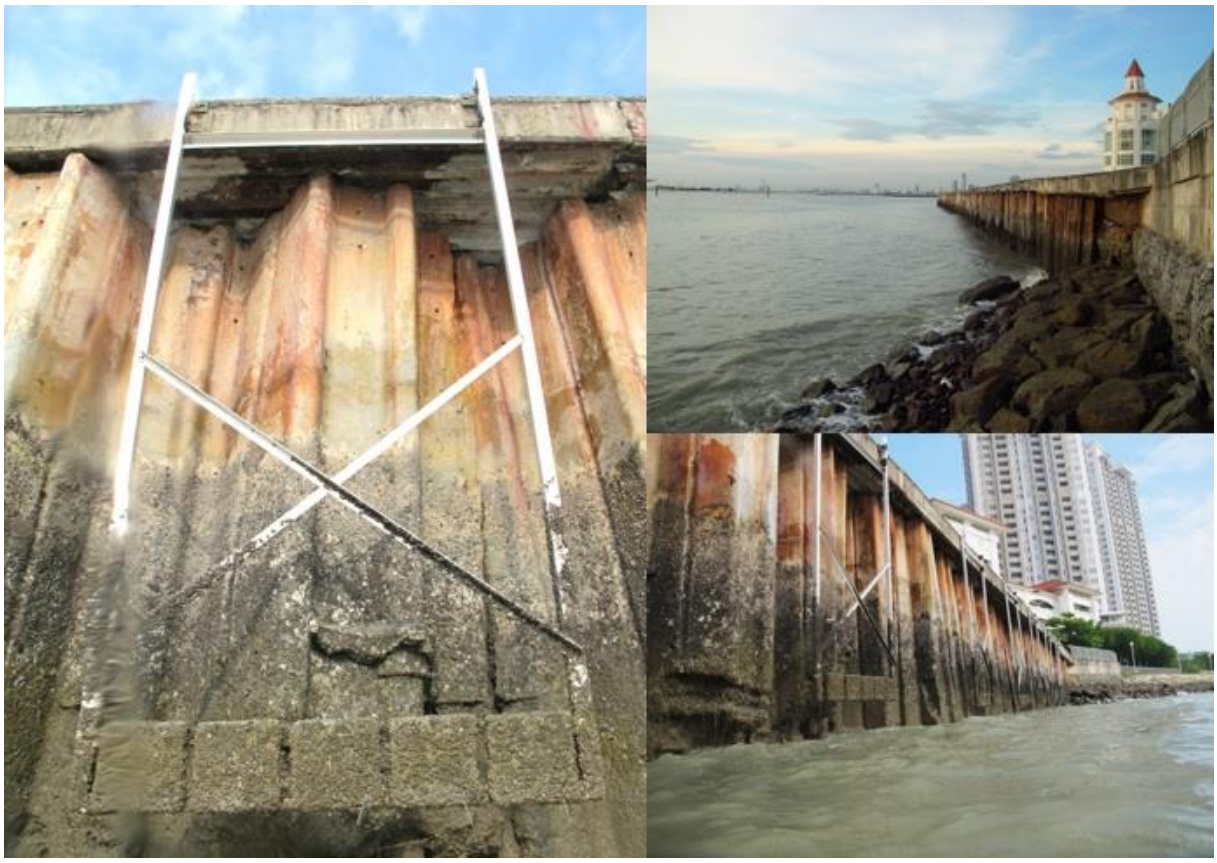
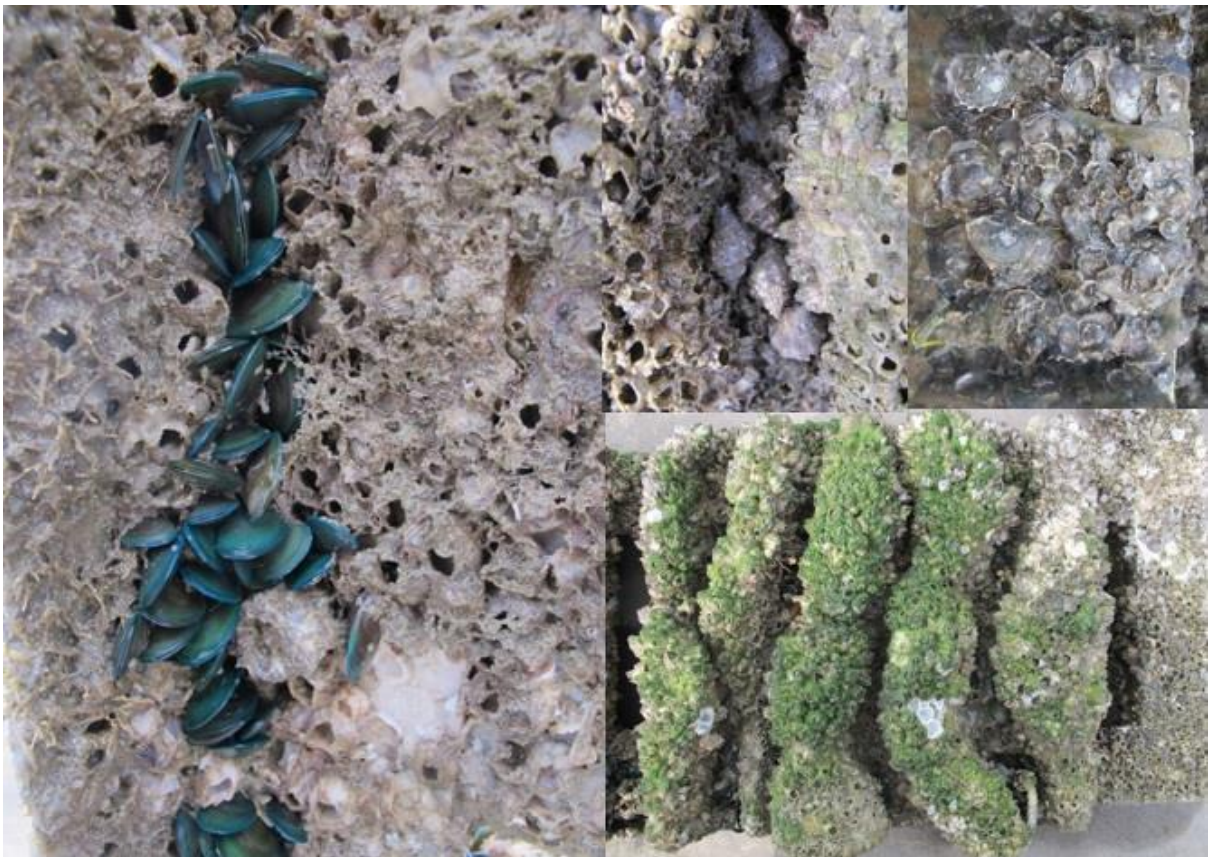
Project Update: October 2017

