Mangrove Restoration Activities on a Degrading Coastal Strip in Sg Hj. Dorani, Selangor, Malaysia

By:

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(Paper presented at the ***19th International Conference of the Society for Ecological Restoration*** held on 23-27 August 2009 in Perth, Australia)

SERI WORLD CONFERENCE 2009 ON ECOLOGICAL RESTORATION

Making Change in a Changing World

19th Conference of the Society for Ecological Restoration International

Perth, Western Australia, Australia

Sunday 23 August to Thursday 27 August 2009

Conference Abstracts

SER Society for Ecological Restoration International

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Coastal, Marine, Mangrove Restoration

ECOLOGICAL REDUNDANCY IN HABITATS PROVIDED BY NATIVE AND NON-NATIVE OYSTERS: IMPLICATIONS FOR COASTAL RESTORATION.

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The Sydney rock oyster, *Saccostrea glomerata*, is an ecologically and commercially important species. In eastern Australia, S. glomerata is threatened by disease caused by Marteilia sydneyi, a protozoan parasite, responsible for up to 94 % mortality of aquaculture stocks. Consequently, selectively bred disease resistant S. glomerata, and sterile non-native Pacific oysters *Crassostrea gigas*, are cultured in several estuaries. Yet, it is unknown if disease resistant *S. glomerata* or *C. gigas* may also be useful in restoration of wild S.glomerata populations and the ecosystem services they provide. We conducted a field experiment to determine whether habitats provided by wild-stock S. glomerata, selectively-bred disease resistant *S. glomerata*, and *C. gigas*, are ecologically redundant to macroalgae and invertebrate assemblages. Oyster spat were glued at natural densities to concrete plates. Plates were deployed at two intertidal heights of a rocky shore. After 2, 3, 7, 10 and 12 months, oyster mortality, growth, and percentage cover of macroalgae and invertebrates were sampled. *C. gigas* displayed significantly higher mortality and growth rates than wild-stock and disease resistant *S. glomerata* over time, at each tidal height. Yet, despite structural differences, oyster habitats consistently supported similar macroalgae and invertebrate assemblages. These results indicate that in the early stages of oyster population establishment, there are no functional differences in the habitat provided by wild-stock and disease resistant *S. glomerata*, or *C. gigas*. Ongoing sampling will assess long term algae and animal assemblages as oysters grow, and increase our understanding of how non-native oysters may assist coastal restoration.

MANGROVE RESTORATION ACTIVITIES ON A DEGRADING COASTAL STRIP IN SG HJ. DORANI, SELANGOR, MALAYSIA.

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Malaysian coastal strip is facing serious erosion problem where 29% of its 4,809 km coastline is facing erosion. Sg Hj Dorani in the state of Selangor is experiencing degradation at an alarming rate where a thin layer of mangrove forest can be observed along its coastline. This paper reviews on an effort to restore back its mangrove community by introducing an integrated approach of hard engineering and soft engineering techniques with emphasis on mangrove replanting in a small pilot study area of 100m x 60m seaward from the shoreline. A 100m long of a non continuous hard engineering structure known as L-block was installed 60m from the shoreline as a first defense to dissipate wave energy. Behind this structure landwards, an installation of soft engineering materials of bamboos and mangrove vegetated coir logs took place. Both hard and soft structures are aimed to increase sedimentation and stabilize the area to produce a conducive environment for the introduced mangrove seedlings as well as for natural regeneration. Results indicated that the sedimentation has increased 17 cm after 6 months following installation of the L-Blocks. Initial trial planting works showed that mangrove seedling survival (*Avicennia marina*) was recorded at 12.6% after 1 month due to barnacle infestation and active sedimentation.

Mangrove Restoration Activities on a Degrading Coastal Strip in Sg Hj. Dorani, Selangor, Malaysia.

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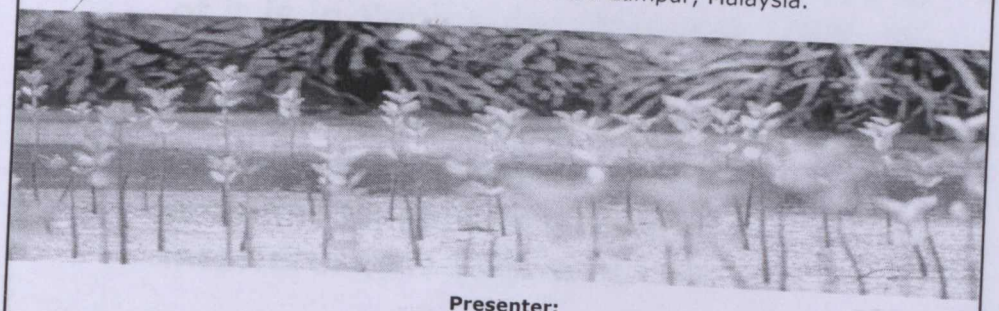

