DENSITY COMPOSITION AND MEASUREMENT OF ABOVE BIOMASS OF SEAGRASSES IN TANGALAN, AKLAN

A Research Paper
Presented to the Faculty Members
Philippine Science High School western Visayas
Bitoon, Jaro, Iloilo City

In Partial Fulfillment
Of the requirements in Science research 2

By

Lim, Arvidas Nikos V.
Calacat, Michael M.
Jecong, Kenneth Jay B.

January 2003

TABLE OF CONTENTS

APPROVAL SHEET

This research paper hereto entitled:

"Density Composition and Measurement of Above Biomass of Seagrasses in Tangalan, Aklan"

prepared and submitted by Lim, Arvidas Nikos V., Calacat, Michael M., Jecong, Kenneth Jay B. in partial fulfillment of the requirements in Science Research 2, has been examined and is recommended for acceptance and approval.

JosetteT. Biyo, Ph. D.
Adviser

Approved by the Committee on Oral Examination with a grade of Passed on November 26, 2002.

Virna Jane Navarro
Chair

Rolando Libutaque
member

John Arnold Siena
member

accepted in partial fulfillment of the requirements for Science Research 2.

Rebecca V. Yandog
Director III

ACKNOWLEDGEMENT

First of all, we thank the Almighty GOD for giving us strength and helping us finish this paper.

We would like to thank our parents for supporting us financially and morally.

Also to our research teacher, Dr. Josette T. Biyo for the patience and kind support on our study. And to Mrs. Estilo for letting us lend the materials we needed.

Thank you to all our panelists, we wouldn't be able to finish this paper without your advice.

And lastly, to our gang and love ones for inspiring us. We wouldn't have made it without you all!

LIST OF TABLES

LIST OF PLATES

ABSTRACT

The community structure of seagrasses in Tangalan, Aklan is being compared in terms of its species biomass(g/shoot) and density(shoots/m^2) in a 1 square meter quadrat. The number of shoots per species in a 1 square meter quadrat are being counted for species density and 10 shoots per species are being weighed to measure for its biomass.

The different species we have found in the beaches of Tangalan, Ibajay, Aklan, are: *Thalassia hemprichii, Cymodocea serrulata, Cymodocea rotundata, Syringodium isoetifolium, Halophila ovalis, Halodule uninervis, Halodule pinifolia.*

Chapter I

Introduction

A. Background of the Study

Fishes and other marine animals are one of the primary food sources in our country. And as we know they are sold at high prices. There is a need to determine the factors that affect the productivity of these marine animals. One factor that affects the productivity of these marine animals are seagrasses.

Seagrasses are abundantly found at coastal areas and is serve as breeding ground for marine animals. They provide shelter and food for fishes and other marine organisms and serve as nursery grounds (Fortes 1990; Larkum et. Al. 1989). Seagrasses help reduce wave and current energy filter suspended sediments from water and stabilize bottom sediments (Fonseca and Cahalam 1992;Fonseca et.al. 1982). Therefore, the more abundant the seagrasses are the more breeding grounds and food for marine animals.

Researches on seagrasses quite few due to the small number of researchers directly involved in seagrass research (Fortes 1990). Only a few are interested on the research and many are not knowledgeable in this study.

Seagrasses are flowering grass-like plants, which are adapted to saline habitats (Field Guide of Seagrasses in the Philippines). Seagrasses are the only submerged, flowering plants marine plants (Rollon 1998) found mostly in shallow, soft-bottom marine coastlines. The plants arise from a creeping underground stem or rhizomes (Field Guide of Seagrasses in the Philippines) they attach to all type of substrate, occurring most extensively on soft-tones (Field Guide of Seagrasses in the Philippines).

B. Statement of the Problem

This study determined the biomass and density of seagrasses in Tangalan, Aklan, Philippines.

C. Hypothesis of the Study

There is a high density and large biomass of seagrass in Tangalan, Aklan.

D. Objectives of the Study

1. To determine the biomass and density of seagrasses Tangalan, Aklan.

E. Significance of the Study

This study can bring new knowledge to Philippine scientists about the biodiversity, biomass and the community structure of seagrasses found in the study site. This study can determine the productivity of seagrasses in Tangalan, Aklan and it can help in understanding the beaches in the study site because seagrasses has also a certain role that is beneficial to the beach. This study can also help other researches that involve seagrasses in Tangalan, Aklan.

F. Scope and Limitations

This study is about biomass and diversity of seagrasses found in Tangalan, Aklan. Since the study site is a large area, it would be difficult to gather samples in deep water. We would just gather samples on the coastal area of the beach. We cannot gather in the deeper part of the beach due to lack of equipments.

Another is that Ibajay, Aklan is located in rural place and expected to be far away from the city which Kalibo, Aklan. The researchers too will have a hard time

finding a place to stay for neither one of the researchers live there.

