

## Installation of Artificial Reefs by the DOF Malaysia

*Ahmad bin Ali, Mohamed Pauzi bin Abdullah, Abdul Aziz bin Yusof, Zaidnuddin bin Ilias*  
Department of Fisheries Malaysia

Artificial reefs (ARs) are objects of natural or human origin deployed purposely on the seafloor to influence physical, biological, or socioeconomic processes related to the living marine resources.

Under the 9<sup>th</sup> Malaysian Plan (2006-2010) focus of DOF Malaysia was placed on building big size ARs for soft bottom (muddy area) and hard bottom (sandy area). These ARs would be used mainly for the protection of coastal habitat from trawlers as well as for enhancement of the lobster resources. It was envisaged that by 2010, DOF Malaysia will come out with new design of ARs for specific purposes (soft bottom, hard bottom and for lobster).



### Common Objectives of ARs Deployment

- Resource enhancement
- Increasing catch
- Diving site
- Recreational fishing
- Habitat protection
- Research
- Mitigation of habitat damage and loss
- Others

### Deployment of ARs in ICRM-PL Project Site in Kuala Teriang

The activity started with site selection of the location based on suggestion from state fisheries office after several consultations between stakeholders (fisherfolk community from Kuala Teriang), SEAFDEC/MFRDMD and Kedah State Fisheries staff.



Consultation (left), sampling of sediment and benthos (center), and sediment sample showing soft bottom (right)

### Specification of ARs for Soft Bottom

The DOF study team recommended that the ARs should have reinforcement using 1.2 cm solid steel bar covered with cement mixture grade 50, and weighing about 18 tons/unit, 3.6 m height x 3 m width x 3 m length. The ARs should comprise 25 piles and connected each other at the base. This is to ensure that the structure is really strong and could not break during transportation and deployment.

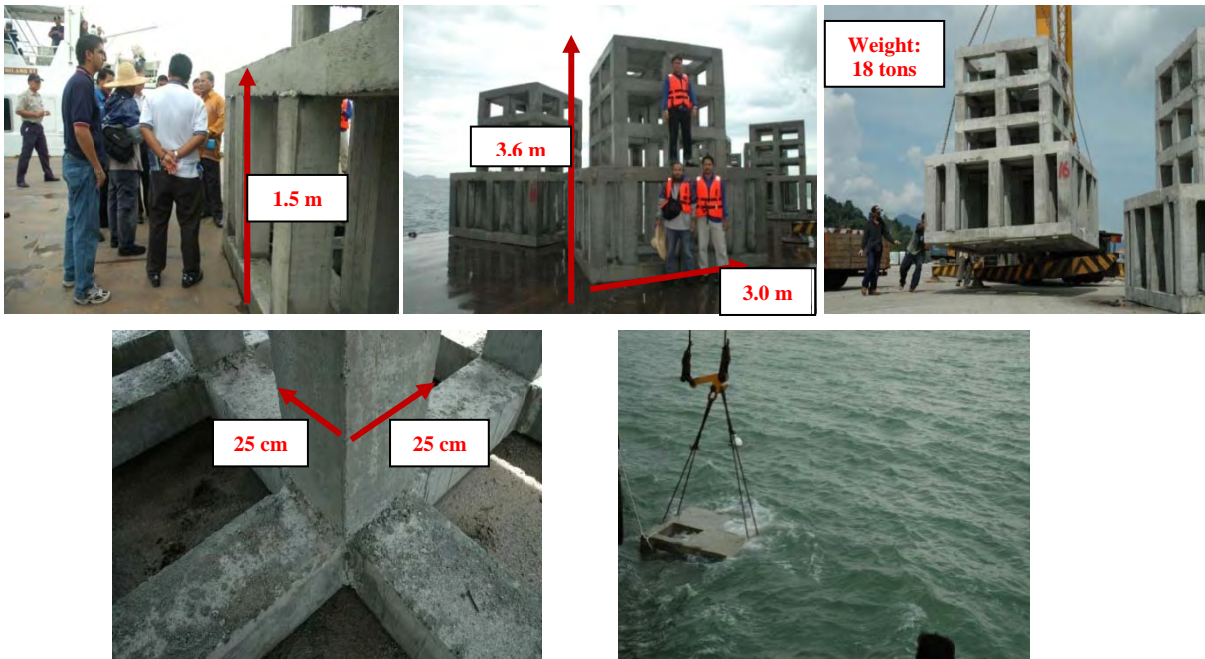


For soft-bottom ARs: construction of base (left), construction of solid steel bar 1.2 cm dia (center), and construction of 25 piles (right)



ARs ready for deployment

The lower part of the ARs is expected to submerge during deployment if the thickness of muddy layer is about 1.5 m. Only upper part (2.1 m) will be on the sea floor.



Structure of base (above) and actual deployment (center and right)



Each AR is marked with styrofoam float (left), the location of ARs (right) is about 1.5 nautical miles from Langkawi Island

## Monitoring

The development of ARs at Kuala Teriang was monitored using CCTV, through SCUBA diving as well as fishing. Three diving trips were conducted but unable to record any photo or video because of very low visibility due to the muddy water. Schools of pelagic fish species such as scombridae were observed around the AR structures. However, the local fisherfolk also informed the project staff that they also caught big size of snappers, groupers, barracudas, Spanish mackerel, cobia, scads, sweet-lips and trevallies during night fishing, using squid as bait.



After three (3) months, snappers, groupers as well as coral species were observed near or inside the ARs. After seven months sessile organisms attract the larvae and juvenile of unidentified fish species around the ARs while adult fish species such as snappers, sweetlips, yellow tail fusilier and groupers were also observed. After 16 months, the structures look like natural habitat of adult demersal species such as snappers, groupers, sweetlips, yellow tail fusilier, etc. while adult snappers and sweetlips were noticed within the ARs structure. After 18 months, adult grouper was observed within the ARs structure.

## Issues and challenges

- Drift nets entangle the bouys and make fishing activity using hand line always not successful
- The area covered with ARs is very small and only few fishermen can go fishing at one time
- The ARs function as fish aggregating devices, where fishermen also catch the adult fishes aggregating near the ARs hence, the ARs are not really for resource enhancement
- Lost fish traps and scattered net materials near the ARs if not monitored would lead 'ghost fishing'
- Catching fish using fish trap near the ARs would result in decreasing of the resources within short period of time
- Recreational fishing or fishing for leisure vs fishing for livelihood at the ARs site, could lead to competition with local fishermen

## Conclusion

- The project at Kuala Teriang is still at experimental stage and SEAFDEC/MFRDMD/FRI should continue monitoring the development especially on the suitability of the design of the ARs.
- Preliminary results showed that the structure could aggregate adult, juvenile and larvae of both pelagic and demersal species.
- The structure has now become new habitat for larvae and juvenile as well as adult of certain species.
- The ARs also resulted in slight increase of the incomes of the local community in Kuala Teriang.