FIELD GUIDE ON SEAGRASS

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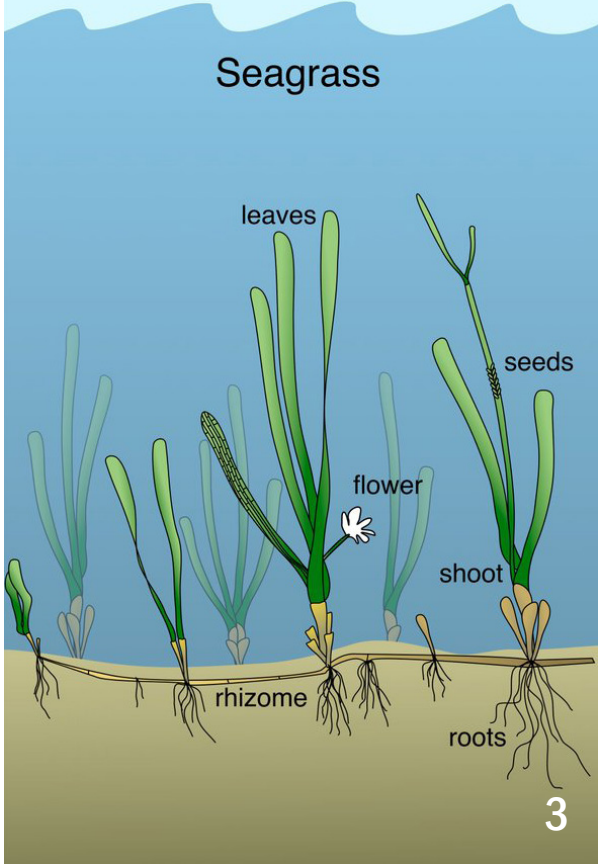
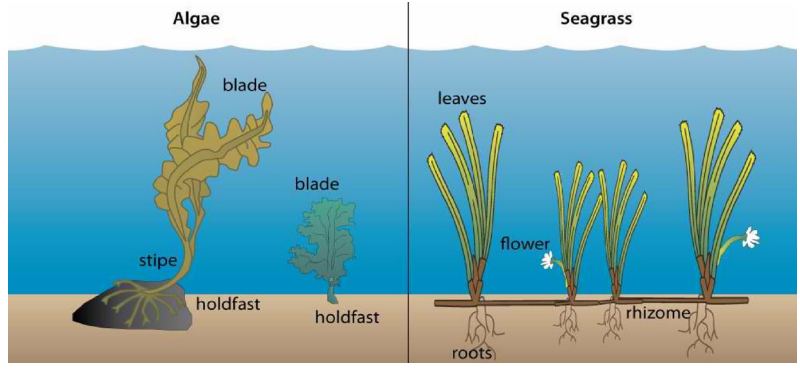
What is SEAGRASS?

- Seagrasses are aquatic flowering plants (angiosperms) with a high degree of uniformity in vegetative appearance.
- Seagrasses are the only group of submerged flowering plants that live entirely and exclusively in seawater.



COMPARISON OF SEAGRASS AND ALGAE

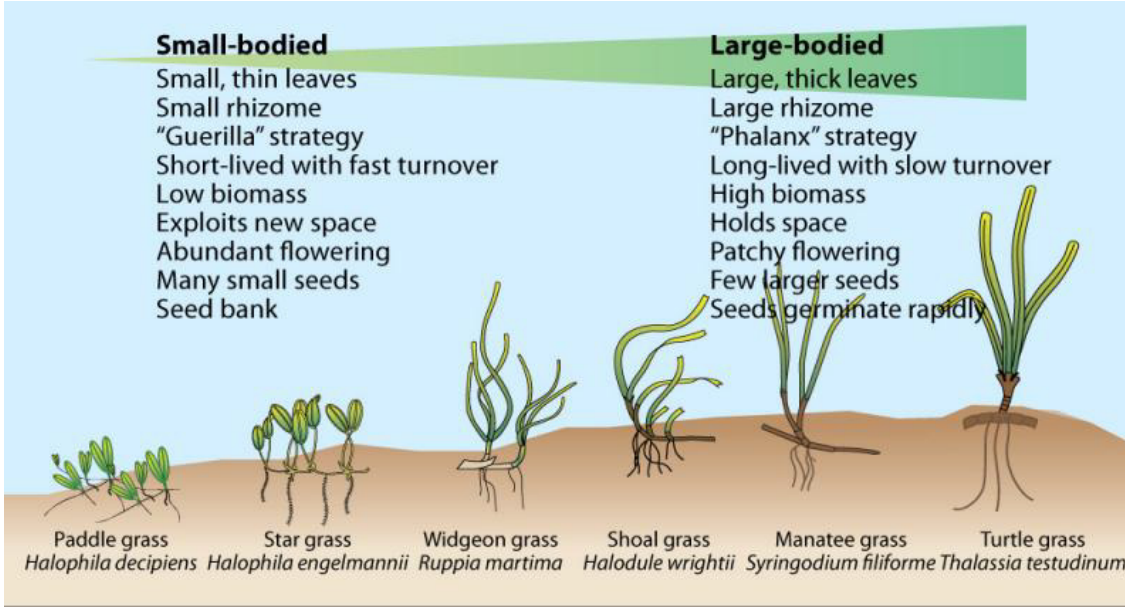


ALGAE

- Non-flowering plants
- Do not have below-ground past; holdfast for anchoring
- Sexual reproduction via spores
- Asexual reproduction via vegetative propagation

