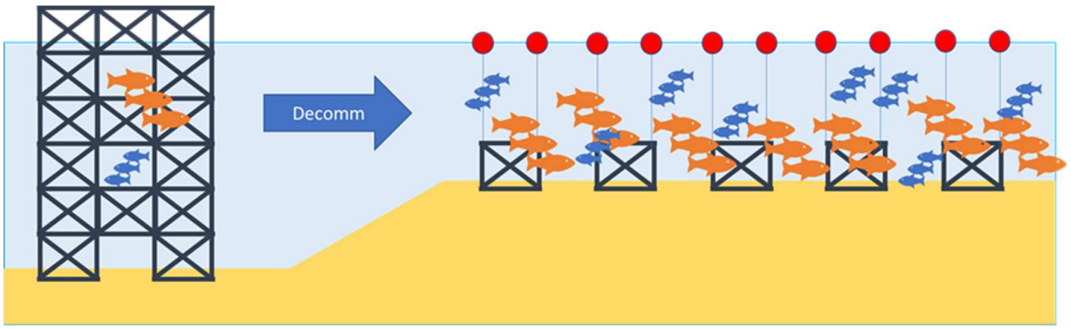
OCEAN ORCHARDS – An overview

SUMMARY

The aim of the Ocean Orchards project is to reverse the decline of the fisheries in Malaysia by developing a prosperous, expanding, sustainable fishing industry which restores the natural abundance and variety of Malaysian waters, and at the same time provides a surplus for export.

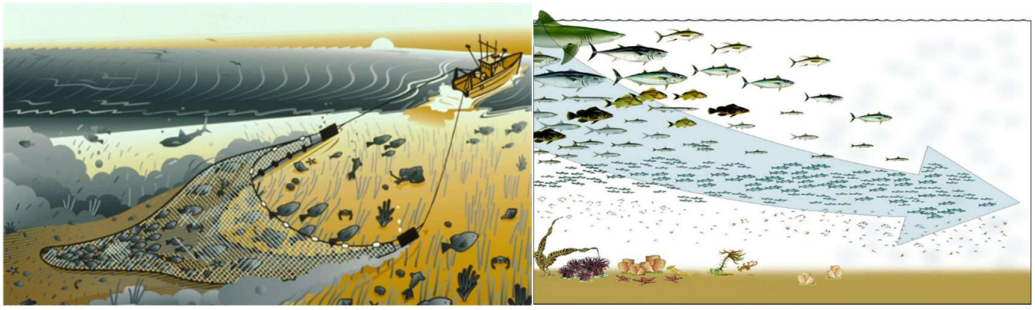
The seabed is rejuvenated by installing new, large-scale fish-friendly habitat across extensive areas of trawler-damaged seafloor. Designed to have a positive environmental impact, these Ocean Orchards will facilitate and enable fishery abundance across large areas, in contrast to the typical small and isolated artificial reefs that have been installed globally.



Based on concrete reef blocks with an abundance of modified FADs, sections of decommissioned oil platforms will also be included to form sections of each Ocean Orchard. As the Ocean Orchard industry develops, the range of alternative materials that can be repurposed will also be identified.

PROBLEM

Most wild-caught fish are gathered with trawlers. This is a destructive technique which severely damages the fragile seabed environment, producing fish in the short term but eventually reducing the primary productivity and long-term yield of the sea to a tiny percentage of what it once was.

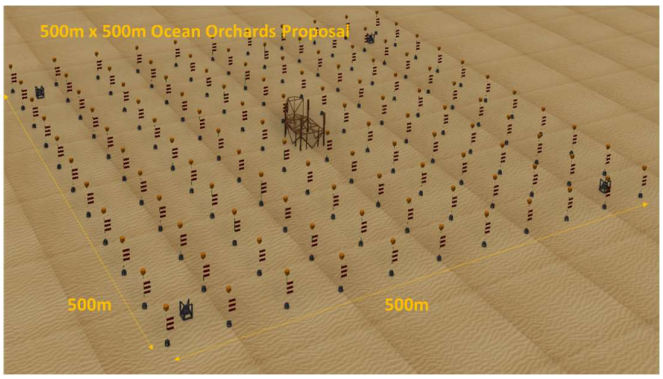


The consequence is collapsing fish stocks, a steady erosion of incomes and opportunities for fisherman and disastrous prospects for the fishing industry in the long term. This pattern is seen across the world as trawling and other unsustainable fishing techniques are used.

