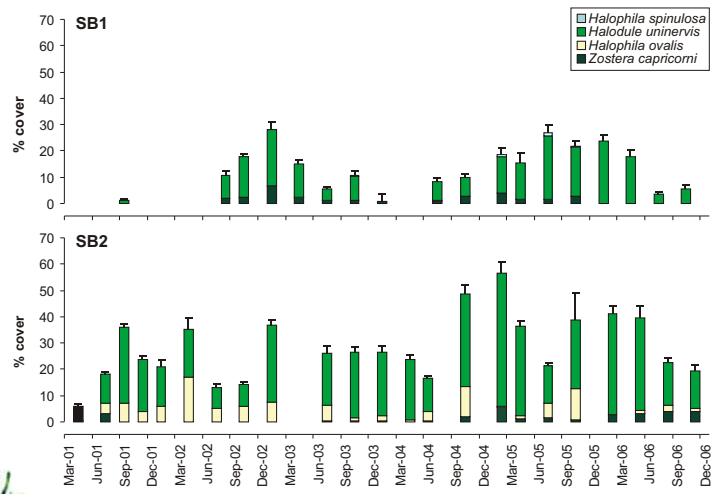
Naomi Smith reports

It was a beautiful clear cool sunny day for our August Seagrass-Watch monitoring at Shelley Beach SB2. On our leisurely walk to the site we spotted a green turtle "sunbaking" amongst the intertidal rocks. It is quite common to see turtles sunbaking as it allows them to rid themselves of algae and barnacles that can be found on their shells. On our return journey a second turtle was also spotted in the same area. Having worked/studied previously at the SB2 site, Barry Bendell used his experience to lead newcomer Michael Whiting in the right direction (the less muddier path). Meanwhile Catherine Walsh, Iony Woolaghan, Graham Smith and I thought we would take on a challenge (through knee deep mud). After a cardio workout (for some) the peg was located and the three transects were taped and pegged out. We split into our three transect teams and began monitoring the seagrass bed.

Overall, it appears that *Zostera capricorni* is increasing in abundance in the area but *Halodule uninervis* is still the dominant species in this meadow. We also observed small scattered patches of *Halophila spinulosa* near our sample site, where the water pooled at low tide. It was a great afternoon and we all felt quite energised after our muddy exercise. Thank you to Barry for sharing his seagrass knowledge and to Catherine for taking Micheal (hopefully who will volunteer with us in the future) under her experienced Seagrass-Watch wing. Also, this Seagrass-Watch team showed their passion for protecting the environment by collecting two buckets of rubbish along the way. Well Done!

"Crocodile sightings" headlined the local newspaper in November, but that did not deter our determined SB2 Seagrass-Watchers. We did, however, undertake a risk assessment and had many crocodile spotters on the lookout. Our group had a total of 8 volunteers, which was a very good turnout for a weekday. We walked up over the hill and out to the site. The sediment had changed quite considerably since our last visit in August. The sediment had gone from very muddy to slightly sandy with only a few patches of ankle deep mud. The seagrass meadow was dominated by *Halodule uninervis* with only a few patches of *Zostera capricorni* (a decrease from last monitor) and *Halophila ovalis*. We had a few interesting finds: Sue and Francis observed a species of anemone found in their quadrat on transect 1 and Catherine and Sarah later found another anemone on tansect 3. Also, on the walk back Linda spotted an unusual clump of coloured rock, which we have identified to be a species of soft coral.

Thank you to all the volunteers who once again showed their passion for the environment by attending and by picking up the rubbish on the way out and back from the site. A big thank you to new recruit Francis who had a tough time with shoe malfunctions in the muddy sections. Overall, we had a lovely day and it was a nice way to finish off the working week.



Townsville Region - Queensland

Picnic Bay

Peter, Savannah, Cara, Cayla and Rui
Year 4/5, report

Our year 4/5 class from Magnetic Island State School embarked on Seagrass-Watch at Picnic Bay, in early August. The Seagrass-Watch kit was brought down by Rhonda and the three transects were laid out in preparation for our class by Catherine, Iony, Flora, Patsy and Naomi. After arriving at Picnic Bay we had lunch, then, Mr Hammelswang separated us into three groups. We monitor the seagrass meadow found at the eastern end of the bay. To do the monitoring we lay a quadrat down every 5 metres along each transect. We then report the details found in our observation area, for example, seagrass coverage, algae coverage, epi-cover, the sediment type (muddy, sandy, etc), height of seagrass leaves, any animals living in the seagrass (shrimps, snails, crabs etc) and any other species of seagrass we find. We also take a photo at every 5m, 25m and 45m along each transect. We then did our seed coring to find any seagrass seeds. The seagrass meadow at Picnic Bay has three main species *H. uninervis, H. ovalis* and *Z. capricorni*. One of the groups even found a *Z. capricorni* leaf which measured 20 cm.

This collection of data is useful to scientists as they can see how the environment is changing over time in a certain area. Often a large group of helpers are needed as we can only monitor when the tide is very low. We are having fun and learning a lot from our involvement in Seagrass-Watch and hope to do it again.

Cockle Bay

Don Kinsey (U3A) reports

The Winter monitoring by our U3A Earth and Sea Class was carried out on 25th of July. For the first time, there were no DPI&F staff present. *H. ovalis* was not very dominant and there was relatively low levels of *H. uninervis*. There was still some evidence of *Enteromorpha*-type green filamentous alga on higher ground. A notable difference was that the epi cover was totally dominated by turf algae and diminutive foliose red algae. There was also a very small amount of *Dictyophaeria* sp., adjacent to the transects.

October sampling of Cockle Bay, went well. *H. ovalis* was not very dominant except in transect 2. There was relatively low levels of *H. uninervis*. The higher ground from the inner ends of the transects back to the beginning of the mangroves is now showing even lower cover of *H. ovalis* than on the previous three sampling periods, and that remaining was only in the puddles in depressions. There was no evidence of the *Enteromorpha*-type green filamentous alga on this higher ground as has been found previously.

Most epicover was a fine muddy diatomaceous layer with a small amount of turf algae and diminutive foliose red algae. The only dominant type of algae was foliose reds - at least two species were dominant, *Halimeda* spp; *Padina* sp., but only at low levels. One total new-comer was a *Caulerpa* sp that resembled but was not, *C. cupressoides*.

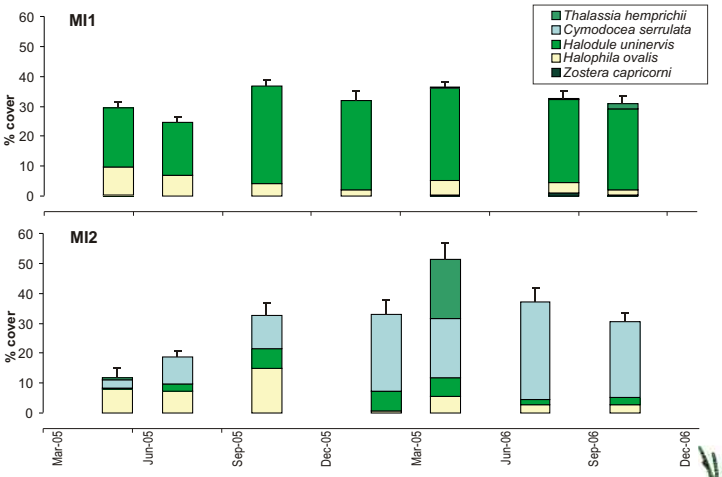
Bushland Beach

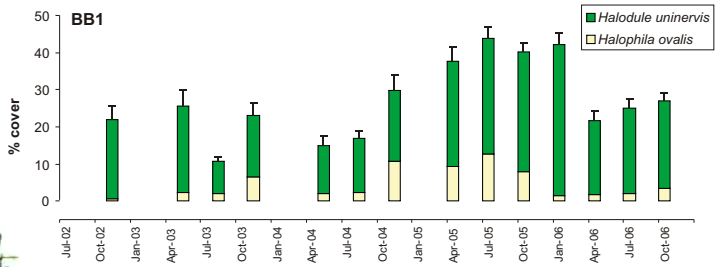
Lux Foot & Catherine Walsh report

Saturday 7th October was an excellent day to go seagrass monitoring. There was a gentle breeze and a few clouds to keep us cool, the whole sixteen of us. There were a few new recruits from James Cook University who learnt about Seagrass-Watch through a seminar by Dr Jane Mellors (Seagrass-Watch HQ), and of course we had other members from the Northern Beaches Rotary. The Department of Primary Industries & Fisheries had their sampling team at Bushland Beach (BB1) collecting for the Great Barrier Reef Reef Water Quality Protection Plan (RWQPP), and they lent assistance with the seed counting once they finished their task. Cairns based DPI&F scientist, Dr Rob Coles and his family, helped with both the RWQPP and Seagrass-Watch. Also in attendance were two girls from Thursday Island, I was pleased to see them as I had met them while in T.I. last November.

