

SOS Volunteers Handbook



Save Our Seahorses

First Edition

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Dedication

This handbook is dedicated to Ms. Thing Siew Shuen, SOS founder, who is currently pursuing her postgraduate degree overseas



Foreword

It is through the support of many loving people that SOS is able to flourish to these days. We are heartened by a growing number of SOS volunteers who are concern about the fate of the seahorse and the unique Merambong seagrass bed. Indeed, the Merambong seagrass bed is such a rare sight which emerges for only a few days each month during low tide, resembling a huge green carpet sprawled by bountiful marine life in the middle of the Johor Strait.

In the past ten months since the beginning of SOS volunteers program in August 2005, we have been giving briefing to volunteers 40 minutes prior to their field survey. Although this method works fine to date, we feel it is timely to develop a handbook for the volunteers so that they have ample time to digest the work which they are to carry out rather than brainstorming during the quick briefing.

This handbook is the first attempt in the country which encourages non-scientist to gather scientific data to help with conservation and management issues of seahorse and seagrass. The volunteers could experience what is like being a marine biologist!

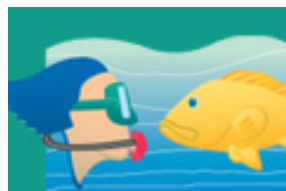
I would like to record my thanks to our dedicated SOS team members. Particular thanks to Ng Wei Soon, who played key roles in SOS website development and as valuable volunteers coordinator; and to Ng Hong Jing who helped with poster production. I would like to take the opportunity to thank members of the Suara Rakyat Malaysia (SUARAM) for helping with the initial stage of SOS establishment and exhibition activities.

We are grateful to receive some funding support from national as well as international sponsors and donors. Thanks to Ford Motor Company, Project AWARE, University College of Science and Technology and Rufford Small Grant for Nature Conservation for their funding support. Special thanks are due to the Seagrass Watch Program Coordinator, Len McKenzie, who has been extremely helpful as our project partner.

Last but not least, thanking all our faithful volunteers whose belief and contributions continued to give us moral support and motivation. I hope you will find this handbook useful and please do send us comments and suggestions for future improvement.

Yours Truly,

Choo Chee Kuang
SOS Program Coordinator



Project AWARE Foundation



Ford Motor Company
Conservation & Environmental Grants

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1.0 Overview of the Handbook

This handbook provides public volunteers with detailed information to carry out surveys on seagrass and Syngnathids at the Merambong seagrass bed. It allows volunteers to have clear ideas of the nature our field work. These include what to bring, what to wear, what to do and what to expect. You can even direct your queries to SOS personnel before embarking on a survey or during the briefing to avoid confusion.

The handbook uses simple English language combined with illustrations to make understanding easier for students as well as the general public. It starts with a brief introduction to seagrass in Chapter 4, providing some key features in seagrass species identification. This is followed by some notes on the importance and threats to seagrasses. The techniques associated with seagrass mapping and monitoring are furnished with data forms and pre-printed identification guides.

The seagrass mapping and monitoring protocols in this handbook are adopted from the comprehensive manuals developed by Seagrass-Watch (see McKenzie, 2003; McKenzie and Campbell, 2002). The survey techniques described in this handbook are specifically used at our project site. Therefore SOS volunteers should use the techniques described here to ensure consistencies in the data collected. For volunteers who wish to initiate an independent seagrass survey at other sites, it is recommended that you refer to McKenzie (2003) and McKenzie and Campbell (2002) to choose the appropriate technique for your survey or consult an expert.

Chapter 8 touches on the Syngnathids, which include the seahorse and pipefish, and the survey techniques used by SOS. At present the Syngnathids survey is carried out simultaneously with the seagrass survey during low tide. Here we illustrate how to catch seahorse and pipefish using a drag net and making measurement and associated records. It is not impossible to initiate an underwater survey but due to poor water visibility in our project site, I do not include underwater survey technique in this handbook.

2.0 Our Goals

The ultimate goal of SOS is to conserve the seahorse, seagrass and other marine creatures in the Pulai River Estuary which are under immediate threats from the surrounding development. We use research, education and conservation approaches. The specific goals of the volunteers program are:

- To establish mapping and long term monitoring data for seagrass communities
- To develop community participation in resource monitoring and ownership of marine resources
- To educate community on the importance of marine resources
- To raise community awareness of coastal management issues

3.0 How to Participate as Volunteer

Register online

To volunteer for a particular slot, you need to register online (www.sosmalaysia.org). An email will be sent to you shortly confirming your booking. However, please be aware that under unavoidable circumstances e.g. bad weather, trips will have to be cancelled.

Getting There

The project site is located at the southwestern corner of the Johor State, at the Pulau River Estuary. To get there, you have to pass by Gelang Patah, a small town which is approximately 40 km drive from Johor Bahru. If you are driving from Kuala Lumpur using the North-South Highway, pay attention to exit at the signboard leading to Gelang Patah.

Our volunteers normally gather at the Petronas Station in Gelang Patah (only one Petronas here) for briefing. Kindly check the briefing schedule to make sure you arrive on time. After the briefing (30-40 minutes) you can follow the volunteers coordinator to Kampung Pendas which is another 20 minutes drive. The boat ride from Kampung Pendas jetty to the Merambong seagrass bed takes around 15-20 minutes. For project site map please refer to Page 10.

