

Installation of Artificial Reefs (Unjam-Unjam) by LKIM

Dianatul Azni Binti Mohd. Yazid

Economic Officer

Fisheries Development Authority Malaysia (LKIM)

Kuala Lumpur, Malaysia

Unjam-unjam is an artificial reef developed by the Fisheries Development Authority Malaysia (LKIM) that combines a permanent structure (artificial reef) and semi-permanent structure (FAD) purposely on the seafloor to influence the physical, biological, or socio-economic processes related to the living marine resources in coastal waters. It is a practical and effective way to gather fish and breed in the short run, and to recover marine sources in the long term.

Previously, old tires were commonly used but now the trend has switched to using concrete blocks and other materials such as steel, ceramics and rock incorporated in custom-designed artificial reefs.

The main objectives of deploying this government – funded “*unjam-unjam*” scheme which the LKIM first adopted in 1983 are:

1. To enhance the biological productivity and fisheries resources in the inshore waters (0-5 miles) through the creation of new fish habitats;
2. To enhance the productivity of catching as compared to cost of operation, time consumption will be less for searching the fishing area;
3. To rehabilitate and conserve fisheries resources adversely affected by trawling activities;
4. To create a kind of “user right” for the artisanal fisherman over the fisheries resources around the “*unjam-unjam*”;
5. To promote awareness and sense of responsibility among the fisherman to sound resource management and conservation practices; and
6. To encourage the business activity of sport fishing and local tourism by the fishermen.

UNJAM-UNJAM (LKIM’S ARTIFICIAL REEF)

Apart from being functional as **Fish Aggregating Devices (FADs)**, *unjam-unjam* also acts as sanctuaries for marine fishes, once marine growth has already flourished and new ecosystem is created. The materials chosen should resist rapid corrosion and should not introduce harmful substances into the marine environment. LKIM’s “*unjam-unjam*” scheme is socio-economically biased towards increased accessibility to the resources, catches and incomes of the artisanal fishermen.

As of December 2007, a number of LKIM’s *unjam-unjam* were constructed and established at over 500 locations all over the country’s coastal waters. About 65% *unjam-unjam* in Peninsular Malaysia are located in the coastal waters off the east coast as the west coast has the disadvantage of being narrow and having unsuitable substrate such as the Straits of Malacca.