OUR SOLUTION

Ocean Orchards are low-cost manmade structures that consist of hundreds of concrete blocks, ropes with buoys, and sections of old oil platforms arranged in 500m x 500m squares providing a massive increase in range and number of sites for marine life to reproduce and grow from the sea bed right up to the surface, which is large enough that it cannot be trawled to destruction. This benefits not just larger fish but also every other part of the marine food chain including corals, seaweeds, sea grasses, worms, phytoplankton

and zoo plankton, wild borne and farm-bred fingerlings, shell fish, star fish, sea cucumbers, crabs, squid, and so on. The vertical element is particularly important to encourage the growth in midwater and surface fish – and this has been demonstrated to occur around operating oil platforms, which have some of the highest productivity environments in the sea.



A key part of the Ocean Orchards design is the use of fixed FADs (fish aggregating devices) which imitate the 'multi-storey' habitat of oil rigs. Work by Claisse et.al. indicates that oil platforms can be up to 30 times more productive than neighbouring natural reef, and even greater compared to trawled sea floors.

Sonar data will be gathered in the Ocean Orchards to build up a data-rich model of the fish distribution in the area. The squares will be separated by lanes that allow licenced trawlers to fish, with access carefully controlled to ensure optimum population and catch. It is envisaged that local fishing cooperatives would be given licences to control areas of, say, 10km x 10km containing 100 individual Ocean Orchard squares to manage as sustainable working units.

Large areas of seabed, eventually thousands of km^2, will be licensed by governments to fishing cooperatives, and fishing companies who will build and run Ocean Orchard areas. These cooperatives and companies will manage the new purpose-designed fishing areas and the resulting increased fish and other marine populations to produce a truly sustainable supply of wild-caught fish.

GOVERNMENT AUTHORITIES AND OTHER INTERESTED PARTIES

Several Malaysian authorities, universities, companies and organisations need to be involved in the delivery of this process. These include MoA, DoF, LKIM, MESTECC, UMT, Petronas, T7 and NGOs such as WWF, Bellona and ReefCheck which each have a shared interest in the Oceans Orchards project. Bringing together so many parties is not easy and this hurdle is one of the a key reason that it has not been done so far.

There are existing rules that grant a 500m exclusion zone around oil platforms and artificial reefs. This arrangement can be adapted to protect the investments made by the various parties in their own Ocean Orchard sites. Legislation will eventually be needed to manage concessions for the growing Ocean Orchards industry which may build upon the early experience using exclusion zone legislation.

CUSTODIANSHIP AND SOCIAL IMPACT

The first large scale 10km x 10km sites will be under the custodianship of a specially formed Fisherman's Cooperative with the assistance of the MoA, DoF and LKIM.

Larger scale commercial sites, which may be further offshore according to the water depth, will be operated along the lines of Plantations by specially formed companies. These companies will raise funds, install Ocean Orchards, produce MSC fish and as an additional side benefit, generate significant Blue Carbon which can be sold as carbon credits. Income from the sale of sustainable fish will bring in a large, steady income for concessionaires.

Local – Ocean Orchards will bring significant opportunity to local fishing communities generating employment, revenue and investment.

Regional – Ocean Orchards can be a key area for cooperation with other ASEAN countries. The nations around the Coral Triangle all have large areas of heavily trawled seabed which can be rejuvenated by Ocean Orchards.