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Presentation Outline:

- Introduction
- Objectives
- Site study
- Methodology
- Results
- Conclusion
- Future work
- Acknowledgement

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Introduction

- Malaysia has 4,809 km coastline
- 566, 856 ha of mangrove forest :17% of it is in Peninsular Malaysia, 26% in Sarawak and 57% in Sabah
- 29% of it is facing erosion – due to natural phenomenal - (coastal erosion) as well as human interference – (aquaculture)

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Problem statement:

- presents the effort taken to restore back the mangrove community - by integrated approach of hard engineering and soft engineering techniques **with** emphasis on mangrove replanting.
- Why? Because conventional planting efforts taken in Malaysia has proven a failure.

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Objectives:

- To rehabilitate existing mangrove forest
- To mitigate extensive damage to the coastline
- To continuously protect coastal erosion by use of cost-effective and environmentally friendly rehabilitation technique

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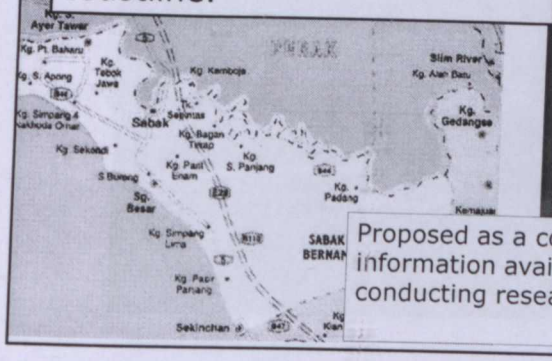
SITE STUDY:
SUNGAI HAJI DORANI, SABAK BERNAM, SELANGOR,MALAYSIA.

experiencing degradation at an alarming rate where a thin layer of mangrove forest (from a row of mangrove) can be observed along its coastline.



Proposed as a communal Research station – more information available for the site. Few agencies conducting research here – FRIM, UM, UTM, FD.

Methodology

1. Installation of hard engineering structure known as L-Block
2. Installation of soft engineering structures – fascines, bamboo piles
3. coir logs vegetated with mangrove seedlings reared in nursery followed by transfer to coastal site
4. Monitoring of sedimentation process and growth of mangrove seedlings for the next 1-2 years

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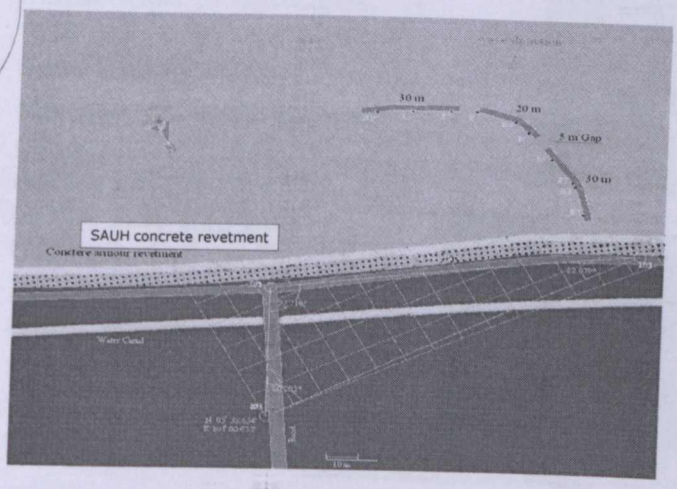
1. Installation of Wave Breaker L-Block –

A 100m long of a non continuous hard engineering structure known as L-block was installed 60m from the shoreline as a first defense to dissipate wave energy.



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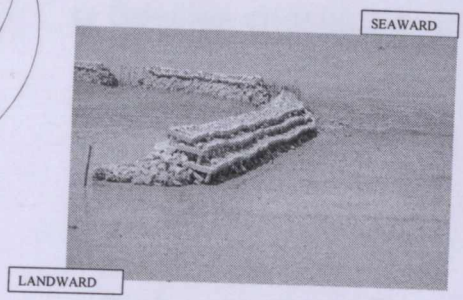
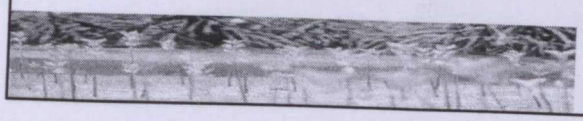
L-BLOCK structure was fully installed on site in August 2008.



