

## Preliminary Assessment of the Seagrass Resources in the Northern Philippines

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### Abstract

Seagrass resources in the northern Philippines affected by the warm, nutrient rich water of the Kuroshio Current were assessed. Four of the major fish producing municipalities of the province were examined with the aim of identifying species composition and relative abundance. The information will be used as a tool in managing the coastal resources of the region in which productivity is fast declining due to increasing anthropogenic activity which threaten the coastal community. Results show that there are six dominant genera thriving in the northern Philippines, namely *Syringodium*, *Cymodocea*, *Thalassia*, *Enhalus*, *Halodule* and *Halophila*. The abundance of each species differs from one area to another. Seagrass beds of the four municipalities have a total area of 367 ha of which the municipality of Sta Ana has the greatest coverage area (359 ha).

Key words: Cagayan, Northern Philippines, quadrat method, seagrass resource

### Introduction

Seagrass is one of the most important resources in the coastal area. It supports and provides a habitat for many coastal organisms. Aquatic species like siganids, shrimps, sea cucumber, sea urchins, sea horses, crabs, scallops, mussels, snails, and many more find their niche environment in seagrass beds. The seagrass ecosystem is a good place for the spawning, breeding, nursing and refuge (Fortes 1989) of these organisms. Aside from giving food, it also stabilizes and holds bottom sediments, maintaining balance, biodiversity and a good symbiosis among the living aquatic organisms. Dugongs and turtles are also very much dependent on seagrasses for survival (Bleakley and Wells 1995). Studies show that about 40,000 fishes and 50,000 invertebrates can be supported by the 10,000 tones of leaves produced in an acre of seagrass beds (Mukhida 2007).

The warm water of the Kuroshio Current determines the distribution of seagrass species along its affected areas (Kuo and Kanamoto 2006). This current originates from the equator and flows along the east coast of the Philippines and Taiwan to Japan (Fig. 1). Notwithstanding seagrass' importance to the productivity that goes along with the Kuroshio Current, the other coastal habitats (coral and mangrove) would not exist without

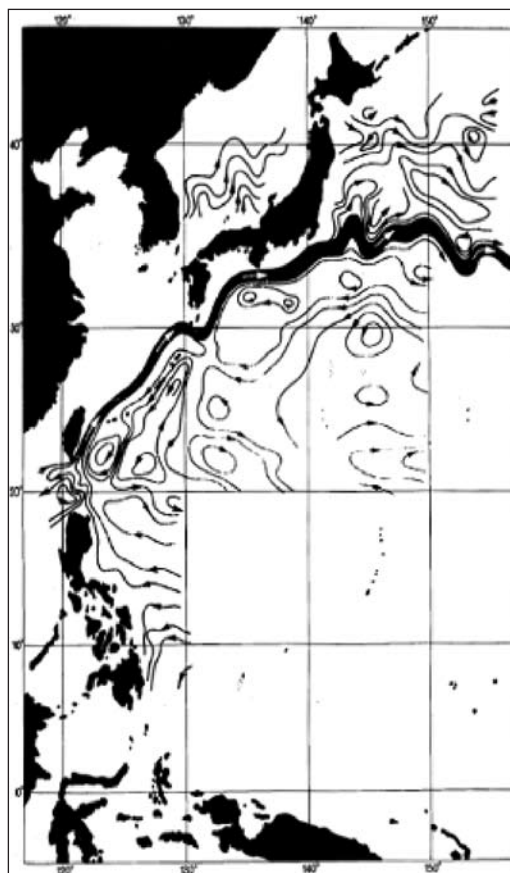


Fig. 1 Study area in relation to Kuroshio Current

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seagrass. It was estimated that if about 20-60 % of sea-grass beds were to disappear, the removal of mangroves and the collapse of reefs might occur within 20 years (PEMSEA 2003).

