

Northern Territory



Dhimurru Sea Rangers establish NT's first Seagrass-Watch monitoring site.

Neil Smit reports



Northern Territory was established at the Giddies River (GR1), just across Melville Bay from Nhulunbuy.

The three-day workshop was led by Len McKenzie from Seagrass-Watch HQ with assistance of local coordinators Vanessa Walsh (Dhimurru Aboriginal Corporation) and Neil Smit (Marine Biodiversity Group, Parks). Also joining the workshop were Paul Younger and Helen Clark from Batchelor Institute of Indigenous Tertiary Education to see how Seagrass-Watch activities could be incorporated into the Certificate II, Conservation and Land Management course that the Dhimurru rangers are currently enrolled in.



There were five of us at the workshop. In the mornings we were introduced to the do's and don'ts in seagrass management, seagrass taxonomy, monitoring and mapping techniques. Our first hands-on classroom task was identifying seagrass species from the area, such as *Enhalus acoroides*, *Halophila ovalis* and *Halodule uninervis*. Some of these specimens were even good enough to make it into the press and are now housed at the NT Herbarium in Darwin.



In the afternoons we put the theory to test and went out to establish our monitoring site. Fieldwork is always challenging here in Nhulunbuy; natural hazards and distractions such as crocodiles and sting rays are never far away. Then we also have to deal with the fact that our good spring low-tides are always leaning towards sunset, narrowing the time window in which we can do our monitoring.



Nevertheless we managed to get our site established, completed its first assessment and partially mapped the seagrass meadow in which the site is located. Our site is dominated by extensive meadows of *E. acoroides*

with the occasional *Halophila* and *Halodule* species. During our days out on the site we also found signs of *Enhalus* having recently flowered.

Although the species' found at the site is nothing unique for northern Australia, Len commented that, "... from what we know about northern Australia, the type of meadow/community is unique and is more comparable with *Enhalus* meadows seen in Indonesia and PNG".

After our first experience with seagrass monitoring we are keen to continue with monitoring of our unique meadows in the harbour and we will back in December to reinforce Seagrass-Watch's training.

Further, we like to thank Len McKenzie for gently guiding us into world of seagrasses, Paul Younger and Helen Clarke (Batchelor Institute of Indigenous Tertiary Education) for using their facilities during the workshop; Marine Biodiversity Group (Parks) for providing the funds to run the workshop and last but not least Vanessa Walsh for the organisation of the workshop. 🌱



Dhimurru is an incorporated Aboriginal organisation established by Yolngu land-owners in Northeast Arnhem Land, Australia. The office is located in Nhulunbuy.

Yolngu (Aboriginal people of Northeast Arnhem Land) are the traditional owners of lands consisting of approximately 101,000ha. The Aboriginal Land Rights (Northern Territory) Act of 1976 recognises Yolngu as the owners of this land under Australian law. Dhimurru has jurisdiction over approximately 8,500km² of this land.

Since time immemorial Yolngu have managed the natural and cultural resources and have achieved a balance that ensured long term, sustainable resource use for the economic and social well-being of the landowners.

The permanent presence of a large non-Yolngu population in recent times required a new response. On April 8, 1992, after extensive consultations Dhimurru Land Management Aboriginal Corporation was formally incorporated under the Aboriginal Councils and Associations Act 1976 on September 8, 1992.

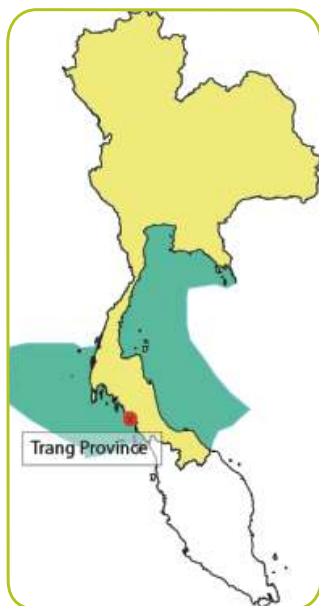
On the Dhimurru logo, the black cockatoo represents the Dhuwa moiety and the white cockatoo the Yirritja moiety. They are encircled by a stem of a coastal ground creeping plant known as rowu (Goats Foot, Morning Glory or Purple Beach *Convolvulus: Ipomoea pes-caprae*). This plant represents the unity of the clan groups working together.

Source : <http://www.dhimurru.com.au/about.html>

Thailand

Dugongs : Constructor or destroyer of a seagrass ecosystem ?

Chittima Arytuhaka (Kasetsart University, Thailand) and Kanjana Adulyanukosol (Phuket Marine Biological Center, Thailand) report



The dugong (*Dugong dugon*) is a large marine mammal which is the only living representative of the once diverse family Dugongidae, belonging to the order Sirenia. At the present, it is listed as vulnerable internationally by the IUCN Red list and the trade of derived products is banned by the Convention on International Trade in Endangered Species (CITES).

In Thailand, dugong populations have been found along the coastlines of both the Gulf of Thailand and Andaman Sea. Over the last few decades, dugongs have received more attention in research and conservation. So, it seems that in Thai waters, populations of dugongs have increased from about

150 to 250 individuals over these decades. However, it is not clear whether the increase in populations is due to the success of coastal management and conservation or just more frequent population surveys by researchers in collaboration of NGOs and fishermen.

To achieve an aim of dugong conservation, it is essential to have knowledge of the seagrass meadows, which are the dugongs main feeding ground. Dugongs feed predominantly on seagrass and the stomach content of dugong samples from Trang waters contained nine seagrass species with the most common two genera *Halodule* and *Halophila*.

These seagrass species are distributed widely in the seagrass meadows along the Andaman Sea coast. It has been widely reported in the literature from dugong surveys in Thai waters that the largest group inhabits around Talibong-Muk Islands, Trang Province (see map). This area has been announced as a wildlife reserve area and covers one of the largest and diverse seagrass meadows in Thailand.

As seagrass meadows serve as feeding grounds for dugongs, dugongs are therefore an important component of the seagrass ecosystem. Through my research, I am quite interested to find out whether the dugong's role is either a constructor or destroyer of seagrass meadows. To understand that, I collaborated with the second author (who has great experience on biology of dugongs in Thailand), to examine the impact of dugong feeding activity on an area of 8.9 km² of the Talibong seagrass meadow, from December 2006 to April 2007.



Feeding trail at high tide in predominant *Halophila ovalis* meadow Talibong, Trang Province, Thailand



Feeding trail just after seagrass grazing by dugong in Talibong wildlife reserve area, Trang Province, Thailand

Map of Talibong wildlife reserve area, Trang Province, Thailand
Insert has map of seagrass meadows overlaid.

