

Saltmarsh

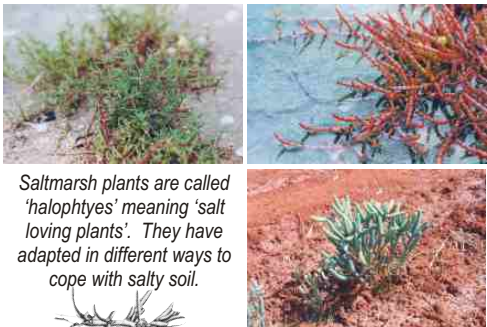
Saltmarsh - the quiet acheiver!

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 'halophytes' 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 'halophytes' 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.

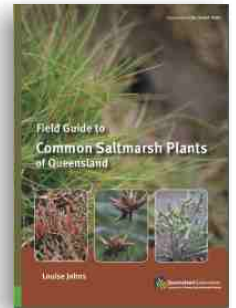
Even the bare sections of the saltmarsh known as salt pans have their value as they often support dense algal mats which contribute to the local food web.

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.

The guide contains pictures of 32 different saltmarsh plant species with detailed



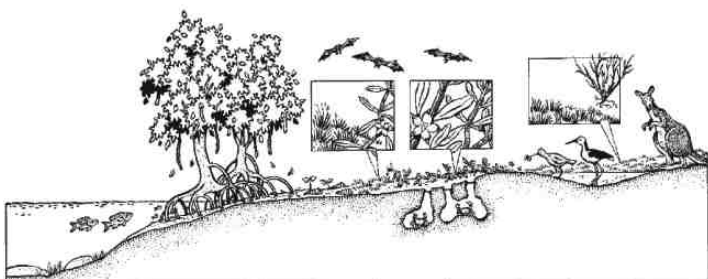
Author of the field guide, DPI&F officer Louise Johns



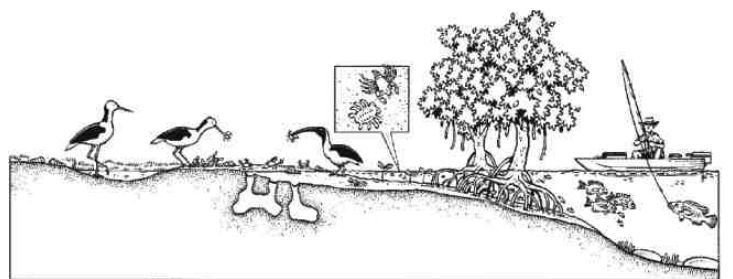
descriptions, line drawings, flowering periods and distribution maps. It is extremely user friendly to ensure simple identification of saltmarsh species which will highlight the values of these important fish habitats.

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 fisheries have been captured in saltmarshes.

Research

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 Cackle 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 Cackle 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



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

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

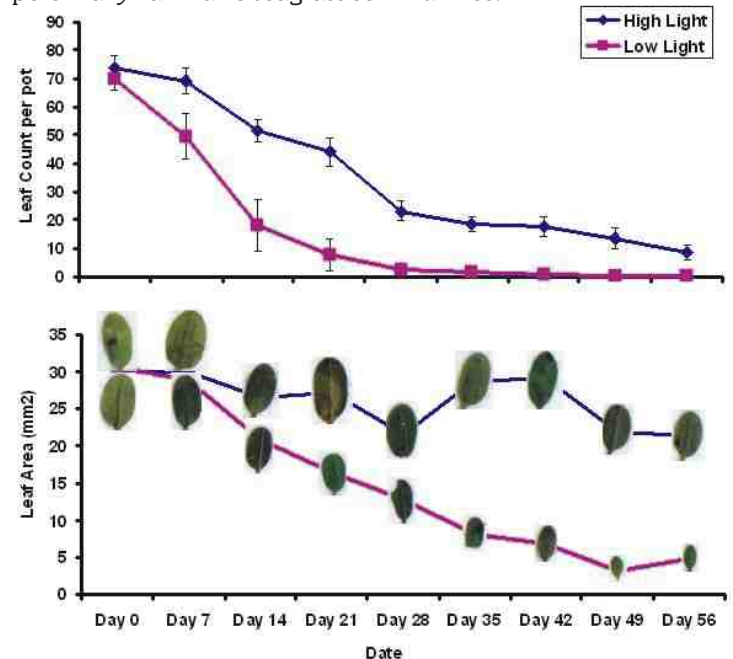
Table 1: Survival results for *H. ovalis*, biomass, internode lengths and new apices (shoots).

