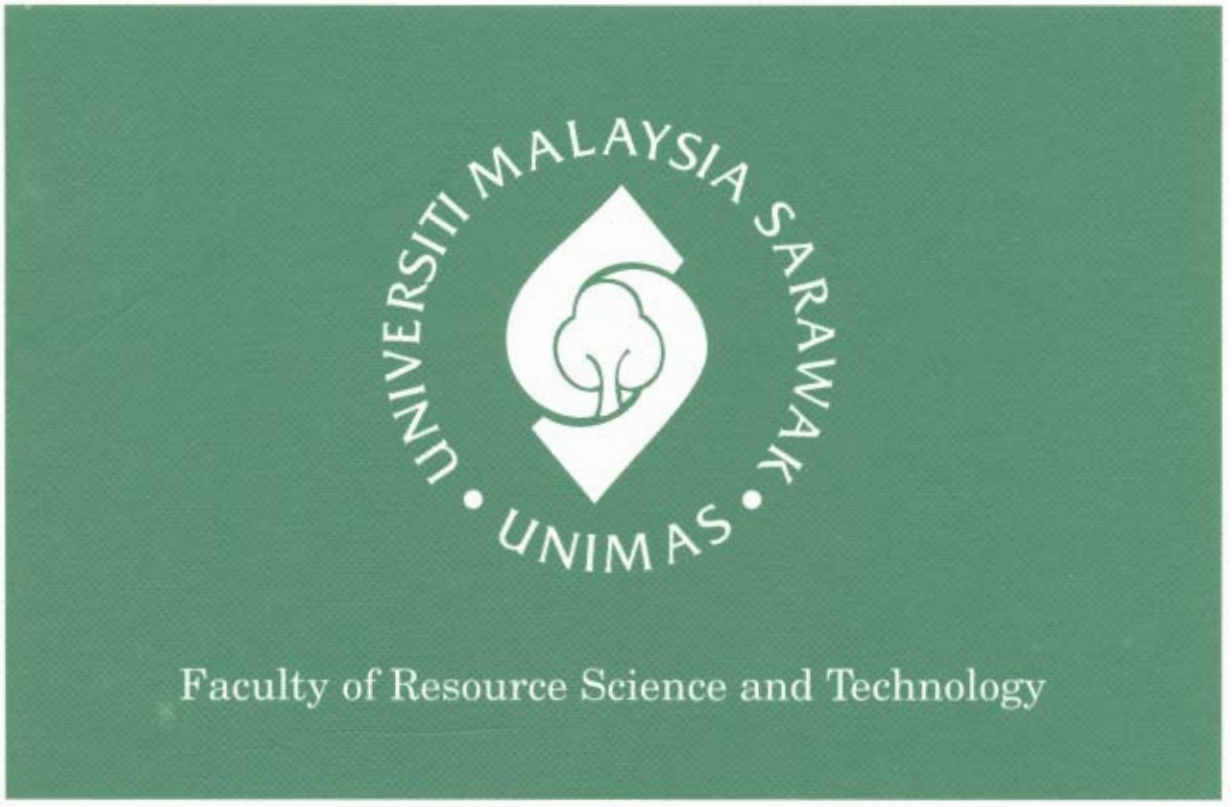

BENTHIC MICROALGAE IN KAMPUNG MANGGUT, BATANG SARIBAS, SARAWAK.

Supiah Binti Azmi

Bachelor of Science with Honours
(Aquatic Resource Science and Management)
2004

BENTHIC MICROALGAE IN KAMPUNG MANGGUT, BATANG SARIBAS, SARAWAK.

SUPIAH BINTI AZMI

This project is submitted in partial fulfillment of
the requirements for the degree of Bachelor of Science with Honours
(Aquatic Resources Science and Management)

Faculty of Resource Science and Technology
UNIVERSITI MALAYSIA SARAWAK
2004

Benthic Microalgae in Kampung Manggut, Batang Saribas, Sarawak.

By Supiah Bt. Azmi
Aquatic Resource Science and Management Program
Faculty of Resource Science and Technology,
University Malaysia Sarawak.
March 2004

ABSTRACT

A study on the benthic microalgae was conducted in Supa, Tanjung Keranji, Kampung Manggut, Tanjung Baring and Kampung Serambang in Batang Saribas, Sarawak. From this study, the biomass distribution of benthic microalgal was determined. The microalgal biomass (chlorophyll *a*) was highest at Station 2 (Tanjung Keranji) and lowest at Station 5 (Kg. Serambang). Correlation analysis indicated that chlorophyll *a* concentration was significantly correlated with the water content. The composition of benthic diatom living in the sediments was also determined. There were 7 genera of diatoms identified during this study which include *Coscinodiscus, Thalasionema, Achnantes, Nitzschia, Navicula, Pleurosigma and Okedenia.*

Key words: Chlorophyll *a*, Diatoms, Physicochemical, Estuary (brackish water).