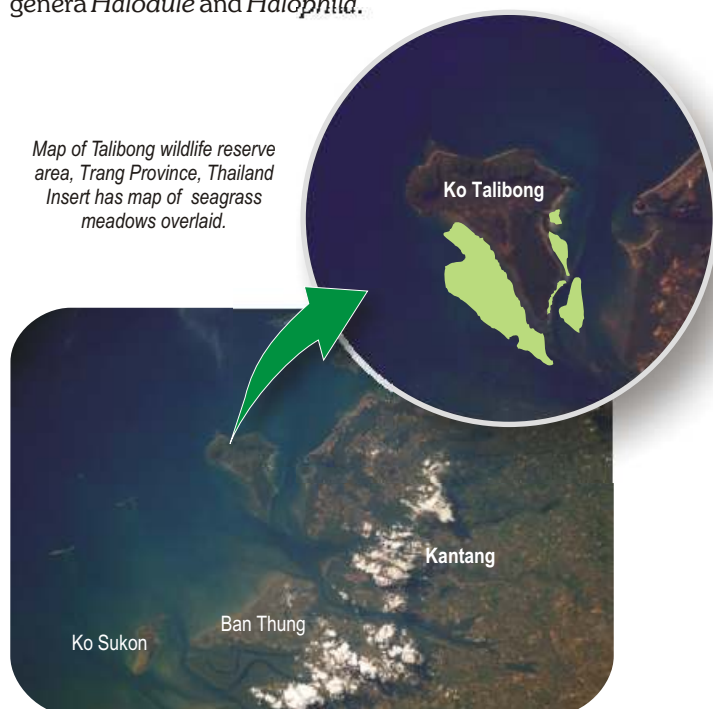


Image courtesy of the Image Science & Analysis Laboratory, NASA Johnson Space Center.
Image ISS006-E-33386, <http://eol.jsc.nasa.gov>



Thailand



Herd of dugongs in Talibong seagrass bed, Trang Province, Thailand. Photo taken by Adulyanukosol (co-author) during her survey of dugong population.

dugongs naturally fed in the area) and then examined 30 newly grazed dugong feeding trails (the sample size was sufficient for statistical analysis). On six occasions over a two month period we examined the feeding trails, taking photographs for description of temporal changes throughout the study period. During each visit we also randomly selected four trails from which we sampled the seagrass and collected sediment for analyses of meiobenthos, macrobenthos, grain size and organic matter content.

From the experiments, seagrass in feeding trails gradually recovered by extension of remaining rhizomes in the trails and possibly from the surrounding meadow. The feeding trails fully recovered to the same density and biomass as the surrounding seagrass within two months (56 days).

The study results indicate that dugongs cause a decrease of seagrass meadows with a scale of disturbance for a few months.



Feeding trail filled with seagrass expansion after 60-days grazing by dugong in Talibong wildlife reserve area, Trang Province, Thailand. Photo taken by Cherdskujai (2007).

However, their feeding activity also mobilised sediments which had settled on the seagrasses, allowing more light to reach the plants. The feeding activity also aided benthic communities in the area. More discussion on actual roles of dugongs will be achieved after further analyses of meio- and macro-benthic samples. We expect to continue reporting on the findings of our research in future Seagrass-Watch Newsletters. ♡



Dugong near Marsa Alam (Egypt). Photo courtesy of Julien Willem. Copyright 2008

About the Dugong

The word "dugong" derives from the Tagalog term dugong which was in turn adopted from the Malay duyung, both meaning "lady of the sea". Dugongs (*Dugong dugon*) are marine mammals in the Order Sirenia which are commonly called sea cows. Sea cows are more closely related to elephants than they are to other marine mammals such as whales or dolphins.

The closest relative of the dugong was the Steller's Sea Cow (*Hydrodamalis gigas*), which was hunted to extinction in the 18th century.

Dugongs live in the shallow waters of at least 37 countries and territories around the world. Throughout their range which runs from east Africa to Vanuatu, dugongs are threatened by rising pollution from the land, coastal development, boat traffic, entanglement in fishing nets, and hunting and poaching for their meat and trophies. Dugongs have already disappeared from some places including the waters off Mauritius, Taiwan, western Sri Lanka, the Maldives, Japan's Sakishima Shoto Islands, Hong Kong's Pearl River estuary, several islands in the Philippines and parts of Cambodia and Vietnam.



Map showing dugong distribution

Dugongs feed mainly on seagrass, but can supplement their vegetarian diet with invertebrate animals such as polychaete worms, sea squirts and shellfish. Its snout is sharply down turned, an adaptation for grazing and uprooting benthic seagrasses. Dugongs feed mostly on small, delicate seagrasses, especially *Halophila* and *Halodule*, which are low in fibre, high in nitrogen and easily digestible. Dugongs can dig up whole seagrass plants including the roots. They do not favour lush seagrass meadows. Often very little of their preferred food can be seen on the seabed.



Dugong rolling. Image courtesy of Alberto Scarani. Copyright 2007

The largest dugong populations typically occurring in wide, shallow, protected areas such as bays, mangrove channels and the lee sides of large inshore islands where seagrass meadows are abundant. Groups of 10,000 or more are present on the Great Barrier Reef, at Shark Bay in Western Australia, and in Torres Strait.

Dugongs generally surface to breathe after only a few minutes. Dugongs can dive to at least 39 metres but spend most of their time in shallow water, less than 10 metres deep. Their paired nostrils are on the top of the head and have valves to stop water entering when they dive. Dugongs have flippers and tails that resemble those of dolphins, but they lack a dorsal fin. Their ears (which have no flaps or lobes) and eyes are on the side of the head. Dugongs do not see very well but are believed to have acute hearing within narrow sound thresholds. They have sensitive bristles covering their upper lip which they use to find and grasp seagrass. Dugongs grow to three metres long, can weigh up to 400 kg and live for 70 years or longer.

Dugongs have a slow rate of reproduction. Groups of male dugongs follow a female when she is in oestrous ('in heat') and many mate with her, inflicting scars on the female's back, and on each other. Females have their first calf when they are between six and 17 years old and then produce calves only once every 2.55 years. As a result, females give birth only a few times during their life, and invest considerable parental care in their young.



Mother and calf, East Timor. Photo courtesy of Nick Hobgood. Copyright 2005

Dugongs can move large distances, travelling alone or with their calves in search of food. They appear to have a good memory of place because satellite tracking shows that they return hundreds of kilometres to specific locations.