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

overall decrease in leaf morphology over the 56 days, the pictures of the leaves tell the story!

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 (irradiance of 143 $\mu\text{mol m}^{-2} \text{s}^{-1}$) 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. 🌱



Average (\pm 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.

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".

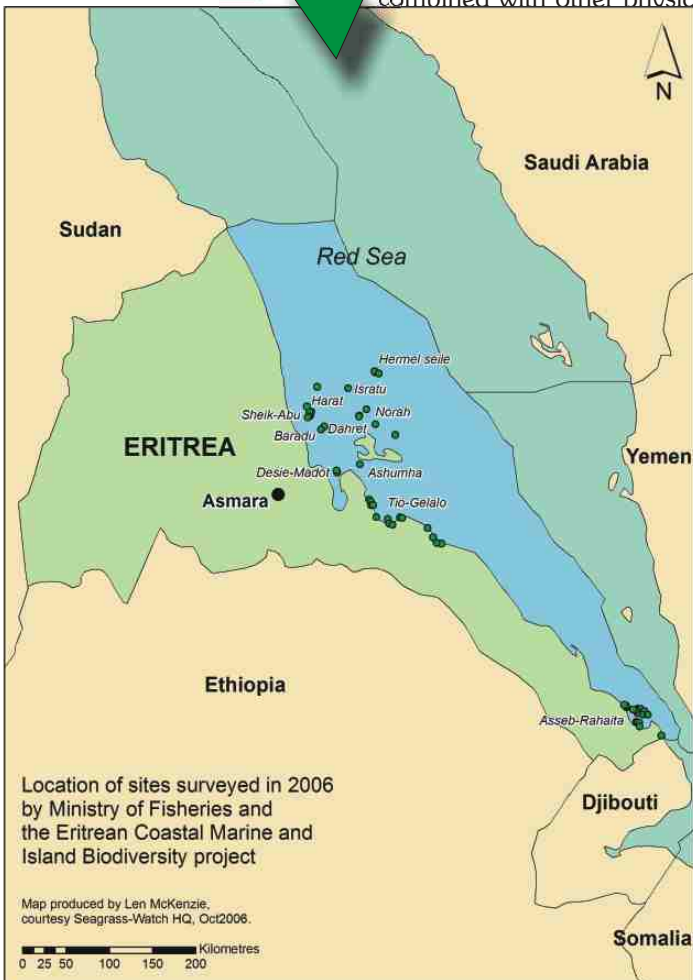
Rapid assessment method was applied to collect data of seagrass abundance and distribution. As the methodology focuses only on the shallow inter-tidal and sub-tidal waters, depth wise seagrass distribution of the region is not known. Basic environmental factors controlling seagrass biomass along with 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.



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



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



Enhalus acoroides, Eritrea Red Sea
Photo by: Yosief Hiabu

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.

India & Bangladesh

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



Dumping of tuna waste in the seagrass meadow

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.

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. ♡



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



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 its 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 Pulau 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.



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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 Pulau 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,



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

supporting a rich biodiversity dependent on mangrove.

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,



Dugong feeding trails on the sandbar.

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. 🌱



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 currently 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. ♡



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Left: seaweed farm in Chwaka Bay

Below: fish trap "dema".



Solomon Islands

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.



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

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.