Consequently, like any other natural resources, seagrass beds are often exposed to pressures and are constantly under threat due to destructive anthropogenic activities. Dredging, agricultural run off, industrial run off and oil spills in addition to typhoons and floods that occur naturally are among the causes of seagrass bed destruction (Short and Wyllie-Echeveria, 1996 in Seagrass watch 2007). Population increase has contributed to resource overuse and destruction. In the Philippines, the use of poison and blast fishing continue to impact the country's coastal resources.

With this in mind, it is imperative that conservation and management measures be undertaken to ensure the continuing derivation benefits from this precious resource. This study tries to elicit some initial information on the seagrass coverage of the coastal town of Cagayan which is one of the identified routes of the Kuroshio Current. Its objective is to determine the extent of seagrass coverage in the northern part of the Philippines, identify species composition up to genus level, and identify the status and conditions that could serve as a tool in coastal resource management.

### 1. Study Area

The study was conducted in the four coastal municipalities of Cagayan namely Sta Ana (18° 17' 27"N: 122° 25' 54.8"E), Gonzaga (18° 23' 07" N: 122° 25' 54.8"E), Buguey (18° 16.3 N: 121° 53.097 E) and Claveria (18° 36.514' N: 121° 03.557' E.). These municipalities are the major fish producing municipalities of the province, having naturally productive marine flora and fauna. The other coastal municipalities have deep continental

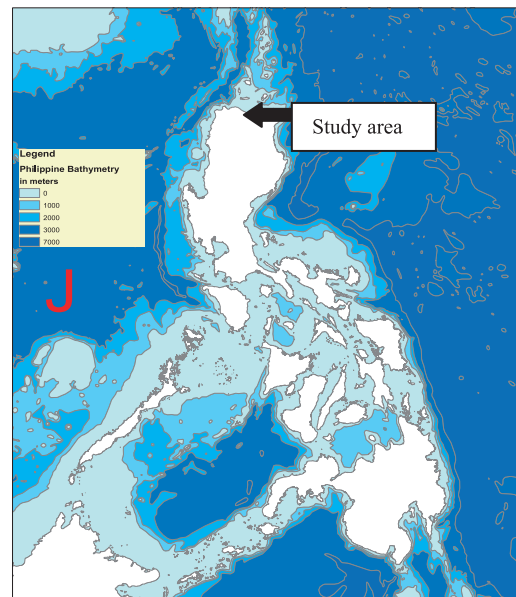


Fig. 2 Map showing the study area

shelves and long beaches and foreshores which are not favourable for the growth of seagrass or any other form of aquatic plants. Claveria is the second to last coastal municipality of Cagayan located in the north-western part of the province while Sta Ana is located at the north-eastern part facing the Pacific Ocean (Fig. 2). As shown on the map, the Kuroshio current has a more direct influence on Sta Ana compared to the other municipalities.

### 2. Methodology

The study was conducted using transect lines and quadrats (Fig. 3). Transect line were laid at points where the habitat starts and ends. A distance of 100 meters was maintained between transect lines.

Quadrats measuring 1m x 1m were set every 10 meters along the transect lines to serve as representative samples. The number of quadrats established depended

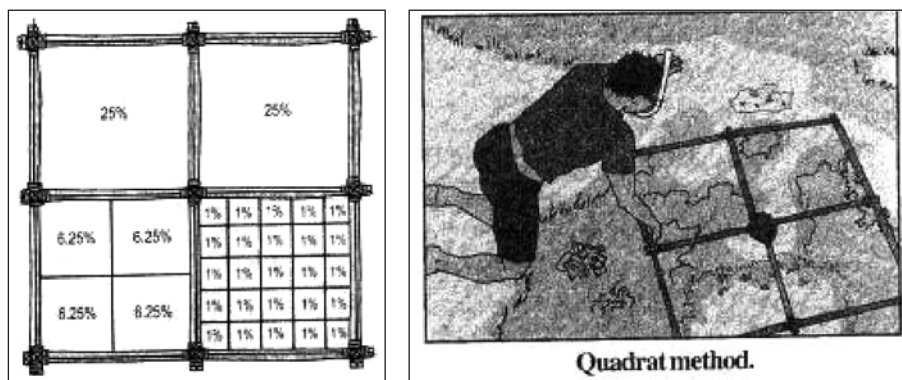


Fig. 3 Quadrat method

on the number of transect lines placed. The quadrats were divided into four squares for easy percentage estimation.