Source: Lawler, I., Marsh, H., McDonald, B. and Stokes, T. (2002) and <http://en.wikipedia.org/wiki/Dugong>

Indonesia

Seagrass meadows in the Pari Islands, Bay of Jakarta

Ichwan Makmur Nasution (Agency for Marine and Fisheries Research
Ministry of Marine Affairs and Fisheries of Indonesia)



Seribu Islands is an archipelago near Jakarta, the Capital of Indonesia. Part of this group includes the Pari Islands, which consist Burung, Tengah, Kongsu, Pari, and Tikus. The Pari Islands are coral cays with shallow and low coasts. Water salinity in this area varies from 27 to 32.75 ‰ and is influenced by tides with daily average of highest tide 1.2m (lowest tide = 0.18m). The islands can be reached from Jakarta in 1-2 hours by boat. Seagrass in these islands has been studied from the 1970s, when Indonesian scientists started to conduct seagrass research.

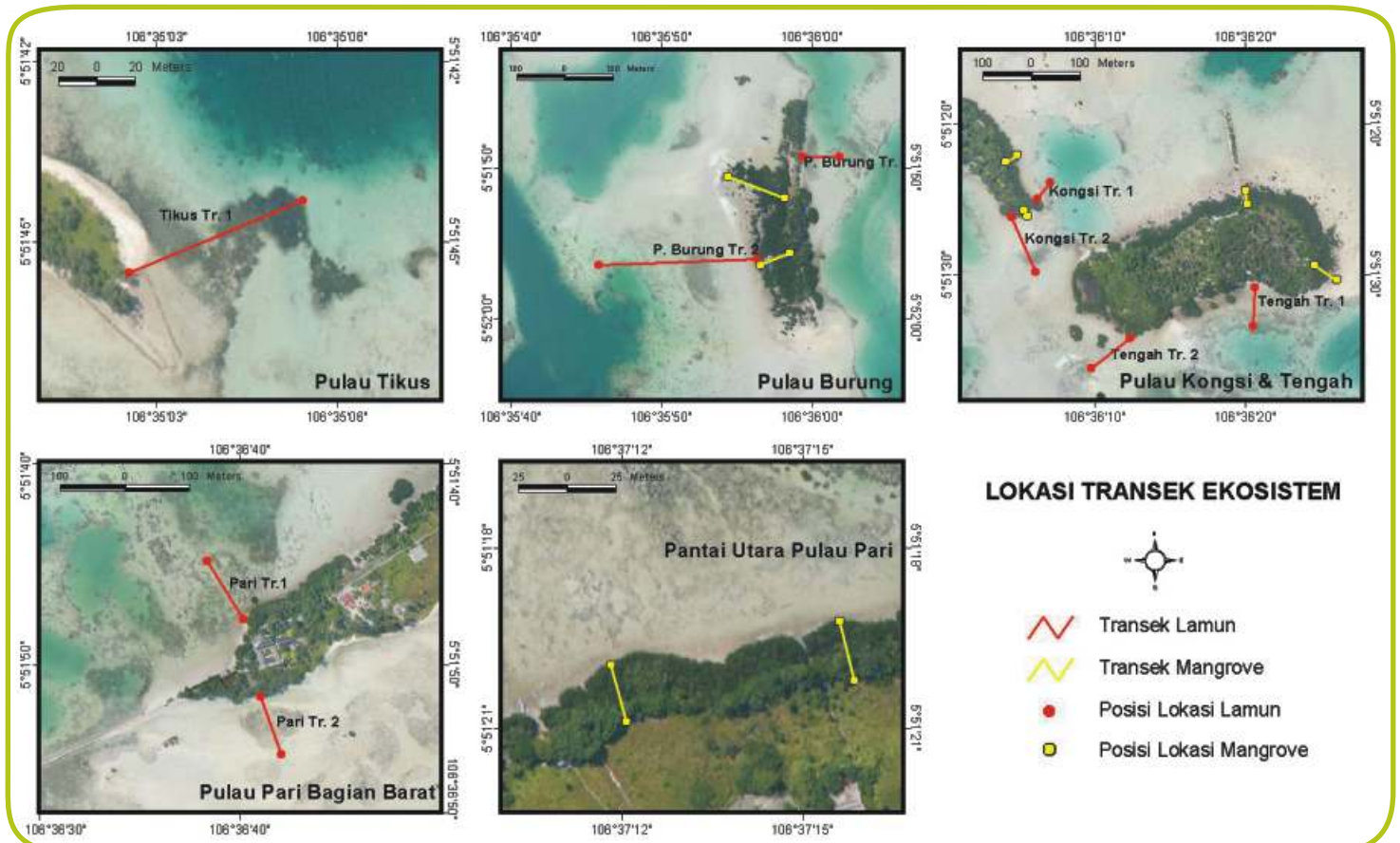
The current survey was conducted in June 2007, at 9 stations on the five major islands.

The stations were chosen based on aerial photography. Using Seagrass-Watch methods, we collected data about seagrass distribution, total cover, species composition, shoot density, and total biomass. Seven species of seagrass were identified, including *Enhalus acoroides*, *Thalassia hemprichii*, *Halodule uninervis*, *Halophila ovalis*, *Syringodium isoetifolium*, *Cymodocea rotundata*, and *Cymodocea serrulata*. Burung Island and Tikus Islands had the highest number of seagrass species (5) and Kongsu island and Tengah island has the lowest (2 species). *E. acoroides* and *T. hemprichii* were the species with the widest distribution in the Pari Islands as they were found at 8 of the 9 stations surveyed. Density of each species varied between stations. *H. pinifolia* has the highest density in the islands (1060 shoots/m² in Tikus island) and *C. rotundata* has the lowest (8 shoots/m² in Pari island). Average of total percent cover of seagrass in the islands varied from 13.5% in Burung islands to 71% in Tikus island. Total seagrass biomass varied from 225.04 in Pari Island to 1126.27 g DWm⁻² in Tikus island.

There are a lot of factors which impacted the condition of seagrass meadows in this area. A lot of pollution occurs in the Bay of Jakarta and by the influence of current and waves, sometimes will carry the pollutants to this area. In the last 10 years, there has been an expansion of extensive seaweed farms in the Pari Islands. These farms are located in the areas where seagrass grow. 🌱



Top: Kongsu Is.
Middle: Running out a transect.
Bottom: *Enhalus* and *H. uninervis* (Tikus Is)

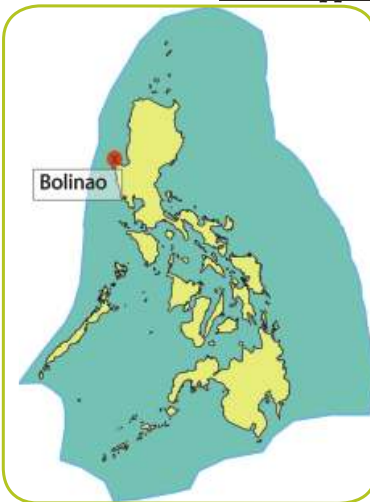


Philippines



Do we have to wait for a catastrophe to realize the economic value of seagrass?