SEAGRASS

- Flowering plants
- Have distinct above-ground (leaf bearing 'shoot') and below-ground (rhizomes, roots) parts
- Leaf sheath protecting the apical meristem and developing leaves
- Sexual (generative) reproduction via flowering, pollination and fertilization
- Asexual reproduction via vegetative propagation ('clonal growth')



Seagrass species come in many different shapes and sizes, as illustrated by this conceptual diagram of some common seagrass species. (From "Tropical Connections: South Florida's marine environment" (pg. 260), courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science.)

SEAGRASS

SPECIES CODES

Cymodocea rotundata (CR)

- Flat, strap-like leaves 2-4 wide
- Rounded, smooth leap tip
- Smooth rhizome
- Scars from well develop sheaths form a cotinuous ring around the stem
- Found on shallow reef flats

CR

HX • Hu or Hm species cannot be distinguished (i.e., not sure of the ID)

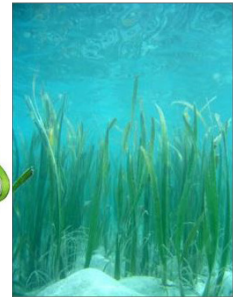
HY • Hu or Hm species cannot be distinguished (i.e., not sure of the ID)

Cymodocea serrulata (CS)

- Linear strap-like leaves 5-9 wide
- Serrated leaf tip
- Leaf sheath in broadly triangular with a narrow base
- Leaf scar do not form continuous ring around the stem
- Found on shallow subtidal reef flats and sand banks

CS

Enhalus acoroides (EA)



- Very long ribbon-like leaves 30-150 cm long
- Leave with inrolled leaf margins
- Thick rhizome with long black bristle and cord-like roots
- Found on shallow/inertidal sand/mud banks (often adjacent to mangroves forests)

EA

Halophila capricorni (HC)

- Small oval leaves that are hairy on one side
- Central vein on leaf with 9-14 cross veins
- Usually found deeper than 10m in coral environments proximal to coral reefs
- Only found in subtidal Australian waters (>10m) proximal to coral leaf

HC

Halophila decipiens (HD)

- Small oval leaf blade 1-2.5cm long
- 6-8 cross veins
- Leaf hairs on both sides
- Leaves usually longer than wider
- Found at subtidal depths(>10m)

HD

Halophila minor (HM)

- Less than 8 pairs of cross veins
- Small oval leaves occuring in pairs
- Wedge-shaped leaf sheath
- Found on shallow/intertidal sand flats

HM

Halophila ovalis (HO)

- Oval shaped leaves in pairs
- 8 or more cross veins
- Nohairs on leaf surface
- Prefered dugon food
- Common early colonising species
- Found from intertidal to subtidal depths

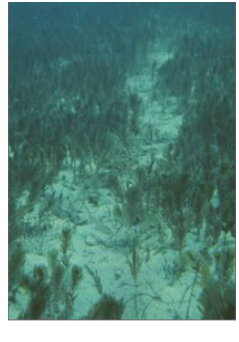
HO

Halodule pinifolia (HP)

- Fine, delicate leave up to 20cm long
- 1 central vein
- Black and white wein splits into two at the rounded leaf tip
- Usually pale rhizome, with clean black leaf scars
- Found on intertidal sand banks

HP

Halophila spinulosa (HS)



- Fern like
- Leaves arranged in opposite pairs
- Erect shoot up to 15cm long
- Found at subtidal dephts (>10cm)

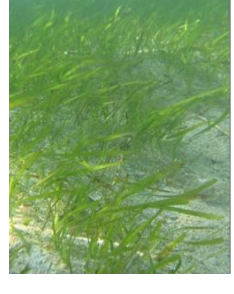
HS

Halophila tricostata (HT)

- Erect shoots 8-18cm long
- Leaves with 3 veins
- 2-3leaves at each node
- Leaves “whorl” around stem
- Found at subtidal depths (>10cm)
- Endemic to Queensland, Australia

HT

Halodule univervis (HU)



- Uasually larger than *Halodule pinifolia*
- Trident leap tip
- 1 central longitudinal vein
- Rhizome usually pale ivory, with clean black leaf scars
- Dugong preferred food
- Found on shallows/intertidal snd or mud banks

HU

Where are SEAGRASSES found?

