

**ENVIRONMENTAL DEPARTMENT**

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## PTNNT REEFBALL MONITORING

### 1.1. Background

Reefball is an artificial dome-shaped coral with some holes in its body. The form designed resembles the natural form of coral reef. Until November 2006, 678-reef balls consisting of 376 bay balls and 302 pallet balls had been placed in Benete Bay waters since its first drop on May 2004. To identify whether corals can grow on a reefball in the seabed it needs to conduct a regular monitoring, which is part of reef ball monitoring program. The monitoring is carried out on six monthly basis namely on Q2 and Q4.

### 1.2. Purpose

During the recent Q4 survey (29-30 November 2006) there were target to achieve:

- a. To record biota coverage that have attached to reefball body.

### 1.3. Method

- a. Observation on biota attached to reefballs by using 50 x 50 cm transect quadrates equipped with 5 x 5 sub transect respectively. Thus, the total is 100 boxes of sub transects. The percentage of reef biota coverage is based on the number of sub transect boxes that cover biota coverage on the reefball (coverage per 0,25 m<sup>2</sup>). Each reefball is monitored three times transect at different sides.

#### 1.3.1. Observing Biota on Reefballs

The initial monitoring on corals on the reefball was carried out on December 2004 by using visual method. The monitoring aimed at identifying types of biota existing on reefballs in general. The use of transect square was started when the monitoring was carried out on March 2005. The use of transect square method helps identify the growth of abiota (especially, hard coral), which is monitored continuously, as seen in Figure 3.

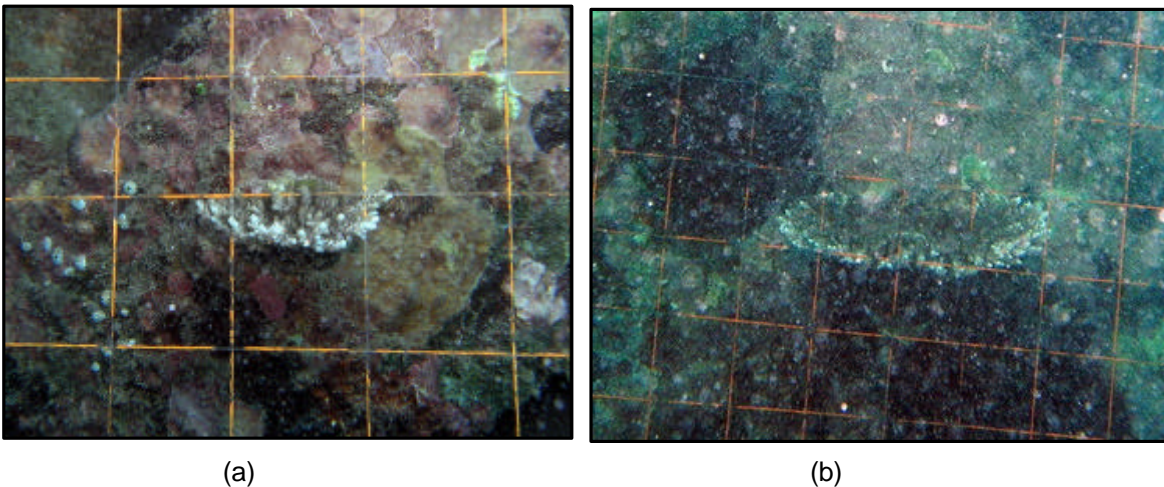


Figure 3. *Acropora Tabulate guards* on Reefball on (a) May 2006 and (b) Nov 2006

Figure 3 above shows that on May 2006 *Acropora Tabulate* coverage in transect 1 is 1 % and six months later [November 2006] the coverage increased by 4 % per 0.25 m<sup>2</sup>.

During 2006 Qtr 4, seven reef balls were monitored by using the transect quadrate method. In general, biota composition is summarized into six big groups, namely Coraline Alga, Hard Coral, Softcoral, Others, Dead Alga with sand and Water (hole). While, other groups comprise of Ascidian, sponge, hydroid, zoantharian, barnacle, anemon and clam. Water (hole) group is part of the holes on reefball body, while Dead Alga group with sand is classification of dead algae and sand which is trapped between algae that cover reefball body in general.

