

Sea stars and feather stars are commonly found in seagrass beds.



STATE OF OUR OCEANS

SEAGRASS – IS OUR IGNORANCE TOWARD THIS FORM OF MARINE LIFE THE BIGGEST THREAT TO OCEAN BIODIVERSITY? JILLIAN OOI EXPLORES THE IMPORTANCE OF SEAGRASS.

“What are you studying?” the petite and very intelligent-looking MD asked me as she peered down my right ear.

“Seagrass”, I reply.

“Can you eat it?”

“No”

“Well then, what’s the point?”

No point indeed, if you were allergic to seafood, were unaware of the millions of people whose livelihoods depend on fisheries, and had no desire to dive into a shimmering shoal of fish which owe their existence in no small part to these verdant underwater seagrass meadows. The conversation above is one that gets repeated every time the subject of my work comes up, albeit with variations, reflecting how little the public know about this marine flora. On June 8th, we celebrate World Oceans Day. It is a suitable time for us to remind ourselves about the seagrass habitats that line our shores because very often, they go unnoticed and as a result, are undergoing a silent but rapid decline.

WHAT IS SEAGRASS?

Seagrass (rumput laut) are marine plants that spend much of their lifecycle submerged in seawater and very often grow in or adjacent to coral reefs around the islands of Malaysia. They often get confused with seaweeds (rumpair laut) but are very different forms. Seaweeds come from a much more ancient line of organisms, while seagrasses are fairly young. Some think they evolved less than a million years ago from land plants and aquatic plants. I have spent many amusing moments witnessing scientists trying to explain the difference to people who absolutely cannot tell them apart. A tip is

to look for flowers or fruits, first. Seagrasses are the only marine plants to produce flowers and fruits for reproduction (seaweeds produce spores), but if these aren’t evident, then take a look at the roots. If you see obvious roots (at least 3 cm long), then you’ve got yourself a seagrass. One thing to note about the flowers is that they are neither large and colorful nor aromatic in the way flowers of land plants are. On land, colour and smell serve to attract pollinators such as birds and bees but since seagrasses aren’t pollinated by animals or insects, they have had no need to develop these attributes. Therefore, seagrass flowers are small and humble (except for *Enhalus acoroides* which produces flower pods that look like an Alien Queen’s evil spawn!).

They grow in a variety of forms, with leaves that are strap-shaped much like the grasses that grow on land (*Thalassia*, *Enhalus*, *Cymodocea*, *Halodule*); leaves that are slender and cylindrical in shape like straw (*Syringodium*) or leaves that are oval or spoon-shaped (*Halophila*). The largest seagrass species in Malaysia is *Enhalus acoroides*, which stretches up to a meter in length or more. In contrast, the smallest form is *Halophila*, also known as spoon grass and paddle grass in some countries. This form stands at a height of mere centimeters from the sediment surface.

There are around 60 species of seagrasses worldwide with 15 of those occurring around our shores. This makes Malaysia a seagrass hotspot and indeed, Malaysia lies within the famed Coral Triangle, the richest place in our world in terms of marine biodiversity. Here, corals, seagrasses, mangroves, and a dazzling array and abundance of fish, mollusks, crustaceans, and many other types of organisms exist in what has been called an “evolutionary cauldron”.

Photo credit: Affendi Yang Amri



It is easy to imagine how dense seagrass beds such as this one in Pulau Tinggi, Johor, provide shelter for juvenile fish from predators.

Photo credit: Affendi Yang Amri

Seagrasses aren't just important as individual plants; they have the capability of developing into extensive meadows that function as habitats for a wondrous variety of marine life, large and small. Sometimes, these meadows are exposed at low tide, giving nature-lovers the rare chance of exploring them on foot. The most well-known and largest of these inter-tidal meadows in Malaysia is the Merambong-Tanjung Adang shoals of Johor (Bujang and Zakaria, 2003). On islands off the east coast of Peninsular Malaysia, most meadows remain submerged throughout the year and as a result, are easy to remain unnoticed and unexplored. There are many bountiful meadows of this sort in Pulau Tinggi, Pulau Besar, and Pulau Seribu. Sabah and Sarawak, of course, potentially have even more vast areas of seagrasses but these are even more unstudied than those in Peninsular Malaysia.