The data was analyzed by computing the average percentage cover of each transect by dividing the total per transect by the number of quadrats. The averages from each transect were added and divided by the totals of the averages of each component by the number of transects in the survey.

The condition of the seagrass beds was determined using the criteria set by Fortes, 1989 as stated below:

Condition	Criteria
Excellent	76 – 100% coverage
Good	51 – 75 % coverage
Fair	26 – 50% coverage
Poor	0 – 25% coverage

Source:PCRA manual

### 3. Results and Discussions

#### 1) Distribution and percentage coverage of seagrass beds in Cagayan Province, Philippines

The effects of the Kuroshio Current on the distribution of seagrass in the northern Philippines are clearly evident in the areas where seagrass beds are located. Starting from the eastern part of Sta Ana facing the Pacific Ocean, seagrass are well distributed along barangay San Vicente, Patunungan, Diora Zinungan, Rapuli, and Palaui island (Fig. 4). Seagrass area in this municipality was estimated at 359.5 hectares. Percentage coverage was recorded at 67.55 % comprising five genera namely *Cymodecea*, *Syringodium*, *Halodule*, *Halophila* and *Enhalus*. This coverage is still considered good based on the criteria set for habitat assessment by Fortes (1989) . Seagrass abundance in this area may be attributed to the designation of Palaui Island in Sta Ana, as a National Landscape and Seascape Protected

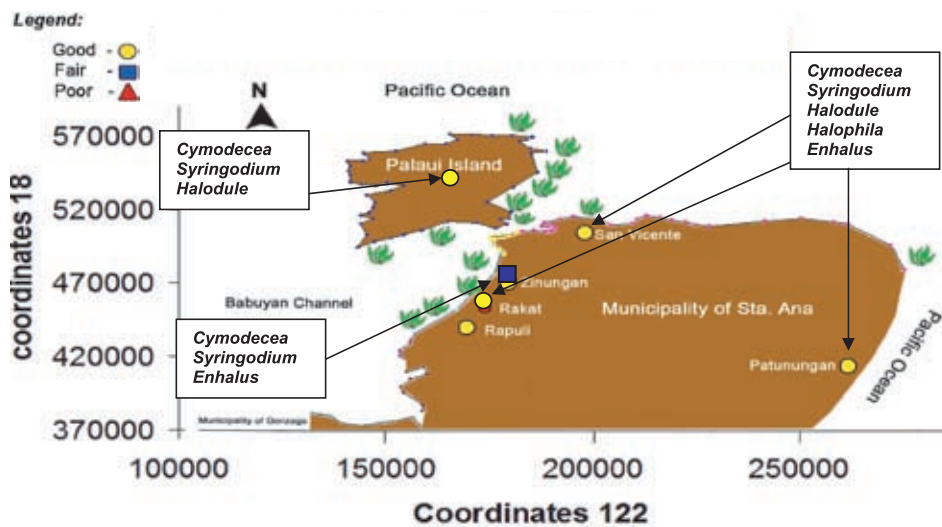


Fig. 4 Seagrass beds of Sta. Ana, Cagayan

Area through the 1992 Republic Act No. 7586 under the National Integrated Protected Area System (DENR PAWB 1992). Being a protected area, the hunting, destruction, distribution or the mere possession of any wild plant or animal is highly prohibited. However ongoing developments with Sta Ana being declared as an eco-tourism and industrial zone pose great environmental threat to the surrounding waters. The establishment of lodging houses and other structures is expected to contribute to pollution that may lead to habitat destruction. Illegal fishing activities such as dynamite fishing and the use of cyanide also contribute to increased seagrass

destruction in this municipality.