The Bushland Beach seagrass meadow looked extremely healthy and there were a number of flowers noted for both *H. uninervis* and *H. ovalis*, indicating that this time of year is very productive. A large number of dugong feeding trails were also obvious, winding through the lush meadow. The tide was quite low this time which gave us plenty of time to do our thing.

Our meadow still has a lot of razor clams throughout. The blow outs have not increased in number but have become a little deeper, no doubt the result of the heavy seas we have had over the past few months. Most times when we go out, we see something different, this time was no exception. We saw crabs, snail-egg masses, sea cucumbers, an eel and we found a brown sea snake while we were on our way back to the beach. It was in a pool of water, no doubt it would be pleased to see the tide again. Big thanks to Rotary for the wonderful BBQ organised for the team after the monitoring, and to the head chef John - great snags! Our next trip is in January 2007.





Regional Roundup!

Posa Skelton reports

Seagrass communities in Townsville continue to receive close attention from the Townsville-Thuringowa Seagrass-Watch group. Aside from our regular seagrass monitoring programme, promotions of Seagrass-Watch and recruitment of volunteers were high on the agenda. Since the last newsletter (June 2006), we have managed to survey Bushland Beach (BB1) twice (22 July and 7 October) under the guidance of Lux Foot and the Northern Beaches Rotary. Cockle Bay at Magnetic Island (MI2) was surveyed on 25 July and 7 October by Don Kinsey and the University of the Third-Age. Sheley Beach 1 (SB1) was surveyed on 9 July and 7 October and the second Shelly Beach site (SB2) was surveyed on 9 August and 3 November. Picnic Bay (Magnetic Island, MI1) was monitored by Magnetic Island State School under the watchful eyes of Rhonda Stevens and Martin Hammelswang. Finally, Rowes Bay was surveyed by the Belgian Gardens School, supervised by Gayle Joyce. Participating in the Rowes Bay survey were staff and students from the Yokohama City University, Japan.

A Belgian Garden Student shows Yokohama University Staff what a H. uninervis seed looks like.

For most of the surveys, field reports were prepared and sent to the Townsville-Thuringowa members; the reports can be viewed on our webpage:

(http://www.seagrasswatch.org/Townsville_thuringowa.html).

As some of our members are novice Seagrass-Watchers, time was spent in training them in the Seagrass-Watch methodology, as well as answering their queries on email.

To ensure a smooth coordination of our activities, meetings were held with local organisations to affirm their support and participation. The Conservation Volunteers Australia ran a Risk Assessment Workshop at the Museum of Tropical Queensland, which was attended by two Seagrass-Watch members.

Yokohama University Students and Staff with Rowes Bay Seagrass-Watch volunteers

We are grateful to Jane Mellors for her public-lecture on Seagrass-Watch at the Institute of Marine Engineering, Science and Technology North Queensland Branch, which received a lot of interest. A number of volunteers were recruited following her presentation. We also took advantage of the public presentation by Canadian Environmentalist David Suzuki to set up a stall at the Townsville Entertainment Centre (3rd October 2006), to promote Seagrass-Watch and our activities in the region. We managed to recruit a volunteer for every 6 minutes of our 2-hours spent there. Many thanks to Naomi Smith and Sue Mulvany for their assistance in the display.

We are grateful for the participation of our international visitors at our seagrass surveys, in particular Flora Akwilapo from Tanzania, Sibylle Seubert from Germany and the Yokohama City University staff and students from Japan. The Yokohama City University (YCU) students performed a small seagrass play for the benefit of the Belgian Gardens School students, who monitored the Rowes Bay site. Professor Hayashi (YCU) was impressed with the student's involvement in Seagrass-Watch and he expressed his desire to visit again.

We also farewelled some of our committed and regular seagrass watchers. We thank and wish the Clifton family the best on their move back to the USA, and our best wishes to Barry Bendell who has completed his PhD studies on the seagrass communities of Shelley Beach.

While some of our Seagrass-Watch groups were making splashes on the meadows, others were making headlines in the media. The University of the Third-Age under the guidance of Don Kinsey (Cockle Bay site, Magnetic Island) made it to the Prime-Time of the Townsville Bulletin (26 September, 2006). Not to be outdone was the Bushland Beach site coordinated by the Northern Beaches Rotary and Lux Foot with their "Dugong Habitat Thriving" feature in the Townsville Bulletin (11 October, 2006).

Our activities were only made possible through the generous support of many people and organisations, for which we are most grateful for. The sites and their supporters are: BB1 - Northern Beaches Rotary and Lux Foot; MI2 - University of the Third-Age and Don Kinsey; MI1 - Magnetic Island State School, Martin Hammelswang and Rhonda Stevens; RB1 - Belgian Gardens School, Gayle Joyce and Brett Murphy; SB1- Mundingburra Rotary and Steve McGuire; SB2 - DPI&F, Jane Mellors and Naomi Smith

We also gratefully acknowledged support from the Townsville City Council, Conservation Volunteers Australia, Department of Primary Industries & Fisheries, Seagrass-Watch HQ, the International Ocean Institute (Australia) and the Burdekin Dry Tropics. Finally, to all our volunteers a big THANK-YOU: we look forward to seagrass-watching with you in the near future.

HAS YOUR LOCAL COORDINATOR SENT YOUR DATA TO HQ??

If you're not sure, check with them.. ensure the time you spend monitoring is not wasted.. otherwise your data

Queensland

Noosa River Seagrass-Watch (NRSGW)

Kris Boody (NRSGW coordinator) reports

Two new sites and five new volunteers have been added to the NRSGW program over the past few months. QPWS Elanda Pt. have come on board for seagrass monitoring with a boat and research team to adopt two sites in Lake Cooroibah (one of 5 in the Noosa River system).

Subtidal seagrass sites have made kayaks and a catamaran, a necessary resource

Subtidal seagrass sites have made kayaks and a catamaran, a necessary resource. A method of paddling over the area to take the data protects the seagrass from disturbance and limits turbidity in the water, aiding in more accurate data collection.

Seagrass beds in the upper reaches of the Noosa River are necessary for minimizing erosion in the river system

Species diversity has increased since last survey, due to refined survey methods, survey experience, and/or seasonal vegetative growth of *Halophila ovalis* making it more noticeable. *Halophila ovalis* was still lower than the dominant seagrass species *Zostera capricorni*.

Above and Below: The Weyba Creek site

Seagrass meadows in the upper reaches of the Noosa River help minimize erosion in the river system. The Weyba Creek site showed the largest increase in seagrass cover between survey 1 and 2 (approximately 39%). This is possibly a consequence of less boat wash, because vessels must slow down to traverse the shallow channel (<1m depth) adjacent to the site.

NRSGW will in 2007, add temperature loggers supplied by Seagrass-Watch Moreton Bay, train the Noosa Sea Scouts to monitor seagrass and a catamaran will be purchased before the next monitoring that is set for January 2007.

The Noosa River Community Seagrass-Watch Program is supported by Noosa Integrated Catchment Association (NICA), through funding provided by SEQ Catchments and the Noosa Shire Council. For more information contact Kris Boody at seagrass@noosariver.com.au

Moreton Bay Community Seagrass-Watch

Paul Finn (QPWS) and Keira Price report

Our last monitoring period (July-August) saw 35 of our 55 sites surveyed. We are now well into the last monitoring period of the year (November-December).

We have begun installing temperature dataloggers at sites that will record the within canopy temperature every four hours. We are hoping to see a correlation between temperature and seagrass condition over time.

Moreton Bay Seagrass-Watch volunteers aboard the QPWS barge "Spoonbill" enjoying lunch after a natural history expedition on to the sand flats off Moreton Island. (photo by Don Marshall)

The 2005-2006 Healthy Waterways report card for Moreton Bay has just been released. The continual decline in water quality in the Southern Bay is of particular concern. Poor water clarity is one of the main reasons behind this decline which also effects the stability and health of seagrass meadows in the area. Continual Seagrass-Watch monitoring will be important over the coming years to detect any changes occurring in the meadow. Visit www.ehmp.org to view the full report. Seagrass-Watch sites on the eastern side of the Bay, where water quality is at its best, boast 5 out of the Bay's 7 species of seagrass.

Ken and Nadia O'Carroll at Southern Bay Islands site 4. (Photo by Don Marshall)

A snail egg-mass from a Polinices species. (photo by Joyce Newell)

Approximately 250 dedicated volunteers continue to work hard and support Moreton Bay's Seagrass-Watch. Through their efforts we will continue to keep an eye on any changes that may occur.

Volunteers come in all shapes and sizes! (photo by Danielle Udy)

Thanks to continued financial support from SEQ Catchments, the Gold Coast Broadwater is set to become a new Seagrass-Watch region for Queensland. We have identified 12 potential monitoring sites within four locations and are in the process of arranging a workshop for early 2007 to get the program underway.

HAVE YOU SENT YOUR DATA TO HQ??

If not, your data cannot be used for regional and global assessments

ARE YOU REGISTERED WITH HQ??