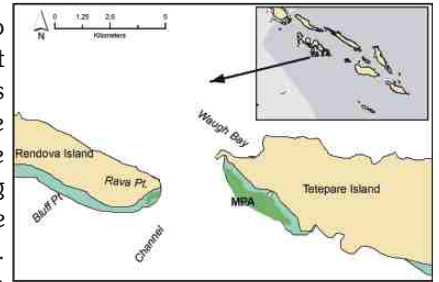
The landowners of Tetepare are represented by the Tetepare Descendants' Association (TDA), which supports conservation efforts on the island. ♡

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



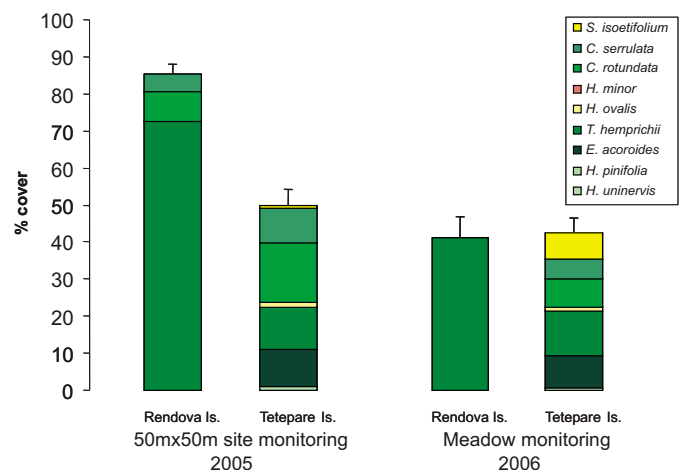
search within a 25m radius for edible clams that have previously been over harvested on the island. Clams are measured at their widest point parallel to the hinge.

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. ♡





Pacific



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 a 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 immediately 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



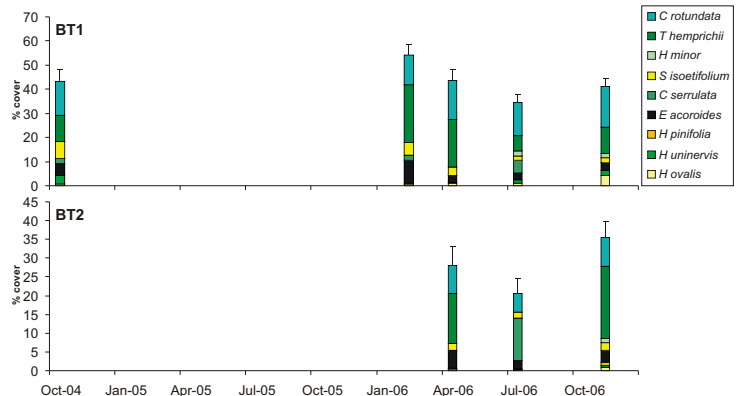
November sampling at Motupore Island's two Seagrass-Watch sites



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



Green Ambassadors award

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.



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)

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

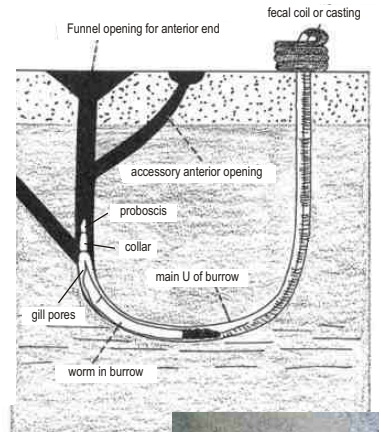
Every wondered what makes the little piles of coiled sand you often find on sand flats? Well, they're called casts and they are made by Acorn worms.



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.



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 original 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



Australian Government
Department of the Environment and Heritage

Queensland Government
Department of Primary Industries and Fisheries

Reef & Rainforest
the Great Barrier Reef & Pacific Island

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

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NEXT ISSUE OUT MARCH 2007