Seagrass coverage in Gonzaga, the next town to Sta Ana, is distributed across only five barangays namely San Jose, Amunitan, Batangan, Ipil and Tapel (Fig.5). Its seagrass area is only around 5.55 hectares with a percentage cover of around 34.48%. This is only around 1.5% of the seagrass beds of Sta Ana and is considered to be in fair condition. Although Gonzaga is still influenced by the warm water of the Kuroshio Current, the rocky substrate on the western part of its coastal area facing Babuyan Channel does not favour the growth of seagrass.

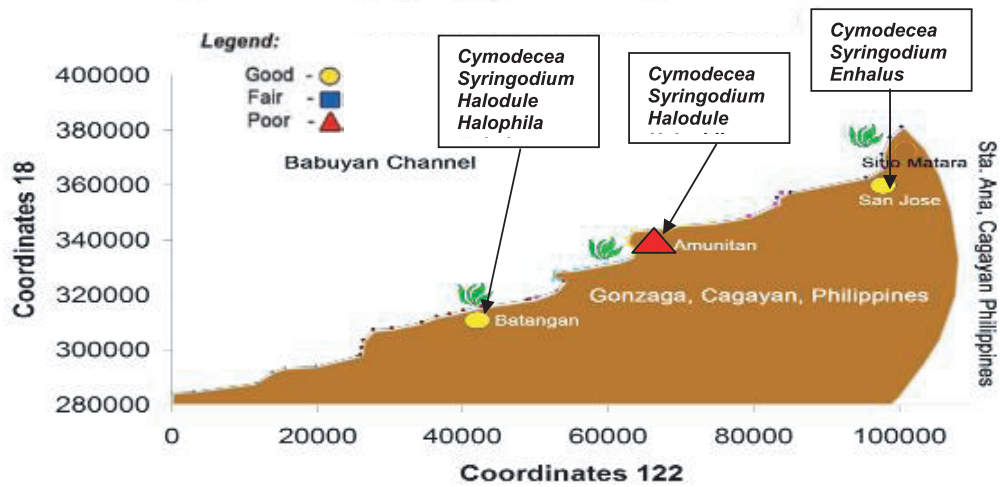


Fig. 5 Seagrass beds of Gonzaga, Cagayan

Only one species of seagrass was found to thrive in Buguey, Cagayan and it is located on the lagoon. The lagoon has two openings, one for marine water and the other for freshwater. The mixing of saltwater and freshwater from inland sources brings along nutrient rich organic materials which are utilized by this ecosystem. The lagoon is considered as the most productive estuary in the entire region. It is the source of fry of the most economically important fish species in Cagayan such as mud crabs, siganids, groupers, caranx, eels, and milkfish. Seaweeds (*Gracilaria firma*) also abound in this area.

In Buguey lagoon seagrass covers an estimated area of around 10 hectares. Specifically in the area around barangay Villa Leonora and Calamegatan, seagrass coverage was estimated at 69.16%, which is still considered good based on the criteria set by Fortes (Fig 6). The area has a muddy to sandy-muddy substrate. Water salinity is

dependent on the weather conditions in the area. During the rainy season it is diluted with freshwater coming from runoffs from the nearby inland areas. During summer however, water salinity goes as high as 35 parts per thousand (ppt) usually lasting from March to August (Ame 2004). The seagrass beds along this area support many aquatic habitats. They provide livelihood and income to the fisherfolk of the municipality. The presence of fry of fish species found in the lagoon which abound at certain times of the year indicates the great support the seagrass ecosystem and its surrounding mangroves give to the aquatic organisms. Unfortunately, the multiple uses of the lagoon, as a docking area for fishing boats, a fishcage belt area, fry collecting ground and drainage area for some nearby residents cause a negative impact on the sustainable existence of the ecosystem.