The researchers cannot explore at deeper regions for they lack equipment in diving at deeper parts. In determining the number of seagrasses, it is difficult counting the seagrasses accurately for some seagrasses are small. Lastly, the researchers have limited time and a low budget so this means that we cannot go there every week and anytime that we want to. Contact person would be hard to find in making arrangements.

G. Definition of Terms

Seagrass - Seagrasses are flowering grass-like plants, which are adapted to saline habitats. Seagrasses are the only submerged, flowering marine plants.

Ecology - the study of the relationship and interactions between living organisms and their natural or development environment.

Chapter II

Review of Related Literature

A. Seagrass

Seagrasses are flowering grasslike plants which are adapted to saline habitat (Field Guide to Seagrass in the Phil.). Seagrasses are either grasslike or not grasslike in gross external morphology (Field Guide to Seagrass in the Phil). Seagrasses are commonly found in the littoral zones along temperature and tropical coastline (Philyes 1996) and examination shows that seagrass communities worldwide could extend to depth of a 90 meters (Duarte 1991).

Philippine seagrasses are generally mixed (Menez et. al. 1983; Tomasko et.al. 1993) and the species present contrasting growth forms and growth capacities, from small, fast growing Halophila species to the large Enhalus acoroides. A total of 13 species have been recorded in the Philippine water (Menez Philips and Calumpong 983; Menez and Calumpong 1983;1985). This represents 27% of the total species reported worldwide, second only to Austria which has 23 species (Phillips and Menez 1988).

B. **Importance of Seagrasses**

Seagasses are important in providing shelter, food and breeding grounds for marine organism. Seagrasses helps in stabilizing and holding bottom sediments even through the enormous stresses of hurricanes and temperature storm. It also helps in slowing and retarding water currents and waves, promoting sedimentation of particulate matter and inhibiting resuspension of organic and inorganic matter through leaf action. Seagrasses too are shelter and refuge for resident and transient adults and juvenile animals, many of which are of commercial recreational importance.

Seagrasses are food for grazers, epiphyte and detritus feeders and are source of organic matter as the plants attain a high production and growth (leaves of some species can grow 5-10 mm per day). Lastly seagrasses helps in production and trapping of detritus and secretion of dissolve organic matter that contribute to nutrient cycle within the ecosystem (Wood Odum and Zieman(1969)). In addition, it also serves as nursery ground for species that spend their adult lives outside the community (Field Guide to Seagrasses in the Philippines).

C. Origin of Seagrasses

Seagrasses are the sole marine representatives of the Angiosperm. They all belong to the order of Helobiae, in two families: Pota mogetonaceae and Hydrocharitaceae. The currently accepted hypothesis of the origins of seagrasses is that they derived from terrestrial plants which return to the sea (den Hartog, 1970).

There are currently fifty-eight species recognized, in 12 genera, of which Austria is home to thirty-more than half. The origins of the searasses appear to have been around the ancient Tethys Sea, bounded by Africa, Londwana and Asia. Around a hundred million years ago. By the Ecocene, the seagrass appear to have dispersed widely in the Asian-Pacific and the neo-tropics (den Hartog ,1970).

Representatives of the seven genera, considered characteristic of tropical seas, are found in the Philippines (Phillips and Menez, 1988).The most widely distributed, and tolerating a wide range of temperature and habitat, is Thalassia hemprichhii, colonizing as far north in Batanes (Calumpong, Menez and Phillips, 1986) to Malita,Davao Gulf in the south(Calumpong, Menez and

Phillips, 1985) all the way to Tawi-tawi(pers obs). It thrives in muddy, sandy to coral substrates.

One species that may be considered endangered, if not totally extirpated from Philippine waters, is Halophila beccarrii Ascherson, although this has been reported as growing in abundance in the South China Sea and Bay of Bengal (Phillips and Menez, 1988). The only specimens collected from the Philippines were from Manila Bay reported by Merrill (1912) and subsequently cited by other workers(Mendoza and del Rosario, 1967; den Hartog, 1970; Calumpong, Menez and Phillips, 1983).

The Philippine seagrass flora is part of the Indo-West Pacific flora and is closely related to the Caribbean, with a few genera shared with Austria and two genera shared with the Mediterranean. This flora does not share any of seagrass species with the Northeast and the northwest coasts of North America and Europe. Such differences may be explained by movement of land masses by tectonic events, and with them, their ancestral biotas, followed by parallel speciation and extinction (McCoy and Heck,1976).

D. Habitat of Seagrasses

Although seagrasses are occasionally exposed to the air, they are predominantly submerged, and their flowers are usually pollinated underwater. Seagrasses are commonly found in shallow coastal marine locations, salt-marshes and estuaries, in the topics they are found associated with mangroves.