Accommodation

For volunteers who wish to stay overnight at Gelang Patah, we would recommend Orchid Garden Hotel (Tel: 012-7394303), which is the only available hotel in town. The standard rate for an air-conditioned room with bathroom attached is around RM58 per head. Other hotels are in Skudai.

Note: Please do not hesitate to contact us if you are an experienced volunteer who wish to initiate an independent survey by coordinating a group of people. We are always delighted to work with pro-active people.

Be Prepared

- Wear proper clothing and footwear e.g. a hat, diving booties or old shoe with tough sole and good grip. If you do not have diving booties and need to borrow one, do let us know early. Stocks and sizes are limited.
- Prepare extra clothing so that you could change after the survey
- Be sun-smart. On some occasions the survey may occur during mid-day. Check the survey schedule and wear sun-screen if possible.
- Use a waterproof bag. Put your mobile, camera, car keys and other electronic devices in the waterproof bag. It is not uncommon where camera and car key (alarm) had accidentally fell into the water.
- Some people developed skin rashes after they got in contact with certain seagrass species. But normally, these rashes disappear within a few hours. As a precaution, wear gloves and bottom tracks or bring along some aloe vera lotion.

Potential Danger: Do not simply touch weird-looking marine creatures as some are poisonous. The most serious injury our volunteers had so far is being stung by a stingray.

Note: The project site has fairly good Celcom and Maxis network coverage.

4.0 SEAGRASS

4.1 A Brief Introduction to Seagrass

Seagrass is a flowering plant, complete with leaves, a rhizome (an underground, usually horizontally-oriented stem) and a root system. There are 60 described seagrass species worldwide and the majority of species are found in the Indo-Pacific region.

Seagrasses are found in shallow marine or estuarine waters generally below 10 m deep. Most seagrass species grow in silty or sandy sediments. In Peninsular Malaysia, seagrasses are primarily found on the east coast of Johor and in the Johor Strait. Whereas in East Malaysia, seagrasses are widespread around Sabah,

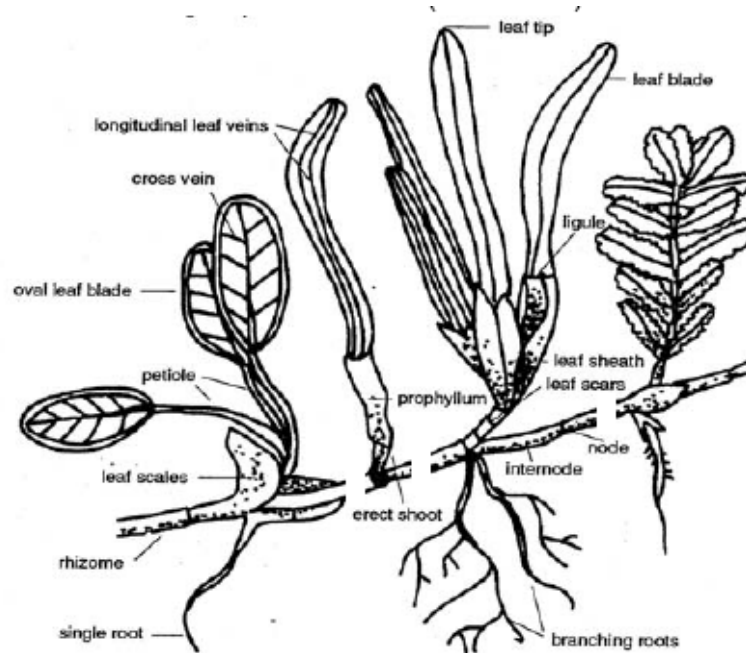


Diagram of seagrass morphology showing basic features used in species identification.

Source: Lanyon et al. 1989

4.2 The Importance of Seagrass

i) Stabilizing sediment

Seagrass have complex roots system which helps to fix sediment and absorb nutrients from the sediment. They help with nutrient recycling and maintaining water quality and clarity.

ii) Preventing coastal erosion

Seagrass can act as wave breaker. The dense leaves formed by seagrasses serve to dissipate wave action thus slowing the wave action and prevent coastal erosion.

iii) Sustaining high fisheries productivity

Seagrass bed is one of the most productive marine ecosystems in the world. The high photosynthetic outputs and habitat complexity in seagrass bed serve as nursery and breeding grounds for many marine species.

iv) Support high biodiversity and endangered species

The complexity of habitat structures within seagrass meadow enhances the diversity and abundance of marine animals. Seagrass also serve as important food and habitat for threatened marine species. It has been reported that an adult green turtle consumes an average of 2 kg of seagrasses per day; while an adult dugong could graze up to 28 kg of seagrasses per day. Rare marine animals like seahorses, pipefishes and seadragons are also closely associated with seagrass.

4.3 Threats

The distribution of seagrasses in shallow coastal and estuarine waters makes them susceptible to a wide range of human activities. A number of seagrass beds in Malaysia have been destroyed and seriously impacted due to coastal reclamation, port and jetty development and human settlement.

Land-based agricultural and industrial run-off causes water quality degradation which adversely affects seagrass photosynthetic activities. The use of destructive fishing gears like bombs, cyanides and gill nets are also extremely harmful to seagrass. Global warming and disease outbreak are indirect threats to the seagrass as a result of increasing human population and unsustainable development.



