

Status of Artificial Reefs In Malaysia

By

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Introduction

- ✦ Up to the year 1990's Department of Fisheries has deployed 3,000,000 tyres as artificial reefs. Deployment of tyre reefs has stop after the launched of 1987 artificial reefs in Pulau Pisang Pontian Johor.
- ✦ 1990-2004 DOFM started to deploy pre-fabricated concrete and PVC reef for special purpose artificial reef for example for Lobster and squid.
- ✦ In 2000 Reef ball was promoted to Malaysia



Peninsular Malaysia
(DOF 1987)



Definition

- ✦ *Artificial Reefs are man-made structure sunk (accidentally or constructed) underwater to increase fish resources in an area (Ino, 1974)*
- ✦ *This includes structures for example fish trap, FAD, Payao, Kelong, wreck etc.*

Aims

- ▲ *The primary aims of DOF artificial reef program are;*
 - ▲ *to enhance the fishery resources by using artificial reefs*
 - ▲ *to use the artificial reefs as a mitigating method to control encroachment by fishermen into fish protected area*

Parties Involved in development of artificial reefs in Malaysia

- ▲ *Department of Fisheries Malaysia (officially since 1975)*
- ▲ *Local Fishermen- not recorded*
- ▲ *LKIM(Fisheries Development Board)- 1990's*
- ▲ *Universities and Local governments*
- ▲ *NGOs for example diving club*



Objectives of Artificial reef programs

- ▲ *To increase fish resources*
- ▲ *To stop encroachment*
- ▲ *Protection of turtles (Sarawak Islands)*
- ▲ *For fishing activities*
- ▲ *For target species for example lobster grouper*
- ▲ *For SCUBA diving purposes*

Type of Artificial Reefs

- ▲ *Used Materials*
 - ▲ *FAD's- bamboo, coconut leaves, sand bags*
 - ▲ *Scuttled boats,*
 - ▲ *tyres*
- ▲ *Pre-Fabricated*
 - ▲ *Concrete cubes, pyramids*
 - ▲ *PVCs'*
 - ▲ *Jetties*
 - ▲ *Oil rigs*

Tyre reefs

- ✦ *First deployed in 1975 near Pulau Telor, Kedah.*
- ✦ *Non design modules, only tied together*
- ✦ *More at Pulau Payar, Kedah from tied together design to pyramid design*



Pyramid Design



Concrete reef

- ▲ *Pilot project deployed at Pulau Payar in 1988 from culverts*
- ▲ *other sites are in Tioman, Terengganu*



PVC Reef

- ▲ *Pulau Payar for colonization study*
- ▲ *Pulau Perhentian big structure- 80 units*
- ▲ *The latest was the Royal Reef of Johor in 2004- 100 units*