ABSTRAK

Kajian ke atas mikroalga bentik telah dijalankan di Supa, Tanjung Keranji, Kampung Manggut, Tanjung Baring dan Kampung Serambang, Batang Saribas, Sarawak. Kajian ini menunjukkan kandungan klorofil a *adalah lebih tinggi di Station 2 dan lebih rendah di Stesen 5. Analisis korelasi pula menunjukkan bahawa klorofil* a *mempunyai korelasi yang signifikan dengan kandungan air dalam sediment. Komposisi diatom bentik juga telah dapat ditentukan. Terdapat 7 genus telah dijumpai dalam kajian ini iaitu* Coscinodiscus, Thalasionema, Achnantes, Nitzschia, Navicula, Pleurosigma *dan* Okedenia.

Kata kunci: *Klorofil* a, *Diatom, Fiziko-kimia, Estuari (Air Payau).*

INTRODUCTION

Microphytobenthos (benthic microalgae) refers to microscopic, photosynthetic eukaryotic algae and cyanobacteria that grow in marine habitats ranging from wave swept beaches to detritus-laden backwater lagoons (Macintyre *et al.*, 1996). Intertidal microphytobenthos include motile benthic diatoms (mainly pennate forms) that migrate vertically upward to the sediment surface at the beginning of the day and downward at the end of the day (Guarini *et al.*, 2002).

Benthic microalgae live in many different coastal habitats within the sediment of intertidal areas. These habitats include estuaries, sand flats, muddy shores, saltmarshes and bare soft substrate. Benthic microalgae communities contribute to the intertidal biological and physical processes (Blanchard *et al.*, 2001). Microalgae are a major carbon source for higher trophic levels such as benthic macrofaunal communities (Stocks and Grassle, 2001).

There are two principal habitats for diatoms, moist or submerged surfaces (benthic) and open water (planktonic) (Croll & Homes, 1982). Diatoms are unicellular, eukaryotic and microorganism. They are pigmented and photosynthetic, although some at least can live heterotrophically in the dark if supplied with a suitable source of organic carbon. Less than ten species are obligately heterotrophic, all are colorless (apochlorotic) and belong to the genera *Nitzschia* or *Hantzschia* (Li & Volcani, 1987). Diatoms are an important and often dominant component of the benthic microalgal assemblages in estuarine and shallow coastal developments (Michael, 1999). Organisms living in estuaries must have wide temperature and salinity tolerance

(i.e., eurythermic and euryhaline) because of the wide variation of these factors in an estuary (Robert, 1989).

In Malaysia, the study on the population of benthic diatom has previously been carried out in coastal area at Mengabang Telipot, Terengganu (Shamsudin, 1988), in mangrove area in the south of Peninsular Malaysia and Singapore (Wah & Wee, 1988) and in intertidal area of Kota Kinabalu, Sabah (Harun, 1990). No similar studies have been reported in Sarawak. Therefore, this study aims to determine the species composition of diatom and their biomass distribution in benthic ecosystem in Batang Saribas.

MATERIALS AND METHODS

Study area

This study was carried out in Batang Saribas, Kampung Manggut, Sarawak during lowtide. Kampung Manggut is situated at 1^{o} 30.50' N and 111^{o} 21.37' E. This study was carried out at 5 stations such as "Supa", "Tanjung Keranji", "Kampung Manggut", "Tanjung Baring" and "Kampung Serambang". The coordinates of all these stations were determined using a map and Global Positioning System (GPS) (Table 1). The coordinate of station 5 however was not determined due to equipment problem. These samplings were carried out in August 2003.

