1 INTRODUCTION

1.1 Background

Coral reef ecosystem is one of the most unique and complex ecosystem in tropical region which has high productivity and biodiversity. Ecologically the coral reef ecosystem has a role to provide feeding ground, nursery ground, and spawning ground for fishes and supporting organisms in that ecosystem.

Coral reef ecosystem is very sensitive with the implication of human activities. Generally this ecosystem has been threatened because of its over-exploitation, therefore its conditions are in decline (Emor 1993; Supriiharyono 2000). Based on the observation in 583 stations, it was shown that there are 590 coral species spreading in all around Indonesia. But those coral reefs are at risk. Of those coral reefs in Indonesia, there are only 6.83% reefs in a very good condition, 25.72% in good condition, 36.87% in intermediate condition, and 30.58% in damaged condition (Suharsono 2003). This data shows that coral reefs in Indonesia are at risk and it can minimize the role and function of this ecosystem which may give implication on the life of reef fish and other marine biota.

In the report of COREMAP II (2008), based on the research conducted by LIPI (Indonesia Institute of Sciences), there was a decline in the percentage of live coral coverage (LC) from 2004 (average percentage 62.74%) to 2007 (average percentage 60.04%). The declining percentage is 2.70%. This data shows that the function of coral reefs has no longer in its maximal power and will affect on the life of reef fish and other marine biota. As we know, the existence of coral reefs support the life of many organisms, one of them is reef fish.

According to Dahuri et al (1996), factors that influenced the damage of coral reefs in Indonesia are; (1) the mining of limestone skeleton (reef stone) for construction materials, highway construction, and ornaments; (2) fishing with explosive and toxic materials, and fishing device whose operation cause the damage of coral reefs, like muroami; (3) water pollution by industrial, agricultural, and household wastes either from land base activities or marine base activities; (4) sedimentation and the increasing water muddiness (because of soil
erosion in land), seashore excavation and mining activity surrounds the coral reef; and (5) over exploitation of reef fish resources.

Seagrass bed ecosystem is a habitat which is frequently found between sandy beach or mangrove area with coral reef area. Seagrass bed is found in tidal area along the border of land, reef island, or coral reef. In addition, it is frequently found mixed with the coral reef (Nienhuis et al. 1989). It was also added that there is an interaction between seagrass bed and coral reefs in the form of animal migration which finally lead to mineral transfer between the two ecosystems. As we know, seagrass has a role as foraging area, place to hide (protection), and food resources for fish and invertebrates (Hutomo 1985; Hutomo and Azkab 1987; Nienhuis et al. 1989).

The utilization of coastal area for various reasons can affect the sea grass ecosystem, as reported by Colles et al. (2004) in Queensland Australia. It was stated that the threat to the seagrass was caused by the sedimentation, excavation and construction in the seashore area and the activity of boats and ships. The utilization of seagrass bed for various reasons will affect the biota within its area. Kiswa (1995) reported that the change which happened to seagrass community in Banten Bay is the implication of human activities. The total disappearing area of seagrass bed in that bay was approximately 50 Ha. The lost of seagrass bed cause the number of juvenile fish in Banten bay decreases.

Abang Island is one of many islands located in Southern Batam and is known as the center of traditional fishing activities. This region is administratively located in Pulau Abang District, Galang Regent. Most of the people in Abang Island rely on the sea resources to continue their life. It can be seen through their occupation as fisherman (86.9%) or 308 fathers from 413 family who spreaded in three populated region, they are community of Pulau Abang, Air Saga, and Pulau Petong (Pulau Abang District 2009).

Rabbit fish (S. canaliculatus) is a fish that life associated with the ecosystem of coral reef and seagrass bed. In the mean time, this fish is the targeted fish for the people of Abang Island. Especially near the celebration of Lunar Chinese New Year (Imlek), this fish must be served as the main cuisine for the celebration. This high demand cause the expensive price of the fish, especially for
those fish that contain eggs. According to the information from the local people, the price of Rabbit fish in Imlek is about Rp 200,000/Kg to Rp 300,000/Kg rupiah, while in non-celebration time is about Rp 20,000/Kg s/d Rp 30,000 /Kg.

