

Home in Focus

THE OCEAN GARDENERS

Restoring seagrass meadows, one blade at a time

Singapore's inaugural seagrass restoration project seeks to deepen knowledge of tropical seagrass reproduction and transplantation.



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Before the crack of dawn, when most had yet to stir from their sleep, a group of seven people toiled away at a quiet patch of shore in East Coast Park.

With familiar ease, they traversed the seagrass meadow which had emerged at low tide, armed with headlamps and water shoes now streaked with mud.

The team fanned out across the shoreline, stopping from time to time to pot seagrass, which was to be transplanted to a recipient site on Sisters' Islands the next day.

This marked the first leg of the Republic's inaugural seagrass restoration project, co-led by Dr Samantha Lai, deputy director of the National Parks Board's (NParks') National Biodiversity Centre (Coastal and Marine branch), and Dr Ow Yan Xiang, a senior research fellow at the NUS Tropical Marine Science Institute (TMSI).

The project, which seeks to deepen knowledge of tropical seagrass reproduction and transplantation, was launched in September 2024 with close to \$1 million in grants from OCBC Bank.

Unlike past projects, it also has a focus on restoration, which in the environment scene is the act of recovering ecosystems or landscapes that have been damaged.

To researchers like Dr Ow, the project's inception is timely. She said: "As scientists, we have always been pushing for seagrass conservation, which I think is very important. But the reality is that seagrass beds are being lost at a high rate – within South-east Asia, for example, the rate of loss is 5 per cent every year. And if we're losing seagrass beds and conser-

vation action cannot catch up, we have to look for a more progressive and less passive intervention, which would be restoration."

Her team's work, conducted mainly in the St John's Island National Marine Laboratory, focuses on the sexual reproduction of tropical seagrasses.

Unlike seagrasses in temperate waters, which flower seasonally, much less is known about tropical seagrasses, which flower less frequently and regularly.

Seagrasses are also understudied in the region – despite South-east Asia being home to 21 of the world's 72 seagrass species.

Among the 12 species in Singapore, the reproductive cycles of only two – sickle seagrass (*Thalassia hemprichii*) and tape seagrass (*Enhalus acoroides*) – are well characterised.

Dr Ow said: "These two species tend to have longer lifespans and thus bigger biomasses, so their fruits and flowers are also more visible."

To do this, the team has been identifying donor-recipient site pairings across Singapore, where seagrass can be transplanted from a denser, more species-rich meadow, like the one at East Coast, to another, which may have less or no seagrass, like on Sisters' Islands.



Dr Lai said: "When picking out the sites, we look at things like water quality, sediment quality and hydrodynamics. "We want to make sure that the donor and recipient sites are not too different, so that when we transplant the seagrasses, it's not too much of a shock for them, and they have a better chance of survival."

The team also regularly monitors the health of newly transplanted meadows, by measuring the seagrasses' leaf length, and using pulse-amplitude modulated fluorometers to assess how well they are photosynthesising.

But seagrass transplantation isn't always easy, said Dr Lai. While doing fieldwork, her team is at the mercy of the elements – with the low tides that offer optimum working conditions lasting only two hours.

The team has also weathered a thunderstorm or two, said Ms Goh May Ching, a research assistant from TMSI who is involved in seagrass restoration work.

"We've gotten absolutely drenched... I would squeeze my hair and water would come out," she said.

Survival rates of transplanted seagrass have previously also been low, Dr Lai added, possibly due to factors such as human disturbance, or even the movements of crabs, which may dig up newly transplanted seagrass.

When the team returned to Sisters' Islands two weeks later, one of the two plots of transplanted seagrass had close to no leaves left.

Ms Goh said: "It's a little sad, but the rhizomes still look healthy, so the seagrass may possibly grow back."



As for the benefits of seagrass, experts say that there are many. Seagrass meadows are sources of food and shelter for many marine animals, and serve as nurseries for fish larvae and juvenile fishes. And because they have underground roots and rhizomes, seagrasses help to hold sediment together, hence reducing coastal erosion.

Additionally, these meadows are excellent carbon sinks – sequestering and storing carbon dioxide which would otherwise escape into the atmosphere.

Dr Ow said: "I think seagrasses punch above their weight. They occupy such a small area of our ocean space – just 0.1 per cent – but they provide so many ecosystem functions."

With plans for coastal development on Singapore's horizon, restoration projects like this may also help the Republic to expand its land mass, while rebuilding marine habitats impacted in the reclamation process.

Dr Lai said: "It's quite interesting because the site we are on was reclaimed in the 60s and 70s, and since then, seagrass has come back and given rise to a huge meadow. This gives us hope that when we do the future Long Island reclamation, we can recreate these habitats to get the species to come back – and, hopefully, restoration will help us to speed up the process."

As they enter the next leg of their research, Dr Ow and Dr Lai plan to rope in another demographic: volunteers.

