

# Seagrasses around Lampi and neighbouring islands of the Mergui Archipelago

## Abstract

Six species of seagrass were found around Lampi and neighbouring islands of the Mergui Archipelago. Those species were *Cymodocea rotundata*, *Cymodocea serrulata*, *Thalassia hemprichii*, *Halophila ovalis*, *Enhalus acoroides*, and *Halodule uninervis*. The latter occurred in both narrow and broad-leaved forms. *C. rotundata* and *T. hemprichii* were the dominant species. Meadows occurred on the east coasts of islands on flats inshore of coral reefs. Only *Enhalus acoroides* did not occur on reef flats. Dugong feeding trails were found in dense *H. ovalis* in one meadow at Lampi Island, and is the first concrete evidence of the occurrence of Dugongs in the Mergui Archipelago. That meadow was estimated to have an area of 28 ha. Reef associated seagrass meadows are biodiverse habitats, markedly different from the coastal meadows of the region, and in urgent need of protection.

## Introduction

The waters around Lampi Island, and associated islands of the Mergui Archipelago, are known to support a diversity of tropical marine habitats, including coral reefs and mangroves. However, anecdotal evidence suggested that seagrasses were not particularly common in the area. Nor was there much published evidence of seagrasses there (Soe-Htun et al. 2001). Seagrass is important as food for dugongs (*Dugong dugon*) and green turtles (*Chelonia mydas*), both of which are considered endangered, and are the object of considerable conservation efforts. Seagrass meadows are also important habitat for fish, and invertebrate species that are exploited by local fishermen. Seagrass meadows are one of the world's