Claveria, Cagayan lies at 18° N latitude and 121°

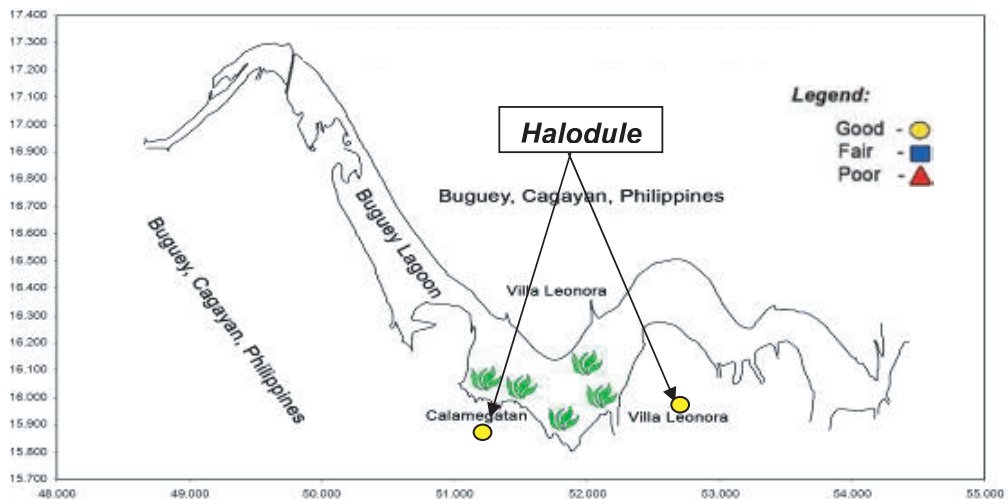


Fig. 6 Seagrass beds of Buguey, Cagayan

East longitude. It is bounded to the north by the Babuyan Channel, to the east by the municipality of Sanchez Mira, to the west by the municipality of Sta Praxedes and to the south by the province of Apayao. The seagrass beds of Claveria have an estimated area of one hectare with percentage cover of 30.92 %, which is still considered as fair. The lagoon is being protected by the surrounding hills and big rock mass which the local folk called *Lakay lakay* to meaning “old man”. Like in Buguey, the seagrass beds of Claveria supports marine organisms. A

similar problem is experienced, however, with a greater number of fishing boats being docked in the lagoon since it is the only protected area in the north-western part of Cagayan.

In terms of percentage cover per species, *Halodule* found in the municipality of Buguey has the highest coverage (69.16 %), followed by *Cymodecea* in Sta Ana (33.07%), *Enhalus* (9.34%) also in Sta Ana and *Syringodium* (17.67%) in Claveria (Fig. 7 and 8).