THREATS

Evidence shows that global seagrass ecosystems are declining. At least 5% of our known seagrass extent has been lost every year in the last thirty years (Waycott

et al., 2009). Why this sorry state of affairs? Well, an obvious answer is that seagrasses inhabit shallow coastal waters that are all too easily impacted by human activity. High sediment loads in river and coastal water, pollution events from industrial complexes and marinas, land reclamation that converts whole seagrass beds into private islands, artificial beaches, airstrips, esplanades and parks, and coastal development that results in shoreline hardening, are some examples.

Let me touch on a little more of that last point. When land is reclaimed from the sea, its shoreline is necessarily "hardened" by the magical feat of engineers who design structures that allow the newly acquired land to remain above sea-level. Shorelines are also hardened when retaining walls are built to stabilize beaches such as those we now see in some of our Marine Parks (e.g. the west coast of Pulau Tioman). It is difficult for seagrasses to colonize "hardened" shorelines and thus, they are prevented from retreating into shallower waters when sea-levels rise as a result of global climate change. Port activities and industrial complexes may also be

detrimental to seagrass meadows. In Malaysia, one example of a highly-public case where conflicting land use is evident is the Sungai Pulai estuary in Johor. Here, the massive port development that began fifteen years ago has apparently resulted in damage to the seagrass system according to local inhabitants. Over-harvesting in seagrass beds is also a problem. In Desaru, villagers have spoken of how *Enhalus acoroides* beds in the area have disappeared because busloads of what they think were illegal immigrants used to arrive en masse over weekends to harvest the edible fruits of the plant.

However, the biggest threat to seagrass meadows is ignorance. Communities protect only that which they have an emotional connection to, and this can only come in the wake of awareness. Sadly, most of us are simply unaware of seagrass meadows and how they are connected to our ways of life. One indicator of this is the fact that seagrass habitats in Malaysia are not protected by law and are not target organisms in the site selection of marine protected areas. Coral reefs are the primary target habitats for conservation and deservedly so, but

seagrasses should also enter the equation as the equal counterparts of coral reefs and, for that matter, mangrove forests.

Another indicator is the lack of ongoing research on these plants. Dredge the scientific literature on seagrasses and you'd come up with a mere handful of peer-reviewed manuscripts on the seagrasses of Malaysia, written mostly by a very small group of researchers whose numbers are far below those from other marine habitat disciplines such as coral reefs and mangroves. This lack of a critical mass of seagrass scientists means that many seagrass areas in Malaysia remain unstudied and unmapped. Under this scenario, it is no great surprise that the verdant green meadows that support the seafood industry, the subsistence of fishing communities, and the entire food web in the ocean lacks the attention it deserves.

WHAT WILL WE LOSE?

If we lose our seagrass meadows, we stand to lose the ecological benefits these habitats support and along with it, many economic benefits we may have taken for granted. These meadows provide nursery, foraging and refuge grounds for echinoderms (sea urchins, sea cucumbers), mollusks (shellfish), crustaceans (crabs and prawns), and commercially important fish such as snappers and groupers. Therefore, seagrass decline means our fisheries will suffer. In this regard, seagrass habitats complement coral reef systems. Many marine organisms use both coral reefs and seagrass meadows at different stages of their life cycle. Snappers and groupers are good examples. Juvenile snappers and groupers inhabit seagrass meadows in the first few weeks of their lives, but migrate to coral reefs when they reach a certain age and can fend for themselves. In Southeast Asia, fisheries dependent on seagrass meadows are significant but remain un-quantified (Unsworth and Cullen, 2010) but elsewhere, the economic support this habitat provides is great. The penaeid prawn fishery in Cairns Harbour, Northern Queensland alone has an estimated worth of USD 3,600 ha⁻¹ year⁻¹ (Watson et al., 1993).