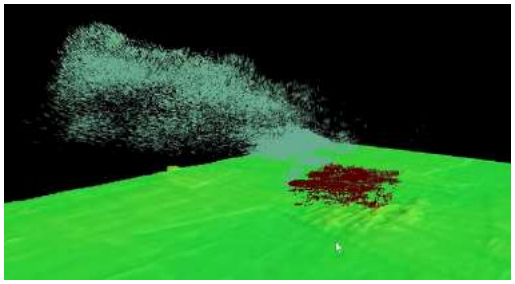
National – The new fishing areas will create an additional sector for GDP growth. This expanding area will be part of the gradual transition to a more diverse, low carbon economy.

International – Ocean Orchards provide a positive, progressive measure to restore wildlife and diversity in South East Asian tropical waters, and at the same time will substantially increase the amount of sustainably caught wild fish. The blue carbon created by Ocean Orchards will also contribute to Malaysia's Paris Agreement commitments, and contribute to 11 of the UN's 17 sustainable development goals:

BENCHMARKING OF SUCCESSFUL REEF PROJECTS

PULAU KAPAS RIGS TO REEFS SITE STUDY

A 'rigs-to-reef' site was installed at Pulau Kapas, Terengganu, in 2017 by Malaysian contractor, T7, for DoF. This site is 10m x 8m x 5m tall, and there is now a considerable population of fish and many other marine flora and fauna living around this structure.



Although this is great news, it also highlights that small projects only provide small improvements. For large-scale improvement of the fisheries industry, extensive areas of trawler-damaged seabed will need to be converted to Ocean Orchards.

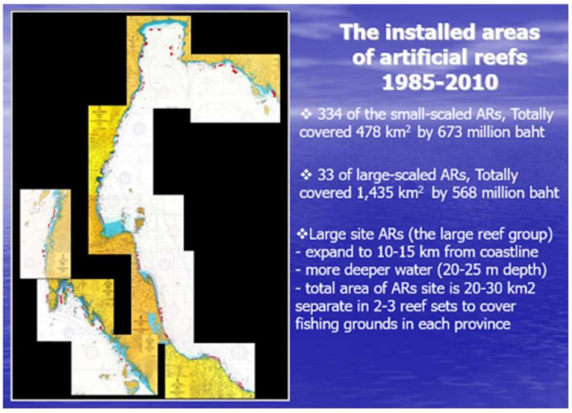
INTERNATIONAL PROJECTS

RecFishWest has installed 20 artificial reefs for sport fishing, offshore Perth, Australia which has made substantial improvements to the local fishing stocks. The installation of these reefs and other artificial reefs around Malaysia, Asia and the rest of the world have collectively demonstrated most of the techniques that will be used. What they all lack is the necessary scale and vertical height.

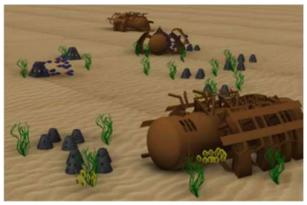
The key difference with Ocean Orchards is that reef blocks, old rig sections, and FADs will be used together to create the scale, and the height create large 'closed' areas with adjacent 'open' lanes where fishing can continue.

Malaysia Artificial Reefs Site Installed in 2006-2016

STATE	NUMBER OF ARs SITES	
	CONSERVATION	RECREATIONAL
Perlis	2	-
Kedah	18	1
Pulau Pinang	3	1
Perak	4	3
Selangor	9	-
Negeri Sembilan	3	-
Melaka	3	1
Kelantan	8	1
Terengganu	27	6
Pahang	7	2
Johor	3	3
WP Labuan	9	2
Sabah	16	28
Sarawak	13	8
TOTAL	125	56
	181	



This Open and Closed areas side-by-side will be a world-first for which Malaysia is ideally suited. Ocean Orchards will greatly improve the condition of the seabed in Malaysian waters by closing-off large numbers of small squares which will act as mini marine protected areas. Everyone can benefit, including the existing local fishing communities, who will have vastly increased stocks to fish.