If not, you will not receive updates on the program and may not be a recognised member of the Seagrass-Watch community. www.seagrasswatch.org/register.html

Hydeaway Bay

Update from Mareen Mathew

Seagrass-Watch volunteers Hydeaway Bay: Anita, Tommy (the little boy) , Hannah, Linda and Ros

Well we finally did a seagrass monitoring for Hydeaway Bay in July. I had a lot of new people assisting, and so it was a very quick lesson on what data to collect. I was busy running between both sites trying to keep an eye on things and also take photos. I don't think there was a great deal of difference in the seagrass from the last monitoring event, but the data and determine that.

I explained to the new volunteers that it was imperative that we monitor the same area in each quadrat with an example given where one group had dragged the tape and the difference between the "correct" quadrat area and the one they were monitoring were like "chalk and cheese".

We also had some children join our group and I hope that they will join us again. Due to other commitments, we may be able to monitor the sites every 6 months, unless Margaret and Co [QPWS Volunteers] would like to help out. We are more than happy to join them.

Midge Point

Update from Paul & Jennifer Wenzler

We have just completed out survey of the Midge Point transects, despite the strong wind. The weather has been cooler for this time of year and has been reflected in the quality of the seagrass being surveyed. Normally at this time of year we find a lot of the seagrass spindly and dried out. But this time most of it was nice and green and long. There is a continuing presence of *Halophila ovalis* in the area and we noted and a couple of different seaweeds lying around as well as a piece of seagrass that we had not seen before in this area (sample collected for identification). Some of the *Halophila ovalis* had quite large leaves compared to what we have seen in the past in this area. We noted some were in the vicinity of 2 cm in length.

NSW Community Seagrass Monitoring

Rebecca Small (Seagrass Project Officer(CEN))

The Community Seagrass Monitoring sadly has come to an end with the conclusion of funding for now. I am excited to see the progress the project has made over the last 18 months, with the project successfully achieving an increase in education and awareness about this local resource, the importance of catchment health and water quality.

I have been busy writing funding reports and applying for further funding for the continuation of the project as a result of the overwhelming level of interest and support for the project over the last 18 months. We will be applying to a number of funding bodies over the next few months to ensure the longevity of the project so… 'Watch this space!"

The project has had responses from 28 local government areas, participation from over 250 key experts and government representatives, and also had involvement from over 500 community members along coastal NSW! We have 16 letters of support from experts and representatives from government and non-government organisations all showing their support for the continuance of the project.

We have successfully completed 15 workshops and provided equipment to 16 sites across coastal NSW, despite being initially funded for just 7 workshops and no equipment! We have successfully had attendance from over 300 community members from across NSW, with important monitoring sessions completed at various sites throughout the state.

We hope to use the lessons learnt and resources gained to link into the internationally renowned Seagrass-Watch, to provide a nationally recognised community seagrass monitoring effort. A huge thankyou to Len McKenzie Principal Scientist of the program, as well as the whole team at seagrass watch you guys are inspirational!

The project has been successful due to its strong volunteer base - a part of which many of you were involved and at this time I would like to thank you very much! Many of you have aided in networking, and information as well as brilliant ideas about everything from funding to future activities the project could be involved with. I would like to personally thankyou for the support shown to myself for the last 18 months. I look forward to working closely with you all in the near future!

A hearty hello from Team Seagrass

Siti Maryam Yaakub reports

Some might say, that our little island nation is well known for its good shopping and scrumptious gastronomic delights. While this is nothing short of true, few actually realise that the seagrasses we've got are no less scrumptious. Contrary to popular belief, Singapore still possesses a delectable spread of seagrass species, in spite of the urban development of its coastal areas and land reclamation. Len McKenzie and Rudi Yoshida from Seagrass-Watch HQ witnessed this for themselves when they visited Chek Jawa on Pulau (Malay for island) Ubin with Ria Tan and I on the 8th of October 2006.

Although it was a rather hazy day - the previous day recorded a high of 150 on the Pollutants Standards Index (PSI) - we headed for Chek Jawa for a bit of seagrass watching. Several different habitats can be found at Chek Jawa, which is located on the eastern tip of Pulau Ubin. These include coastal forests, mangroves, sand bars, rocky shore, coral rubble and of course, a seagrass lagoon. While the algal blooms common on Singapore's shores around this time of year made seagrass spotting a little more challenging than usual, we managed to find what we came for. Namely, the shallow pools of *Halophila spinulosa*, which are not commonly found in exposed intertidal areas, and the elusive *Halophila beccarii* a first for both Len and Rudi! Other species of seagrass found in the multi-species meadow at Chek Jawa include *Cymodocea rotundata, Halophila ovalis, Halophila minor, Halodule uninervis, Thalassia hemprichii* and isolated clumps of *Enhalus acoroides*.

Ria Tan (SW Singapore Coordinator), leading the way, with Len (SW HQ) and Siti (Team Seagrass)

Anecdotal evidence from the day suggests that a large portion of the seagrass community on Chek Jawa may have been overrun by the green seaweed *Caulerpa mexicana*. A more recent visit to the site showed that *C. mexicana* has since retreated quite considerably. However, some visitors recall *H. spinulosa* having been much more common at Chek Jawa five years ago, when a survey of the site was initiated. Whether this was a seasonal blip or a change in the relative abundance seagrasses is not known hence justifying the need for closer and more periodic monitoring of this beautiful seagrass community.

The elusvie Halophila beccari, found at Chek Jawa

In total, 11 species of seagrass have been recorded in Singapore. A further three species, *Cymodocea serrulata, Halodule pinifolia* and *Syringodium isoetifolium* have been recorded on other shores in Singapore. The most prominent seagrass habitats are found on offshore islands at Chek Jawa on Pulau Ubin, and, off the southern coast of the island, on the northern shore of Pulau Semakau and a patch reef known as Cyrene Reef.

Len and Rudi's visit really started the ball rolling for Seagrass-Watch here in Singapore. Since their visit, we've gained the support of the Biodiversity Centre of the National Parks Board (NParks), who have agreed to work closely with us. We even thought of a catchy new name "Team Seagrass" (Seagrass-Watch Singapore can be a bit of a mouthful) complete with hip insignia and blog (http://teamseagrass.blogspot.com/).

Chek Jawa: We measured up a possible site in the middle of the lagoon to include the largest patch of Cymodocea rotundata that we've yet seen on our shores.

Perhaps more importantly, we have decided on the areas in Singapore where we'd like to set up monitoring sites. Our strategy is to identify monitoring sites throughout the island. This is because different parts of the island face different types of environmental and anthropogenic pressures. For example, the eastern side of Singapore is affected by run-off from the Johore River, whereas the southern shores face pressure from land reclamation projects and heavy shipping traffic. Most of the areas we have identified are intertidal seagrass beds that are exposed at low tide.

We are currently in the midst of planning for monitoring of Phase 1 sites, which so far include the Chek Jawa in the East, Pulau Semakau to the South, Sentosa Island in the West and Tuas in the North. Most of December and January will be spent on reconnaissance trips, training volunteers and ironing out logistical and technical kinks so that we're ready when the really low tides conducive to monitoring intertidal seagrass beds rolls around in 2007.

Merawang Beacon, Tuas: Seagrass Here!!" Siti announces. And indeed, there's plenty of seagrasses on the shore.

The Walkie Talkie: was a great thrill for Siti to use, no doubt to the amusement of everyone else on Channel One.

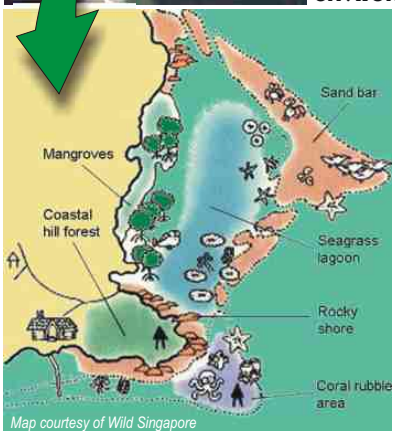
Compared to countries like Australia, little is known about the seagrasses in our part of the South-East Asian region. Team Seagrass hopes that the data we collect will help us better understand the pattern of distribution of seagrass species in Singapore and the region as well as the pressures facing our seagrass habitats. More importantly, having a Seagrass-Watch monitoring programme will allow Singaporeans to get back to basics. Mud, sand and saltwater are not common features of city living, but we hope the denizens of this cosmopolitan nation will take to the glorious muckiness of it all!

Till then, Team Seagrass will be traipsing around Singapore's shores. Do drop by our blog to see what we've been up to and to say hi. I can guarantee you'll be greeted with a hearty "Hello(phila)!"

Pulau Ubin's Tanjung Chek Jawa
A Treasure to Behold

Chua Sek Chuan and Shawn Lum

Pulau Ubin remains one of Singapore's few areas of natural and cultural heritage. Not for much longer as there are plans to develop the island for residential and light industrial use, and for part of its coastline to be extended by land reclamation. The natural environment is yet again forsaken, its hidden potential ignored and cast by the wayside in the relentless pursuit of progress.