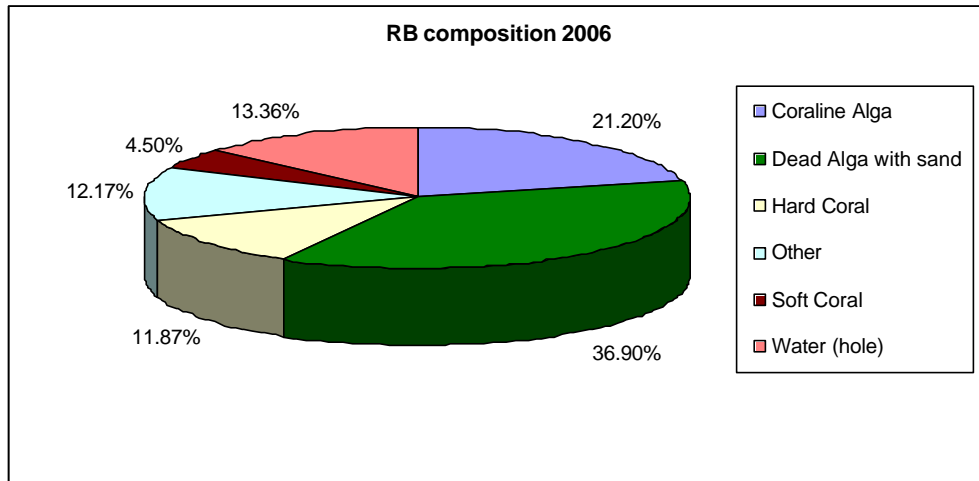


Figure 4. Graphic of the Average Composition of Biota in Reefball during 2006 Monitoring.

Figure 4 shows that the average composition during 2 monitoring activities (Qtr2 & Qtr.4) in 2006. The Dead Alga group with sand dominates 36,9% and Coraline Alga by 21,2%.

The height of Dead Alga with sand coverage may be caused by the natural condition of the sea water current near the bay which is not strong enough to release the algae from the reefball and a type of sub strat generally in the form of fine sand which is easily washed away and trapped in reefball (Figure 5).

Coraline alga is the type of alga capable to generate calcium as cement to the object they inhabit on. This type of alga is one of the pioneers in the development of corals on the reefball. The calcium generated provides place for the alga to stick on coral polyps after the medusa / floating phase completes. Many studies show that Coraline alga plays an important role in forming coral reef and it is estimated that Coraline alga is indicated as the stake of coral reef and some says that coral reef can not form unless there is interference of Coraline alga. The facts show that coraline alga is one of the main substances for coral reef.

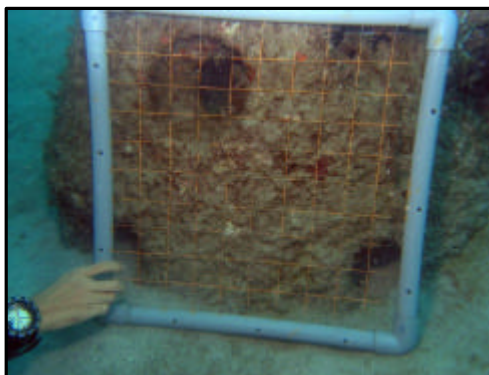


Figure 5. Guard for Dead Alga with Sand next to Reefball

During 2006 monitoring hard coral group shows the average composition of biota/group existing on reef ball monitored by 11, 87%. To date, hard coral group comprises of *Acropora tabulate*, *Acropora branching*, *Coral encrusting*, and *Coral Submassive*. It is hoped that the growth of hard coral group would be successful. One of indicators that the purpose of reef ball placement program in the waters is successful.

After 2 years of reefball deployment in the seabed it shows significant results although there is no comparative data indicating the reefball program has been successful in two years after the deployment. The average comparison of biota composition on reefball during 2005-2006 monitoring (Figure 6) shows that there is a change in the composition of six biota category or group covering the reefball. It is considered that the change would be better if Coralline alga, Hard coral, soft coral and other groups increase, while Dead alga group with sand and water hole group decrease in the composition

Most of reefballs monitored are covered with dead alga with sand except the ones in RB2.3 and RB2.1. During the three times observations at RB2.1 no coverage of dead alga with sand is recorded. This may be caused by the location of RB2.1 is near the group of natural corals. Thus, the based substrat is not too fine and it is estimated that many algae-eating fish gathering the group of natural corals also play role in cleaning algae on reef ball RB2.1.

It is recorded that the number of coverage of dead alga with sand in 2006 is higher than in 2005. It is estimated that the high coverage are caused by the weak current pattern in the waters near the bay and the fine type of substrat yet, the definite causes have yet to be identified.

The coverage on holes at reefballs begin to decrease in most reef balls being monitored. This means that the growth of biota on the holes wall multiplies in number, generally the types of sponges and hydroids.

The number of coralline alga coverage tends to decrease in 2006, except at RB2.1 shows an increase. The decrease of coralline alga in number at the monitored reefball is caused by the coverage of dead alga with sand. When we remove dead alga from the surface of the reefball the coverage of coralline alga is still visible.

