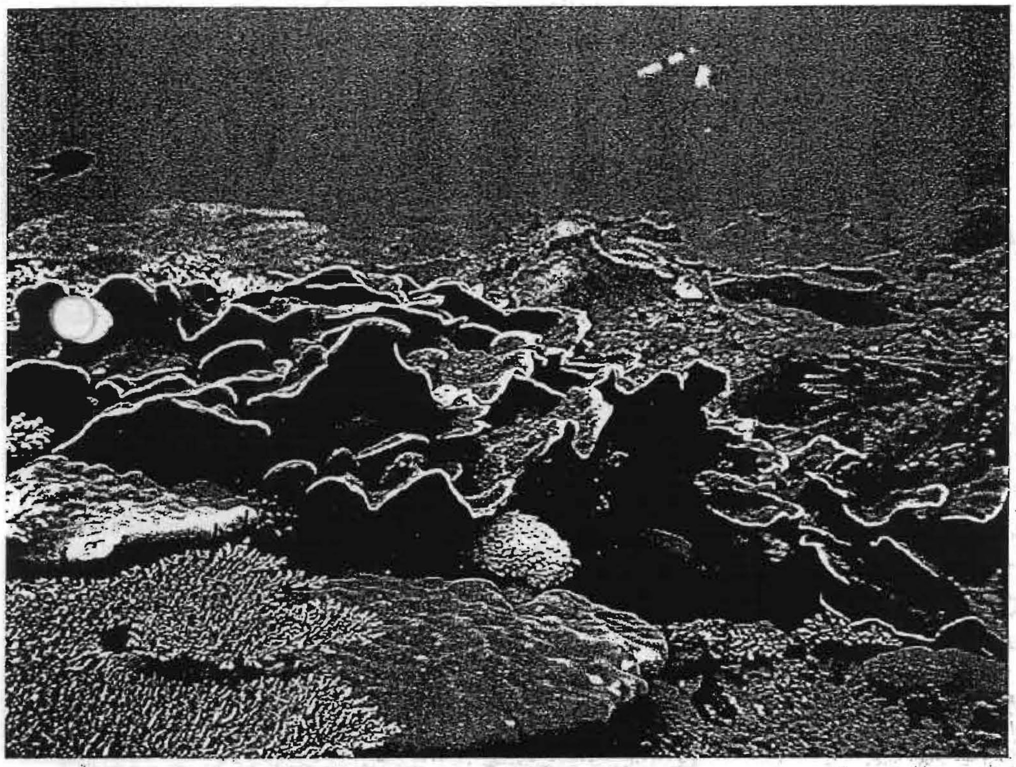
# Research Bulletin

Faculty of Resource Science and Technology

Volume 1/2009 ISSN 1511-0788

***Coral reef of Patricia Shoal located at the offshore of Bintulu, Sarawak***
(photograph courtesy of Dr Lim Po Teen)

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## Dean Message

*Prof Dr Shabdin Mohd Long*

I would like to express my warmest welcome and gratitude to all readers of the Research Bulletin FRST. This is the first issue for 2009 which focuses on the research activities at the Department of Aquatic Science. Thanks to all department members who have contributed to this issue and to the editorial board members for their efforts to ensure the publication of this issue is ready as scheduled.

Research Bulletin FRST is a part of the faculty's on-going publications. This Research Bulletin not only serve as a platform to share information on research activities among staff members but also to disseminate current research information to counterpart at other institutions. It also serves as a venue for potential collaborators at both national and international levels for initial research networking.

Seven articles from the Department of Aquatic Science have been included in this issue, comprise of various research topic, ranging from diversity of tiny blue green algae, to razor clams and aquacultures system. Works on application of molecular tool on crocodile's research is also included.

Please feel free to direct your enquiry to me at email: lshabdin@frst.unimas.my or to the editorial members if you need any further information on the Research Bulletin.

Thank you and happy reading.

In summary, a high degree of morphological differentiation was found between the three species of razor clams. DFA managed to determine that LAAS and SWHT as suitable predictor that can be used in differentiating the three species of *Solen*. In the future there is a need to expand on the variables besides solely targeting on internal shell characters, in order to obtain an unambiguous view on which variables serve better in discriminating the three species of *Solen*.

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# Utilization of modeling approach in shrimp farm management

Mordi Bimol[1], Teck Yee Ling[2], Norhadi Ismail[1] and Jane Labadin[3]

[1]*Department of Aquatic Science*

[2]*Department of Chemistry*

[3]*Department of Computational Science and Mathematics, Faculty of Computer Science and Information Technology*

The shrimp industry is one of the most important and the fastest growing aquaculture sectors in Asia (FAO, 2005) but one of the most controversial industries in the world. In Malaysia, the number of shrimp farms and farming areas has increased steadily over the years. There are currently about 11,580 farms operating in Malaysia, covering a total of about 7309 hectares (ha). In Peninsular Malaysia, 7115 farms are operating the 4,810 ha land area and 4465 farms cover about 2,500 ha in Sabah and Sarawak (Asean Shrimp Alliance, 2006). In Sarawak, shrimp farming is considered as a relatively new industry.

In the year 2000, Malaysia produced a total of 12,000 metric tons of tiger shrimps (Nyanti *et al.*, 2002). However, the figure had increase in 2005 to 21,866 metric tons. Shrimp farmers harvested a total of 33,364 metric tons of shrimps (tiger shrimps and white shrimps) in 2005, of which 23,615 metric tons was produced in Peninsular Malaysia and 9,749 metric tons in Sabah and Sarawak, East Malaysia (Asean Shrimp Alliance, 2006).