Seagrasses' ecosystems provide habitats for a wide variety of marine organisms, both plant and animal. These include meiofauna and flora benthic flora and fauna, epiphytic organisms. Plankton and fish, not to mention microbial and parasitic organisms. Seagrasses are also directed consumed by birds, dugongs, and turtles. As well as directly producing organic matter, seagrasses act as a substrate for many genes. Amphibolis have been shown to harbour over a hundred million different epiphytic species (Duarte et al, 1977).

Seagrasses recovery from physical disturbance and catastrophic decline involves the colonization by propagules and the overgrowth of bare substratum through rhizone expansion (Duarte and Sand-Jensen, 1990).

E. Seagrass Development

Vertical growth of seagrasses occurs by stem-leaf, the vertical extension of specialized reproductive organs. This vertical growth habit can form tall, multidimensional shoot canopies with influence local hydrodynamics, promote sedimentation and facilitate resource acquisition in the water column (Duarte et. Al., 1996).

Seagrasses are rhizomatous clonal plants with differentiated meristematic tissue, enabling them to grow vegetatively along both horizontal (plagiotropihic) and erect (orthotropic) axes (Tomlimson, 1974).

F. Seagrass Distribution

Seagrasses have a center of generic richness and diversity in the Indo-West Pacific (Heck and McCoy, 1978). However, their distribution and ecology in the ASEAN region are very poorly known. The most authoritative account that includes the plants in the region was made by den Hartog (1970). However, after 21 years, the distribution pattern of ASEAN Seagrasses remains incompletely understood. In the Philippines, Menez et. al. Published a comprehensive account on the

local flora, and Fortes (1986) produced a more complete work on the taxonomy and ecology of the local seagrasses.

CHAPTER III

METHODOLOGY

A. Materials

The materials used in conducting the study are:

- field book
- cameras
- key to taxonomic identification of seagrasses
- pens/markers
- 0.5 x 0.5 quadrat
- shovel

B. Description of the Study Site

The study site is located in the central area of Tangalan, Ibajay, Aklan. The town of Ibajay is located at the north of Aklan. The beach in Ibajay, Hawili beach specifically, serves as a suitable habitat for a large number of organisms including seagrasses.

C. Sampling Method

Samples were collected from different station, which are chosen randomly. We used a 0.25 m^2 quadrat was thrown into the study site. We then collected all the

species inside the quadrat. Each specimen inside the quadrat was placed in a separate plastic bag. Then we cleaned the seagrasses that were inside the plastic bags using water.

D. Species Composition and Density

The researchers sorted the seagrasses according to their description provide by Philips et al (1988) and Fortes (1990). The number of shoots of each species recorded to estimate shoot density (shoot/sq.m). The species compositions in core sampling were noted (shoot/m^2) (Biyo 2002).

E. Measurement of Above Biomass

Right after the species composition and density were determined all macroscopic organisms would be scraped using a paring knife (Biyo 2002).

The samples were then oven-dried in constant weight at 60-80 degrees Celsius to estimate the biomass (gDW/sq.m) (Biyo 2002). The samples oven-dried shoots were placed in an analytical balance and their weight (g) was recorded.

CHAPTER IV

RESULTS AND DISCUSSIONS

The sampling we have done in Tangalan, Aklan showed that there were seven species of seagrasses in its beaches, namely: *Thalassia hemprichii, Cymodocea serrulata, Cymodocea rotundata, Syringodium isoetifolium, Halophila ovalis, Halodule uninervis, Halodule pinifolia.*

Based on the data that we have gathered and shown on the tables on the succeeding pages, we have known that *Thalassia hemprichii* has the highest biomass per 10 shoots, and *Haloduli pinifolia* has the most number of shoots per square meter ().

Table 1. Density (no. shoots/m^2) of seagrasses in Tangalan, Aklan

Seagrasses	Density (Mean ± std)	Percent composition
Thalassia hemprichii	224.871	16.67 %
Cymodocea serrulata	168	50 %
Cymodocea rotundata	156.704	16.67 %
Syringodium isoetifolium	488.136	16.67 %
Halophila ovalis	66.374	16.67 %
Halodule pinifolia	131.846	16.54 %
Halodule uninervis	568.710	16.67 %

Table 2. Biomass (g DW/m^2)

Seagrasses	Biomass	Percent composition
Thalassia hemprichi	54.10	9.78 %
Cymodocea serrulata	72.95	13.19 %
Cymodocea rotundata	48.65	8.80 %
Syringodium isoetifolium	90.01	16.28 %
Halophila ovalis	7.29	1.32 %
Halodule uninervis	34.69	6.27 %
Halodule pinifolia	245.28	44.36 %
Total	552.97	

According to the results we calculated, the *Halodule* pinifolia has the highest density and greatest overall biomass on all the seven species we collected. *Halophila* ovalis has the least number of shoots per square meter. Halodule pinifolia is the most abundant seagrasses in Tangalan, Aklan.