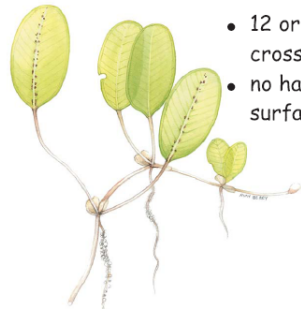
Pic (left): A patch of seagrass meadow in Semporna, Sabah ruined by construction of a floating restaurant presents a strong contrast to a pristine meadow in Pulau Gugusan (right).

4.4 Why Mapping and Monitoring Seagrass?

Mapping means to document seagrass species diversity and distribution to be able to identify areas requiring conservation measures. In the past, many seagrass beds have been destroyed by coastal development activities largely due to ignorance of their existence. For instance, a massive seagrass bed of the size of several football fields in the Pulau River Estuary, Johor, was destroyed by port reclamation activities because the Environmental Impact Assessment was less comprehensive and existing information on the seagrass bed was not disseminated to the relevant authority.

Monitoring seagrass resources, on the other hand, allow us to know whether the condition of seagrasses in a particular area is stable, improving or declining. Seagrass is a valuable bio-indicator of estuarine health because they often occur at the downstream end of catchments, receiving run-off from agricultural and industrial waste. Consistent monitoring, therefore, allows early detection of change, exposing coastal environmental problems before they become intractable for the improvement of coastal management practices.

Ho *Halophila ovalis*



- 12 or more cross veins
- no hairs on leaf surface

Hm *Halophila minor*



- Less than 12 pairs of cross veins
- Small oval leaf blade

Si *Syringodium isoetifolium*



- Cylindrical in cross section
- leaf tip tapers to a point
- Leaves 7-30cm long

Hd *Halophila decipiens*



- Small oval leaf blade 1-2.5cm long
- 6-8 cross veins
- Leaf hairs on both sides

Cs *Cymodocea serrulata*



- Serrated leaf tip
- Wide leaf blade (5-9mm wide)
- Leaves 6-15cm long
- 13-17 longitudinal veins

Cr *Cymodocea rotundata*



- Rounded leaf tip
- Narrow leaf blade (2-4mm wide)
- Leaves 7-15 cm long
- 9-15 longitudinal veins
- Well developed leaf sheath

Ea *Enhalus acoroides*



- Very long ribbon-like leaves with inrolled leaf margins
- Thick rhizome with long black bristles and cord-like roots
- Leaves 30-150 cm long

Th *Thalassia hemprichii*



- Short black bars of tannin cells on leaf
- Thick rhizome with scars between shoots
- "Sickle" shaped leaves
- Leaves 10-40 cm long

Hu *Halodule uninervis*



- trident leaf tip
- 1 central vein
- Usually pale rhizome, with clean black leaf scars

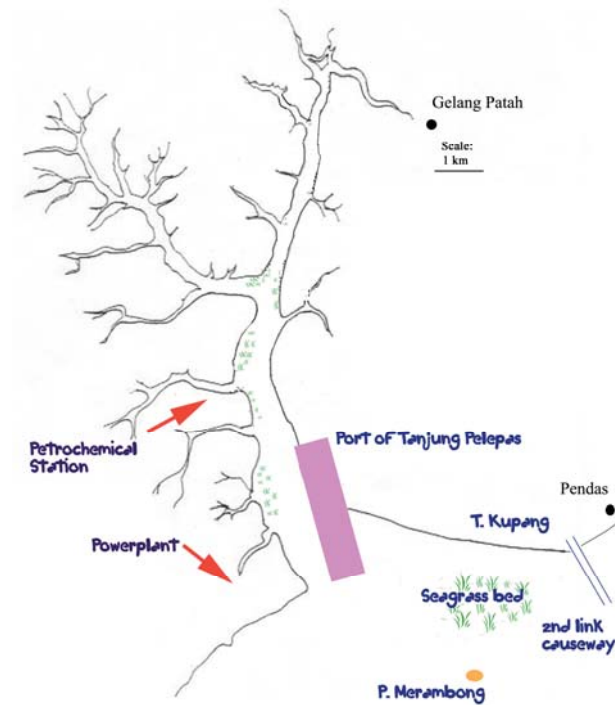
Hp *Halodule pinifolia*



- rounded leaf tip
- 1 central vein
- Usually pale rhizome, with clean black leaf scars

Some common seagrass species in Malaysia and their key identification features. *Source: McKenzie (2003)*

5.0 Project Site Map

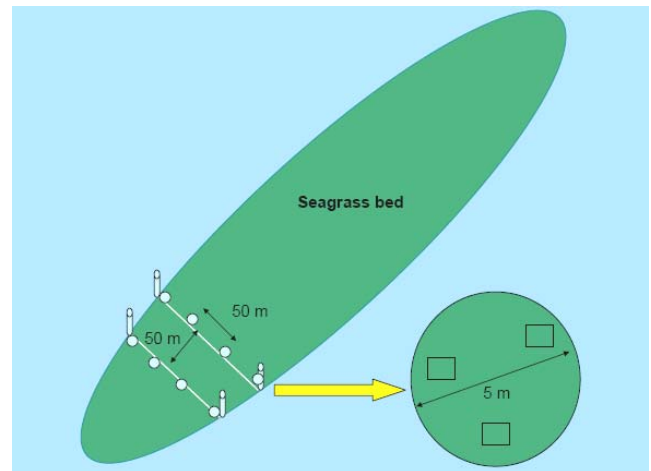


6.0 Intertidal Seagrass Mapping

The mapping technique described here is called the grid strategy. Transect lines are laid across the exposed seagrass bed in a systematic manner.