The sustainability of the shrimp industry is threatened due to poor management practices. Pollution from ponds due to discharge of effluents is highly important due to its adverse impacts on the environment and the decline of the river water quality. Therefore it is very important to determine the carrying capacity; the maximum level of shrimp farm development a watercourse can accommodate without excessive water-quality degradation (Ward and Green, 2001) of particular system for management purposes.

Thus, carrying capacity should be established in advance to manage the farms and also for the development of new shrimp farms. All factors must be predicted in advance to develop a mathematical model as a technique for understanding the dynamics of a system and for predicting future outcomes within the system. By modeling, the water quality of the river can be predicted and the carrying capacity of the river can be estimated.

Various types of model are available for this purpose and vary based on performance. Different models are designed for different water systems for example lake, river and estuarine and depends on the extent of the particular system. In comparison with an estuary, a bay is wider (Fig. 1). Thus it must usually be modeled as a two-dimensional horizontal system. Also it can sometimes be deep enough that it must be treated as a three-dimensional body.

Modeling requires the water system to be segmented into a few segments and each segment will have approximately the same characteristic within the boundary. A model network is a set of expanded control volumes, or "segments," that together represent the physical configuration of the water body. As Fig. 2 illustrates, the network may subdivide the water body laterally, vertically, as well as longitudinally. Benthic segments can be included along with water column segments.

If the water quality model is being linked to the hydrodynamic model, then water column segments must correspond to the hydrodynamic junctions. Concentrations of water quality constituents are calculated within each segment. Transport rates of water quality constituents are calculated across the interface of adjoining segments. Basically, factors or parameters that are needed depend on the objectives of study and the equations to be solved in the model utilized.

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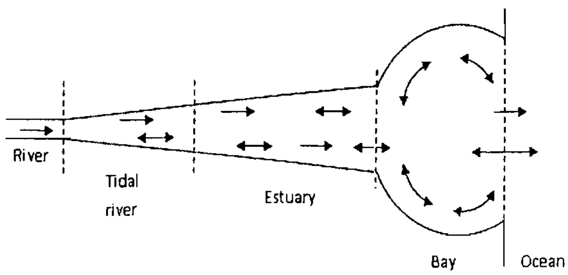


Fig. 1: A schematic of the various zones in an estuarine system

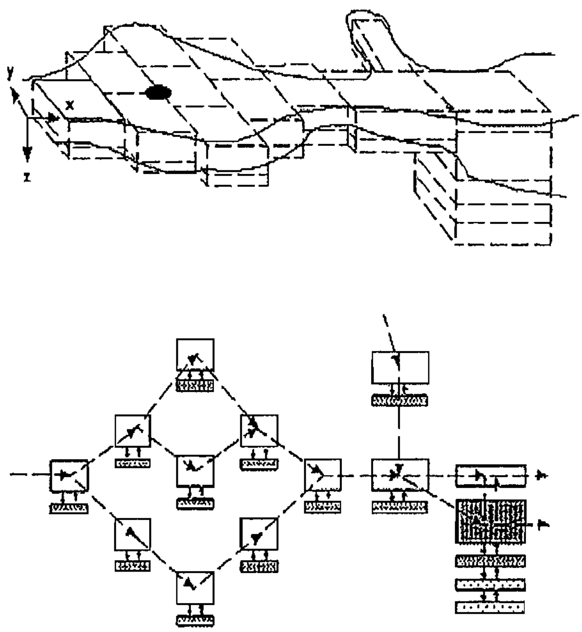

Fig. 2: Model network (Wool *et al.*, 2004)


FAO (2005). Yearbook of fisheries statistics extracted with Fish Stat Version 2.30 (Copyright 2000). Fisheries Database: Aquaculture Production Quantities 1950-2003; Aquaculture Production Values 1984-2003; Capture Production 1960-2003; Commodities Production and Trade 1976-2002.
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"SUSTAINABILITY OF SHRIMP INDUSTRY IS THREATENED DUE TO POOR MANAGEMENT PRACTICES"

# Similarity assessment on cyanobacteria assemblages in selected Sarawak aquaculture ponds

Mohd Nasarudin Harith and Ruhana Hassan
*Department of Aquatic Science*

Cyanobacteria (blue green algae), belong to the class Cyanophyceae, have the characteristics of both bacteria (prokaryotic cell organization) and algae (ability to photosynthesize like plants). They can grow in most diverse ecological conditions and are very beneficial to mankind, for example, *Spirulina* is a source of food for the native people near Lake Chad, Africa (Sze, 1998). In contrast, they may produce toxins that cause deleterious health effects on humans and animals (Skulberg *et al.*, 1993).

Beta (β) similarity index is one of the methods to assess the inter-community or inter-habitat similarity. In contrast to the β-diversity proposed by Routledge (1977), β-similarity is the mean proportion habitat or communities occupied by a single species. It allows comparison of habitat similarity of two different study systems and provides information about the degree of partitioning of habitat by species.

In this brief report, the Jaccard's index of floristic similarity, $C_J$ (Mueller-Dombois & Ellenberg, 1974) was analyzed to evaluate the β-similarity of cyanobacteria in terms of genera composition. Five stations involving three types of empurau (*Tor tambroides*) aquaculture ponds namely HDPE (High Density Polyethylene) layered ponds, earth ponds and cage culture in Serian and Batang Ai, Sarawak were selected for this study. The cyanobacterial samples were identified up to genera level based on keys from credible references.

A total of 25 genera were identified in all five sampling stations, with 23 genera recorded at Batang Ai whereas 10 genera were documented at Serian. In general, aquaculture ponds in Batang Ai supported more cyanobacteria genera compared to those in Serian. *Chroococcus* (Fig. 1) was the most common genera and potentially commercial genera *Spirulina*