L-Block fits 2 functions:

1. To encourage accretion of sediments.
2. To control wave impact so that mangrove seedlings could be planted between the wave breaker and the land



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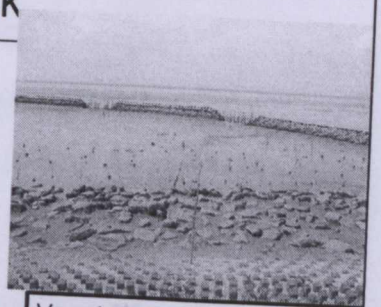
2. Installation of soft engineering structure behind L-Block

- Between L- Block and land, installation of bamboos, fascines, coir logs and geo piles took place.
- Mangrove seedlings were grown in coir logs in nursery for 5 months (since July 08) before transplanted on the coast.
- Reading on growth only conducted from Sept 08 (in nursery) and continued on site.



Vegetated coir log on site

Vegetated coir log in nursery

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3. Planting of mangrove seedlings

- Species chosen based on existing species
- *Avicennia marina*
- A total of 130 seedlings were planted on coir logs in the first batch
- Each unit of coir log is 10kg/m^2
- a maximum of 5 seedlings per coir log
- Raised in the nursery since July 08
- transferred to site in Dec 08.

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4. Monitoring

- Monitoring of sedimentation
- Monthly monitoring of the plant survival and height

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Observations

Beach profile changes:

To find out the amount of deposited sediment in the sheltered area:

1- Profile surveying has been conducted monthly

2- Profiles were compared with initial profile to calculate the changes

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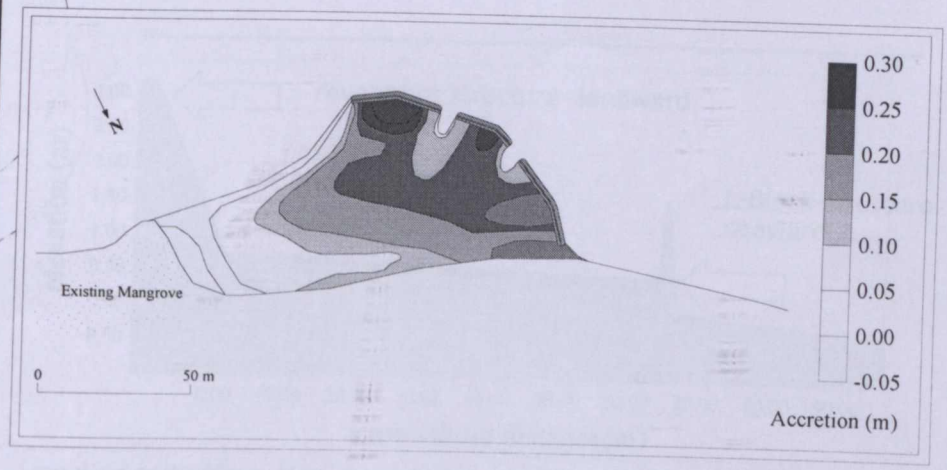
Observations



October 2008 (4 months after construction commenced July 2008)

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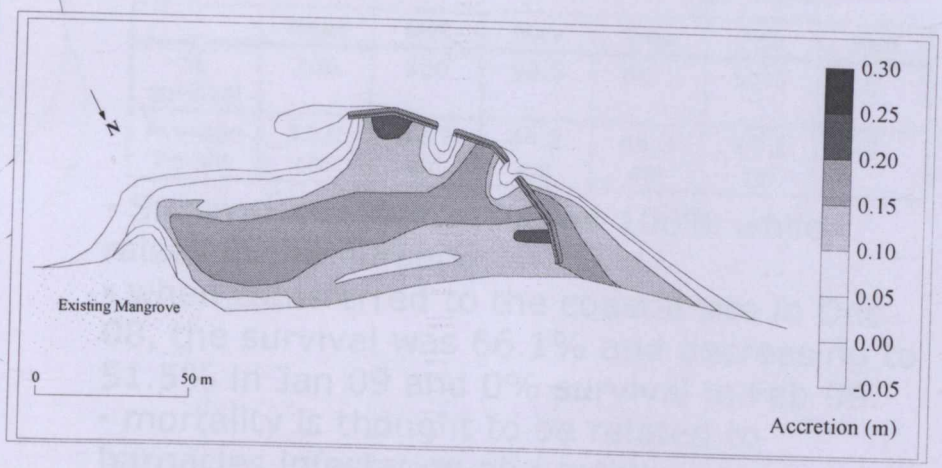
Observations