Miguel D. Fortes (Marine Science Institute CS University of the Philippines) reports



On the 27 November 2007, the Indonesian barge, APOL 3003 (92 x 25 m dimension), while being towed from Indonesia to a coal-fired power plant, was hit by typhoon 'Mina' in the vicinity of western Bolinao, Province of Pangasinan, Philippines. Due to strong winds (70-100 km/hr) and big waves (about 5-7 m high), the barge anchor and towing rope broke. The barge was hurled to the reef fronting the shoreline of Barangay Ilog Malino, where

the impact destroyed her metal flat sheet railing cargo fence, spilling 95% of its 8,373 metric tons of its coal cargo. It was estimated the coal spill affected 33 hectares of seagrass in the immediate vicinity.



Indonesian barge, APOL 3003, with its spilled coal cargo (Barangay Ilog Malino)

Our immediate response to the incident was to utilize the learning from the seagrass subcomponent of the UNEP/GEF SCS Project. That gave us a chance to immediately mobilize the Seagrass-Watch volunteers to intensify the monitoring of seagrass permanent sites. Using a combined transect, Seagrass-Watch and photographic protocols, the assessment teams recorded considerable damage to the seagrass ecosystem, ranging from complete burial of healthy meadows to death of fish and benthic invertebrates. Fishers and gleaners livelihoods were negatively affected. The results of the economic valuation of the goods and services coming from the affected area gives the total economic value of the damage at US\$ 80,226.85.

The grounding of the barge affecting such a sizable area of seagrass presents a fortuitous, first-hand direct challenge to the usefulness of the Demonstration Site in Bolinao in particular and

of the UNEP/GEF SCS Project in general. On one hand, it brought to surface the elements in the true valuation of the goods and services of local seagrasses, which were lacking. This hindered considerable efforts on the part of both the local government and the Marine Science Institute to reach a reasonable and realistic total economic value of the resource. In addition, it also brought to fore the glaring inadequacy of the local government to handle such a case. This 'invited' outside vested interests, which complicated the legal settlement process.

On the other hand, the incident is perhaps the most persuasive factor, which for a very short period, convinced the people from all walks of life in Bolinao to truly realize the importance of the 'lowly' seagrass: that this importance can be converted directly to money, big money. With the current agreement of all parties concerned to give the amount due the municipality, more support on the part of the communities and the LGU have been pouring into the implementation of the projected activities of BSDS. This galvanized their voiced commitment to extend the life of the project beyond 2008.

While we all were happily challenged by the incident, it is opening up some old 'wounds' especially among the old politicians in the area. The legal tussle that resulted invited other interest groups to meddle in what should be a purely local affair. The other sectors of government jumped in, but in the long run, not contributing substantially to the resolution of the case.

Unfortunately the incident is likely to happen again. This is because of the increasing intensity and number of typhoons that are known to pass the northern part of the country, hand-in-hand with a similar increase in coal and oil tanker traffic in the western and northwestern part of Bolinao attendant to the enhanced economic partnership between China and the Philippines.

Fortunately, the coal spill gave us the opportunity to further refine our advocacy on seagrass protection and sustainable use. The incident demonstrated the true nature of the integrated approach to seagrass management and protection. 🌱



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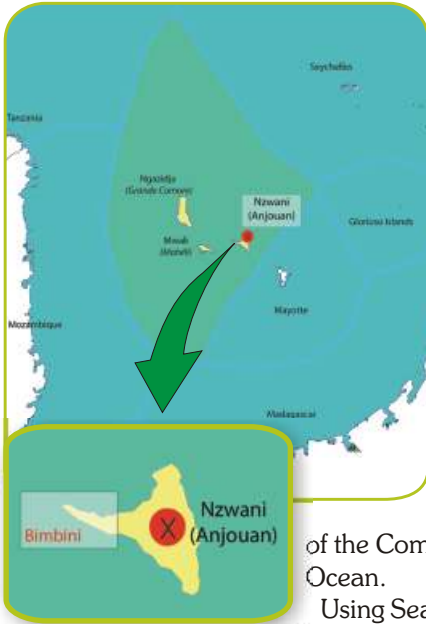


Comoros Islands



Mapping seagrass meadows on the remote Bimbini peninsula of Anjouan Island

Soizic Le Courtois and Daniella Blake report



Exploring the seagrass meadows around a remote peninsula of an island recovering from political turmoil was just part of a challenging expedition conducted by Community Centred Conservation (C3) and local partners in September 2008. This latest expedition was part of C3's ongoing project to map the previously unstudied extensive seagrass meadows on the three islands of the Union of the Comoros in the western Indian Ocean.

Using Seagrass-Watch methods, the C3 team scrambled, waded and climbed along the Bimbini peninsula on the north-west coast of the island of Anjouan through knee-deep mud and fields of sea-urchins. A huge expanse of seagrass, 15 km long and up to a kilometre wide was mapped around the peninsula. Nine species were found: *Thalassia hemprichii* was by far the most common. *Thalassodendron ciliatum*, *Halodule wrightii* and *Halodule uninervis*, *Cymodocea rotundata*, *Cymodocea serrulata* and *Enhalus acoroides* were also regularly observed, but *Halophila ovalis* and *Syringodium isoetifolium* were less common.

This expedition also offered the opportunity to train three members of a local environmental NGO, HTC (Halieutiques-Tourisme-Conservation) in Seagrass-Watch methods. A day was spent out on the peninsula with the three Comorians learning to identify the different species of seagrass and how to conduct surveys using Seagrass-Watch methods. The three students: Anlimouddine Moutouraffi, Andhumaty Omar and Naima Abdallah enjoyed their first experience learning about seagrass.

Unfortunately this biodiversity-rich area, containing nine out of the twelve species of seagrass present in the Indian Ocean, is at threat from pressing environmental problems which include deforestation, clearing of mangroves, daily trampling by seashell and octopus gleaners, coral reef degradation and pollution from household waste dumped into the sea. According to local communities, the knee-deep mud is a recent phenomenon and is probably due to the extensive



Researchers find evidence of Green turtle poaching. Copyright Community Centred Conservation C3

deforestation occurring on the island (Anjouan has lost 73% of its original forest cover).