Map courtesy of Wild Singapore

The south-east coast of Pulau Ubin harbours a unique ecosystem no longer found elsewhere in Singapore. Tanjong Chek Jawa used to be home to a Malay kampong until the inhabitants vacated it earlier this year. This is a rich, fertile area, the result of synergy between many coexisting habitats.

Along the coast of Chek Jawa lies an expanse of mud and sand flats with a mangrove forest on the landward side. These sand and mud flats are home to a variety of fauna and flora, providing for a high biodiversity habitat.

This area has at least eight species of seagrasses, including two *Halophila* species, the type of grass that the Dugong (*Dugong dugon*) feeds on. All seagrasses are listed as "Rare" or "Endangered" in the Singapore Red Data Book. Extensive seagrass beds are an extremely rare sight in Singapore and in other areas. The sandflats at Chek Jawa are possibly the last of their kind anywhere in Singapore, which speaks volumes for their conservation value.

Due to the nature of the substrate, burrowing animals abound such as tube worms and nemerteans (a burrowing worm). Horseshoe crabs (*F. merostomata*), an ancient form of animal that can rightly be called a living fossil, creep along the bottom. Mantis shrimps can be found stalking prey. Other marine organisms include tunicates or sea squirts, sea cucumbers, sand dollars, nudibranchs and anemones.

The mangroves at Chek Jawa feature a magnificent stand of bakau (*Rhizophora* species), a patch of nipah or attap palms (*Nipah fruticans*), and a back mangrove that includes a number of majestic dungun trees (*Heritiera littoralis*). Mangrove species such as api-api puteh (*Avicennia alba*) will no doubt re-colonise the future reclaimed land, but mature mangroves such as those found at Chek Jawa will neither regenerate rapidly nor lend themselves to simple restoration.


Anemone in a dense Halophila spinulosa meadow

Highlights of this wonderful flora include the seashore nutmeg (*Knema globularia*) so rare that it was once thought to have gone extinct locally; a coastal relative of the mangosteen (*Garcinia hombroniana*), listed as locally 'Endangered" in the Singapore Red Data Book; the sea olive (*Olea brachiata*), listed as "Vulnerable"; the coastal shrub *Memecylon edule* ("Rare"), and a good number of other rarities.

Chek Jawa is slated for reclamation in the near future. Another part of Singapore's natural heritage will disappear forever as will any research potential to benefit our emerging biomedical and life sciences industry. Horseshoe crabs have been the subject of medical research that has been conducted for more than 10 years. Sponges, one of the familiar marine organisms at Chek Jawa, have the potential to provide derivatives that would offer medical benefits.

Chek Jawa's volunteer guides are vital to help introduce this wonderful place to visitors. Sharing their knowledge, skills and time to care for this natural wonder.

Gone too will be the chance for Singaporeans to experience a recreational nature area that they might not be able to see elsewhere. Sand and mud flats of this type are no longer found in other parts of Singapore. The loss of this valuable ecosystem outweighs the gains from expensive land reclamation. Like Labrador Park, Chek Jawa can also be considered an extended classroom offering a different experience for students as well as a chance to observe a part of Singapore rarely glimpsed.

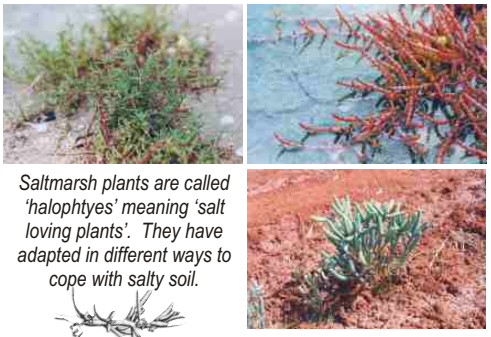
Shawn Lum (Nature Society Singapore) and Len McKenzie (Seagrass-Watch HQ)

Text reprinted courtesy of Nature Watch, Ofical Magazine of Nature Society (Singapore)

Saltmarsh - the quiet acheiver!

Saltmarsh areas are sometimes seen as the ugly cousin of the fish habitat world compared with the more widely known mangrove or seagrass habitats. In the past saltmarshes were often used as dumping grounds, for unauthorised motor bike trails and reclaimed for development.

Saltmarshes are now recognised as important intertidal wetland plant communities containing diverse plant types ranging from succulents, grasses and low shrubs. They grow in the upper tidal zones between mangroves and more terrestrial vegetation. Due to the limited tidal influence saltmarsh areas usually have high salt contents in the soil. Saltmarsh plants are also called 'halophtyes' meaning 'salt loving plants'. They have adapted in different ways to cope with salty soil. To reduce water loss succulent plants like 'bead weed' have fleshy branches and stems, rather than leaves. Certain succulent species accumulate salt in their leaves which have a reddish appearance which the plant discards or drops to reduce its salt load.

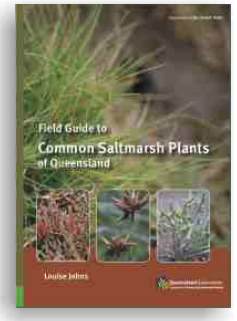


Saltmarsh plants are called 'halophtyes' meaning 'salt loving plants'. They have adapted in different ways to cope with salty soil.

The saltmarsh is home to many marine animals such as burrowing crabs, marine snails and juvenile fish and prawns. Apart from providing shelter saltmarshes produce detritus or decaying plant material for release to the local food web. Marine snails graze the mud for food and produce large numbers of offspring which are a major food source for visiting juvenile and small fish such as glassfish, bream and whiting. Feeding occurs when the tide rises over the saltmarsh, then when the tide falls again, the small fish go back to the nearby mangrove creeks and inlets. Many fish and prawn species migrate between saltmarsh, mangroves and seagrass habitats during their lifecycle so maintaining these links is vital for sustainable fisheries productivity.

Even the bare sections of the saltmarsh known as saltpans have their value as they often support dense algal mats which contribute to the local food web.

Saltmarshes have other values as they trap nutrients and sediments from land and prevent them from entering nearby waterways. These functions are important for maintaining good water quality in surrounding creeks and rivers.



Because saltmarshes are so important to fisheries productivity they are protected in Queensland under the Fisheries Act 1994 legislation.

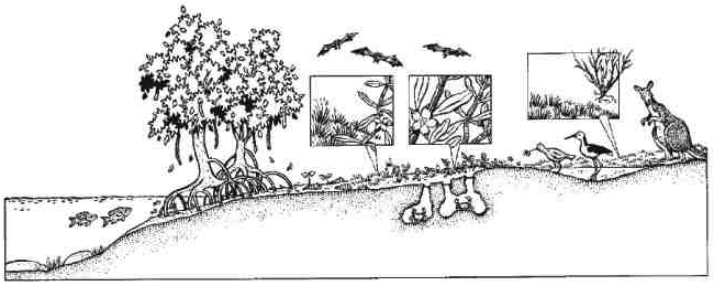
A new publication titled 'Field guide to common saltmarsh plants of Queensland' has been produced by the Department of Primary Industries and Fisheries (DPI&F) fisheries biologist Louise Johns to assist in the identification and protection of these valuable plants.

Author of the field guide, DPI&F officer Louise Johns

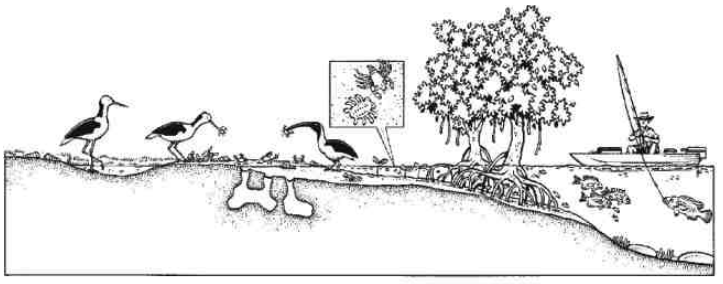
The guide contains pictures of 32 different saltmarsh plant species with detailed descriptions, line drawings, flowering periods and distribution maps. It is extremely user friendly to ensure simple identification of saltmarsh species which will highlight the values of these important fish habitats.

DPI&F hopes that the guide will educate people to value their fish habitats and the plants that live in them and is committed to ensuring these valuable communities survive for future generations.

To get hold of a copy of this field guide you can fill out an order form on the DPI&F website on the following link http://www2.dpi.qld.gov.au/fishweb/18539.html or by calling the DPI&F call centre on 13 25 23.



Low tide : Saltmarsh provides key habitats for terrestrial organisms such as insects, bats and birds along with wallabies and kangaroos



High tide: Fish species living within saltmarshes vary along the coast. Juvenile and adult fish of species from commercial and recreational species have been captured in saltmarshes.