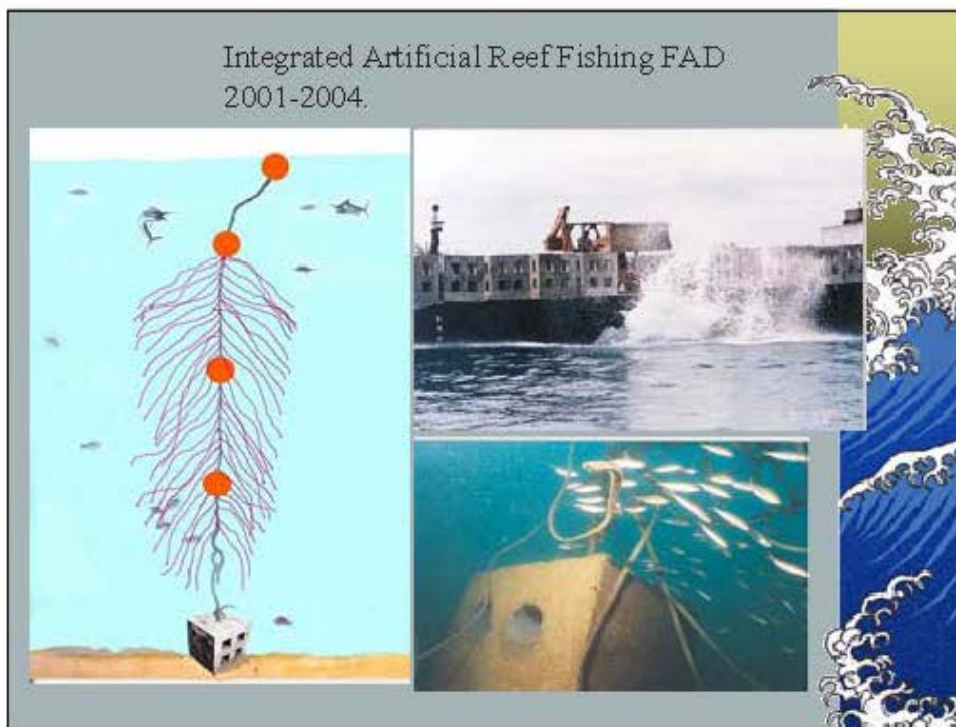
PVC module



Boat Reef

- ✦ *Scuttled used boats, at selected sheltered sites*
- ✦ *Wooden boats lasted from eight months to few years*





Survey Methodology

- ▲ *Non destructive observation;*
 - ▲ *underwater photography*
 - ▲ *visual*
- ▲ *Hand line fishing*
- ▲ *Identification done using available guides from FAO and others*



Deployment depths

Artificial reefs in Malaysia can be divided into two depth groups

- 40 feet or less
- more than 40 feet

Deployment Method



Using Barge and tractor



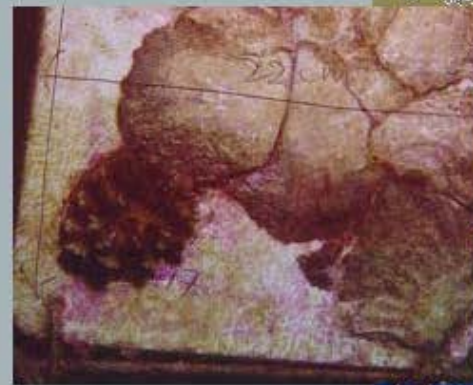
Official marking of artificial reefs

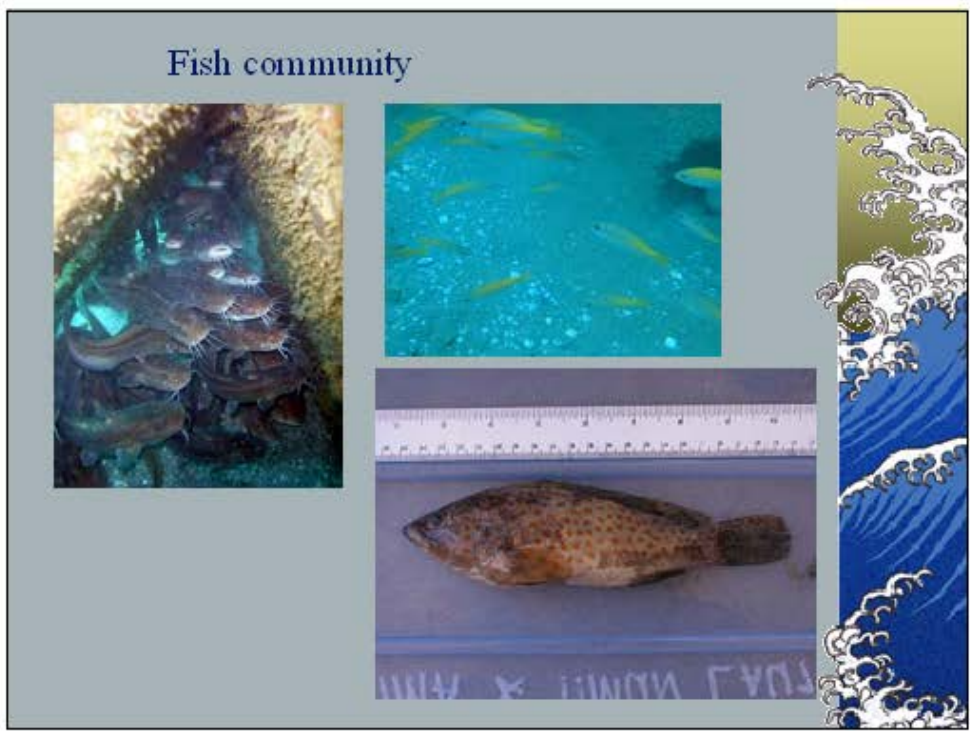


Criteria used to determine success are

- ✦ *Increased in fish stock*
- ✦ *Increased in catch rates*
- ✦ *Increased in colonization of substrates*
- ✦ *Increased in overall diversity*
- ✦ *Decreased in illegal encroachment*