The green engineering component in the World Harbour Project (WHP) in Penang Island has been supported by the Second Rufford Small Grants since April 2017. In this component, the aim of this project is to investigate materials and designs for the "ecological engineering" of harbours using enhancements which include use of eco-friendly materials, addition of structural features and seeding with native habitat-forming species. In this project, settlement tiles made of eco-material in three different levels of complexity were transplanted with native oyster spats, *Crassostrea iredalei*. This species was chosen for its nativity, ability to filter water and act as ecosystem engineers. The settlement tiles were then mounted onto aluminium frames and installed at two sites on the island - Straits Quay Marina at the north and Penang Port at the northeast of Penang Island. Monitoring of this project has been carried out by postgraduates monthly for the first three months and subsequently, every 3 months. The allocations from RSG2 have been spent on the maintenance of the structures holding the tiles and other equipment, consumables, and engagement of contractors.

The project has so far yielded favourable results with occasional setbacks due to extreme weather. In general, the more complex (higher ridges) settlement tiles performed better than the less complex ones and tiles with no ridges. We think that the space and refuge provided by the deep valleys makes it suitable and favourable for organisms to colonize. We observed 70% of mortality in the oysters so far but where they are still surviving, the oyster spats have tripled in size. The dead oyster still played an important role as ecological engineers by providing space on its shells for other sessile organisms to attach to and mobile organisms to seek refuge or/and breed in. In Straits Quay Marina, we observed thousands of Asian green mussel spats growing on the tiles and between the joints of the frames holding the tiles. We have also observed shrimp and small fishes to be using these tiles during our monitoring.





This project has been highly informative and crucial as one of the very first eco-engineering projects to be carried out in Penang and Malaysia. The insights we gained so far include the effects of sediment type and grain size on the mortality of the oysters, different eco-materials yielding different results in terms of species diversity and abundance and characteristics of species-specific habitat. These insights will be invaluable in future eco-engineering projects. Penang Island is continuously expanding its coasts via reclamation and building of islands. The members of this project have frequently been approached by developers to apply these concepts to their projects. Therefore, there is potential for this project funded by Rufford for which we are grateful for and opportunities abound in the future.

The World Harbour Project will conclude in November-December 2017.