The response of Halophila ovalis to shading and sediment nutrients

Catherine Walsh (Honours student, JCU)

Halophila ovalis is a dominant seagrass species within the Great Barrier Reef region, in both coastal intertidal meadows, as well as deep water and reefal. Although this species dominates many seagrass meadows along the Queensland coast, including many Seagrass-Watch sites, there have been very few studies on its biology and ecology within the GBR region. This lack of research prompted me into an Honours project

Luckily for me, I came to the right place, with both Dr. Michelle Waycott (JCU) and Dr. Jane Mellors (DPI&F) having a keen interest in this species. Michelle also had an interesting project in mind, looking at the responses of *H. ovalis* to light and nutrients. With the aid of my newly found supervisors (including Dr. Simon Robson, JCU), I constructed aquaria to grow *H. ovalis.*

I'm sure everyone understands the effects that reduced light has on any plant. On top of this, an increase in nutrients can cause an outbreak of algae, which further reduces light availability. Therefore, this link between light and nutrients is well established, but to what levels does this affect *H. ovalis?*

I collected the seagrass for my study from the *H. ovalis* meadow at the inner edge of Cockle Bay, Magnetic Island. For all those who have done Seagrass-Watch there, this meadow stretches along the mangroves where the substrate is muddy, quite unlike the reef flat where the monitoring site is located. I collected cores of seagrass using a PVC corer, and put these directly into gardening pots, and then into my aquaria.

Once the *H. ovalis* had settled into its new environment, I simulated a high and low light environment by using shade cloth for the low levels with high levels remaining uncovered. Next, I injected nutrients every fortnight into the pots, about 2 inches from the top of the substrate. My nutrients levels were once again high and low. The low levels simulated Cockle Bay as much as possible, and high levels were five times this. To examine the interaction between light and nutrients, I had four treatments.

High light high nutrients
High light low nutrients
Low light high nutrients
Low light low nutrients

The experiment ran for 56 days, which was enough time to show significant results!

To determine seagrass survival I did a few measurements. Every week I took digital photos of each pot to count the leaves. This was my measure of seagrass survivorship. At the end of the experiment, I measured total biomass, internode lengths and new shoots for each treatment. To measure morphology, I collected leaves every week and recorded the average area.

My experiment showed a change in survival and morphology between the high and low light treatments, but not for nutrients. This is possibly because I exposed my plants to an extreme light stress. The poor seagrass was too stressed to utilise the nutrients I was providing! Table 1 shows the final survival response for each of the treatments. By the end of the 56 days there is basically no seagrass left in the low light treatments!

Nutrients injected into pots of H. ovalis

The graph below shows the results for both survival and morphology. The top section shows the decrease in leaf counts for both light levels; however the decrease is much more significant for the low light. The leaf area graph shows the overall decrease in leaf morphology over the 56 days, the pictures of the leaves tell the story!

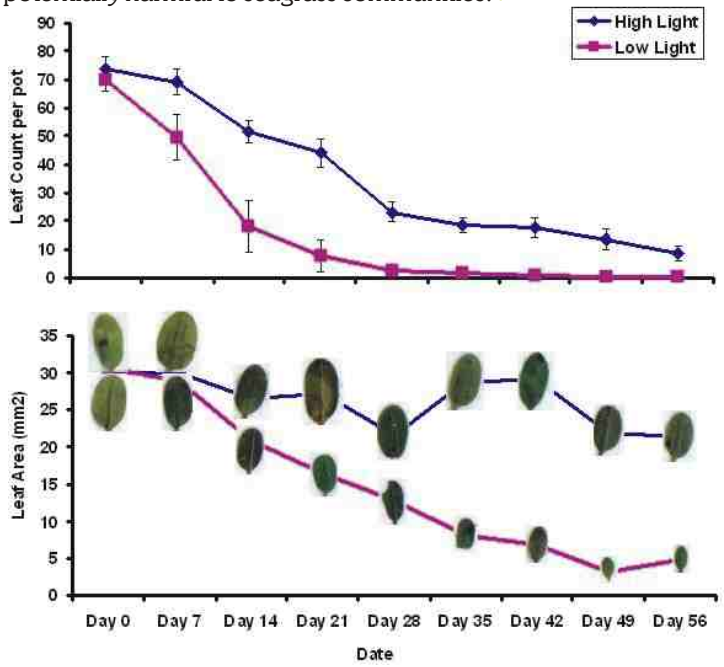
Table 1: Survival results for H. ovalis, biomass, interode lengths and new apices (shoots).

Treatment	Biomass (g)	Internode length (mm)	Number of new apices
High Light High Nutrients	0.09 ± 0.04	4.08 ± 0.85	3.45 ± 1.54
High Light Low Nutrients	0.08 ± 0.04	5.0 ± 0.2	3.60 ± 1.09
Low Light High Nutrients	0.0001 ± 8.8E-05	0.07 ± 0.07	0
Low Light Low Nutrients	0.0001 ± 0.0001	0.08 ± 0.08	0.04 ± 0.04

So, from this experiment, although *H. ovalis* may have a wide environmental tolerance, growing to depths of 60m, high light adapted plants cannot survive under low light (irradiances of 143 μmol m^{-2} s^{-1}) for lengthy periods of time. It survived in the high light treatment for 56 days, however by day 28 the leaf counts in the low levels were extremely depleted.

The implications of this study show the importance of light to seagrass communities, and that a severe reduction in light for periods over two weeks can have detrimental consequences to *H. ovalis* in the shallow waters of the GBR. Anything that reduces light (eg. sediment plumes, increased phytoplankton and algae) is potentially harmful to seagrass communities.

Above left: Experimental aquaria with pots of H. ovalis cores from Cockle Bay.
Above right: The shade cloth around the aquaria



Average (± se) leaf counts per pot and average leaf surface area for each light treatment. Leaf morphology can be seen from the leaf scans.

Eritrea is in northern East Africa. The country is bordered by Sudan in the west, Ethiopia in the south, and Djibouti in the southeast. The east and northeast of the country have an extensive coastline on the Red Sea, directly across from Saudi Arabia and Yemen. The Dahlak Archipelago and several of the Hanish Islands are part of Eritrea.

Eritrea's coastal, marine and island areas are amazingly diverse and include vibrant coral reefs teeming with colourful marine life, lush mangrove forests, flourishing seagrass, manta rays, dolphins, dugongs and marine turtles.

Status of Seagrass in the Eritrean Red Sea

Yosief Hiabu (ECMIB) reports

A recent seagrass biodiversity survey has been conducted in the central and southern Eritrean Red Sea by the Ministry of fisheries and the Eritrean Coastal Marine and Island Biodiversity project (ECMIB-UNDP). The research outcome reveals the presence of 8 seagrass species in the region. These are: *Thalassia hemprichii, Halophila ovalis, Halophila stipulacea, Enhalus acoroides, Cymodocea rotundata, Halodule uninervis, Syringodium isoetifolium and Thalassodendron ciliatum*. The Southern Eritrean marine zone is characterized by more extensive soft bottomed continental shelves and higher rate of water influx from the Indian Ocean as compared to the Central region. These, combined with other physico-chemical and ecological factors might have resulted in increasing seagrass abundance southwards.

Syringodium isoetifolium covered in epiphytes Um-el-Beger Island, Assab.
Photo by: Yosief Hiabu

Coastal people of the region have known certain basic facts about the ecological importance of seagrass for centuries. They often differentiate seagrass from other marine flora and relate them to their terrestrial relative flowering grasses. Many traditional fishermen know which seagrass species to refer in order to trace various marine organisms, although there are no specific names given for each seagrass species. Peoples' attitude towards conservation of seagrass is however poor. Seagrass meadows are regarded as places that are never influenced by environmental or human induced changes. In fact, the mass natural death and onshore discard of seagrass during the hot season (May-August) is taken as a positive natural phenomenon; as residents of the central islands call it "*El Bahr tinezif ra-asiha*", an Arabic expression meaning "*the sea getting clean by itself*".

Cymodocea rotundata infested with bloom of green algae Assab Bay, Southern Region
Photo by: Woldu Habtemariam

Rapid assessment method was applied to collect data of seagrass abundance and distribution. As the methodology focuses only on the shallow inter-tidal and sub-tidal waters, depth wise seagrass distribution of the region is not known. Basic environmental factors controlling seagrass biomass along with their associated fauna and flora needs further investigation. Proper selection and management of seagrass monitoring sites is yet another issue. Public awareness related to the ecological and economic values of seagrass is an important conservation approach. The seagrass survey team is planning to carry on subsequent studies and training programmes through continuous linkage with international seagrass institutions such as the Seagrass-Watch.

Enhalus acorodies, Eritrea Red Sea
Photo by: Yosief Haibu

HAS YOUR DATA PASSED HQ QAQC??

As part of Seagrass-Watch Quality Assurance Quality Control (QAQC), Seagrass-Watch HQ performs a quality check on all long-term monitoring data submitted. This ensures that information derived from Seagrass-Watch is of the highest quality.