Artificial reefs deployed less than 40 feet to study colonization, encrustation of oyster after 2 months





Fish species



Chromis sp.



Snappers and others

Reef Ball, two month after deployment



ARS at 70 feet, sandy bottom, deployed more than five years

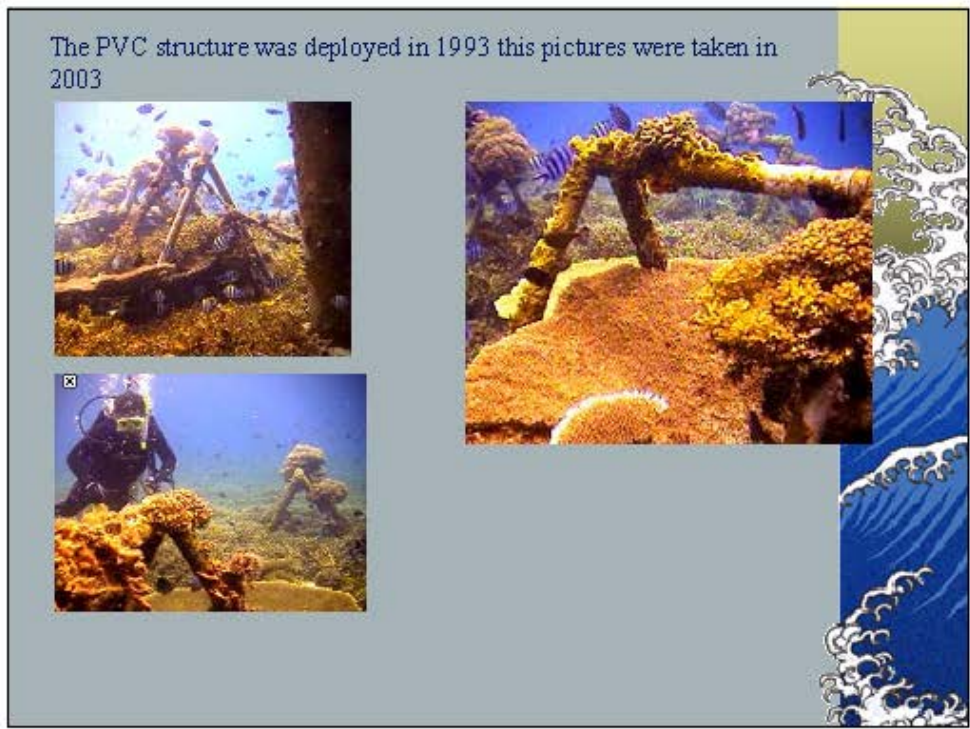


Tyre reefs after more than five years



Other hard coral colonizations

- ✦ *Other hard coral colonizations took from 3-7 years to be significant.*
- ✦ *Coral growths normally slow, can be overgrown by algae and siltation*