- Seagrasses grow in salty and brackish (semi-salty) waters around the world, typically along gently sloping, protected coastlines.
- Normally found in areas where light can easily penetrate (shallow, clear, and calm waters) enabling photosynthesis to occur.
- Many seagrass species live in depths of 3 to 9 feet (1 to 3 meters), but the deepest growing seagrass (*Halophila decipiens)* has been found at depths of 190 feet (58 meters).
- There are 18 seagrass species found from 529 sites in the Philippines (Fortes, 2015). In relation to seagrass as a resource in need of protection, its status as such is yet largely unknown, becoming a focus of scientific inquiry only in the last 30 years and, and as an object of conservation, only in the last 15 years (Fortes, 2015).

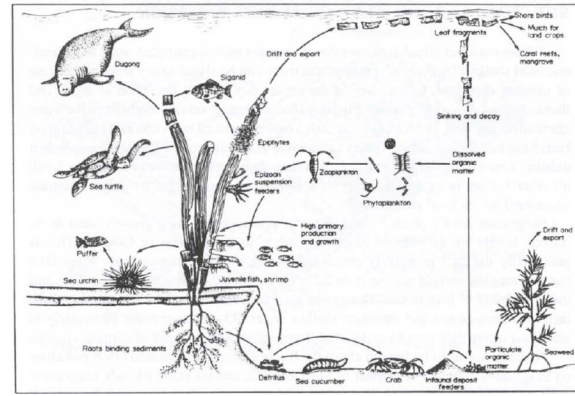
ZONATION

- Salinity, light, and air exposure are environmental factors that affect seagrass distribution.
- Shoal grass tolerates exposure and high salinities better than other seagrasses, thus, it is found in the shallowest waters.
- Turtle grass (*Thalassia*) may be found next at depths nearly as shallow as shoal grass. Deeper than 12 m, manatee grass (*Syringodium filiforme*) forms large meadows, replacing turtle grass.
- Star grass (*Halophila engelmanni*) and paddle grass (SN) may grow deeper than 40 m as long as there is enough sunlight for photosynthesis.

Why are SEAGRASSES Important?

- Seagrass beds are vital for marine life productivity. Seagrass have very high productivity that helps support and provides nutrients and physical habitat to many fish species, invertebrates, crustaceans, marine turtles and the dugong (sea cow).
- Many resident and transient species use the seagrass for refuge, spawning and nursery activities.
- Seagrass absorb nutrients from coastal run-off and stabilise sediment, helping to keep the water clear.
- Filtering the water column of sediments, organic matter, inorganic elements/compounds
- Protect subtidal sediments and shorelines from erosion through baffling of wave and tidal energy by seagrass canopies
- Absorb and accumulate persistent and potentially toxic organic pollutants
- Supply of raw materials for commercial products, fertilizer, filling materials, etc.

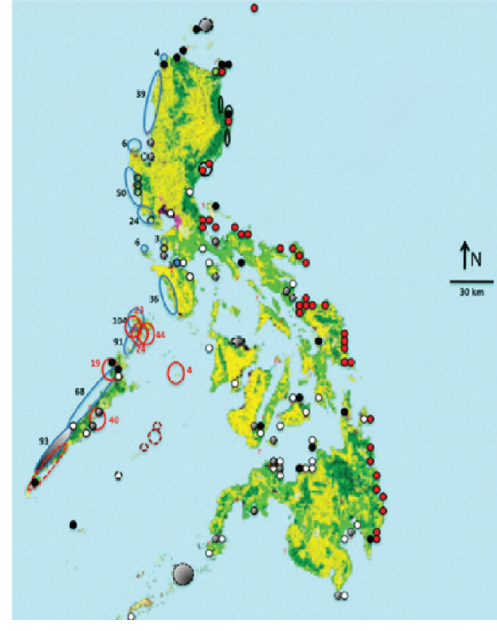
Food chain in Philippine seagrass ecosystems (Fortes, 1989)



Distribution of seagrasses from 529 sites in the Philippines from 1983 to 2012

Five hundred twenty nine (529) sites in the Philippines where seagrasses have been reported (numbers besides geometric figures 1983-2008). Sites without numbers have been sampled only once or repeatedly. Broken lines indicate number of sites undetermined