Changes in our cultural cuisines should be expected as well. Malaysia, being a maritime country, has always relied on fish consumption for the majority of its population. In 1990, per capita fish consumption was estimated at 37.5 kg per annum, which was ten times more than for beef, double that of poultry, and

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four times that of pork (Abdullah and Baharomshah, 1999). Should seagrasses continue to decline, we will get less fish, smaller fish, and more expensive fish. Our palates aside, fish is a readily available source of protein especially for traditional subsistence fishing communities and the stake of these families and the wellbeing of habitats that support their lives is more important than for others. We must respect that.

Seagrasses also provide coastlines with protection from erosion and stabilises marine sediment (Hemminga and Duarte, 2000). Their contribution to biogeochemical cycling in the oceans is significant (Duarte et al., 2005) and is, on the basis of this function alone, valued at a net worth of USD19, 000 ha⁻¹ year⁻¹ (Costanza et al., 1997). This value is apparently unparalleled by other coastal systems except for estuaries. We also stand to lose charismatic fauna which we hold with great affection – the dugong (*Dugong dugon*) and the green turtle (*Chelonia mydas*). Both are known to feed exclusively on seagrasses.

WHAT CAN YOU DO?

There are many things we can do to deal with seagrass decline but the most fun and immediate way would be to just get down and dirty in it by joining your local Seagrass Watch network. Seagrass Watch is a community monitoring network run by local communities in seagrass habitats all around the world. Their goal is to promote the idea that local communities can take charge of monitoring seagrasses in a scientific and non-destructive manner and by doing so, contribute to the conservation of seagrasses globally. Under the Seagrass Watch program, there are presently around 259 sites across 17 countries contributing to the global

database on the status of seagrasses. If you want to get involved, all you need to do is contact your local Seagrass Watch representative, put on your booties, and go collect data with like-minded people on your free weekends. Participants will be given hands-on instructions on how to identify seagrasses and how to monitor their abundance. Along the way, you'll be introduced to the fascinating inhabitants of the seagrasses, ranging from all forms of sea stars and sea cucumbers to seahorses and crabs, and many other creatures that look like they've crawled out of a science fiction movie. You'll get a little muddy and wet but at least, you'll know that you will be doing your part in maintaining this wondrously rich ecosystem.

In Peninsular Malaysia, the best bet is to head on down to Johor where the Save our Seahorses (SOS) people are the local Seagrass Watch representatives. They run short and sweet trips to the inter-tidal shoals near the Causeway. Also in the same area is the Kelab Alami Mukim Tanjung Kupang, a group of school children who pride themselves on being Youth Rangers for the natural environments surrounding their village. The children run frequent Seagrass Watch visits to the Merambong shoals and under the guidance of their trainers diligently monitor the state of the seagrasses and run scientific experiments on how seagrasses respond to changes in the sediment. They would be only too happy to show you around the seagrass meadows on their doorstep but be prepared to keep up with these very energetic and playful teens and tweens!

On June 8th when we pay tribute to the role of oceans in our lives, I will make it a point to also pay tribute to the humble seagrass meadow. I used to think it an insignificant place to be but ever since I have come to discover its many hidden treasures, there is no other place I would rather be than in a lush, bountiful seagrass meadow. I could spend hours diving in it or walking on it; it never ceases to show me something new amongst its leaves and in the pores of its mud and sand. Together, we should start advocating strongly for seagrass conservation in Malaysia in order to protect our marine biodiversity, shorelines, functional marine processes, but most of all, our food security.

True, we cannot eat seagrass, but without it, some families may not even eat. This, is the point. 🐢