And on our results, when we classified the seagrasses, we discovered specie that was not present in all quadrants. The new specie that was found on the beach is the *Cymodocea serrulata*.

CHAPTER V

SUMMARY OF SIGNIFICANT FINDINGS, CONCLUSION AND RECOMMENDATION

A. Summary of Significant Findings

Seagrasses are shelter and refuge for residue and transient adults and juvenile animals, many of which are of commercial recreational importance. It also helps in slowing and retarding water current and waves. Seagrasses are food for grazers, epiphyte and detritus feeders and are source of organic matter as the plants attain a high production and growth. Seagrasses helps in production and trapping of detritus secretion of dissolve organic matter that contributes to nutrient cycle within the ecosystem. In animals, seagrasses help maintain ecological balance for which marine organisms are depending on it.

This paper was focused on the density and above biomass of seagrasses in Tangalan, Aklan. And results shows that we have identified 6 species namely: *Thalassia hemprichii, Cymodocea serrulata, Cymodocea rotundata, Syringodium isoetifulium, Halophila ovalis, Halodule uninervis, Haloduli pinifolia.* Results also shows that *Thalassia hemprichi* has the highest biomass per 10 shoots ,and *Halodule pinifolia* has the most number of shoots per square meter (shoots/ m^2).

B. Conclusion

This paper was focused only on the density and above ground biomass of seagrasses in Tangalan, Aklan. Results showed that there was a high density of seagrasses in the study site. In every quadrat we gathered 5 species of seagrasses namely: *Thalassia hemprichii, Cymodocea rotundata, Syringodium isoetifolium, Halophila ovalis, Halodule uninervis, Halodule pinifolia.* And in some quadrant we discovered another specie *Cymodocea serrulata.* A high density of seagrasses are present in Hawili Beach, Aklan.

We were also able to determine the biomass of the seagrasses in Hawili Beach (*see Tables 1-7*). And we conclude *Thalassia hemprichii* in Tangalan, Aklan is the most abundant among the 6 species found. We also conclude that, Tangalan, Aklan, is a good habitat for a wide variety of marine organisms, which provide both food and shelter.

C. Recommendations

We, the researchers, recommend our research paper as a backbone for other more studies that is similar to our study or studies that is specific than ours. Studies like determining the distribution of seagrasses. We also recommend other researchers to conduct more study about seagrass since seagrass is a fascinating part of the marine ecosystem.

APPENDIX A

Plate 1. The study site in Tangalan, Ibajay, Aklan

Plate 2. The 6 species gathered from the study site

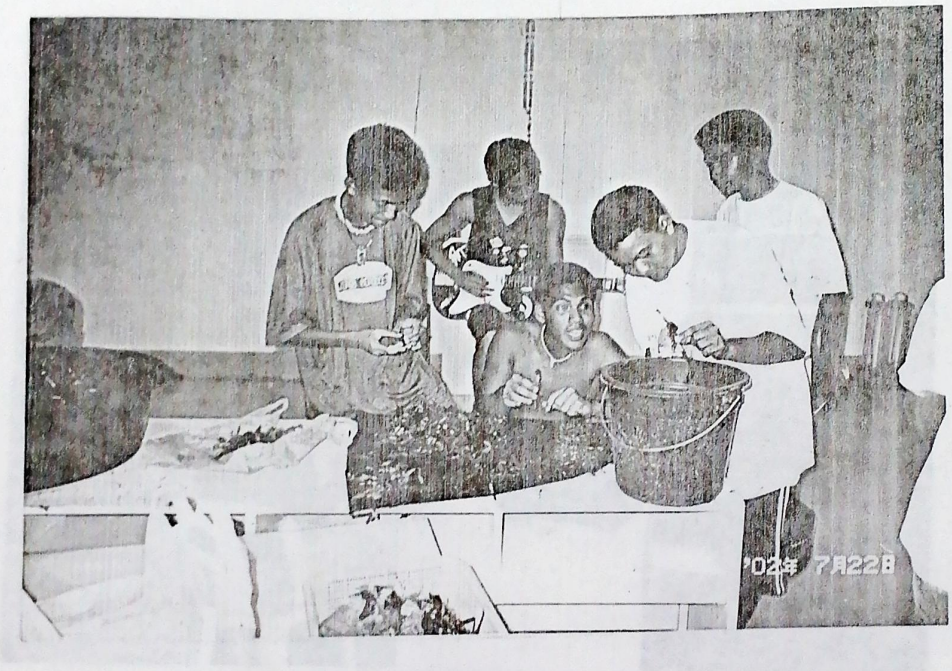

Plate 3. Identifying the seagrasses

Plate 4. Sorting of seagrasses in every quadrat

Plate 5. Wrapping of 10 shoots of every species of seagrass to be oven dried and weighed.