

4 Seagrass

Assuredly the creation of the *heavens* and the earth is a greater (matter) than the creation of men: yet most men understand not. (Qur'an 40:57)

What is seagrass?

Seagrasses are plants living in the sea. They are specialised marine flowering plants and closer relatives to a mango tree on land than seaweed, which is algae. Seagrasses grow in shallow seas close to the *shore*, and play a very important role in the marine ecosystem because they create a good area for animals to live. There are about 60 *species* of seagrasses in the world, 13 of which are found on the coasts of Zanzibar.

What does seagrass look like and how does it grow?

Seagrass got its name because many *species* have long narrow leaves like the grass that grows on land. The way seagrass grows is also similar, forming '*lawns*' on flat sandy areas under the sea, like a *grassy field*. There are many different types of seagrass, and they are not all grass-like. Some *species* have leaves the shape of small paddles (oval), while others are shaped like ribbons, ferns, or even noodles. Below its leaves, a seagrass plant has a stem and roots. Like some true grasses, the stem of a seagrass plant grows horizontally underground. This well-developed, *creeping* stem is called a *rhizome*. *Rhizomes* are formed in segments, and at the joins between segments, or *nodes*, roots grow down into the sediment and absorb water and nutrients, and shoots and leaves – the part we can see – grow up.



Thalassodendron ciliatum

Thalassia hemprichii

Cymodocea rotundata

Halodule sp.

Halophila ovalis

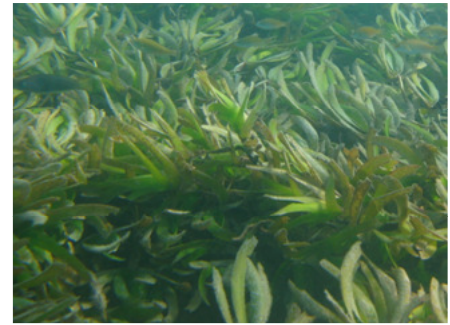
The most common seagrass *species* in Zanzibar, showing the different shapes of leaf © www.seagrasswatch.org

The entire life cycle of the plant takes place under water. Seagrasses can reproduce in two ways. Most seagrass reproduction is asexual: the *rhizomes* grow and branch out so the colony spreads, and if fragments of *rhizome* break off, they can develop into a new plant. If environmental conditions are right, some seagrass plants also reproduce sexually, where male flowers produce pollen which is transported by water currents to fertilise ovules (eggs) produced by female flowers on another plant to make seeds. The flowers are usually very small, so you have to look closely to find them. Seeds vary in shape and size, depending on the *species*. Seagrass flowering and pollination seasons vary between *species* and between plants in different places.

Where does seagrass grow?

Seagrass grows in shallow and intertidal mud and sand flats all around Zanzibar. Large beds can be found in coastal *lagoons*, sheltered from waves and strong currents. In some *seagrass beds*, many different *species* grow together, whereas others have just one *species*. In intertidal areas, the leaves trap water when the tide goes out, which protects the seagrass plants from overheating and drying out.

In general, seagrasses grow best in soft sediments like sand and mud, because the roots and **rhizomes** can easily anchor the plants to the sea floor and take up essential nutrients. There are a number of general environmental conditions that are critical to whether and where seagrasses grow. One important need is the availability of light. Like all green plants, seagrasses need light for **photosynthesis**, so seagrasses grow best in shallow water up to around 25 m in Zanzibar. Seagrass growth is also influenced by water temperature and **salinity**; different **species** have different needs.



Thalassodendron ciliatum at Chumbe Island Coral Park © Nell Hamilton

Why does seagrass matter?

On first sight, a **seagrass bed** might not appear to support much life, but in fact seagrass communities are one of the most productive and diverse ecosystems in the world! They also have very close interactions with other marine ecosystems, especially **coral reefs** and mangroves.