Basic Equipment

- 50metre fibreglass measuring tapes
- Pipes
- Site labels
- Quadrats
- GPS (Global Positioning System)
- Datasheet
- Clipboard
- Pencils & erasers
- Camera (optional)
- Magnifying glass
- Compass
- Watch
- Seagrass Identification and percent cover sheet




Methods

- 1) Start at the edge of an exposed seagrass meadow.
- 2) Mark the site by pushing a pipe into the ground, down to 30 cm below the surface
- 3) Record the latitude and longitude of the GPS readings on the data sheet
- 4) Record the bearing of the direction the transect tape will run using a compass. The direction will be perpendicular to the shoreline
- 5) Run the transect tape out until it reaches the other edge of the meadow. Use two or more transect tapes if necessary.
- 6) Ensure that the tape is as straight as possible
- 7) On reaching the other edge of the meadow, mark the site with another pipe.
- 8) At the starting point, randomly placed 3 quadrats within a 5-m radius surface area
- 9) Record its GPS position on the data sheet
- 10) Record the sediment type and algae % cover. Add comments e.g. seahorse, dugong feeding trails etc. in the data sheet (Appendix I)
- 11) Estimate the total % seagrass cover (Refer to Pg 13: seagrass % cover standard)
- 12) Estimate the species % composition (Refer to species identification, Pg 9)
- 13) After completing one point, proceed to the second point at 50 m
- 14) Repeat the procedures until you reach the other edge of the seagrass meadow
- 15) The second transect tape will be run parallel to the first one at 50 m apart

Notes: Each transect mapping should be conducted by 2-3 volunteers and should take no more than 30 minutes due to the limited low tide duration. If you do come across interesting marine animals, you may quickly take pictures and continue with your work.

If there are 5-6 volunteers, the volunteers can be divided into two groups and start mapping simultaneously

Caution: Before you unroll the transect tape, always make sure you start with the correct edge, otherwise you will probably waste time disentangling the 50 m long tape!


SEAGRASS MAPPING

Recorder: Vessel: Date: 29/4/06...

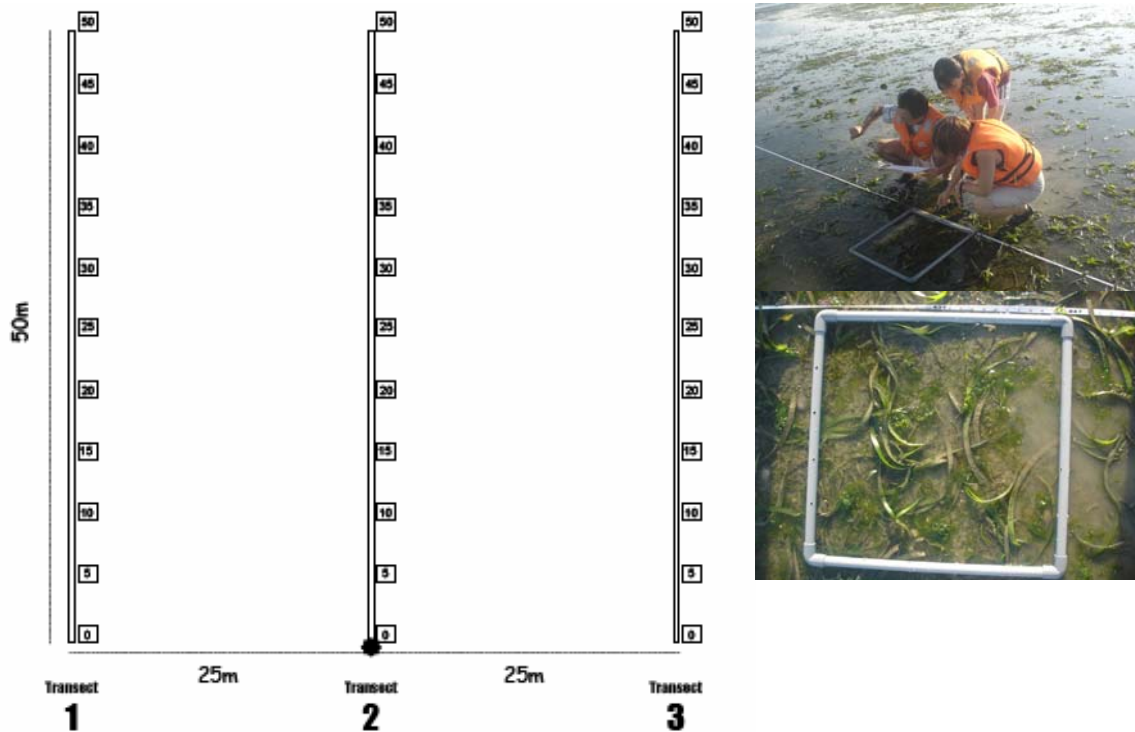
| Site#: SM01 Location: Merambong Lat: 01° 06' 33" S Long: 103° 45' 06" E Time: 0700hrs Depth:m Observer: Choo Sediment: sand Algae (%): 30% Algae (spp./comp): Ulva sp. Comments: | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">% cover</th> <th>Species / % composition of cover</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">55%</td> <td>Ea: 33% Th:20% Ho: 3%</td> </tr> <tr> <td style="text-align: center;">70%</td> <td>Ea: 55% Ho:5% Hs: 10%</td> </tr> <tr> <td style="text-align: center;">58%</td> <td>Ea: 45% Th:8% Hu: 5%</td> </tr> </tbody> </table> | % cover | Species / % composition of cover | 55% | Ea: 33% Th:20% Ho: 3% | 70% | Ea: 55% Ho:5% Hs: 10% | 58% | Ea: 45% Th:8% Hu: 5% |
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| % cover | Species / % composition of cover | | | | | | | | |
| 55% | Ea: 33% Th:20% Ho: 3% | | | | | | | | |
| 70% | Ea: 55% Ho:5% Hs: 10% | | | | | | | | |
| 58% | Ea: 45% Th:8% Hu: 5% | | | | | | | | |
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Recording seagrass mapping data on the data sheet. Source: McKenzie (2003)