The Union of the Comoros is situated at the northern end of the Mozambique Channel, equidistant from continental Africa and Madagascar. It comprises three volcanic islands: Grande Comore, Anjouan and Mohéli. The islands

host a number of ecologically important and vulnerable coastal habitats including coral reefs, mangroves and seagrass which support high marine biodiversity. The seagrass meadows of the other two islands of the Union of the Comoros: Grande Comore and Mohéli, have already been mapped by C3 in 2006 and 2007 and the new information from Anjouan will be incorporated into GIS seagrass maps currently being produced by C3 for the whole Union of the Comoros.

This work has been generously funded by the Rufford Small Grants Foundation, SeaWorld & Busch Gardens Conservation Fund and the PADI Foundation. ♡



Red knobbed Starfish (*Protoreaster linckii*). Copyright Community Centred Conservation C3



Local Fishers gathering octopus and shellfish among seagrass at Bimbini. Copyright Community Centred Conservation C3



Anjouan

Anjouan (also known as Ndzواني or Nzwani), population 277,500 (2006) is an autonomous island of the Union of Comoros, located in the Mozambique Channel. The total area of the island is 424 sq. kilometres.

African mainlanders, Creoles, Arabs, Malay-Polynesians, Antalotes and Shirazi Persians make up the population of Anjouan.

The economy of the island is dependent on agriculture and related industries. These industries employ over 80% of the work force. The island's main food staple is rice, most of which must be imported. Anjouan is the world's primary exporter of ylang-ylang oil, an ingredient in almost all perfumes.

Source: <http://en.wikipedia.org/wiki/Anjouan>
image courtesy of Google maps



United States of America

Seagrass restoration underway in the Florida Keys

Seagrass-Recovery reports



In early October, the Restore-A-Scar program launched its first restoration effort at Knight's Key Bank in the NOAA Florida Keys National Marine Sanctuary. The launch began the restoration process of over 4,000 square feet of damaged seagrass to be restored. The ongoing project at this site is taking place as a result of a significant contribution made to The Ocean Foundation's



Seagrass recovery at work, Seven Mile Bridge, Florida Keys
Photo courtesy of Kenny Wright (Seagrass Recovery)



Laying sediment tubes
Photo courtesy of Kenny Wright (Seagrass Recovery)

capital fund raising campaign by ABSOLUT® Vodka. As part of an innovative solution to combat climate change, ABSOLUT® Vodka and The Ocean Foundation have teamed up to restore seagrass meadows in coastal areas around major metropolitan areas.

Launched August 1, 2008, the Restore-A-Scar program is a collaborative effort by The Ocean Foundation and Seagrass Recovery aimed at restoring seagrass scars found off the coasts of Florida,

New York, California and Washington.

The first restoration project is taking place near the famous Seven Mile Bridge in the Florida Keys. On hand were Mark Spalding of The Ocean Foundation, Jeff Beggins and Kenny Wright with Seagrass Recovery, Dave Score and Bill Precht from

NOAA, representatives from the Florida Department of Environmental Protection and Florida Fish and Wildlife Commission, local elected officials, as well as several members of the media.

The Restore-A-Scar program, www.restoreascar.org, uses individual and corporate donations to proactively restore damaged seagrass meadows. To restore the seagrass scars, biodegradable sediment tubes will be placed inside the seagrass scar to halt expansion of the scar and allow seagrass to re-colonize over the injury.

Donations are now being made to support another restoration on Pigeon Key in the Florida Keys National Marine Sanctuary. Please, join the effort today and support seagrass restoration today. ♡



Turbid waters surround southern Florida and the Florida Keys in this true-color Moderate Resolution Imaging Spectroradiometer (MODIS) image taken by the Aqua satellite on December 2, 2003. Clouds of milky blue, green, and tan sediments and microscopic marine organisms (like phytoplankton and algae) discolour the water in the Gulf of Mexico north of the Keys, but end abruptly in the deeper water of the Straits of Florida. The water north of the Keys is relatively shallow, so sediments are a likely cause of the discoloration. Rough waters can churn up the mud from the sea floor, which then clouds the water. But in the deeper water south of the Keys, sediment on the sea floor is much harder to disturb, which keeps the water clearer.

Image courtesy of http://visibleearth.nasa.gov/view_rec.php?id=6108

fragile this ecosystem is. But on the other hand, those same tourists and their activities can hurt the ecosystem by introducing pollutants and causing physical damage to fragile reefs and seagrass.

Florida Keys National Marine Sanctuary (FKNMS)

USA Congress established the FKNMS in November 1990 to protect the region's valuable and unique resources. The sanctuary comprises approximately 9,844 km² of water and submerged lands, including more than 1700 islands of the Florida Keys archipelago. Unique marine environments including the largest contiguous seagrass community in the northern hemisphere and the nation's only coral reef tract that lies adjacent to the continent are present in the FKNMS.

Recognizing the critical role of water quality in maintaining Sanctuary resources, Congress further directed the U.S. Environmental Protection Agency (EPA) and the state of Florida, to develop a Water Quality Protection Program (WQPMP) for the Sanctuary. This is the first such program ever developed for a marine sanctuary. A Seagrass Monitoring Project (SGMP) is a key component of the Program,

The general objective of seagrass monitoring in the FKNMS is to provide high-quality, quantitative data on seagrass status and trends including: distribution, primary production, tissue nutrient availability and water quality relationships. These data are being collected at three different types of sites within the FKNMS.

For more information and results on the monitoring, visit http://ocean.floridamarine.org/fknms_wqpp/

Source: http://en.wikipedia.org/wiki/Florida_Keys, <http://visibleearth.nasa.gov/>, <http://floridakeys.noaa.gov/>



Papua New Guinea



Marine conservation and management training



In late October 2008, Len McKenzie (Seagrass-Watch HQ) visited Motupore Island, near Port Moresby (Papua New Guinea) to conduct a Seagrass-Watch training exercise as one of the components of the resurrected University of Papua New Guinea (UPNG) marine

conservation and management training course (see also issue 25).

Thirty participants from throughout Papua New Guinea attended, including 3rd and 4th year UPNG students and representatives from various non government organisations.



Representatives from the local Motuan community also attended as they were keen to learn about the ecosystems and resources of Bootless Inlet (Bay) to develop a management plan.

The training was held at the Motupore Island Research Centre and facilitated by Ursula Kolkolo and Rickson Lis, with financial support from the David and Lucile Packard Foundation.

As part of the training, participants learnt seagrass identification, seagrass biology, why seagrasses are important and how they are threatened globally, how to monitor and map seagrass meadows, and how to manage the threats that continue to impact seagrass and marine ecosystems.



Although the training got off to a bit of a rocky start with the station generators breaking down, Len was able

to quickly adapt and participants spent a busy afternoon collecting and identifying seagrass and making fresh press specimens. Although some participants at first confused a few macro-algae with seagrass, they soon could successfully identify

the five species found around the island which were added to the MIRC seagrass herbarium.