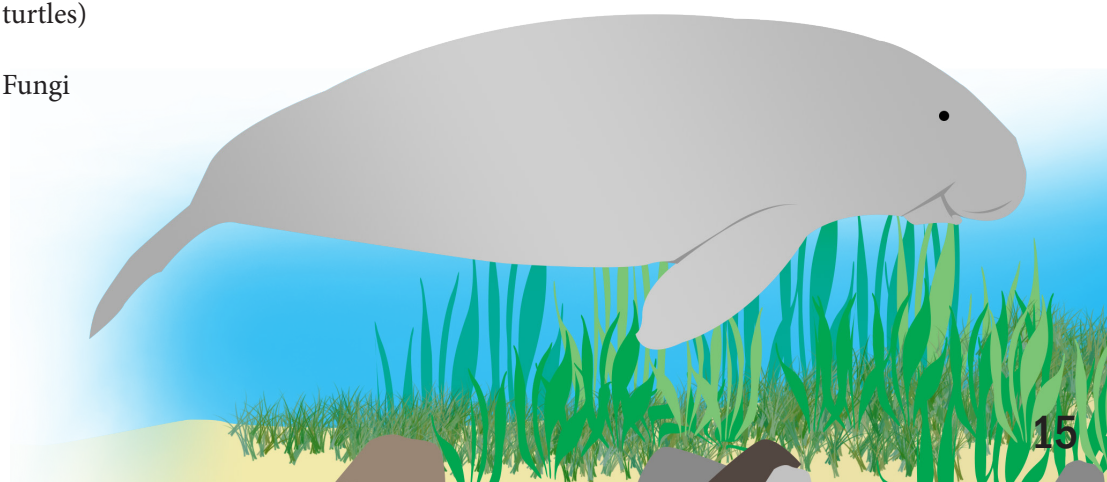
- Initial data 1983-2000
- Spot surveys 2003-2005
- Pacific seaboard project data 2005
- Visual analysis of major (atleast 500m in breadth) seagrasses beds (landsat tm data 1999-2002, bands 1, 2, 3, paths 116-117, row47-54)
- From evironmentally critical area network 2005
- Preceptual survey
- Sampling Overlap



Inhabitants

As ecotone between mangrove forests and coral reefs, seagrass is home to many marine organisms with economic value including shrimps, sea urchins, various fish species, and endangered animals like sea turtles and the charismatic dugongs (*Dugong dugon*) in which 95% of its diet is seagrass.

- Invertebrates (shrimps, sea cucumbers, sea urchins, seahorses, crabs, scallops, mussels and snails)
- Fishes (important species such as rabbitfishes (siganids), rely completely upon the seagrasses)
- Mammals (dugongs and manatees)
- Reptiles (sea turtles)
- Birds
- Bacteria and Fungi
- Algae



Threats to SEAGRASS ecosystem

- Herbivory
- Temperature
- Salinity (~33 ppt)
- Eutrophication (Green et.al, 2003)
- Siltation (Green et., 2003)
- Pollution (Green et.al, 2003)
- Dredging (Green and Short 2003)
- Unsustainable fishing methods (Green et.al, 2003)

Physical disturbance

- Typhoon 'blowouts'

Bioturbation

- The disturbance of sedimentary deposits by living organisms.