most productive habitats. A study of the economic value of ecosystem services provided by various habitat types (Costanza et al. 1997) found that seagrass meadows are more valuable per hectare than mangroves or coral reefs. To assess the importance of seagrasses in the Lampi area, it was first necessary to record the occurrence of the species and to map the location of any meadows.

## Methods

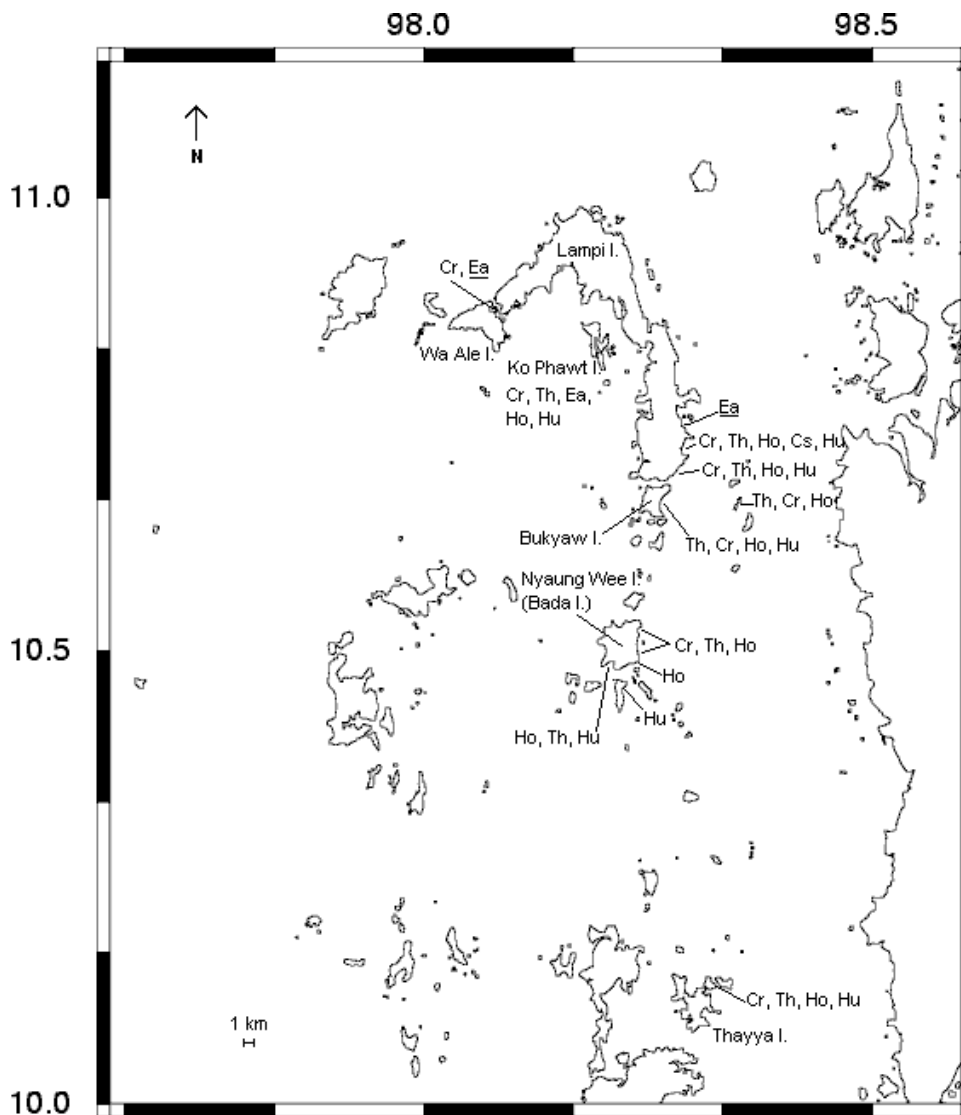
The location and species composition of seagrass meadows were recorded during four trips to the Mergui Archipelago by the Sea Nomad, in the months January through April, 2008. The Sea Nomad sailed around Lampi island, the largest island in the area; and the associated islands of Wa Ale, the Ko Phwat Island group, and Bukyaw. Other islands have been included along the southern approach to Lampi, such as Nyuang Wee (Bada), Pya Gyi (Pine), and Thayya. Sites were examined, when time and access permitted, where it was thought that seagrasses might occur. They were examined by foot at low tide, or by kayak and snorkeling over shallow water. All the sites were intertidal, but included the upper reaches of the subtidal zone. When ever seagrasses were encountered, specimens were taken and identified to species, following Waycott et al (2004). The location of the site was recorded, and later entered on maps of the area. It was not possible to examined all possible sites on the coast of Lampi and neighbouring islands. However, a large number of sites were examined, and it became possible to characterize the seagrass habitats typical of the area. Unexplored sites that are most likely to support seagrass were identified, so that they may be investigated in future trips.