BUSINESS CASE

This new enterprise will develop over several years to reach full scale with the potential to generate millions of tonnes of new fish and billions of dollars of additional revenue that does not exist today. Ocean Orchards will create significant employment, revenue and investment for Malaysia.

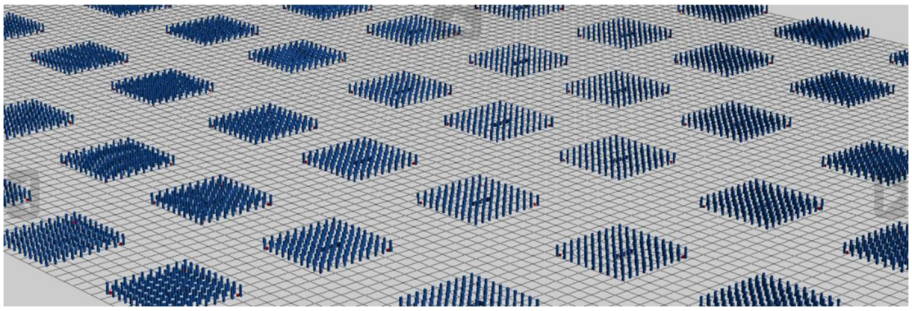
It is intended, and necessary that the Ocean Orchards programme is a profitable enterprise which also rejuvenates the seabed. Only profitable businesses can sustain activity for the years necessary to move to this new form of fish husbandry:

- Financial support for the first Ocean Orchard fishing cooperatives will be required until they are self-sustaining from the fish sales revenue.
- Once demonstrated at the larger, Cooperative scale, operating companies will raise their own finance to develop their own Ocean Orchards offshore in the various trawler damaged areas to build a substantive export market.
- Fishery yields in the Ocean Orchard areas and fish stock management a responsible and truly sustainable manner must be studied in depth and operations adjusted accordingly.
- An initial installation cost less than RM 2 million per km^2 has been estimated (a 500m x 500m square with lanes on either side). A key objective is to drive down the installation costs by adopting mass production. Note that the small-scale reef bock installation in 2018 at Pulau Kendi, Penang, already has a notably lower cost than used in this estimate.
- An Ocean Orchard area is expected to require between 12 and 24 months to become established. Thereafter the costs of the installation are expected to be recovered in 18 to 36 months.

PROJECT IMPLEMENTATION

As a new project the implementation will be in several phases:

- Establish kilometre-sized Ocean Orchard areas to demonstrate the principle and allow the necessary scientific study to take place. It is proposed to demonstrate the Ocean Orchards principle by expanding the existing Pulau Kapas site to 500m x 500m with new reef blocks and FADs. Working closely with local fishermen, UMT and DoF to gather the necessary scientific data;
- Once demonstrated on a small scale, install Ocean Orchard areas of 10km x 10km, operated by Fisherman's Cooperatives that are set up by LKIM. Link these new fishing areas to Fisherman's Markets promoted by LKIM to provide a reliable supply of sustainable fish operated by each cooperative fishing community. This will demonstrate operation at large scale and establish the necessary permitting, licensing and operating system based on real operating experience;



- Establish plantation-scale operations further offshore, using a government-issued special permits, to fulfil additional demand and expand export markets. Specially formed companies will develop and operate these areas to produce MSC sustainable fish;
- Malaysian Authorities will be needed to establish the necessary, licences, permits and laws for the operation of the large-scale Ocean Orchard concession areas.

COMPETITION FROM AQUACULTURE

Although potentially viewed as a competitor, aquaculture is complementary. Excess feed and effluent from aquaculture farms will feed Ocean Orchards and stimulate a wide range of additional wild local fish, shellfish, seaweed, sea cucumbers and other valuable products. This would, in turn, keep the waters clean around aquaculture nets to improve the health of the farmed fish. Co-locating the activities would improve the economics of both.