7.0 Intertidal Seagrass Monitoring

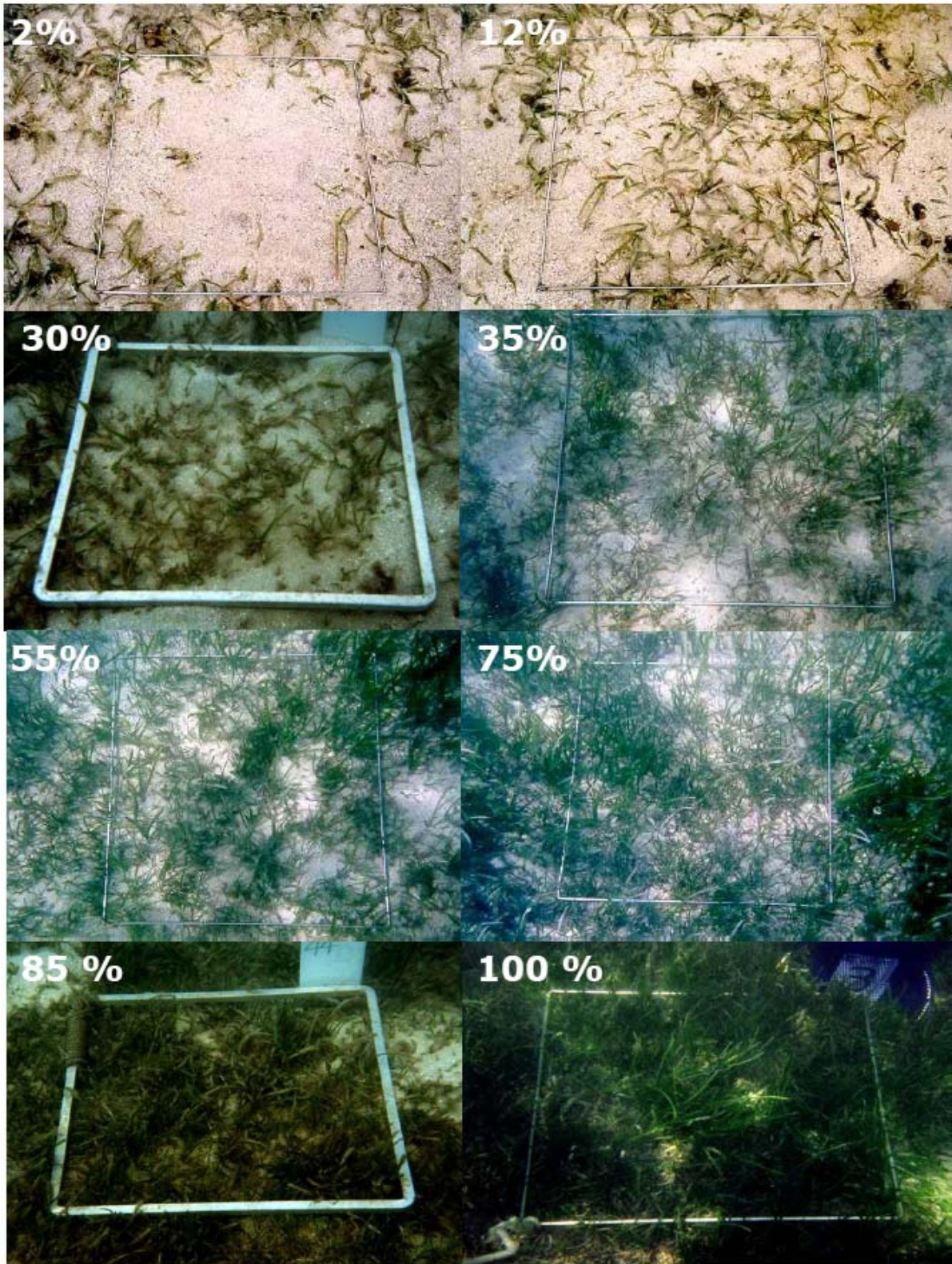
Methods

- 1) Mark the site by pushing a pipe into the ground, down to 30 cm above the surface
- 2) Record the latitude and longitude of GPS readings
- 3) Record the bearing using the compass
- 4) Run the transect tape out for 50 m along the compass bearing, with direction perpendicular to the shoreline
- 5) Make sure you don't leave foot holes on the right hand side of the transect where you will be sampling
- 6) At the end of 50 m, plant another pipe into the ground and record the GPS readings.
- 7) Ensure that the tape is as straight as possible
- 8) At the starting point, place a quadrat at 0 metre mark at the right hand side of the tape.
- 9) Record the start time.
- 10) Measure and record each parameter (sediment, total % seagrass cover, % cover by species, % algae cover) as stated in the datasheet (Appendix II)
- 11) Continue to the next 5 metre mark and repeat this procedure along the transect until the transect is completed.
- 12) Take picture of any interesting organism you come across
- 13) Record the finish time.
- 14) Repeat the procedures for transect 2 and 3 at 25 m apart



Seagrass monitoring: placing three 50 m long transects at 25 m apart. Quadrat sampling at 5 m interval along each transect. *Source: McKenzie and Campbell (2002)*

Seagrass Percent Cover



Seagrass percentage cover standards (source: McKenzie and Campbell, 2002)

8.0 SEAHORSE AND PIPEFISH

8.1 General Information

Seahorse and pipefish are fishes belonging to the Family Syngnathidae. They are also called Syngnathids. Worldwide there are 34 seahorse species, with seven species reported in Malaysia (Choo and Liew, 2004). The number of pipefish species has been estimated at around 300 species worldwide (Vincent et al. 1995).

The most prominent feature of the Syngnathids is male pregnancy. After males receive eggs from females, they fertilize, incubate and osmoregulate the eggs until they give birth to baby seahorses which resemble miniature adults (Haresign and Shumway, 1981).

Male seahorses have a sac-like pouch below the abdomen where they brood the young. But in pipefishes, not all species have brood pouch. In fact, in most pipefish species, eggs are simply attached below the abdomen.

8.2 Why Seahorses Are Rarely Sighted?

Seahorses are generally more popular than their pipefish cousins among recreational divers and aquarium hobbyists. Divers, however, frequently mistook pipefish for seahorse. In Mabul Island, Sabah, the beautiful Harlequin Ghostpipefish is a notable dive attraction.