Invertebrate harvester on a Zanzibar **seagrass bed** collecting shellfish for food
© Lina Mtwana Nordlund

One of the most important roles of **seagrass beds** is to provide nursery **habitat** for many different kinds of fish and shellfish, such as snappers, rabbit fish and cockles, that are highly valuable to fishers and their families. The young fish grow up in the safe shelter of seagrass, protected from strong currents and large **predators**, and with plenty of food. Then, when they grow too big to hide in the seagrass, the adults move to **coral reefs** nearby. Other animals, such as sand-crabs, seahorses and shellfish, spend their whole life cycle in **seagrass beds**. However not just small, but also very large animals depend on seagrass. It is the main food source for big herbivores such as dugongs and turtles, which eat both seagrass itself and algae growing on its leaves.

Seagrass beds provide food for people too. Many women and children harvest shellfish such as cockles, oysters and gastropods from the seagrass **meadows** in Zanzibar. This is a good way to add protein to the diet.

Another very important thing seagrasses do is stabilise the sea floor with their roots and **rhizomes**. The tight network of seagrass leaves reduces water movement, and traps sediments floating in the water, so that they settle out on the bottom. This protects beaches and coastal properties from erosion, and makes the water clearer, which in turn benefits corals and other plants and animals that need light. This stabilising process also recycles nutrients, which are returned to the marine ecosystem through the seagrass plants. Seagrass **photosynthesis** produces oxygen, needed by fish and other animals in the sea, and reduces the amount of carbon dioxide. This is very important, because if carbon dioxide levels get too high, the sea becomes acidic and can dissolve coral!

Even after they die, seagrasses are beneficial. Seagrass leaves washed up on beaches stabilise the sand and help protect the coast from erosion. They also provide nutrients for intertidal organisms, and when they are blown up the beach they help plants grow there, further stabilising the coastline.

Ujikua unajua...?

- Seagrasses are not true grasses – in fact they are more closely related to lilies and the Zanzibar spice ginger!
- Seagrasses are the only flowering plants which live entirely under water!
- Different species grow at different **tidal** levels making different ecological zones!
- Some seagrass leaves can be as small as your fingernail, but others can grow over a metre long!
- An adult green turtle eats about 2 kg seagrass a day while an adult dugong can eat up to 40 kg a day!
- The world's biggest seagrass meadows can be seen from space!

What are the threats to seagrass?

Seagrass meadows are vulnerable to disturbance and climatic change, and are being destroyed globally at the high rate of 7% a year! This destruction, directly or indirectly, is largely caused by human activities.

Often, damage is accidental: people do not realise the seagrass is there or how they are harming it! Boats moored over seagrass beds shade them, and at low tide smother them. Anchors tear up seagrass, and when motor boats travel too fast in shallow water, the seagrass gets shredded by their propellers, leaving scars that take years to heal. The impacts affect a wide area of seagrass because they stir up the mud and a lot of sediment gets into the water. This blocks the light from reaching the seagrass so it cannot grow.

Dredging is even more damaging. To make water deep enough for larger ships, channels are dredged or dug out, and the sediment dumped elsewhere. This stirs up a huge amount of sediment which makes the water dark and settles out in a thick layer on top of the seagrass beds, which kills the seagrass, as well as any nearby coral.



Seagrass is sometimes also deliberately destroyed. For example some beach hotels remove seagrass leaves from the beach, to expose the white sand they think tourists expect. This interrupts the natural nutrient cycle. Even worse, whole seagrass beds are sometimes uprooted. But hotel owners soon find that without the protection of the seagrass, the beach gets washed away, and erosion encroaches on the hotel buildings. This is why many beach-front hotels have ugly concrete walls in front of them now – they have destroyed the natural vegetation that would have protected their property. Worse still, the eroded sand gets washed out to sea and smothers corals on the reef!