With the generators still out of operation on day 2, seagrass biology lectures were quickly moved to the MIRC workshop at Tahira on the mainland. In the afternoon students, learnt about Global Positioning Systems and then after breaking into teams they practised their skills by competing in a "treasure" hunt.

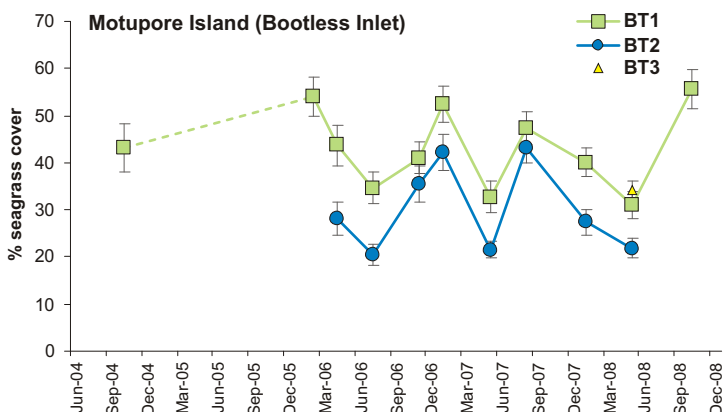
With the power restored on day 3, it was an exhausting morning of presentations and then an afternoon monitoring BT1, one of the long-term monitoring sites established in Bootless Inlet. That evening after entering the data the students compared their findings with previous years.

All participants enjoyed the 3 day course and many commented that they did not realize the importance of seagrass meadows; vowing that on returning to their local regions, they would endeavour to impart their knowledge to the local communities to help support seagrass and marine conservation. You can read their feedback comments on the Seagrass-Watch website at www.seagrasswatch.org.

MIRC has received 2 years of funding from the David and Lucile Packard Foundation to help run the courses in 2008/09. The 2009 course will hopefully include a longer seagrass component which will include seagrass productivity experiments and a few other exciting initiatives. 🌱



Sampling Motupore Island, Bootless Inlet



The Motuans



The Motuans are native inhabitants of Papua New Guinea, living along the southern coastal area of the country. The Motu were seagoing people and their impressive boats, called lakatois and up to 15m long, were capable of carrying a large cargo and crew. Their indigenous language is known as Motu, and they are believed to be the descendants of Polynesian immigrants who intermarried with the native Melanesians of the area.

Most Motuans live in houses built on stilts over the sea. They are the original inhabitants and owners of the land on which Port Moresby - the national capital city of Papua New Guinea - stands. Motupore Island is a protected archaeological site and believed to be the location of the original Motuan village.



Team
SeaGrass

The Year that Was....

Siti Maryam Yaakub reports



It's that time of year again, when we take stock of the year that has been and make plans for the year to come. Here at TeamSeagrass, the plans for next year's monitoring are all ready and laid out, and if the past two years are anything to go by, 2009 will be just as awesome if not more so.

A lot has transpired in the two years we've been monitoring, and we've decided that there's no better way to remember those quirky and fun moments than to do it Oscar-style. Roll out the red carpet and drumroll please!



Chek Jawa, a treasure trove that supports a rich variety of life on it's shores

Fastest Site to Monitor Award:

Chek Jawa Site 2

Yes, it's a bit of a walk from our entry point, but because the dominant species is *Halophila ovalis*, you can't really go wrong with this one. Great site to break in the newbies with, one volunteer commented that he can do it blindfolded - we haven't

actually tried this, but CJ2 is great because it leaves plenty of time for us to explore when the work is done.

The Site Nobody wants to be Assigned to Award:

Pulau Semakau Site 2

Ahhh what can we say, Pulau Semakau is challenging enough as it is, but throw in knee deep water, soft substrates and *Thalassia* and *Cymodocea* that insist on looking like each other and you get a recipe for disaster. There's a running joke that we only

assign the taller volunteers to PS2, because at least some part of them will still be visible if they sink into the mud. But it's not a discriminatory thing, we swear!



Nor Aishah toughs it out after a stingray injury

Toughest Seagrasser Award:

Nor Aishah and the hole in her foot

You have to be tough as nails to go through the rigours of being a TeamSeagrass volunteer (OK not really) but every once in awhile, mother nature throws

you a curve ball. Our tough as nails award goes to Nor Aishah, who after being stung by a stingray on Pulau Semakau, decided she was fine enough to wait for us to complete our session and even put off going to the emergency room in favour of getting some dinner!

Best Boatman Award:

Melvin his crew of merry (and now probably weary) men

Here at TeamSeagrass, we've been turned down a couple of times by different boat companies who want to keep their boat propellers intact (and justly so I guess).

That is until we met Melvin and his crew who seem game for anything. And the best thing is, he has acquired a new boat and it's name says it all....



Melvin and his 'can do' boat, "No Problem"

The "We woke up early for this?!" Award:

Semakau August 2008

We met at 4:30 AM only to wait in the dark because we couldn't locate our site. Yes, daylight is your best friend!



The intrepid TeamSeagrass monitor Semakau in the early hours of the morning.

The Wonky Tides Award: Sentosa

Every year, we at TeamSeagrass purchase our oracle, the repository of all knowledge, the tide tables for the year. We sit around in feverish anticipation and pore over the entire book to plan our trips for the entire year; so that it is cast in stone and written in the blood of sacrificial sheep. But as some wise old guy once said, even the best laid plans go awry. These words never wrung so true in the case of Sentosa when we waited... and waited... and waited but the tides never went below the predicted level. But hey, even Oracles have off days right?

Most priceless TeamSeagrass Moment Award:

Mud Crawl at Chek Jawa, House 1

Words can't describe it, there's a video somewhere of a bunch of us crawling on hands and knees through some really really soft mud that just kept sinking. There was a lot of yelling and needless to say expletives. We ended up looking like Swamp Thing, but we were just happy to be alive :)

Funniest Gullible Moment Award:

Jerald and the Jumping Crab

I told Jerald that the crab was a jumping one and he believed me. 'Nuff said!