Invasive species

- *Caulerpa taxifolia*

Wasting disease

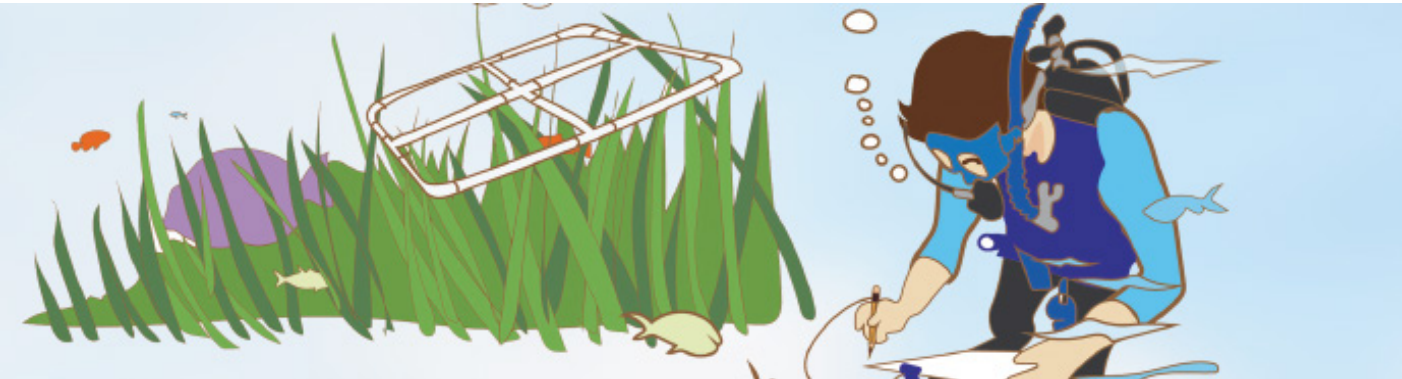
- *Labyrinthula zosterae*

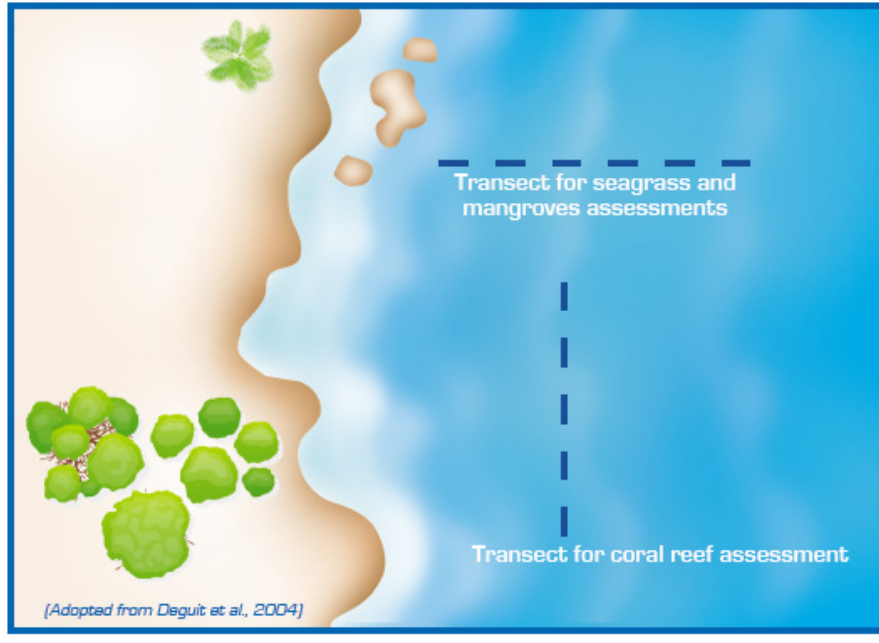
Conservation of SEAGRASSES

A decrease in seagrass habitats have recently been documented through aerial photography and geographical information systems (GIS) as coastal areas become more populated. In response, efforts are being done to protect and manage these areas though water quality improvement, boating restrictions, legislation, and education.

- WATER QUALITY issues can be dealt with by government agencies through appropriate regulations. Industries must be required to follow regulations on discharges to meet acceptable water quality conditions. Improvement of sewage treatment plants and septic systems will result in the reduction of pollutants entering coastal waters.
- BOATING RESTRICTION ZONES will help protect seagrass habitats from propeller scarring as well as the manatees that reside in the area.
- LEGISLATION in the form of environmental regulations should control dredging and filling activities and establish aquatic preserves protected from extensive coastal development.
- EDUCATION is key to local residents, tourists, and boaters in their awareness and appreciation of all marine habitats including seagrasses. Posters, brochures, maps, signs, and classes are all useful in communicating the importance of seagrass habitats to the public.