Hotels that have removed seagrass end up building ugly walls to stop the beach from eroding their properties © Nell Hamilton

Seagrass is sometimes damaged as a result of seaweed farming. To make space for seaweed farms, seagrass beds are removed, which also makes the sand less stable and increases erosion. Even if seagrass is not deliberately destroyed, the seaweed growing above the seabed shades the seagrass so it doesn't get enough sunlight to grow. 3% of the coastal population in Zanzibar is involved in seaweed farming, mostly women. Seaweed accounts for 20% of export earnings of Zanzibar! People use seagrass, especially in coastal villages, to stuff mattresses, as a fertiliser, or as fodder for cattle. It is also used for traditional medicine, crafts and paper production.

Sometimes the damage to seagrass beds comes from the land. Big problems are caused when polluted water flows into the sea after rain. This runoff, polluted by farms, industry or sewage, is full of sediment. It also contains very high nutrient levels, which lead to high growth of algae – an algal bloom. Together these factors make the water so cloudy that not enough light reaches the seagrass for it to photosynthesise or grow. Other pollutants, such as oil from outboard motors, jet skis or cars, are toxic to seagrass and the creatures which live in it. Litter is also washed into the sea if not disposed of properly. Once in the water, it can harm seagrass plants both physically, by smothering them, and chemically, by poisoning them and all the other animals and plants living among them. With an increasing numbers of people living along Zanzibar's coasts, the valuable

seagrass meadows are vanishing more and more. Thus, overdevelopment along the coast is a huge problem for both the marine environment and the people of Zanzibar who depend on it.

Seagrasses are also threatened globally by the impacts of climate change. As water gets warmer, disease activity and algal growth increase, putting pressure on marine creatures. Additionally, extreme weather events which damage the marine environment, such as cyclones, storms and heatwaves, are happening more often.

Tembea ujione!

- You don't have to travel far to find seagrass in Zanzibar, whether you live in the north of Pemba or the south of Unguja! Just walk down to a local sandy beach at low tide, and you will probably find seagrass beds growing there.
- When you walk out to explore a seagrass bed, how many different kinds of seagrass can you find growing there? (Hint: look at the different kinds of leaves!)
- Feel under the mud or sand to see how the rhizomes grow, and how seagrass spreads. Can you find any flowers or seeds?
- How many different kinds of animals can you find living in the seagrass?
- How many people can you see collecting invertebrates in the seagrass bed? How many people do you think they are supporting? What would happen to those people if the seagrass were lost?

How can we protect seagrass meadows?

When motoring in seagrass areas, boat drivers should take care not to anchor over seagrass: anchor on sand, or install fixed mooring buoys instead. Also avoid motoring in shallow areas where the propeller can cut up the seagrass or stir up sediment.

Hotel owners should remember that seagrass prevents erosion of the sandy beaches that tourists come to enjoy and supports local livelihoods, and not remove seagrass from in front of their hotels.

Fishers should use techniques which do not damage seagrass, collecting on foot instead of using nets. It is better only to harvest bigger animals, and let the young ones grow up and reproduce, to ensure there will still be shellfish to eat in the future.

Seaweed farmers should remember that removing seagrass will lead to more sediment mixed in the water, so less light will get to seaweed crops and they will not grow well. It is better to place seaweed farming structures in patches with low seagrass density to avoid shading the seagrass.

Coastal communities can protect their seagrass meadows and the fisheries they support by protecting coastal vegetation such as mangrove, to avoid erosion and sediment smothering seagrass beds.

Communities should also take action to protect the seagrass beds on which they depend for food and protection from erosion. Respect existing protected areas, and if possible, local communities can also set up local no-take zones to protect populations of shellfish to repopulate neighbouring fished areas. To restore areas where seagrass has been destroyed, and encourage growth of shellfish, seagrass beds can be restored through transplantation.

Kitunze kidumu!

- Raise awareness by telling your friends and family how important seagrass is!
- Don't drop taka taka – recycle!
- Don't 'help yourself' on the beach!
- Buy fruit and vegetables grown organically without use of artificial pesticides and fertilizers which can pollute seagrass beds.
- Take care of seagrass beds while boating – go slowly, avoid shallow water, and don't anchor on seagrass!