Seahorses are famous for their elusiveness – the ability to camouflage. This is one of the reasons why they are rarely sighted. However, many veteran divers have never seen seahorses throughout their “divespan” though they claimed to have been extremely vigilant during their dives.

The reason – they have been searching for seahorses in the wrong areas.

It took me one year searching for seahorses throughout the West Malaysia before I finally spot one. It was a female Spotted Seahorse, found at 2 m deep in a murky estuary.

Seahorses live in different marine environment, depending on species. Most recreational divers frequent 10-20 m deep coral reef. The seahorse species in Malaysia, however, happen to occur either in 2-5 m deep waters or in the deeper zone off the reef slope. These places are seldom visited by divers.

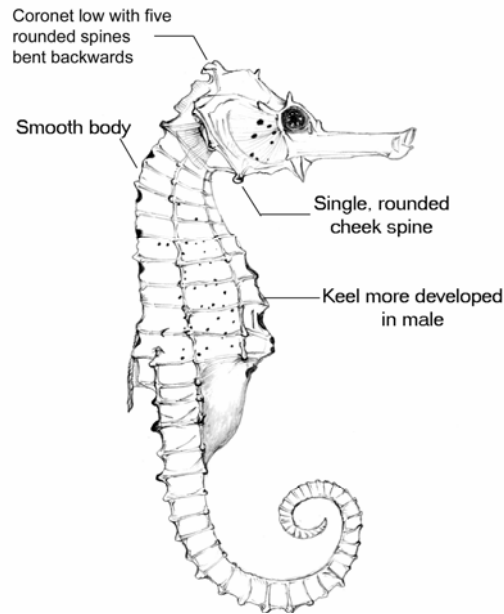
It seems that seahorses purposely avoid crowded places, which can partly be attributed to their shy, slow-moving nature. Given scientific explanation, it would be more advantageous for seahorses to avoid predators and reduce competition for food with other species in cryptic environment.

Nowadays, seahorses are becoming more and more difficult to spot. They are sensitive to coastal environmental problems like pollution, reclamation, mangroves, seagrass and coral reef destructions, shipping activities, bycatch in fishing gears etc. These have greatly reduced seahorse populations worldwide.

All seahorse species and some pipefish species are currently listed on the IUCN Red List of Threatened Species and on the Convention of International Trade in Endangered Species (CITES) Appendix II (See: www.redlist.org).

8.3 The Spotted Seahorse, *Hippocampus kuda*

SOS currently focuses on the Spotted Seahorse, *Hippocampus kuda* found in the Pulai River Estuary. Adults *Hippocampus kuda* averages 18 cm standard length and weighed around 15 g. Their colors vary between yellow, orange, black and brown - probably to match their surroundings. Females invariably have large dark spots along the lateral body; whereas males have distinct brood pouch below the abdomen. Sizes of males and females are rather similar.



The morphology of the Spotted Seahorse (Source: Choo and Liew, 200X)

The Spotted Seahorse can withstand brackish and marine waters and normally found amidst the dense seagrass canopy.