So those are the moments that stick out in our minds, but there are many more that we haven't shared. We're sure that 2009 will be a blast, make sure you read our blog (teamseagrass.blogspot.com) to see what we're up to! Happy Holidays everybody! TeamSeagrass, signing out! 🌱



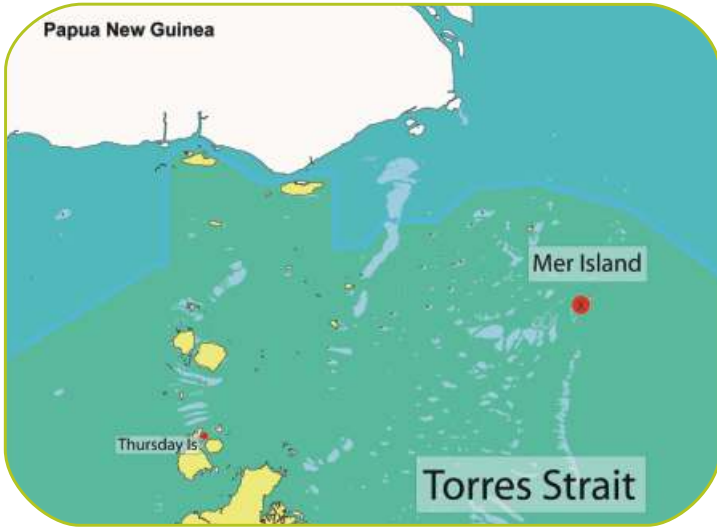
Images courtesy of Ria Tan

WILD SINGAPORE
www.wildsingapore.com



Mer Island Seagrass-Watch

Jane Mellors reports

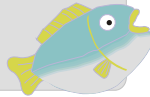


As part of the feasibility study for monitoring seagrass habitats on Mer and Mabiliaug Islands, Seagrass-Watch HQ, Frank Loban (TSRA) and several members of the Tagai College Secondary Campus Seagrass-Watch team visited Mer Island (the most eastern populated island of the Torres Straits). The team met with the island councillor Mr Day, and discussed the intent of Seagrass-Watch and gave presentations at the State School and the community Hall.

Presentations at the school, on seagrass biology, ecology and monitoring, were followed by badge making and magic tricks by Mr Magic himself Andrew Denzin. The presentation to the community was received well with lots of questions relating to Climate Change and seagrass communities. Moses Walu, the Dugong & Turtle Project Officer, has even located a site that he feels should be monitored. Unfortunately due to neap tides and



Community talk



Any Questions?

front, we didn't venture into the water to check out the seagrass. All in all, it was a successful trip, with teachers and community members expressing interest in joining the program. The logistics of monitoring at this remote location due to a lack of commuter flights within the Torres Strait need to be assessed.



Students colouring badges

Look at our badges!!



Mer Island is a small island of volcanic origin, populated by the Melanesian Meriam people (pop. 450) and situated in the eastern section of Torres Strait, near the Great Barrier Reef.

The island rises to a plateau 80m above sea level. The highest point of the island is the 230 metre Gelam Paser, the western end of the volcano crater.

The people of Mer speak Torres Strait Creole and Meriam. English is a second language.

Mer Island's most famous resident was trade unionist Eddie Mabo, whose decision to sue the Queensland government in order to secure ownership of his land, which had been removed from his ancestors by the English colonial powers using the *terra nullius* legal concept, ultimately led to the High Court of Australia, on appeal from the Supreme Court of the State of Queensland, issue the "Mabo decision" to finally recognise Mabo's rights on his land on 3 June 1992. Mabo himself died a few months before the decision.



http://en.wikipedia.org/wiki/Mer_Island



Animal Facts

photo courtesy Jan Derk

Rays

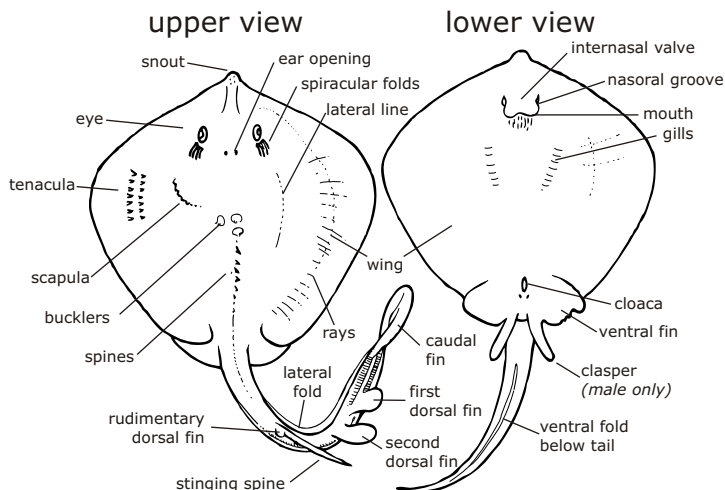
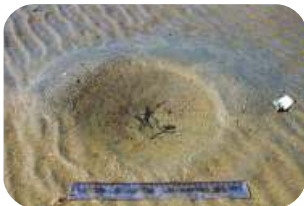
by Helen Taylor & Len McKenzie

Have you ever wondered what causes the pits/excavations on sandbanks and sometimes within the seagrass meadows? Well, some of these pits are caused by rays feeding.

Rays are a type of flattened fish and are closely related to sharks. Rays belong to the group of fishes called Elasmobranchii, which also includes the sharks, skates, and ratfish. Rays are thought to have evolved from sharks. Unlike other fish, the Elasmobranchii are all fish that have no bones; their skeleton is made of cartilage, which is a tough, fibrous substance, not nearly as hard as bone.



Sting ray feeding pits at low tide



Blue bottled ray (*Taeniura lymma*)
Great Barrier Reef, Cairns, Australia.
Photo courtesy of Leonard Low

Rays have a flattened body shape and an elongated tail. Even the ray's skull is flattened. The eyes and spiracles are located on top of the head. The pectoral fins are large and connected to the body to form the ray's "disc." The shape of the disc differs from species to species and may be circular, oval, wedge-shaped or triangular. Some body shapes are

adapted for living on the sea bed; others are adapted for almost constant swimming. Rays can range in size from about 10cm to nearly 7m across. The biggest ray is the manta ray.

There are about 500 different living species of rays and skates world-wide, which are divided into 19 families. These different families of rays are very different in the way they look, live, and hunt. They have different shapes, sizes, colour, fins, teeth, habitat, diet, method of reproduction, and other attributes. Rays occupy a range of marine and freshwater habitats, but are predominantly reported over soft-sediment environments including mudflats, sandflats and seagrass meadows.

Rays swim very differently than other fish. They are propelled

through the water with their powerful, wing-like pectoral fins which ripple and flap. Their large pectoral fins also let them glide through the water. Some rays can even jump above the water. Many species of rays are coated with a slimy mucous which reduces the surface tension and drag of the water and increases swimming speed.

Like sharks, rays lack a swim bladder and use their oily liver to maintain buoyancy (other fish use an air-filled bladder to help them float). When a ray stops swimming, it sinks down to the sea bed.