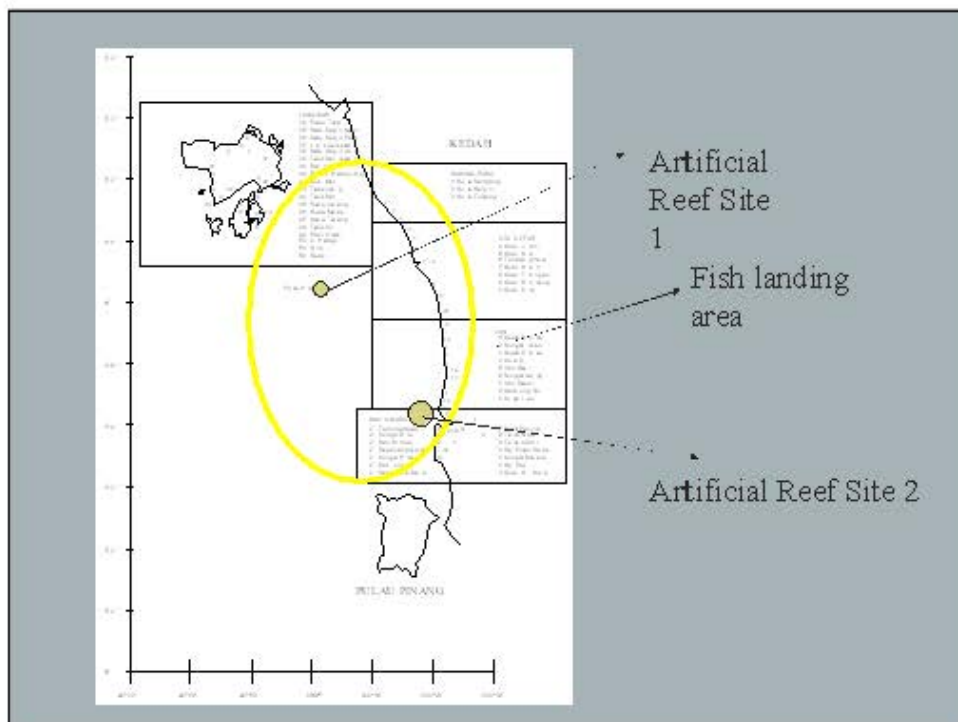


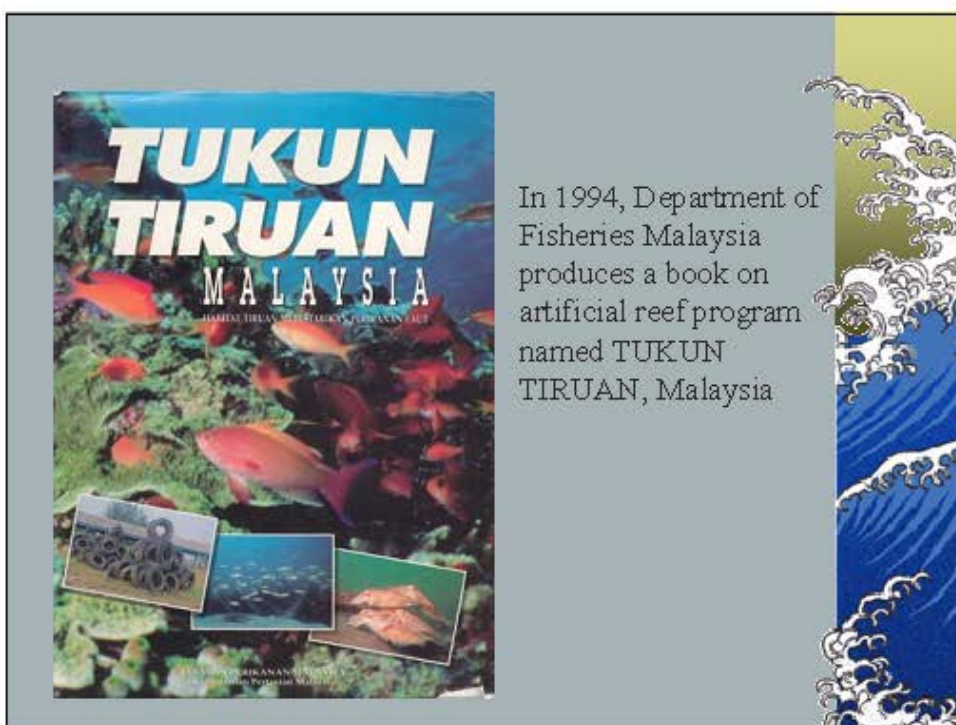
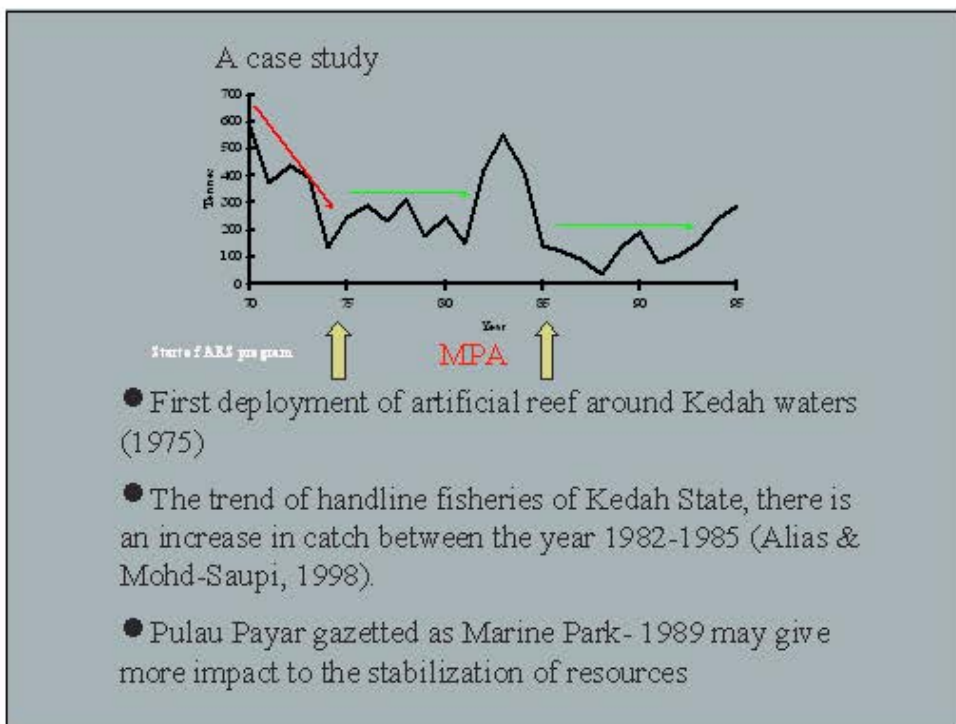
Success on a large scale ecosystem