During low tide, some portions of seagrass beds are exposed and seahorses are sometimes found nestled around seagrasses.

8.4 The Alligator Pipefish, *Syngnathoides biaculeatus*

The name derived from their looks! The Alligator pipefish is greenish in colour with an elongated body. These features help them to blend extremely well into the seagrass environment. Full grown adults normally ranged between 22 to 26 cm.

When the males are pregnant, the eggs are attached to the lower abdomen and development stages of the babies are discernible. There is no brood pouch in males thus in order to distinguish non-pregnant males from females, you can feel with your finger that non-pregnant males have a sticky or glutinous skinfold and their abdomen is flatter; whereas in females the abdomen is protruded.



Eggs attached below the abdomen of male pipefishes. Notice that the eggs with later development stages are darker in colour.

8.5 Syngnathids Survey

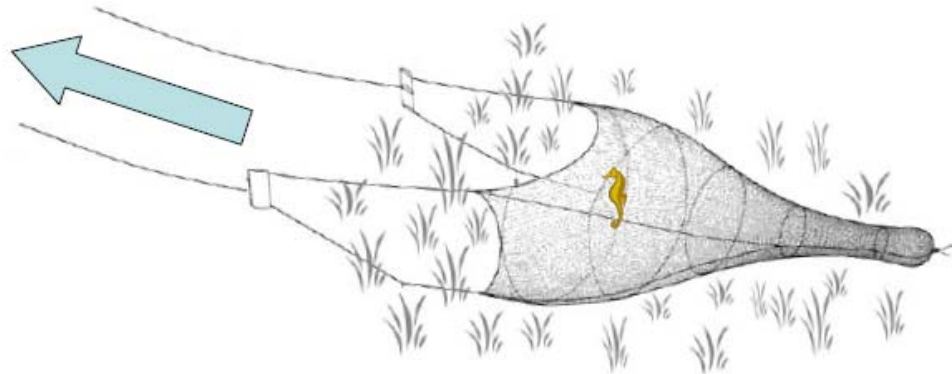
There are a few methods to carry out Syngnathids survey. The common method used by researchers is underwater survey. This method requires at least two certified divers. However, in the Pulai River Estuary where water visibility is limited, dive survey is less suitable. For the particular site at Merambong seagrass bed, we developed a method which uses of a drag net to catch Syngnathids during low tide.

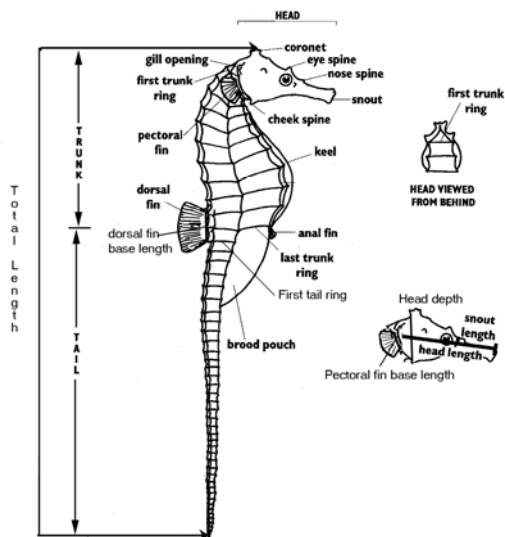
Basic Equipment

1. Boat
2. Booties
3. GPS
4. Drag net
5. Data sheet
6. Pencils and eraser
7. Ruler
8. Pile
9. Camera (optional)
10. Watch

Method

1. Check the tide table and make sure you arrive at the survey site during low tide
2. Choose the starting point (determined by volunteers coordinator) and record its GPS coordinates, date, observer name, site and net number
3. In order for the drag net to operate at optimum efficiency, the depth should at least be 0.5 m to a maximum of 1 m
4. Unfold the drag net. Make sure the opening is correct. The cod end should be at the rear
5. Determine the direction you will be heading. It should be in a straight line.
6. Two persons will tow the net, one on each side of the net, at a speed of no less than 0.5 m per second. Tow for a distance of between 30 to 50 m, depending on the strength and stamina of the individuals. *Note: If you are too slow the seahorses and pipefishes may escape from the net.*
7. The person who records the data should keep up behind them
8. When you are about to stop, closing in to one another. Rapidly lift the bottom of the net (which has a string of weights) and shake whatever caught into the cod end
9. Sort out seahorses and pipefishes, if any, and gently put them into a pile. Release other bycatch fishes and invertebrates and remove debris in the net
10. Record the GPS end location. This will provide information on the distance the net has been towed and its location on the map.
11. Record the sex, size, pregnancy and colour of the seahorse and pipefish
12. Release them in the opposite direction you will be heading for your subsequent tow. This is to avoid catching the same individuals
13. It is important to indicate in the data sheet even if no Syngnathids are caught
14. Repeat the procedures several times at different sites using new data sheets. Normally we do 5-8 tows within 45 minutes depending on whether the tide level is permissible
15. Upon completing the survey, clean the net by dipping and washing in seawater. Remove debris and fishes entangled in the mesh. Fold the net properly and bring it onto the boat





Seahorse total length is measured from the tip of the coronet to the tip of the tail (*Source: Lourie et al. 1999*)

The elongated body of pipefish makes measurement much easier by straightening them next to a ruler