Community shift in seagrass ecosystem Minicoy Atoll (India)

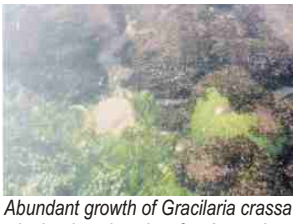
Prabhakaran MP (CUSAT, Kochi) reports

Minicoy, the southern most atoll of Lakshadweep, harbors a rich vegetation of inter-tidal seagrass. The complex ecology and multiple roles that seagrass communities carry out are reasons for maintaining and improving these communities. They stabilize sediments, serve as habitats and nurseries and are direct and indirect food for diverse fauna. Seagrass system provide suitable substratum for benthic algae. Seagrass-algae beds are rated third most valuable ecosystem of the world, only preceded by estuaries and wet lands. Living seagrass leaves provide an attachment site for numerous type of epiphytic and other algae occur between seagrass shoots and in the surface layers of the sediment. These softer, more digestible algae support the abundant grazers associated with the meadows. The drift species are known to serve as habitats and food source for gammaridean amphipods.

Seagrass ecosystem forms a climax community and they demonstrate a balance between physical and biological parameters. Lagoon ecosystems are maintained by a balance of nutrient loads within the system and tidal flushing from the sea. Since the marine inputs of nutrients to coastal lagoons are low and the low freshwater inflow make this system nutrient poor and dominated by seagrasses. The water quality is significantly influenced by the sediment water column exchange. The changes in nutrient status results in the shifting of community structure. It has been widely documented that the habitat modification strongly associated with the changes in biological, physical and chemical conditions. These include both natural and anthropogenic inputs.

Anthropogenic impacts on seagrass meadows some times resulted in the total destruction or shift from seagrass to floating filamentous algae to profuse growth of benthic algae. In Minicoy lagoon the dumping of tuna wastes resulted in the nutrient enrichment and created suitable conditions for the proliferation of macro algae. The colonization of rhizophytic algae like *Gracilaria crassa* enhanced the trapping and stabilization of sediments with increased nutrient loads. This nutrient rich substratum induces the proliferation of *Caulerpa racemosa* and subsequently reduces the growth of seagrasses. *Caulerpa* dominated community was then gradually shifted to *Gracilaria* dominated community. This shift in communities made a drastic decline in seagrass growth and abundance. Such declines in seagrass communities have occurred worldwide, have been linked to natural and human induced disturbances.

Dumping of tuna waste in the seagrass meadow



Abundant growth of Gracilaria crassa in the dumping site after 3 months

The knowledge on the factors regulating the development of proliferating communities may allow forecasting the shift in community structure and health of the ecosystem. Such information will be helpful for the ecological managers.

Bangladesh Seagrass-Watch

Mowdudur Rahman (CCEC- Khulna) reports

Bangladesh is largely a deltaic country formed at the northern end of the Bay of Bengal and is located at the foot of the Himalayan Ganges. The country's terrain has a gentle slope towards the sea with less than 1.5 m to 0.2 m elevation above mean sea level. The coastal area of Bangladesh lies in the tropical zone between latitude 21-23 degree N and 89-93 degree E. The coastline is about 710 km long extending along the Bay of Bengal from the mouth of the Teknaf River in the southeast to the mouth of the Raimangal River in the west. The coastal area encompasses the regions of Cox's Bazar (in the far east), Chittagong, Noakhali, Barisal, Patuakhzali and Khulna (in the far west) and includes some 2.5 million ha of coastal tidal lands.

Fishermen near the town of Cox's Bazaar. Photo by Jawed Karim

Bangladesh is also one of the most vulnerable countries to sea level rise and global climate change, as millions of coastal communities are vulnerable to coastal inundation.

The Centre for Coastal Environmental Conservation (CCEC) is a local environmental NGO based at Khulna, Bangladesh. CCEC is working towards environmental sustainability of the coastal ecosystems of Bangladesh, particularly at the south-west coastal Sundarban region with local people participation. However, since the Tsunami devastation on 26 December 2004, CCEC has been very active on a mangrove conservation campaign and recently established the Mangrove Protection Society (MPS).

CCEC plans to extend it's activities in polder 32 of Dacope upazilla adjacent to Sundarban, the UNESCO declared World Heritage site, to include seagrass monitoring. I believe there could be some seagrass species that could be worthy to monitor as an indicator to global warming or increased salinity.

Unfortunately, very little is known about the seagrasses of Bangladesh. There is no information on their distribution and the only species reported in the literature is *Halodule uninervis* from the sandy littoral zone around Jinjiradwip (St. Martin's Island), the only known coral reef in Bangladesh.

Environmental Education Training (EET) among the Primary School teachers of Khulna, Bagerhat Satkhira districts and Biodiversity Conservation Awareness among Sundarban stakeholders are the two major thrust areas of CCEC. With the support of Khulna University and Prof. Dr. Mahbubur Rahman (honorable Vice Chancellor), linkages have been established between CCEC-KU and Seagrass-Watch. Working closely with these groups and students from the Center on Integrated Studies on Sundarban (CISS) from Khulna University, it is hoped we can identify and monitor seagrasses in the region.

Malaysia & Tanzania

SOS Malaysia

In early October, Len McKenzie and Rudi Yoshida (Seagrass-Watch HQ) visited Johor Bahru and caught up with SOS Malaysia leader Choo Chee Kuang.

Choo had travelled down from Kolej Universiti Sains dan Teknologi Malaysia, (Kustem) (a 9 hr drive) to visit some of his students and check out his seagrass monitoring sites, at Pulai River Estuary.

After first trying out the local cuisine, and an exhilarating ride through the streets of Johor Bahru, Choo, Len & Rudi met up with Siti Maryam Yaakub (from Team Seagrass, Singapore) for a tour around Tanjung Kupang, Johor.

The first stop was the Sekolah Kebangsaan Tanjung Kupang school, which has an education program on conservation of mangrove and seagrass. Kustem undergraduate students had developed educational tools as part of their tertiary studies, and they were being shared with the Tanjung Kupang students. The children showed off their talents in colouring competitions, modelling marine animals using plasticines, solving puzzles and answering quizzes. It was joy to see such enthusiasm on a Saturday afternoon.

Under thick blanket of "haze" (from Indonesian fires) it was then on to a seaside village where Choo had arranged for a boat to ferry the Seagrass-Watch team to the Pulai River Estuary .

In Feb 2003, an area in the Estuary along with the mangrove forests in Tanjung Piai and Pulau Kukup, were declared Ramsar Sites. With its associated seagrass meadows, intertidal mudflats and inland freshwater riverine forest the site represents one of the best examples of a lowland tropical river basin, supporting a rich biodiversity dependent on mangrove.

Siti stays dry and keeps an eye out for Crocs!! Len (Seagrass-Watch HQ) and Choo (SOS Malaysia) get in amongst an Enhalus meadow at the Ramar Site

After visiting the Ramsar site, it was on to an unexplored sand bar to discover a new meadow. According to Choo, fishermen reported that the seagrass on this sand bar had been smothered by port construction, but in the last two years started re-colonizing. The meadow contained abundant dugong feeding trails, large leaved *H. ovalis*, *E. acoroides* and *H. spinulosa*. Back in the boat and a short trip to SOS Malaysia's sampling site, a dense meadow, located between Malaysia and Singapore, approximately 1.3 km in length. So far 10 species of seagrass have been found in this impressive meadow, with *E. acoroides* and *H. ovalis* dominating the site.

Dugong feeding trails on the sandbar.

ISBW7

The 7th International Seagrass Biology Workshop (ISBW7) was held on the island of Zanzibar 10-16 September 2006. Scientists from around the world attended to hear about the latest developments in seagrass research and monitoring and share information. There were several sessions over 4 days of formal presentations on the four main themes: 1. Nutrients and sediment dynamics; 2. Ecophysiology; 3. Linkages between systems, and 4. Distribution, monitoring and management. One day was set aside to explore historic Stone Town and for a field trip to Chwaka Bay, on the eastern side of Zanzibar.

As with the previous International Seagrass Biology Workshop and conference (Seagrass2004) in Townsville (issue 20), there were several presentations from Seagrass-Watch participants. Xiaoping Huang spoke about the Hepu demonstration site in south China (see issue 26), the successful engagement of stakeholders and the eco-compensation process surrently being developed. Jane Mellors (Seagrass-Watch HQ) presented the findings of Seagrass-Watch monitoring at Thursday Island and spoke passionately about how scientists can involve indigenous people in collection of scientific data and raise the local awareness of the importance of seagrass. Finally, Len McKenzie (Seagrass-Watch program leader) gave an overview of the program and spoke about the programs current status, presenting examples of how local Seagrass-Watch participants are helping with the conservation of seagrass meadows globally. He also presented the findings from the Reef Plan Marine Monitoring program for the Great Barrier Reef as an example of government and local community working together successfully.

Apart from specific presentations on Seagrass-Watch, several of the plenary and synthesis presentations spoke about how programs such as Seagrass-Watch are bridging the gap between scientists and the wider community and providing meaningful data to assist with management. There was an overwhelming support from the seagrass scientific community that programs such as Seagrass-Watch are important and making a difference.