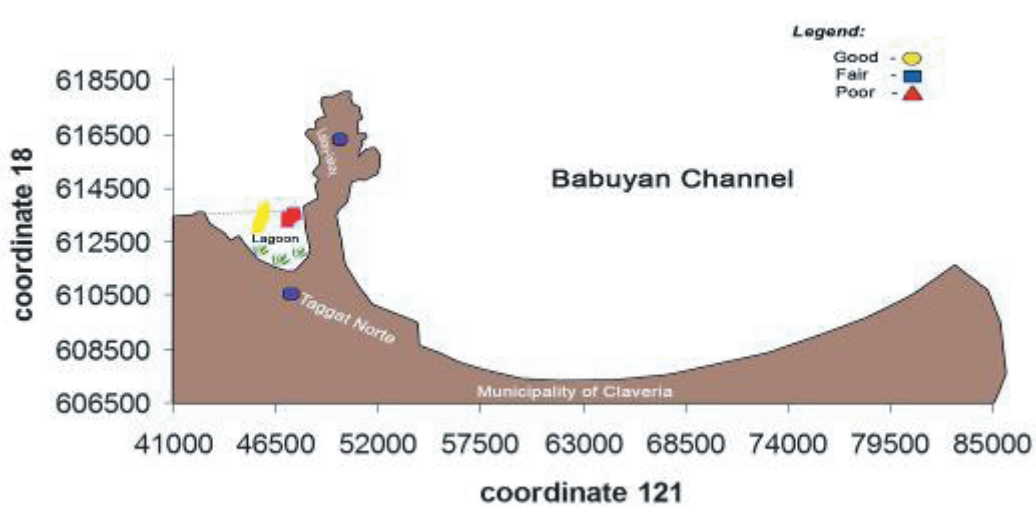


Fig. 7 Seagrass beds of Claveria, Cagayan

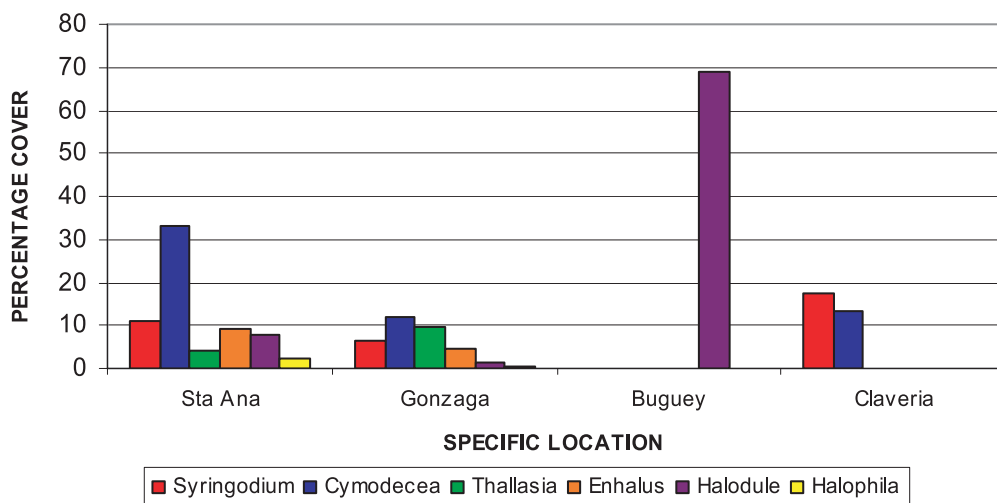
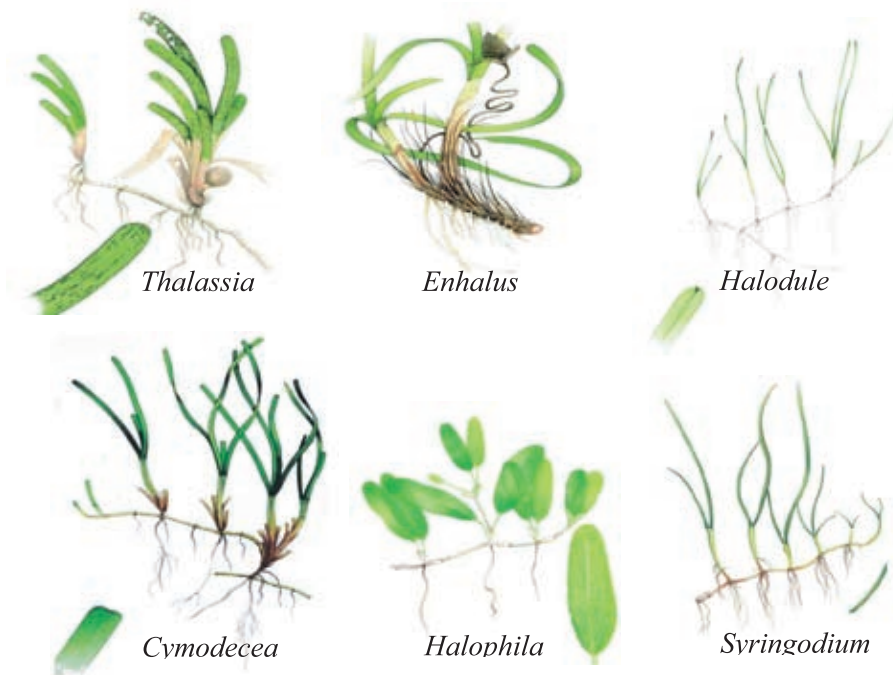


Fig. 8 Seagrass coverage in Cagayan, the Phillipines



**Fig. 9 Seagrasses found in Cagayan**

## 2) Species composition

In this study, identification of the seagrass species has been limited to the genus level only. Detailed assessment covering the species level will be done during the second phase of the study. Results show that six dominant genera are found to thrive in the seagrass beds of Cagayan, namely: *Syringodium*, *Cymodecea*, *Thalassia*, *Enhalus*, *Halodule* and *Halophila* (Fig. 9).