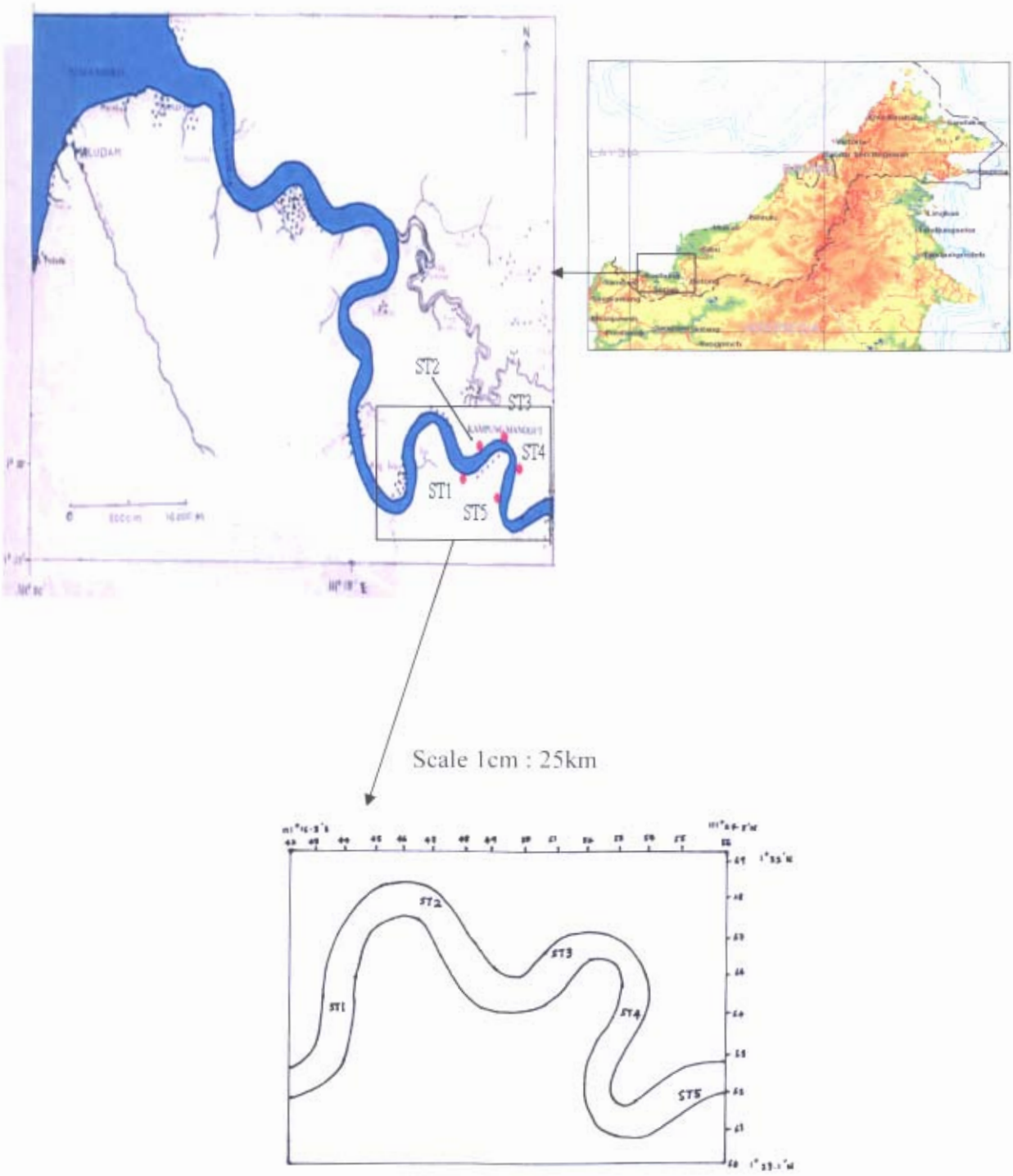

Figure 1 : Sampling stations (Station 1, 2, 3, 4 and 5).

Table 1 : Location of Sampling Station

Station	Name	Latitude (N)	Longitude (E)
1	Supa	01^0 48'	111^0 39'
2	Tanjung Keranji	01^0 30'	111^0 23'
3	Kampung Manggut	01^0 51'	111^0 35'
4	Tanjung Baring	01^0 52'	111^0 32'
5	Kampung Serambang	-	-

Background of the study area

Batang Saribas is one of the major rivers in Sarawak. The surrounding brackish and mangrove swamps are dominated by *Rhizophora* spp., interspersed with *Avicennia, Xylocarpus* and *Nypa fruticans*. These forests are a main source of complex detritus formation and maintain the productivity of mangrove systems (UKM, 1995). Brackish water comprise a range of exclusive habitats which can be subdivided into three major categories, transition zones between freshwater and marine habitats, transition zones between hyperhaline water and marine habitat and inland waters with higher salinity than freshwater.

The water in Batang Saribas contained high total suspended solid and total dissolved solid. This is due to development activities in the upper catchment such as logging, agriculture and land clearing and road building. Kampung Manggut is very special place because of 'Puffer Fish". Here, "Pesta Ikan Buntal" was held every year in August when the fish comes to spawning.