Some rays are oviparous (laying eggs) while others reproduce via aplacental viviparity (giving birth to live young that develop in the womb without a placenta). Fertilisation of eggs is accomplished by a pair of claspers of the male, which are modifications of the pelvic fin used for transferring sperm to the female. Rays and skates have a long gestation period and produce relatively few young (compared to other fish). The growth of ray populations, therefore, is slow.

Rays are extremely efficient predators, using a combination of sophisticated sensory systems to locate hidden prey. At close range, rays use a combination of vision and touch (mechanoreception) as well as electroreception to detect the small electric fields emanating from their prey. Their lateral line system, which is sensitive to vibrations and pressure changes, is used mainly for detecting prey over small distances. The sense of smell in rays is not quite as good as their shark cousins, however can still be used as a useful tool to detect prey over larger distances.

Rays mostly hunt on or near the bottom of the ocean. Some rays are active hunters. Rays do not have the typical pointy teeth seen in sharks, instead they have grinding, molariform teeth which form plates inside their mouths. Rays vary in their diets, but they are all carnivores. They feed primarily on small benthic infauna, typically molluscs, polychaetes, crustaceans, echinoderms and teleosts, often excavating the sediment to reach their target, leaving behind distinctive 'ray pits'.

Rays form pits by flapping their wings and jetting water through the modified gill opening (the spiracle) behind their eye and out through its gills on the under-surface of its body. This hydraulically mines the sediment, uncovers the prey and leaves a round or elliptical shaped pit that is characterised by a low sand ridge formed at the rear end of

the animal. Depending on environmental conditions, ray pits can be seen in the intertidal sediment for many days after feeding. In Spain, what was originally thought to be dinosaur tracks have actually been identified as rays pits from the Upper Cretaceous.

The impacts of stingray foraging in seagrass meadows if generally minor, however sometimes they can be significant. In early 2007 it was reported that foraging from cownose rays was destroying seagrass meadows along the east coast of the United States of America. The rays were digging up the seagrass looking for scallops and other shellfish.

Continued over ▶



Above: Sting ray feeding
Below: Ray feeding pits



Seagrass News

◀ RAYS.. continued from page 23...

Cownose rays are reported to have increased 20-fold since 1970 as a direct consequence of overfishing of large sharks (the rays main predator).

However, some scientists have considered that foraging by rays may increase seagrass seedling recruitment because seeds may accumulate in the ray pits. A study in the intertidal seagrass meadows at Shelley Beach (Townsville) in July 1997 found that foraging by stingrays had negligible impacts on *H. uninervis* seed abundance. In that study, they reported there was around one stingray pit every 7m².

A group or collection of rays in commonly referred to as a "fever" of rays!

Rays have a high ratio of brain weight to body weight; they are probably very intelligent, even smarter than sharks. They are known to be very curious animals, often approaching a diver and simply observing the intruder.

Rays defend themselves from predators in many ways. Some use a whip-like tail to lacerate an enemy, electrical rays give electrical shocks (up to 200 volts), and some have series of hard, bony spines on their body that puncture their victims. Camouflage on the sea bed is probably among their best defences.

Some rays can cause minor injuries to humans, but these are rarely serious. Many have a barbed, venomous stinging spine on the tail which rays use as a defence mechanism against predators. Despite media hype after the much publicised tragic death of Steve Irwin, rays are not naturally aggressive animals. When startled or threatened, rays can use their long stinging spines to inflict deep wounds. The toxin of all rays is a large, water-soluble protein that is destroyed by heat. In the event of an injury the wound site should be immersed in hot water (as hot as can be withstood) to alleviate the pain and medical treatment should be sort to ensure that the wound is flushed of the toxin.

So next time you're out monitoring and walking across the sand banks, keep an eye out for the ray pits and be ever vigilant of these fascinating fish. ♡

Seagrass-Watch training workshops

Cape York (Qld, Australia)
9 - 10 March 2009

Whitsundays (Qld, Australia)
4 - 5 April 2009

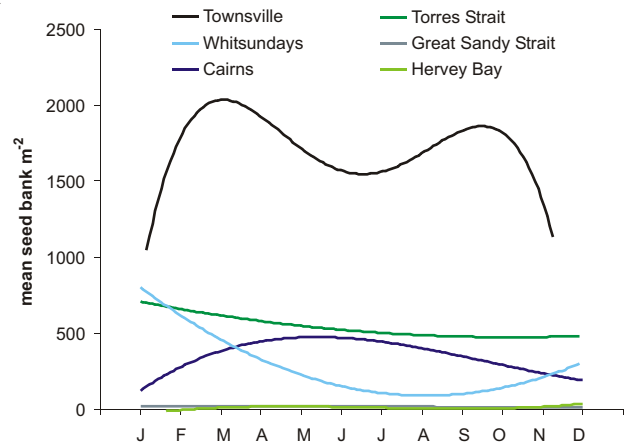
Singapore
2 - 3 May 2009

Bali (Indonesia)
9 - 10 May 2009

Register at <http://www.seagrasswatch.org/training.html>
or contact hq@seagrasswatch.org

◀ SEEDS.. continued from page 9..

Along the east coast of Queensland, *Halodule uninervis* seed banks are generally more prevalent early in the year (post Monsoon) and germination (half seeds) more abundant in spring/late Dry (Sep-Nov) (all years pooled). However, in Townsville, the seed banks appear bi-modal with peaks in March and October. Why this pattern occurs is uncertain, and research currently underway at James Cook University will hopefully help to provide an answer.



Seed monitoring occurs at many locations outside the east coast of Queensland. In the Gulf of Carpentaria (western Queensland), seed banks are slightly smaller at Napranum (Munding) and Ganthaawu (Mornington Island) (approximately 126 and 19 seeds/fruits per m² respectively).

But large seed banks are not restricted to Queensland. Large seeds banks have also been reported from Seagrass-Watch sites in Fiji, in particular Cawaci and Tagaqe (approximately 526 and 238 seeds/fruits per m² respectively). This suggests that *Halodule* meadows throughout the western Pacific are to some extent resilient to disturbance. ♡



Germinating seed, courtesy M. Waycott.

Related to the seed monitoring are investigations on the role dugongs might have dispersing seagrass seeds, helping to ensure meadows recover and genetic exchange. In 2002 (Issue 15) Michelle updated participants on the research her JCU team was conducting by examining dugong "poo" collected by Seagrass-Watch participants.

They found that seeds in dugong poo related to the meadows the dugongs grazed and the time of year. For example, *Zostera* seeds were dominant among the poo samples in November and *Halodule* seeds were found in June.

The research confirmed that seeds eaten by dugongs make it through the gut. Microscopic examination of the seeds from poo samples revealed that 43% of seeds were intact and the embryo inside the seed coat appeared healthy. However, whether the seeds would germinate is another project which Michelle is still keen to investigate.



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