The area of one meadow in a bay on the east coast of Lampi Island was estimated. That meadow was one of the largest, but also the most ecologically significant in the area. Locations around the meadow were determined at regular intervals using GPS (Global Positioning System) while walking the complete perimeter. Those positions were entered into a table and plotted in Excel. That plot was then pasted into Paint, where the points were connected and the area representing the meadow blackened in. That image was then entered into Scion Image, an image analysis program. The area representing the meadow was calculated with the scale set so that 0.1 minute of latitude or longitude in the plot represented approximately 183 m on the ground, which is the approximate relationship calculated for 10° latitude.

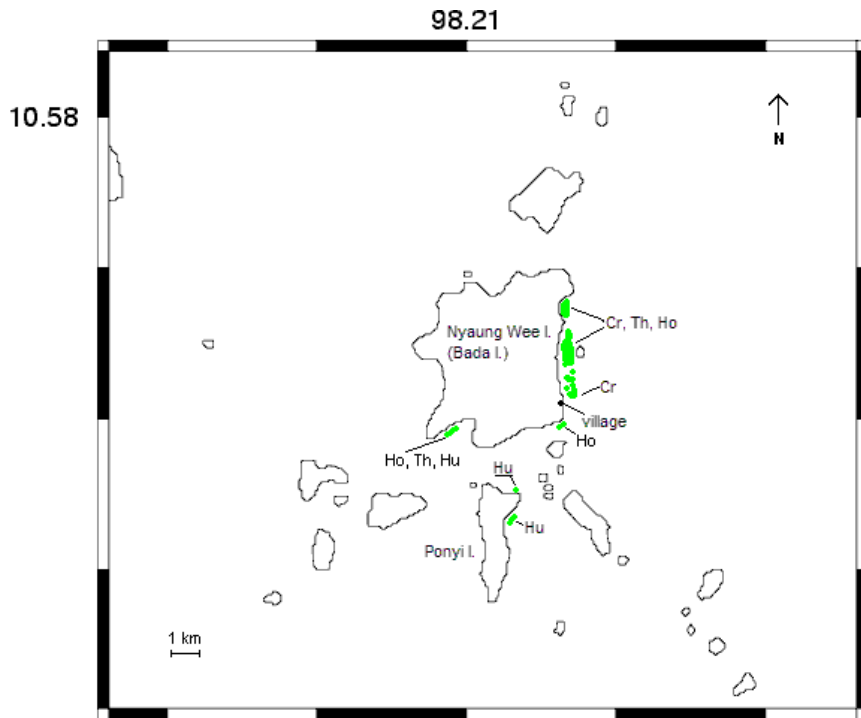
## Results

Six seagrass species were recorded. The dominant species at most sites was either *Cymodocea rotundata* or *Thalassia hemprichii* (Fig. 1). *Halophila ovalis*, a small round-leaved species, occurred commonly among the sites; but was rarely dominant,

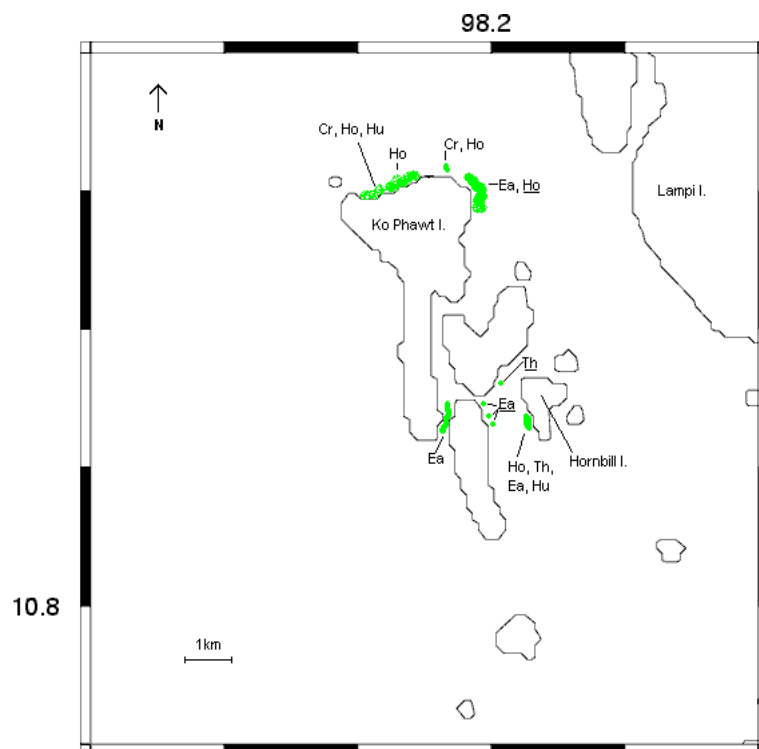
and usually did not form a dense turf. *Halodule uninervis* was also widespread, but usually not dominant. It occurred in both broad-leaved and narrow-leaved forms. Very narrow-leaved forms with rounded leaf tips have previously been identified as *Halodule pinifolia*, but that name is not clearly recognized (Waycott et al. 2004), and has not been used here. The narrow-leaved morph of *H. uninervis* was the only seagrass at the sites on Ponyi Island (Fig. 2). *Enhalus acoroides* was common around the Ko Phawt Island group (Fig. 3), but elsewhere was found only as isolated single clumps. *Cymodocea serrulata* was the rarest species in the area, as it was recorded at only one site on the east of Lampi Island (Fig. 4).