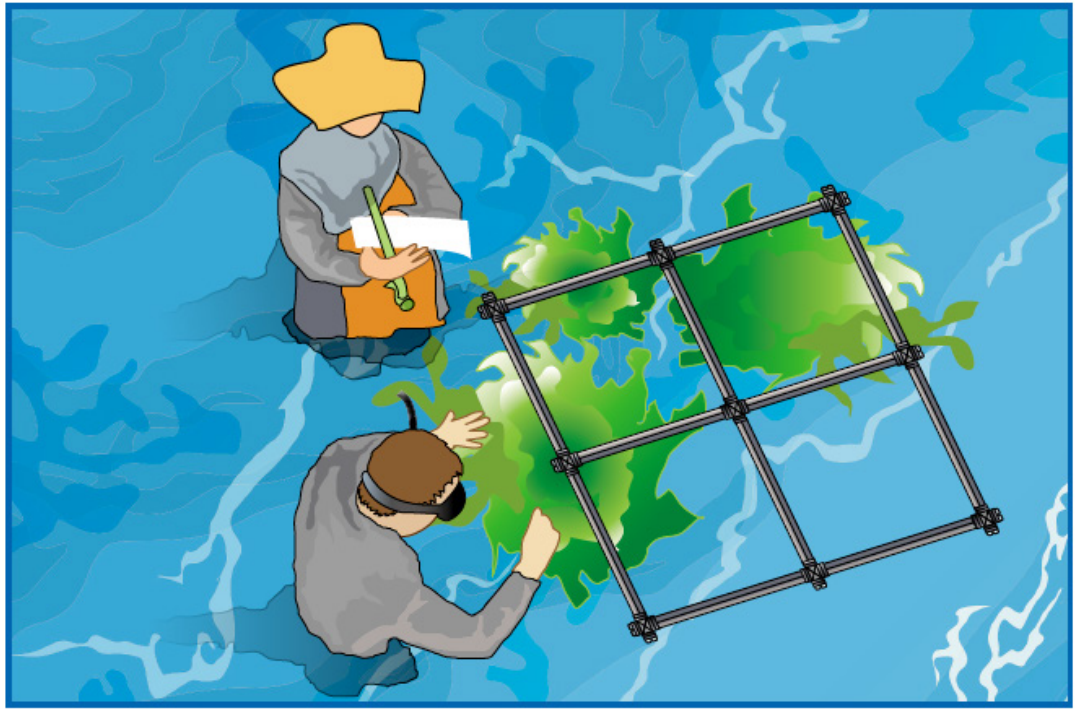
SEAGRASS HABITAT ASSESSMENT





Position of Transects used in Coral, Seagrass and Mangrove Habitat Assessment

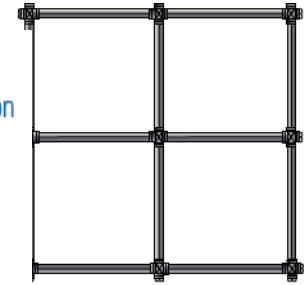
QUADRAT METHOD

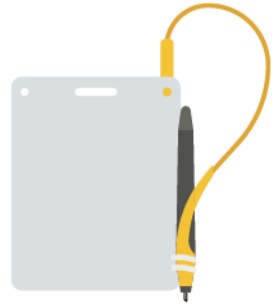


Participants: 9- 12 Persons (3-4 persons in a team)

Materials:

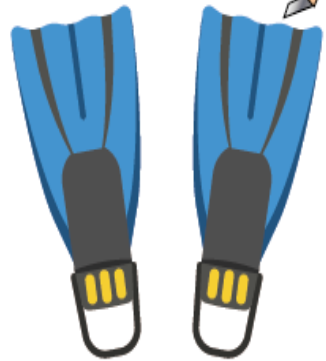
- Quadrat (1 X 1 meter)
- 50 m rope with 5 or 10 m calibration
- GPS
- Slateboards (1 per team)
- Picture book (or Species ID guide)
- Transect data forms

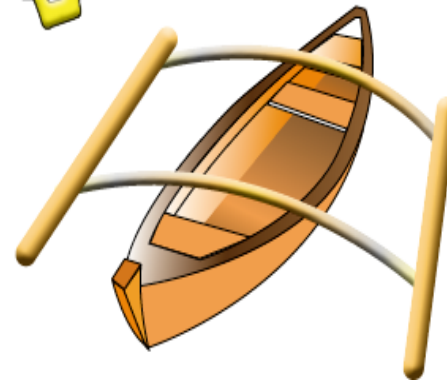




List of optional items:

- Transect tape (50 m)
- Paddle boat
- Snorkel and fins (useful during high tide)





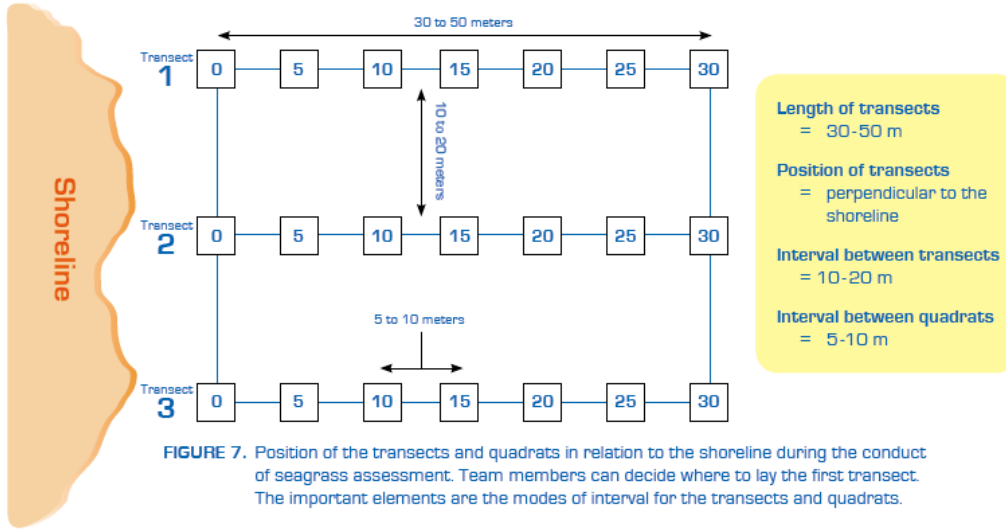


FIGURE 7. Position of the transects and quadrats in relation to the shoreline during the conduct of seagrass assessment. Team members can decide where to lay the first transect. The important elements are the modes of interval for the transects and quadrats.

ACTIVITIES:

1. Plot the seagrass area using Global Positioning System (GPS.

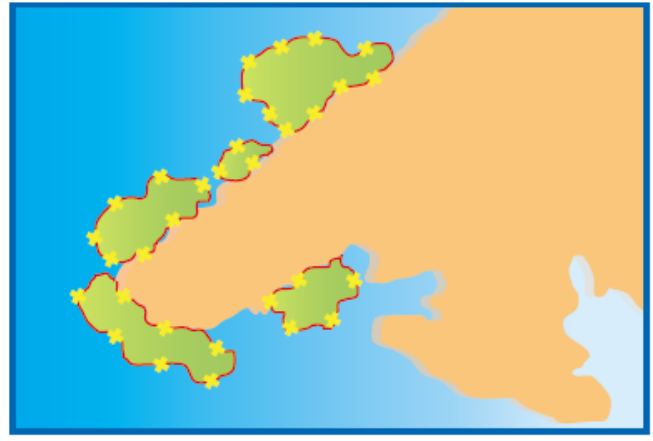


FIGURE 8. Sample of seagrass area plotted from an island.

