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A school of barracudas swirls above an Aquascape artificial reef. – Picture by Michael Aw



This turtle and cuttlefish (above right) are among the inhabitants of Pirate Reef. – Picture by Trinna



Picture by Juliana



An Aquascape unit on top of staghorn corals.

Pros and cons

ARTIFICIAL reefs may have proven their worth in restoring ailing coral reefs but they are not always the best remedy for marine conservation – not when expenses remain high.

Each Aquascape unit costs RM500 to manufacture but deploying just 10 of them can chalk up a bill of RM200,000 because of surveys on site suitability, installation and monitoring.

Projects on artificial reefs are much-loved by sponsors because they grab public attention but in the past, some schemes proved to be failures as site suitability studies were not done; neither were there checks to see if the reef was indeed growing.

Thus a nagging thought is whether funds pumped into artificial reefs might be better spent on promoting sustainable coastal development, environment-friendly tourism activities and pollution prevention.

Malaysian Nature Society official Andrew Sebastian says ill-thought out projects divert attention from the core issue – the need to protect coral reefs and prevent their destruction.

"Artificial reefs should only be done in sites with highly degraded reefs. Why invest in them if the area already has a healthy natural reef? They might cause migration of animals from natural reefs, resulting in changes to marine life behaviour or habitat," says Sebastian, who heads the parks and special projects unit.

There are also other ecological concerns. Some artificial reef structures have rusted away, broken loose from storm and wave action, or leached harmful chemicals into ocean waters. And in the Tioman reef restoration project, two Aquascape units were inadvertently dropped over the reef, breaking staghorn corals.

Marine scientist Dr H.M. Ibrahim agrees that artificial reef projects soak up resources but says costs can be brought down by involving volunteers. "Creating artificial reefs will not hurt. It promotes awareness and a sense of ownership. And it is one way to get corporations involved in conservation."

ropes, given time, will eventually become artificial reefs as they provide shelter and habitat for marine life.

To design the Aquascape, D'Orville drew on his underwater photography background. "To take pictures of marine life, I observe where they can be found. So I know their habitat and I incorporate the features into the design of the Aquascape. And as a photographer, I prefer natural-looking reefs."

To mimic a typical seascape, he shaped the Aquascape into a mound with gentle, terraced slopes. The ridges provide flat surfaces for corals to get a foothold. D'Orville believes that once colonised by marine creatures, the Aquascape will blend with the natural reef seascape.

The Aquascape units are made of cement used in marine structures such as jetties. Each is 1m long and weighs

400kg. The shape and weight make them unmovable in water.

Heavy development pressure, thanks to its "duty-free" status, makes Tioman the choice site for the Aquascape artificial reef. Pirate Reef, meanwhile, needs all the help it can get as a mere 500m away, the sea is being dug up for the controversial marina project.

Five volunteers dived from dawn to dusk over two days to position the 58 Aquascape units around the reef edge at depths of 8m to 12m. "It was hard work but it felt good seeing fish come and check out the Aquascape on the first day itself," says one volunteer, Abdul Rahmat Omar Tun Mohd Haniff.

A survey on water current and movement was conducted earlier on to determine that the underwater environment is right for corals to thrive.

Wong has given the artificial reef a head start by transplanting fragments of two species of stony corals, *Porites rus* and *Acropora formosa*, that are common on the reef. These were attached to the first batch of Aquascape units with non-toxic marine epoxy.

Among the 40 to 60 juvenile stony and soft corals which have colonised the Aquascape are *Pocillopora*, *Acropora*, *Porites*, *Povani* and *Millipora* corals. Tiny gorgonian corals have also taken root.

"The first ones were the *Pocillopora* corals, followed by encrusting and slower-growing corals. It is good that we have these as they are hardy and the ones which build the reef," says Wong.

Indeed, given time and a helping hand, a reef will take shape over the Aquascape and eventually, form part of the ocean ecosystem.