Field Sampling

A transect was established perpendicular to the beach at station 4 and 5. At station 1, 2 and 3 a transect was established parallel to the beach. The length of each transect was 30 meter. Sampling of benthic microalgae was carried out at every 10 m along the transect within an o-ring quadrate (Ø = 1m). Seven sediment samples were taken by pushing a syringe to a depth about 1 cm into the sediments within each quadrate (Figure 2).

These samples were used for:

1) Chlorophyll *a* determination (3 samples)

2) Microalgal cell analysis (2 samples)

3) Determination of percentage of water content in the sediment (2 samples)

Each sample was kept in separate plastic bags and then stored in a cooler box. These samples were bought back to the laboratory and kept at -22° C until further analysis.

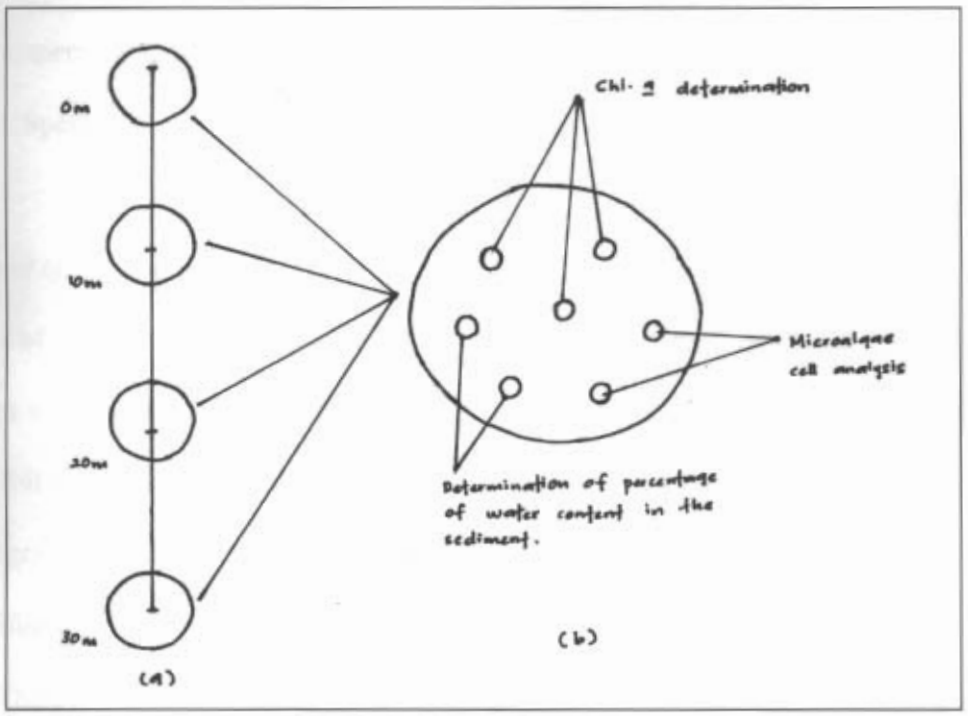

Figure 2 : Transect for sampling work (a) ; Seven sediment samples within each quadrate (b).

Water content in the sediment

The initial weights of the sediment samples was taken and then were oven dried at 105° C until a constant weight. This was a rough estimate of the water content in the sediment.

Number of diatom cells

Twenty five ml distilled water was added to each sediment samples and stirs about 1 to 2 minutes. Separation of diatoms from the sediment was done by agitating the samples for about several minutes. The sample was left to let the sediments settled down as heavier sediment settled

faster than the diatom. The supernatant which contained diatom was taken for cell counts. Two ml of the supernatant was dropped on a grid slaid. Cells were counted under an inverted microscope. Species identification was carried out under a compound microscope.

Measurement of chlorophyll a

Five grams of sediment sample containing microalgal cells were crushed using a mortar. The sample then was poured off into a centrifuge tube containing 15 ml acetone and wrapped with aluminum foil for chlorophyll extraction. The chlorophyll a extraction was kept in a refrigerator to avoid degradation of pigment. The extraction process took about 24 hours. Then, the samples were centrifuged (3000 rpm) for about 10 minutes to separate the chlorophyll extract from the sediment. The pigment was quantified by reading it absorption value at 750, 664, 647 and 630 nm wavelengths using a spectrophotometer. The chlorophyll concentration was calculated according to Parson *et al*. (1984).

Physicochemical parameters

The physicochemical parameters such as salinity was determined and measured using a refractometer respectively.