Zanzibar, is the collective name for two East African islands 35 km off mainland Tanzania: Unguja (also called Zanzibar) and Pemba. The population of Zanzibar was 981,754 in the 2002 census and it's main industries are spices (cloves, nutmeg, cinnamon and pepper), raffia, and tourism. The old quarter of the capital of Zanzibar is known as Stone Town and is a World Heritage Site.

Stone Town

The old town is built on a triangular peninsula of land on the western coast of the island. It consists of a warren of narrow alleys to houses, shops bazaars and mosques. Transport around town is by foot, bicycle or motorbike: cars are too wide to drive down many of the inner streets. Its Swahili architecture incorporates elements of Arab, Persian, Indian, European and African styles. The Arab houses are particularly noticeable because they have large and ornately carved wooden doors and other unusual features such as enclosed wooden verandas. The town has probably been occupied for around three centuries with buildings only being constructed with stone since the 1830s.

The town was the centre of trade on the East African coast between Asia and Africa before the colonization of the mainland in the late 1800s after which the focus moved to Mombasa and Dar es Salaam. The main export was spices and particularly cloves. Slaves were also obtained from the mainland and traded with the Middle East. The town also became a base for many European explorers, particularly the Portuguese, and colonisers from the late 1800s. Immigrant communities from Oman, Persia and India lived here. These were often engaged in trade or in the case of the Omanis were rulers of the island and its dependent territories. It is also famous as the birthplace of Freddie Mercury, the lead singer of the band Queen.

Chwaka Bay

Chwaka Bay is located on the east coast of Unguja Island, about 34 km east of Zanzibar town. Large intertidal flats characterize the bay. The estimated population at Chwaka village is about 9,000 people. Untreated sewage is commonly dumped directly into the bays.

Seagrasses are present in most places of the intertidal zone and in the bay proper with varied coverage; being more abundant in the western part of the bay. The number of species is high (11 species) and includes among the most common *Thalassia hemprichii*, *Cymodocea spp.*, *Thalassodendron ciliatum*, *Enhalus acoroides*, *Halophila spp.* and *Halodule sp.* The species composition in the meadows varies from one to about four species. Near to the mangrove forest, seagrass patches are mainly mixed with calcareous and brown macroalgae. Further out, towards the entrance of the bay, the seagrasses form extensive mono species stands of *T. ciliatum* and *E. acoroides*. The west coast of the bay is covered by extensive, high-density meadows dominated by *T.hemprichii* and *Cymodocea spp.* The borders of the channels inside the bay are dominated by *E. acoroides* and *T. ciliatum*, but these species can also be found in the intertidal zone.

The ISBW7 fieldtrip to Chwaka Bay was lead by Dr Maricela de la Torre-Castro (Stockholm University) who has been working in Chwaka village for several years studying the interactions between humans and seagrasses. The seagrass meadows of the bay provide fishing grounds for finfish and invertebrates, substrate for seaweed cultivation and sites for bait collection. Seagrass-associated fisheries in the form of trap fisheries ("dema") provide the highest daily average income per fisherman. Furthermore, seagrass-associated fish constitute the primary source of animal protein for the local people. Seagrasses are also used as traditional medicine and fertilizers. They provided a wide range of ecological services including aesthetical, instrumental, spiritual and religious.

Left: seaweed farm in Chwaka Bay

Below: fish trap "dema".

Tetepare Island - The Last Wild Island of the South Pacific

Tetepare Island, in the Western Province of the Solomon Islands, is the largest uninhabited island in the South Pacific. Covering an area of approximately 120 square kilometres, Tetepare supports pristine lowland rainforest and a rich inshore marine area.

Tetepare Island has been recognised both nationally and internationally for its conservation significance and archaeological values. The island's beaches support nesting populations of three species of turtle including the endangered leatherback turtle. Other species inhabiting the island and surrounding waters include the dugong, the world's largest skink, the endemic Tetepare White-eye, hornbills, tiny pygmy parrots, huge bump-headed parrot fish, schools of barracuda and pods of inquisitive dolphins.

Fringing reefs teeming with fish and marine invertebrates are located along the weathercoast, or windward side, of Tetepare Island. The leeward coast of the island supports gentling sloping coral gardens.

Although it remains a mystery why human settlement ceased on Tetepare in the late 1800s, many people believe Tetepare Islanders abandoned the island due to a severe illness that befell the people as well as to head hunting pressure among tribes. Descendants of the original inhabitants are now settled throughout the Western Province, and many of these people make regular trips to Tetepare for fishing, hunting and artisanal resource harvesting. As a result of more than 150 years without permanent settlement, Tetepare retains almost all of its primary rainforest.

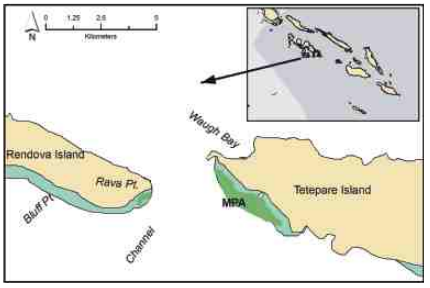

Photo: Ben Kozel http://benkozel.com/

The landowners of Tetepare are represented by the Tetepare Descendants' Association (TDA), which supports conservation efforts on the island.

Tetepare Island Seagrass-Watch

Katherine Moseby reports

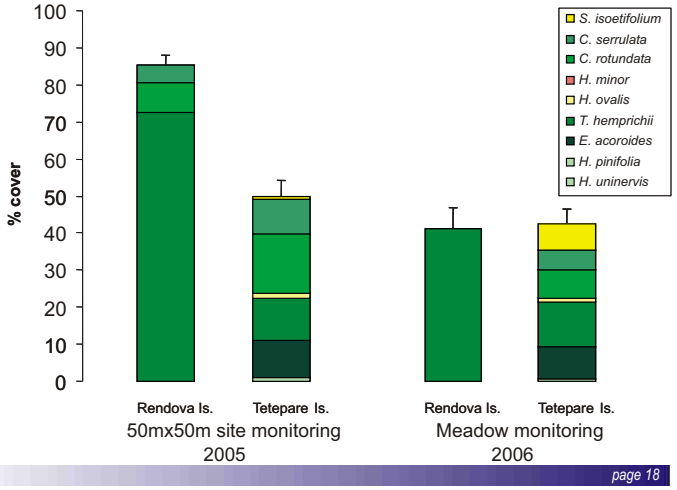
Seagrass-Watch monitoring was established at Tetepare Island in November 2005 by the Tetepare Descendants' Association (TDA) with assistance from WWF Solomon Islands. Monitoring was originally conducted using the standard three parallel 50m transects at each of 5 sites. However, TDA has since acquired the Seagrass-Watch training materials and have decided to change the monitoring system to match the needs and skills of TDA. Seagrass meadows on Tetepare are subtidal and more than 4km of seagrass coastline has been protected within the Tetepare Island Marine Protected Area (MPA). In order to monitor the entire area within the MPA and compare it to areas outside the MPA it was decided to establish a number of smaller monitoring sites, each comprised of 3 random quadrats, at fixed points within the seagrass meadows. Permanent markers were unrealistic and so a GPS was used to record the permanent position of each site. This method enabled a large number of sites to be established ensuring representation across the entire seagrass coastline. Each site also included a search within a 25m radius for edible clams that have previously been over harvested on the island. Clams are measured at their widest point parallel to the hinge.



Although 9 species of seagrass were recorded in 2005 with WWF, only 7 species were recorded at monitoring sites in 2006. Species assemblage changed significantly from west to east with some areas with high richness and others fairly homogenous. Average seagrass coverage was 43% with quadrats ranging from 0 to 95%. Canopy height averaged 13cm, algal cover averaged 5% and epiphyte cover averaged 25%. Average species richness was 4 species. *T. hemprichii* and *C. rotundata* were the most common species recorded, present in 14 of the 18 sites in the MPA. H. uninervis was the least common and least abundant species.

The three sites on Rendova at Rava point were within a monospecific *T. hemprichii* meadow, Average coverage was 41%, 4% algae, 9.2cm average canopy height, species richness=1, 32% epiphyte cover. Seagrass meadows were not as diverse or as extensive at Rava Point on Rendova Island.

Other seagrass meadows have been reported to be present on Tetepare outside the protected area from Sobu to Livutana. Ideally, sites will be established in these areas approximately every 300m-500m along the coastline depending on the extent of seagrass present. A reconnaissance trip will be conducted first to determine the length of seagrass coastline and to choose the location of sites. Sites will be chosen to sample both deep and shallow areas, previous sites were chosen to comprise a variety of depths, some close to shore and others out deep, close to the limit of seagrass distribution. It would be useful to conduct this work within the next few months so that the clam counts can be compared with the other sites.