*Syringodium*, has cylindrical leaves, which are pointed and with air cavities *Cymodecea* has leaves which are strap-like. The tips are rounded and are either serrated or smooth. Leaf sheaths are sometimes flat and triangular. *Thalassia* also has strap like leaves with tips that are rounded or maybe serrated. Leaves may often distinctly curve. *Enhalus* is a large plant with a leaf length of about 30 cm long. It has long black bristles protruding from thick rhizomes. *Halodule* also has a strap like leaf, and the leaf tip may be dentate, pointed or rounded depending on the species. It has rhizomes which are usually white with small black fibers at the nodes. *Halophila* has oval to oblong leaves in which leaves may be arranged in pairs or clusters. Leaf margins are serrated and leaves may have fine hair or no hair at all.

Five genera and probably ever more species are found in the seagrass beds of Sta Ana. Species composition is more diverse in Gonzaga, Cagayan.

*Cymodecea* have a total percentage cover of around 58.44% followed by *Syringodium* with about 35.01 % while *Thalassia*, *Enhalus*, and *Halophila* have percentage

coverage of 13.71%, 14.0% and 2.61% respectively. A species of *Halodule* thrives very well in Buguey lagoon and has a percentage coverage of 69.16%. A more detailed investigation of the species composition is needed to further determine the diversity of the seagrass population in the northern part of the Philippines.

## 3) Problems and threats to the seagrass resources

At present, the percentage coverage of seagrass beds in the northern Philippines can still support the needs of the organisms living in and dependent on this habitat for survival. However, its abundance is under threat of being destroyed due to the increasing pressures brought about by the anthropogenic activities of the community impacting the surrounding waters of the area. Specifically the following problems were identified:

### (1) Resource use conflict

Being deemed as an area that is expected to spur the development of the coastal community in the northern Philippines, particularly Cagayan province, development efforts are being focused on maximizing the utilization of the coastal environment for economic enterprise. Most of the coastal waters are now being used in economic activities such as eco-tourism, fish caging, docking areas and recreation areas. The multiple-use of these water bodies, greatly increases the pressure they receive from the population. Resulting impact ranges from siltation, oil spills and pollution. This has already occurred in

Buguey, Cagayan causing fish kill and other environmental damage.

### **(2) Illegal conversion of mangroves into fishponds –**

This not only deprives the fish and other aquatic organisms of breeding and spawning grounds but also weakens the support system of the seagrass beds against siltation coming from the mainland during heavy rains and floodings. In effect, photosynthesis is disrupted causing low primary productivity.

### **(3) Illegal fishing activities**

Such as the use of dynamite and poison (Cyanide) which contribute to the rapid destruction of the seagrass habitat. The impact of dynamite on the reproductive capacity of fish will surely lead to a decline in fish population in a certain habitat. Likewise, the residual effects of cyanide are irreversible or it may take years before an ecosystem may recover. Hence, it is necessary that corrective measures are undertaken before these precious resources are damaged.

## **Conclusion**

Seagrass plays a very important role in the entire coastal environment. It supports the entire ecosystem, providing the base of the food chain and serving as a good habitat and breeding area for fish. The symbiotic relationship of this ecosystem with the other ecosystems (coral and mangrove) in the aquatic environment induces the productivity of the water along the Kuroshio's area of influence.

Being one of the absorbers of the impact of human activity in the coastal ecosystem, seagrass beds can be used as an indicator species or a tool in coastal resource management. Changes in the surrounding environment due to anthropogenic activities and natural causes can be reflected in the status of the seagrass beds. It can also be used to determine whether a resource is stable, improving or declining.

Seagrass covers and diversity can be improved with the stringent application of management measures aimed at conserving aquatic resources. An intensified education campaign along with the establishment of sanctuaries and protected areas will help ease pressures on this habitat. However, in areas like the Philippines, where poverty is prevalent, it will take strong political will to implement efficient management measures.

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