Success in increasing fish resources of a large area was difficult to determine as most of artificial reef program were small and patchy.

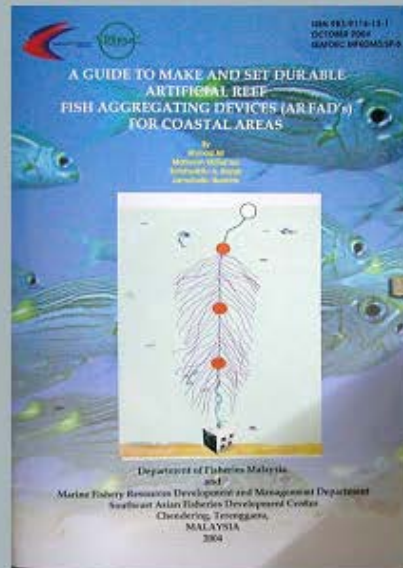
Other influencing factors cannot be easily single out to show the success of the artificial reefs

One example of analysis of resource data was carried out on the coastal hand line fisheries in Kedah State, to determine the usefulness of artificial reef program.





A guide produced by Mr Ahmad Ali in October 2004.



In Future, DOFM is aiming for larger and bigger artificial reefs. These reefs must be able to give enough spaces for fish on muddy bottom. One of the design is using decommission oil rigs as artificial reefs

Recommendation/Observation

- ★ *Site selection is the most important aspect in artificial reef building.*
 - ★ *Success in fish colonization*
 - ★ *Success in encrusting organisms colonization*
- ★ *Depth determine which organisms to flourish either photosynthetic or non/low photosynthetic.*
- ★ *Size and availability of hiding places determine the number of resident type fishes*
- ★ *In one of the study sites fish juveniles recruitment occur after north-eastern monsoon*

Recommendation/observation

- ★ *Any nontoxic material can be used to construct Ars but consideration should be given on available spaces, variation of space size and the Ars purpose*
- ★ *Larger and higher profile reef can contribute more to enhance fish resources especially the pelagics*