In 2006 it is recorded that hard coral group increases in number at most monitoring reefball than the one last year. In general, types of the growing hard coral identified are *Acropora tabulate*, *Acropora branching*, *Coral encrusting*, and *Coral Submassive*. Out of these four types of the growing hard coral *Coral encrusting* has the highest coverage. In general, *Coral encrusting* or known as **crusting coral** is the initial form of growing coral before they develop to other form.

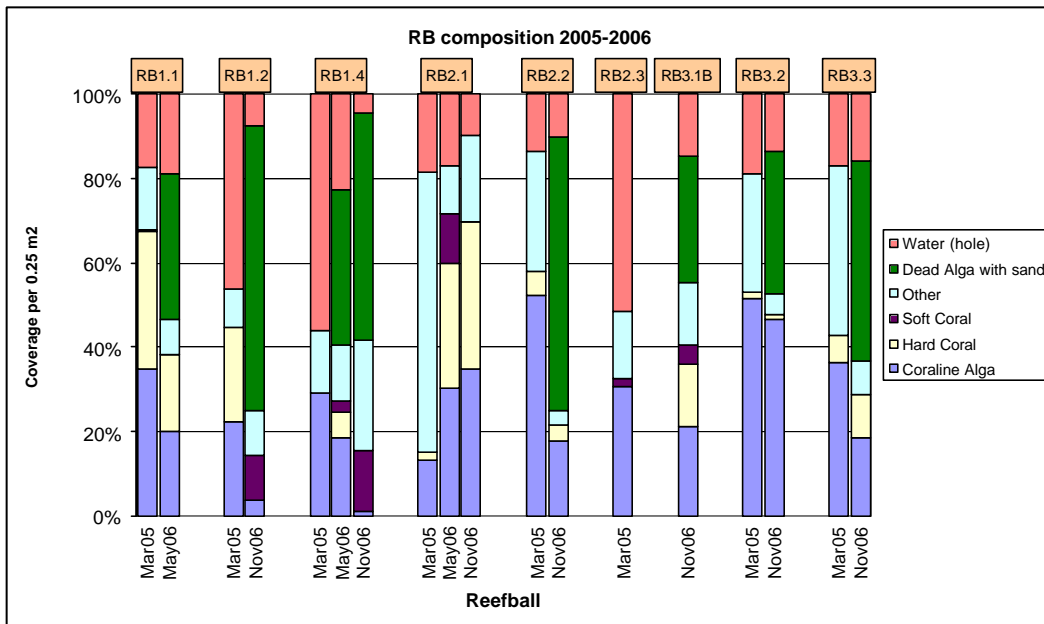


Figure 6. Composition of Biota Coverage on Reefball for 2005-2006

### 1.3.2. Observation of Transplanted Coral

Besides the natural planting of corals to reefball, a modification of coral transplantation into some reefballs is also made. Transplantation observation is carried out visually, instead of being a target in the Q4 survey. Coral transplantation aims at accelerating the growth of coral on the reefball and providing coral family in Reefball. The transplanted coral is placed on the top of reefball. Figure 7 shows that transplanted corals (green circles) grow normally at the reefball. While, the natural corals grow (yellow circle) among them.

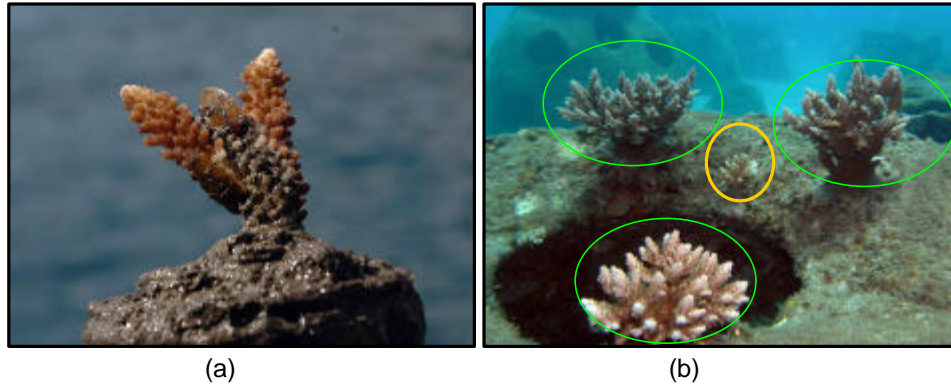


Figure 7 (a) a coral seed prepared to be transplanted into reefball; (b) corals already transplanted.

### 1.4. Conclusion

In general, the condition of monitored reefball has showed better composition of biota. The presence of coraline alga and hard coral has given us a hope for the successful reefball program. Yet, the high coverage of dead alga with sand may disturb, even obstructing the development of other biota.



*Dive in Reefball Area*



*Reefball after 2 years settlement*