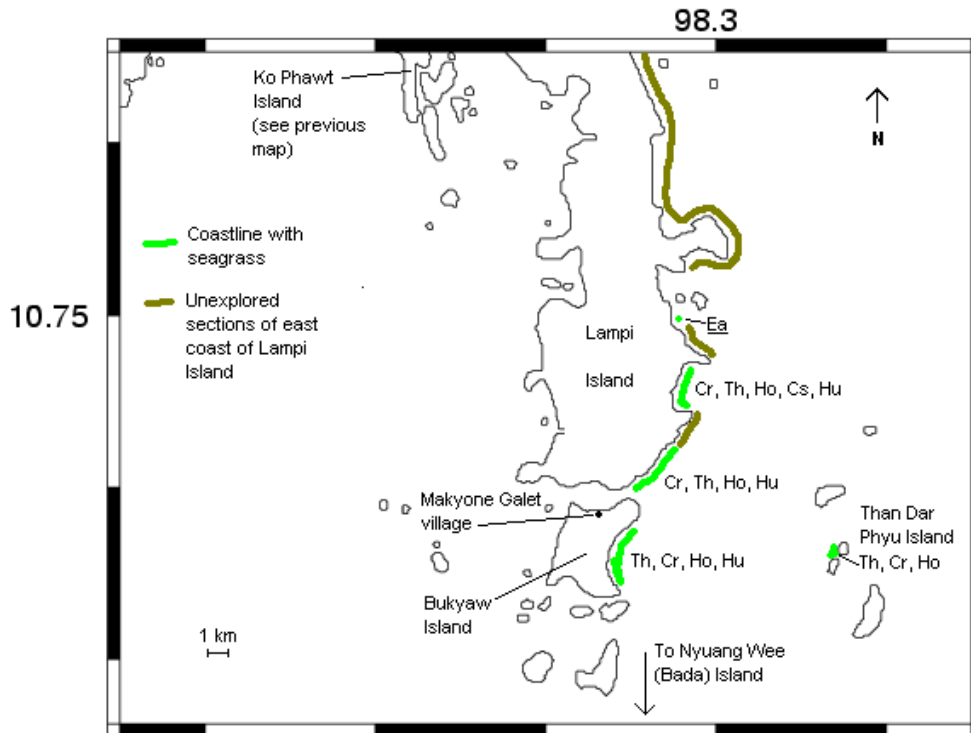
**Fig. 1** Distribution of seagrass species around Lampi and neighbouring Islands. Species names are abbreviated as Cr=*Cymodocea rotundata*, Cs=*Cymodocea serrulata*, Ea=*Enhalus acoroides*, Ho=*Halophila ovalis*, Hu=*Halodule uninervis*, and Th=*Thalassia hemprichii*. Underlined abbreviations indicate a small patch covering an area less than approximately 5 m<sup>2</sup>. Abbreviations are ordered according to their approximate relative abundance at the site.



**Fig. 2** Details of the distribution of seagrass meadows and species around Nyaung Wee (Bada) Island. Abbreviations as in Fig. 1.



**Fig. 3** Details of the distribution of seagrass meadows and species around the Ko Phawt island group. Abbreviations as in Fig. 1.



**Fig. 4 Details of the distribution of seagrass meadows and species around southern Lampi and Bukyaw islands. Abbreviations as in Fig. 1. Also shown are sections of the eastern shore of Lampi Island which have never been searched for seagrass.**

Seagrass meadows were always found on the east side of islands or points of land. There, they are sheltered from the southwest monsoon, which brings the strongest storms of the year across the Andaman Sea during May to September. During other times of the year, winds are milder, and tend to come from the northeast. The largest seagrass meadows occurred on the east sides of Nyuang Wee (Bada), Bukyaw, and Lampi islands, where there are coral reefs which form a partial barrier to waves from the east. Behind those reefs there are flats that gently slope to sandy beaches, so that the seagrass occurs in an intertidal band between the reef and the beach. On the outer edge of the meadows, toward the reefs, the seagrass is less dense, and is scattered amongst coral rubble, macrophytic algae, and patches of bare sand. Toward the beach, the seagrass becomes denser, and there is often a sharply defined border between the meadow and the bare sand of the beach.

The largest continuous area of seagrass seen was along the east coast of Nyuang Wee (Bada) Island. However, the most ecologically significant meadow was in a wide bay on the east side of Lampi. It was the only meadow where dugong feeding trails were

found and photographed (Fig. 5). The trails were in an area of dense *Halophila ovalis*. That meadow also supported the greatest number of seagrass species, and had the densest population of the sea cucumber *Holothuria scabra*. The area of that meadow was estimated to be 28 ha. It curved around the bay in a narrow band 2.5 km long.



**Fig. 5 Dugong feeding trail through a patch of *Halophila ovalis* at Lampi Island, March 2008 (photo by U Tint Tun).**

## **Discussion**

During the trips of the Sea Nomad, more seagrass was found than had been initially anticipated. Although seagrass is absent from the west coast of Lampi and neighbouring islands, it is common on the lesser-known eastern shores. Its absence from the west likely reflects exposure to the southwest monsoon. The large meadows on the east are associated with barrier reefs. In other studies, seagrass has sometimes been associated with mangroves (e.g. in Thailand, Poovachiranon and Chansang 1994). That is not the case in the Lampi area, where exploration of areas with mangroves has never found seagrasses. The seagrass meadows in the Lampi area are characteristic of the ‘reef’ habitat type, that was one of four seagrass habitat types in northeastern Australia described by Carruthers et al (2002). Reef associated meadows are considered to be highly biodiverse, and sometimes highly productive, although limited by low nutrient availability. In the Lampi area, meadows are less likely to be

nutrient limited than those found on Australian reefs, because Lampi is close to a continental shoreline that receives high annual rainfalls and nutrient inputs from large river systems.