The high price of Rabbit fish encourage the people of Abang Island try to catch it hardly. If we let this condition to continue without any management, Rabbit fish resources will decrease. The wrong strategy of the management and the wrong implementation of policy on the utilization of reef fish resources, especially Rabbit fish, will cause biophysical degradation in the environment and the decrease of the fish stock in the related area. Mistakes on that management will finally influence the welfare and income of the coastal people in general and fisherman in particular.

Based on the explanation above and in the context of regional development, we need to update information and publications about marine resources potential, especially coral reef and its associations. One of them is reef fish and its role in the life of the local people. Surely it can finally be an input to make a development concept in coastal region which will finally needed by the stakeholders especially the government. Therefore this research, “The Correlation between Coral Reef and Seagrass Bed with the Sources of Rabbit fish (Siganus canaliculatus) in the Water around Abang Island, Batam City,” needs to be done.

1.2 Research Formulation

Rabbit fish is one of targeted commodity for coastal people (fisherman). It is due to the high market demand especially in the days before Imlek celebration (Lunar New Year Season) by Chinese people. According to the information of local people (Rahmat, Head of Agency of Coral Reef Resources Management, fisherman and fish gatherer, June 12th 2009, personal communication), they are now having difficult situation to catch Rabbit fish. Even when the situation gets better, the number of the fish must be smaller than the previous years.

If we let the condition explained above stay as it was, then the resources of Rabbit fish will be threatened. Thus, the problems in this research can be formulated as below:
1. The availability of Rabbit fish is likely to decrease
2. The condition of coral reef coverage in Bang Island District has decreased 2.7% from 2004-2007
3. There has been no clear management of coral reef and seagrass ecosystem with Rabbit fish.

1.3 Objectives and Benefits

The objectives of this research are:

1. Describing the condition of coral reef and seagrass by observing the coverage percentage of both ecosystems.
2. Describing the abundance of Rabbit fish and several characteristics of reef fish community like: diversity index, equitability index, and dominance index
3. Analyzing the correlation between coral reef and seagrass with Rabbit fish resources.

This research is expected to be the ecological reference and input in the management of coral reef and seagrass with Rabbit fish.

1.4 Framework of Thought

Rabbit fish is a fish whose life associated with coral reef and seagrass bed. Ecologically the coral reef ecosystem has a role as a place for fishes to feed, to nurse, to find shelter, and to spawn. While the role of seagrass bed is to nurse, to feed, to provide shelter and food. The ecological role of those two ecosystems gives comforts for Rabbit fish to continue its life.

Nowadays, there is a high risk of damage undergone by coral reef and seagrass due to the human activities which finally lead to the disturbance of Rabbit fish resources. It can be seen from the comments of local people who undergo difficult situation in catching Rabbit fish (personal communication) and the tendency of the decrease of coral reef coverage based on COREMAP II report (2008).
Fig. 1 Flowing Chart of Research Frame of Thought

To explain the correlation between coral reef and seagrass bed with Rabbit fish, it was all started by observing the conditions which have been undergone by coral reef, seagrass bed, and Rabbit fish. Then, it was correlated with the environmental condition. Later on, the condition was described to ease the analysis of the correlation, then the research is expected to produce alternative way on managing Rabbit fish resources in ecological perspective.

The flowing chart of research activities were started by literature study intended to gain informations in preparing the activities in field study, then the data from the field were tabulated and analyzed to see the correlation between coral reef and seagrass bed with Rabbit fish resources. The result of the analysis then described as a research result for then be extracted to get the conclusion provided as a recommendation for the management of Rabbit fish resources in ecological base (Fig. 2).
Flowing chart of research activities