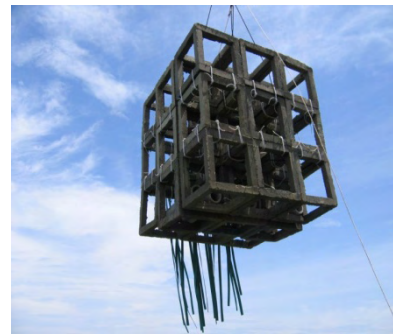
TYPES OF UNJAM-UNJAM



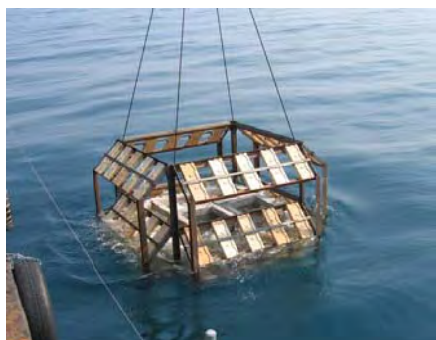
KUBOID MARINOVASI



UNJAM SOTONG



UNJAM KUBOID



BIO-CERAMIK



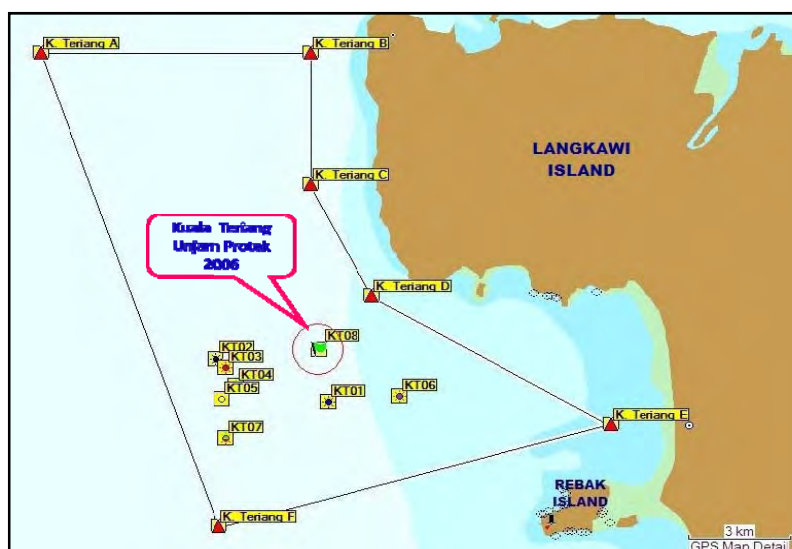
UNJAM SOTONG



SINE SLAB

For the Integrated Coastal Resources Management Project (ICRM-PL) in Pulau Langkawi, LKIM's main participation is to develop and construct the artificial reef (*unjam-unjam*) for deployment in the demarcated zone in order to rehabilitate and enhance the coastal resources. The details on the installation of ARs by LKIM are as follows:

- Date of Installation : 21 January 2006
- Types of ARs module : concrete 'Unjam Protek'
- No of Units : 10
- Total Project Cost : RM 183,000.00
- Location : Demarcated Zone Kuala Teriang
- Water Depth : 21.7 meter with muddy-sandy bottom sediment



Location of Artificial Reefs and FADs in the waters off Kuala Teriang, Langkawi

The Unjam installed by LKIM in Kuala Teriang, Langkawi, Malaysia

No	Location	Year Built	Type of Module	Coordinates	Budget (MYR)
1	Kuala Teriang 1	1990	BAMBOO+CYLINDER	06°19.6'N, 99° 37.8'E	28,000
2	Kuala Teriang 2	1991	CUBOID+CYLINDER	06°20.327'N, 99°36.006'E	10,000
3	Kuala Teriang 3	1992	CYLINDER	06°20.183'N, 99°36.162'E	10,000
4	Kuala Teriang 4	1994	CUBOID	06°19.878'N, 99°36.339'E	10,000
5	Kuala Teriang 5	1997	CUBOID	06°19.652'N,99°36.106'E	30,000
6	Kuala Teriang 6	2001	CUBOID	06°19.700'T, 99°38.939'E	80,000
7	Kuala Teriang 7	2004	CUBOID	06°18.990'N, 99°36.171'E	100,000
8	Kuala Teriang 8	2005	PROTEK	06°20.492'N, 99°37.645'E	183,000

The Unjam Protek 2006 of LKIM in the ICRM-PL Project Site in Kuala Teriang



INSTALLATION OF UNJAM-UNJAM

- Installation work includes preparation, laying-down, diving and handling on barge
- Global Positioning System (GPS) is used to provide the position of the proposed location of the artificial reefs
- Although the criteria for site selection had been established, the zoning of ARs within the municipal waters has to be considered, considering that sometimes, AR location intervenes with other fisheries activities
- Divers are needed to carry out underwater activities such as guiding the position of artificial reefs, releasing of slings, underwater inspection and rearranging stones as found necessary



ARs properly stacked and loaded at both sides of the barge

ARs ready to be installed at identified position



On-board crane lifting the ARs

ARs unloaded and placed on the seabed

UNDERWATER VIEW OF INSTALLED UNJAM PROTEK



After Unjam Protek is lowered to the seabed, diver's responsibility is to guide the ARs to position in the site

MONITORING AND RESEARCH PROGRAM WITH OCEANOGRAPHY INSTITUTE

On April 2007, research by INOS under Malaysia University of Terengganu found that all unjam structures on various locations in Kuala Teriang did not receive major damage due to the 2004 tsunami. Thus, the fishermen were able to continue their regular activities in Kuala Teriang.

Moreover based on feedback from fishermen who fish in the AR areas, they indicated that they are beginning to experience increased incomes and returns. Thus, more artificial reefs were requested by the local fisherman especially in Langkawi Island. Unjam-unjam came from the concept of making the best house for marine life, thus making the fishing grounds rich enough for fishermen to get good catch.