Syngnathids Survey Form

SOS Syngnathids Survey Form

Net No. SS Date: / /

Observer: _____

Location: _____

Site: _____

Latitude _____ Longitude _____

START of transect (GPS reading) _____

END of transect (GPS reading) _____

Start time: _____ End time: _____

| Seahorse (Hk) | Pipefish (Sb) | Sex | Size | Pregnant | Colour | Note |
|---------------|---------------|-----|------|----------|--------|------|
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Recommended Links:

Seagrass Watch: www.seagrasswatch.org

Project Seahorse: www.projectseahorse.org

10.0 Contact Details

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Appendix I

SEAGRASS MAPPING

Recorder:

Vessel:

Date: .../.../.....

| | | |
|---|---------|----------------------------------|
| Site#: Location..... | % cover | Species / % composition of cover |
| Lat° S Long° E | | |
| Time.....hrs Depth:.....m Observer..... | | |
| Sediment: Algae (%)..... | | |
| Algae (<i>spp./comp</i>) | | |
| Comments: | | |
| | | |

| | | |
|---|---------|----------------------------------|
| Site#: Location..... | % cover | Species / % composition of cover |
| Lat° S Long° E | | |
| Time.....hrs Depth:.....m Observer..... | | |
| Sediment: Algae (%)..... | | |
| Algae (<i>spp./comp</i>) | | |
| Comments: | | |
| | | |

| | | |
|---|---------|----------------------------------|
| Site#: Location..... | % cover | Species / % composition of cover |
| Lat° S Long° E | | |
| Time.....hrs Depth:.....m Observer..... | | |
| Sediment: Algae (%)..... | | |
| Algae (<i>spp./comp</i>) | | |
| Comments: | | |
| | | |

| | | |
|---|---------|----------------------------------|
| Site#: Location..... | % cover | Species / % composition of cover |
| Lat° S Long° E | | |
| Time.....hrs Depth:.....m Observer..... | | |
| Sediment: Algae (%)..... | | |
| Algae (<i>spp./comp</i>) | | |
| Comments: | | |
| | | |

| | | |
|---|---------|----------------------------------|
| Site#: Location..... | % cover | Species / % composition of cover |
| Lat° S Long° E | | |
| Time.....hrs Depth:.....m Observer..... | | |
| Sediment: Algae (%)..... | | |
| Algae (<i>spp./comp</i>) | | |
| Comments: | | |
| | | |

| | | |
|---|---------|----------------------------------|
| Site#: Location..... | % cover | Species / % composition of cover |
| Lat° S Long° E | | |
| Time.....hrs Depth:.....m Observer..... | | |
| Sediment: Algae (%)..... | | |
| Algae (<i>spp./comp</i>) | | |
| Comments: | | |
| | | |

Appendix II – Seagrass Monitoring Form

SOS Seagrass-Watch

Fill out one sheet for each transect survey

| | |
|-------------------|---------------------|
| Observer: _____ | Date: / / |
| Location: _____ | |
| Site no.: _____ | Transect no.: _____ |
| Start time: _____ | End time: _____ |

START of transect (GPS reading)

LATITUDE

LONGITUDE

| QUADRAT | Sediment <i>(sand/mud/shell)</i> | Comments <i>(whelks, crab, sea cucumber, sea star)</i> | Total % seagrass cover | % COVER OF EACH SPECIES | | | | | | | | | | Total % algae cover | |
|---------|-------------------------------------|---|------------------------------|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|--|
| | | | | <i>Ea</i> | <i>Hp</i> | <i>Hm</i> | <i>Hp</i> | <i>Hl</i> | <i>Hs</i> | <i>Tl</i> | <i>Cf</i> | <i>Cs</i> | <i>Sl</i> | | |
| 0 m | | | | | | | | | | | | | | | |
| 5 m | | | | | | | | | | | | | | | |
| 10 m | | | | | | | | | | | | | | | |
| 15 m | | | | | | | | | | | | | | | |
| 20 m | | | | | | | | | | | | | | | |
| 25 m | | | | | | | | | | | | | | | |
| 30 m | | | | | | | | | | | | | | | |
| 35 m | | | | | | | | | | | | | | | |
| 40 m | | | | | | | | | | | | | | | |
| 45 m | | | | | | | | | | | | | | | |
| 50 m | | | | | | | | | | | | | | | |

END of transect (GPS reading)

LATITUDE

LONGITUDE

Appendix III

SOS Syngnathids Survey Form

Net No. 55 Date: / /

Observer: _____

Location: _____

Site: _____

LATITUDE _____ LONGITUDE _____

START of transect (GPS reading) _____

END of transect (GPS reading) _____

Start time: _____ End time: _____

| Seahorse | Pipefish | Sex | Size | Pregnant | Colour | Note |
|----------|----------|-----|------|----------|--------|------|
| | | | | | | |
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SOS Syngnathids Survey Form

Net No. 55 Date: / /

Observer: _____

Location: _____

Site: _____

LATITUDE _____ LONGITUDE _____

START of transect (GPS reading) _____

END of transect (GPS reading) _____

Start time: _____ End time: _____

| Seahorse | Pipefish | Sex | Size | Pregnant | Colour | Note |
|----------|----------|-----|------|----------|--------|------|
| | | | | | | |
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