Volunteer teams will be led by members of Team Seagrass, a citizen science programme started by NParks in 2007, where everyday Singaporeans help to monitor



Dr Samantha Lai (centre), deputy director of NParks' National Biodiversity Centre (Coastal and Marine branch), briefing the research team before they begin collecting seagrass in East Coast Park.





(From left) Dr Lai and Tropical Marine Science Institute (TMSI) research assistants Goh May Ching and Samuel Lee hard at work collecting seagrass.



TMSI research engineer Gerard Jack Nidhan (left) and research assistant Samuel Lee studying the collected samples.



The team gathering at a quiet patch of shore in East Coast Park. The seagrass restoration project was launched in 2024 with close to \$1 million in grants.



Above: Lightning strikes as Dr Lai (left) and Ms Goh collect seagrass at East Coast Park. The team is often at the mercy of inclement weather.
ST PHOTOS: SHINTARO TAY



Above left: TMSI research assistant Goh May Ching and intern Liew Pei Zhao on their way to Sisters' Islands.

Above right: The leaf length of a seagrass sample is measured to monitor the health of the plant.



Left: Mr Liew using a machine to assess how well the seagrass is photosynthesising on Sisters' Islands, while Ms Goh records the data. The netting cut-outs help protect the seagrass.

Below: Ms Goh using a water monitoring instrument to assess the quality of the seawater on Sisters' Islands. During fieldwork, the team has to work quickly – with the low tides that offer optimum working conditions lasting only two hours.

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Left: The team pushing a trolley loaded with boxes of seagrass up the jetty on Lazarus Island, where the boxes will be loaded onto a vehicle bound for the St John's Island National Marine Laboratory.

Far left: After a hard session of collecting seagrass, the researchers change out of their water shoes.

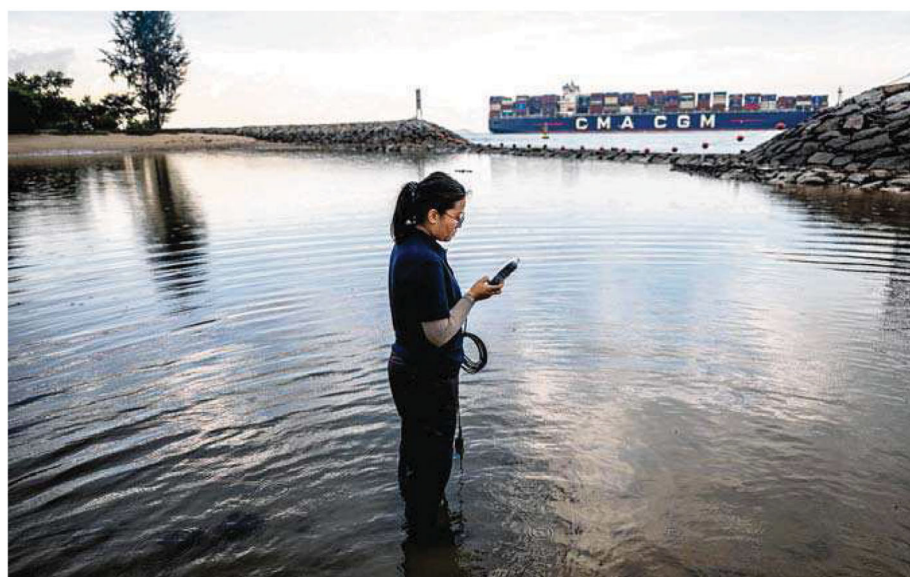
three of the largest seagrass meadows in Singapore: at Chek Jawa, Pulau Semakau and Cyrene Reef.

Slots for these volunteer excursions are often snapped up quickly, Dr Lai said, an observation which the two seagrass researchers find deeply heartening.

Dr Ow said: "Growing up in an urbanised society, most of us really have no opportunity or interest to go out and look at what's happening at our coastlines."

"But I think it is very encouraging, having the public show more awareness not just of seagrass, but also the natural coastal ecosystems that we have – that really helps to let policymakers know that this is what people care about."

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Singapore's ocean gardeners



Singapore's inaugural seagrass restoration project, which was launched in September 2024, seeks to deepen knowledge of tropical seagrass reproduction and transplantation. In late May, NUS Tropical Marine Science Institute volunteer Faith Goh (left) and research assistant Sun Yuchen were among a group of seven who braved lightning and inclement weather to collect seagrass at East Coast Park to be transplanted at Sisters' Islands. Though it makes up only 0.1 per cent of the ocean, seagrass meadows pack a mighty punch, providing food and shelter for juvenile marine wildlife, and serving as excellent stores of carbon. But in South-east Asia, they are depleting rapidly, with 5 per cent of habitat being lost each year. ST PHOTO: SHINTARO TAY [SEE HOME IN FOCUS • A14&15](#)