There appear to be distinct differences between the seagrass communities found in the Lampi area and those previously recorded from Myanmar. Previous collections have come mostly from coastal habitats in Rakine (Soe-Htun et al. 2001). Seagrasses are unknown in the Ayeyawady delta region. The commonest species in the Lampi area, *Cymodocea rotundata*, has not been recorded on the Rakine coast. In contrast, the rarest species in the Lampi area, *Cymodocea serrulata*, is a dominant species there (Soe-Htun et al. 2001). *Thalassia hemprichii* has never been recorded before in Myanmar, although it is a dominant species in the Lampi area. It is an important food of green turtles. Hence, its common name of turtlegrass. It is a species which appears to be particularly well adapted to reef flat habitats (Stapel et al. 1997). Within the reef flat habitat, seagrass biomass tends to increase as one moves away from the reef edge and up the slope of the flat, until it becomes too exposed, probably at about the point of lowest water during neap tides. The reduced amount of seagrass immediately adjacent to reefs is believed to be due to the foraging active of reef associated fishes, such as parrot fish (Randall 1965).

Of the six species recorded in this study, only *Ehalus acoroides* was absent from the reef flat habitat. It is the largest species, and appears to be very intolerant of desiccation. It was usually found rooted in deeper water where its leaves remained floating during the lowest tides. However, it appears to be more tolerant of turbid conditions. One significant patch occurred in a muddy channel draining a mangrove area at Ko Phwat village where fishermen anchored their boats.

The recording of dugong feeding trails is the first concrete evidence of the existence of dugongs in the Mergui Archipelago. The feeding trails were found on in an area of a meadow at Lampi where there was a dense turf-like growth of *Halophila ovalis*. That species is the preferred food of dugongs (Preen 1995), which feeds on its roots, and so produces distinctive feeding scars in the meadow. U Tint Tun also recorded some evidence of the existence of dugongs in the area during interviews with local people. Dugongs are known to occur on the Rakine coast, and in neighbouring areas

of Thailand (Hines et al. 2005), but are rare and endangered throughout the region. The number and size of the meadows we observed in the Mergui Archipelago suggest that there is enough seagrass in the area to support a small population of dugongs. Individual meadows are small however, as they occupy a thin coastal strip behind coral barrier reefs. In contrast, the coastal meadows that support dugong populations in Thailand cover areas of several km<sup>2</sup> (Chansang and Poovachiranon 1994)

The meadow on Lampi where the dugong feeding trails were recorded was also the meadow with the highest density of the sea cucumber *Holothuria scabra*. That species is strongly associated with seagrass, as its larvae preferentially settle on seagrass leaves (Mercier et al. 2000). It is the most valuable of the sea cucumbers collected in the area. It was never observed in the seagrass meadows at Nyuang Wee (Bada), and only one small individual was observed in the meadow at Bukyaw. In contrast, large individual *H. scabra* were easily found in the meadows on Lampi. The difference is likely because the previous islands support villages, and the meadows are easily accessible to local populations during low tide. There are no human populations on the east coast of Lampi, and the meadows must be approached by boat.

## **Conclusions**

There are likely to be other undiscovered seagrass meadows in the Lampi area. On the eastern coasts of any island where there is an outer reef there is the possibility of seagrass. Conditions like that occur around a number of small islands, but the amount of seagrass there is likely to be small. More important is the east coast of Lampi itself. There are several areas on the coast of Lampi which need to be explored for evidence of seagrass and dugong feeding.

The seagrass meadows on the southeast coast of Lampi Island represent a unique reef associated habitat, that differs from meadows in coastal habitats. Reef associated habitats have high biodiversity, and their isolation provides some protection from overexploitation of their resources, e.g. sea cucumbers. Lampi Island is the only location in the Mergui Archipelago proven to be used by dugong, a rare and endangered charismatic species. It is in an area already designated as a national park, and needs to be actively conserved and protected from future exploitation.

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