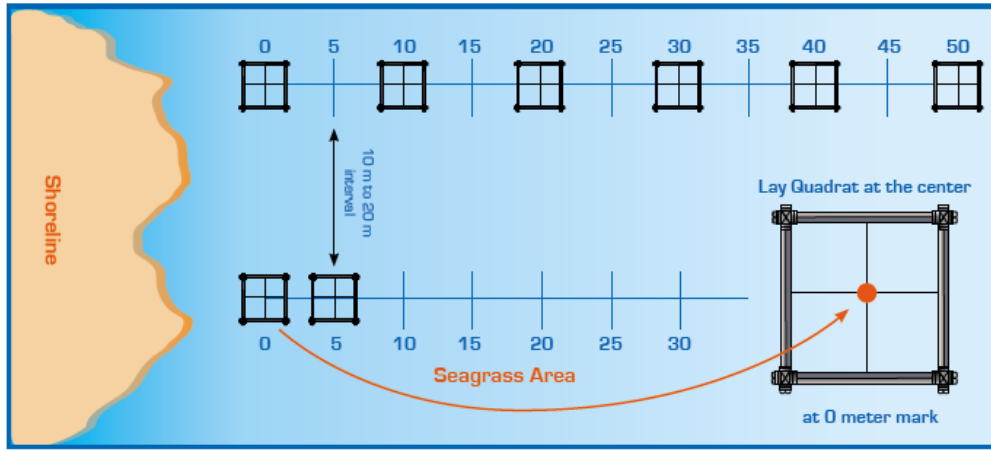


FIGURE 9. Placement of transects, position of transects in relation to the shoreline, and interval of transects.

2. Assign transects (30-50 m) perpendicular to the shoreline with a distance of at least 10-20 meters between each transect. In the transects, the quadrants will be laid in 5-10 meter intervals, depending on how far the seagrass area is from the shoreline. The key is to ensure that the last quadrat is established towards the end of the seagrass area, as shown in the figure below.

3. Lay transects at the start of the seagrass area. Lay transects as straight as possible and position the center of the quadrats at the interval marks, starting at the 0 meter mark.

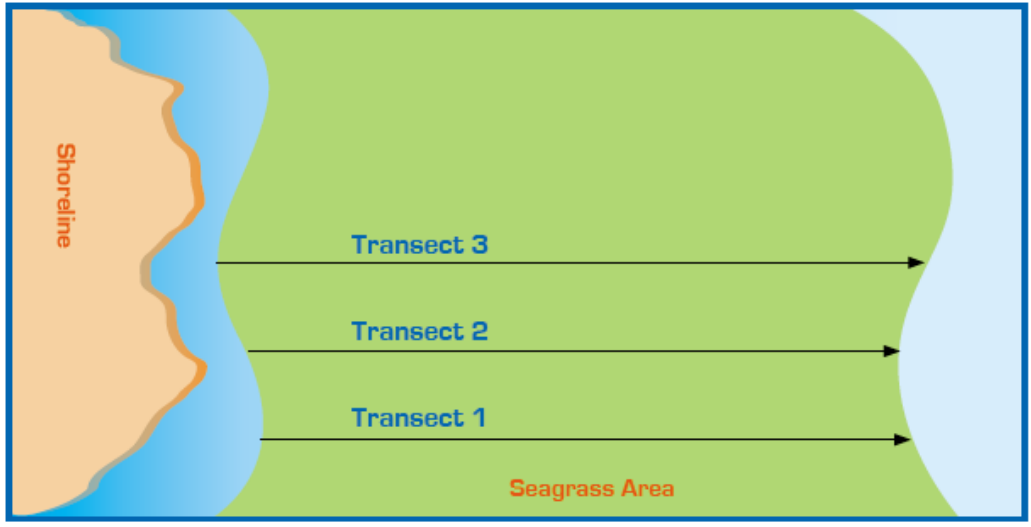


FIGURE 10. Minimum number of transects.

4. Depending on the extent of the seagrass, establish at least 3 transects (or more if the area is wide) in the seagrass area.

5. Identify and record the types of seagrass species and the estimated percentages of the types of species for each quadrat in the transect line. The consistency of the estimation of percent cover depends on the observers. Before the start of the assessment, it is important that participants have leveled off what different percentages (e.g. 5%) look like in a 1 m x 1 m quadrat. Use the Seagrass Identification Guide found in the Annex of this booklet to identify the different species of seagrass.