PRODUCTS

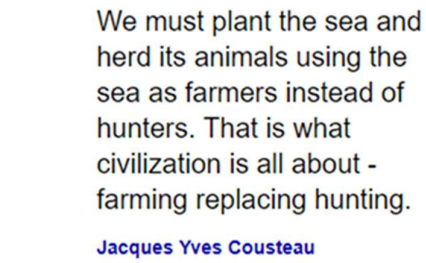
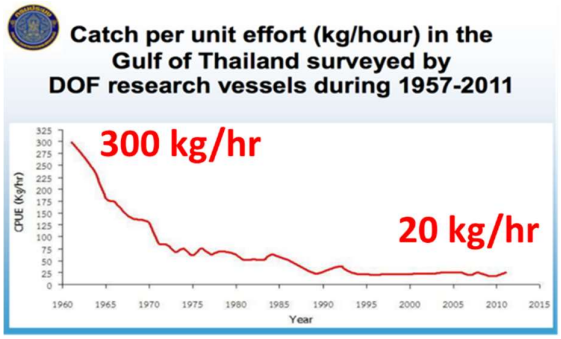
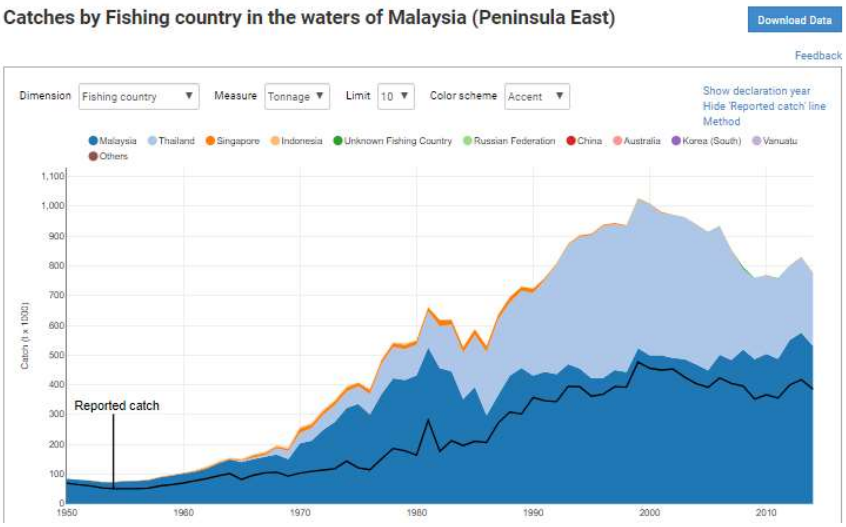
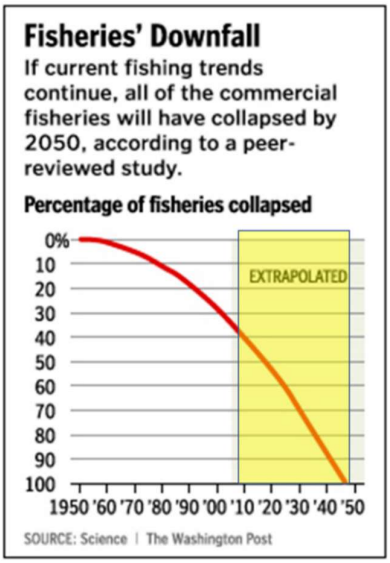
The primary product of Ocean Orchards will be the fish collected at these sites. A range of secondary products will variously include seaweed, shellfish, lobsters, crustaceans, sea cucumbers, etc.

The Ocean Orchards concept can be further expanded to make large amounts of fish for the global MSC sustainable fish market. Dedicated companies will be set up to establish and run these areas.

CONCLUSION AND WAY FORWARD

Ocean Orchards will become a major new industry for Malaysia where the fishing industry and nature work together in harmony to create abundant new habitats. These managed habitats will increase fish output while preventing capture of all fish and the damaging of the fragile seabed.

Interested parties must now work together to deliver the Ocean Orchards trial at Pulau Kapas (or any other suitable site) to prove the effectiveness of the proposal, and then move onto larger Ocean Orchards operated by Fisherman's Cooperatives.

REFERENCES

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