Seagrass-Watchers Cawaci: (left to right) Shaun, Charlene, Rosarina & Nicolette

Cawaci, Fiji

Shaun & Charlene Ashley report

Monitoring of both sites at Cawaci (Ovalau) took place on Saturday 25th November, 2006. The group of five, Shaun Ashley, Charlene Ashley, Rosarina Olsen, Masao & Nicolette Yoshida, left for Cawaci, at 2.30pm and finished at 4.30pm braving the hot sun.

It was a much better day compared to our previous attempt a week earlier: we had to cancel due to strong winds, higher than expected tides and a strong current making it near impossible to see the grass and carry out our scheduled monitoring.

In spite of the low tide being 0.5m on Saturday 25th the two sites, CW1 and CW2 were underwater. This was a first since usually the sites were dry, at such at low tide. There appeared to be some dredging being done in front of the monitoring area. Perhaps this would have some effect on the growth of the seagrass??

Algae was very noticeable, growing over most of the seagrass and covering a lot of the area at CW1. This together with epiphytes growing on the seagrass made it difficult to monitor the sites. There also seems to be a significant decrease in *Syringodium isoetifolium*, at CW1.

Above and left: Cawaci, CW2: It's 0.5m tide and still underwater! Can you see anything?
Below left: Masao (Yogi) - another year of sampling completed

Previously there was a large meadow at the end of transect 1, however, at this sampling event, no *Syringodium isoetifolium* was found at any of the transects at CW1. A minimal growth of *S. isoetifolium* was noticed at CW2 and some small patches were found growing immediatley outside of CW1 & CW2. We did however find some *S. isoetifolium* closer inshore, where mangrove shoots are appearing.

Another year of sampling completed, happy holidays from the Seagrass-Watch team on Ovalau.

Local villagers fishing in the dense seagrass meadows of cawaci

Motupore Island Research Centre

Jane Wia (Research and Training Officer, Motupore Island Marine Biodiversity Unit)

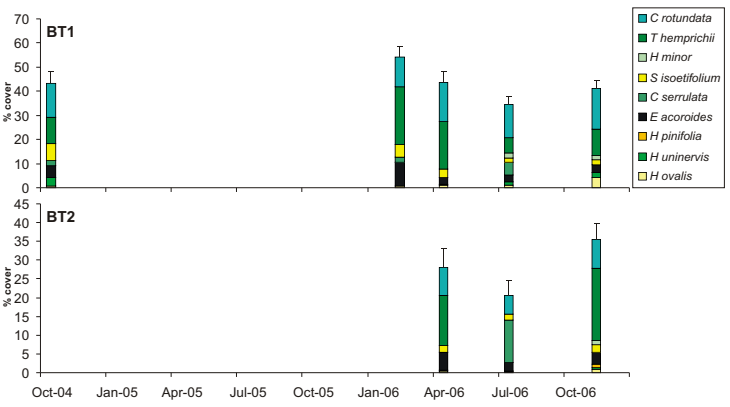
Since the establishment of two monitoring sites on Motupore Island (PNG) early this year, we have been able to successfully carry out three of the quarterly monitoring surveys without too much mishap. In recent months, Port Moresby has experienced some very extreme low tide periods that have resulted in prolonged exposure for the seagrasses and as such a lot of the species close to the shore have died off. These may take some

November sampling at Motupore Island's two Seagrass-Watch sites

time to recover, and as we have seen in the most recent of the surveys, there were a lot of burnt-out seagrasses with only the more resilient species being able to survive and begin growth.

We are still in negotiations with the local communities in Bootless Bay and will hopefully be able to set up permanent monitoring sites in a number of villages and in doing so, be able to gather information on the ecological condition of the seagrass ecosystems throughout the Bay.

The Motupore Island Research Centre through its specialized branch, the Motupore Island Marine Biodiversity Unit (MIMBU) is very much in support of the work of Seagrass-Watch in Papua New Guinea and will continue to assist in providing data on the condition of this vital ecosystem within its local area.



SEAGRASS-WATCH HQ IN FIJI 2007

Seagrass-Watch HQ will be in Fiji conducting training workshops & sampling in January 2007. If interested in attending please contact hq@seagrasswatch.org for further information.

ARE YOU REGISTERED WITH HQ??

If not, you will not receive updates on the program and may not be a recognised member of the Seagrass-Watch community. www.seagrasswatch.org/register.html

Australia

Animal facts

Green Ambassadors award

Photos from top: At Sarina Inlet with the crew (Sep05), Horn Island with students(Aug05), Receiving her SGW certificate from Len McKenzie (SW HQ) (Nov05), Pigeon Island with Margaret Parr (Sep05), Back Beach, TI , with Boigu and Dauan Island students (Nov06)

Rebecca Bowie received a Green Ambassadors award for her contribution to environmental initiatives through her involvement in Seagrass-Watch. The Commonwealth Bank Green Ambassadors program is a joint partnership between the Commonwealth Bank and Conservation Volunteers Australia, that recognizes, rewards and supports 20 young Australians who demonstrated leadership in environmental conservation and actively assist or protect their local environment. The standard of applications this year was excellent and this is reflected in all of the 2006 Commonwealth Bank Green Ambassadors.

Becky is a student at Thursday Island State High School and has been a member of the Seagrass-Watch team on Thursday Island for 2 years. During this time Becky regularly participated in Seagrass-Watch surveys at Thursday Island and Horn Island. She also regularly visited the local primary school where she mentored and trained the younger students in Seagrass -Watch surveys and educated them about the beauty and importance of this resource. In 2005 Becky was awarded a CRC Torres Strait travel grant which enabled her to participate in Seagrass-Watch activities and Reef Water Quality (RWQPP) sampling in the Whitsundays and Sarina Beach areas.

Ambassadors receive a Commonwealth Bank Green Ambassadors pack which includes a digital camera, polo shirt and the opportunity to partake in a volunteer conservation experience as well as a Certificate 1 in Active Volunteering.

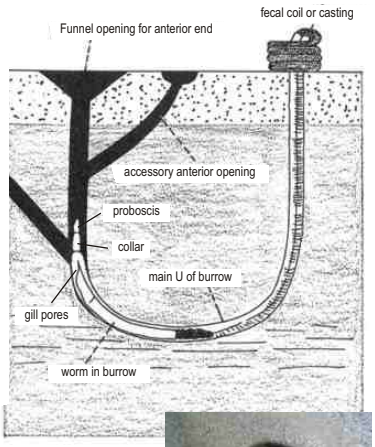
Congratulations Becky from Seagrass-Watch HQ, on receiving you Commonwealth Bank Green Ambassadors for 2006. For more information on other winners through out the state visit http://www.conservationvolunteers.com.au/greenambassadors/

Acorn Worms

Every wondered what makes the little piles of coiled sand you often find on sand flats? Well, they're called casts and they are made by Acorn worms.

Acorn worms or Enteropneusts are classified in the phylum Hemichordata, closely related to the chordates. There are about 70 species of acorn worm in the world.

Acorn worms are burrowing worms. They live in U-shaped burrows in sandy or muddy bottoms mainly in shallow waters, but can be found in water depths to 3km. Some of these worms may grow to be very long; one particular species may reach a length of 2.5 meters (almost eight feet), although most acorn worms are much, much smaller. Acorn worms are delicate and almost certain to disintegrate if they are dug up. So please don't try to dig them up.



The Acorn worm's body is cylindrical. The body is made up of three main parts: the acorn-shaped proboscis (nose), a short fleshy collar that lies behind it, and the long trunk, which is the rest of the body. The creature's mouth is located at the collar behind the proboscis.


Funnel opening for anterior end

Worms with gills like fishes? Acorn worms are considered more highly specialised and advanced than other similarly shaped worm-like creatures. They have a circulatory system with a heart that also functions as a kidney. Acorn worms have gill-like structures that they use for breathing, similar to the gills of primitive fish. Hence, acorn worms are sometimes said to be a link between classical invertebrates and vertebrates. Some also have a postanal tail which sometimes show weak signs of segmentation. An interesting trait is that its three-section body plan is no longer present in the vertebrates, except from the anatomy of the frontal neural tube, later developed into a brain which is divided into three main parts. This means some of the orginal anatomy of the early chordate ancestors is still present even if it is not always visible.

To obtain food, many acorn worms swallow sand or mud that contains organic matter and microorganisms in the manner of earthworms (this is known as deposit feeding). At low tide, they stick out their rear ends at the surface and excrete coils of processed sediments. Called the cast, this is all that most people will see of an acorn worm!

Do you want to get Involved?
Contact a local Seagrass-Watch representative in your location - visit www.seagrasswatch.org

VOLUNTEERS NEEDED

Australian Government Department of the Environment and Heritage
Queensland Government Department of Primary Industries and Fisheries
Reef & Rainforest Research Centre
The David and Lucile Packard Foundation

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Layout & graphic design: Rudi Yoshida & Len McKenzie

Any comments or suggestions about Seagrass-Watch or contributions to newsletters would be greatly appreciated.

NEXT ISSUE OUT MARCH 2007

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