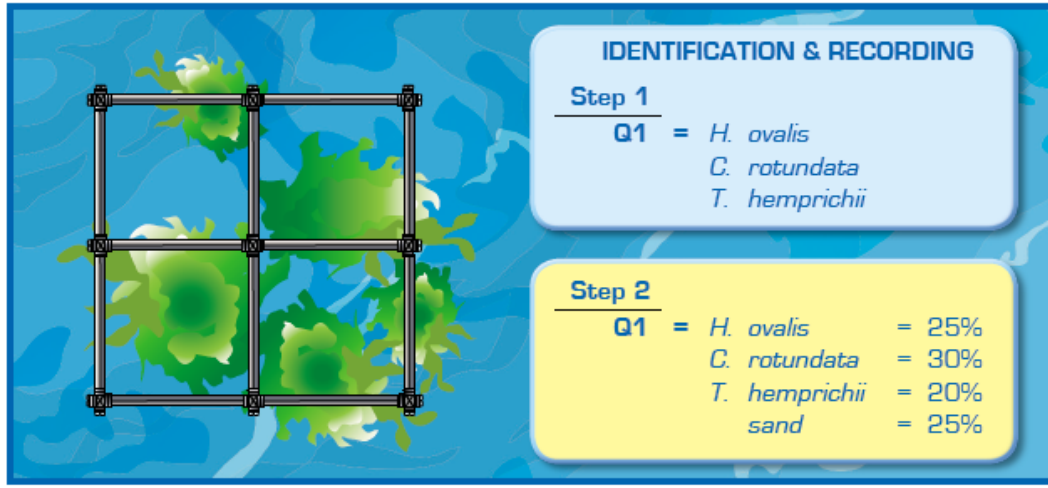


FIGURE 11. Identification, estimation, and recording of seagrass species.

Count and record other organism, plants, and animals found within the quacrat. Be careful not to touch any marine organisms as some are poisonous and harmful

T1 - Q1	-	*T.*	*hemprichii*
	-	*C.*	*rotundata*
		3	*sea urchins*
		1	*starfish*
Q2	-	*C.*	*rotundata*
Q3			
Q4			

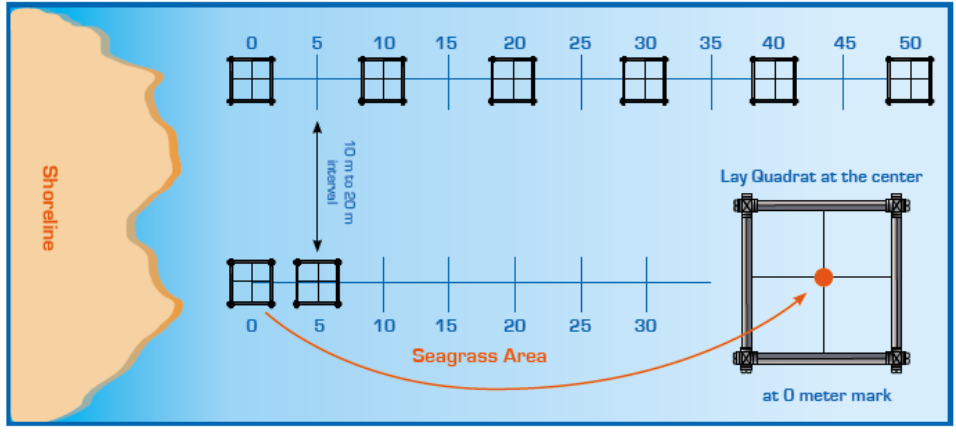


FIGURE 9. Placement of transects, position of transects in relation to the shoreline, and interval of transects.

Record the data using this form.

SEAGRASS HABITAT ASSESSMENT

Transect Data Form

DATE: August 17, 2016 LOCATION/AREA COVERED: Barangay Malinis

Transect No.	Quadrat No.	Species	% cover	Substrate	Other Observations
1	Q1	*T. hemprichii*	20	sandy	3 sea urchins
		C. rotundata	30		1 starfish
		H. ovalis	25		
		sand	25		
	Q2	*C. rotundata*	100		5 starfish
	Q3				

Form adapted from Deguit et al., 2004

Sources:

- Fortes, Miguel, 2015.A Review of : Biodiversity, Distribution and Conservation of Philippine Seagrasses. Marine Science CS, University of the Philippines, Diliman Quezon City
- Green, E.P. and Short, F.T. 2003. World Atlas of Seagrasses. University of California Press, Berkeley
- Hurtado, Anicia Q. and D. Agri. Section 3. Importance And Conservation Of Coastal Ecosystems
- https://www.ocean.si.edu/ocean-life/plants-algae/seagrass-and-seagrass-beds?fbclid=IwAR211spUoHwnlq5z7oJ6lAFyt002Tu54w3dAFJK-6To8wgyLOg4FSgFDX9Wo
- http://www.seagrasswatch.org/id_seagrass.html#IDHM1

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