February 2009 (8 months period after installation in July 2008)

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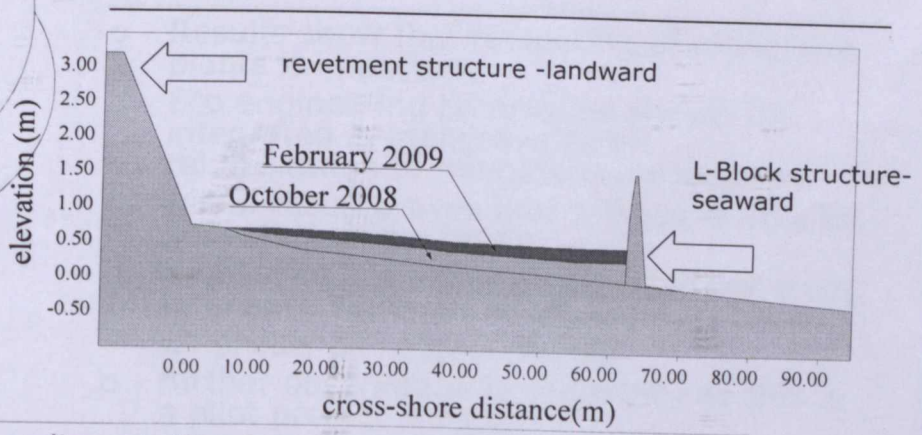
Result: Sedimentation



sedimentation has increased 17 cm after 6 months following installation of the L-Blocks.

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Result: Survival rate and growth

	Sept	Oct	Nov	Dec	Jan	Feb
% survival	100	100	98.5	66.1	51.5	0
Average height	41.0 cm	42.2 cm	44.2 cm	45.3 cm	47.3 cm	0

- Survival rate was recorded 100% while raised in the nursery
- when transferred to the coastal site in Dec 08, the survival was 66.1% and decreasing to 51.5% in Jan 09 and 0% survival in Feb 09.
- mortality is thought to be related to barnacles infestation and active sedimentation.

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conclusion

- Results show that replanting of mangrove plants is important.
- Eco engineering techniques should be integrated in mangrove forest rehabilitation to mitigate wave impacts.
- Initial result proves that L-Block is able to activate sedimentation
- Replanting technique require further study to ensure higher survival rate
- Emphasis on natural recruits
- further observation is necessary as this is a pilot project in Malaysia.

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Future work

- more seedlings replanting with a modified technique and different species
- Continue monitoring for the next 1-2 years
- Faunal observation to complement floral observation
- Natural recruits to be recorded

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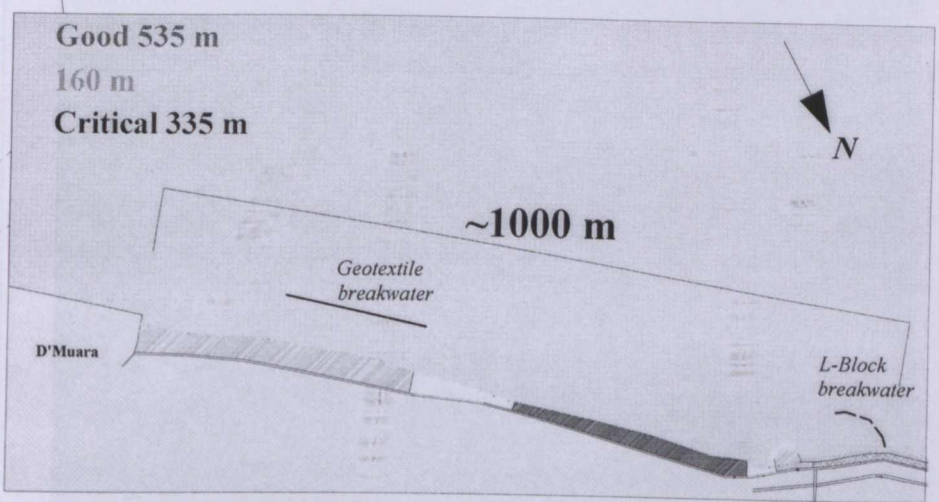
Shoreline conditions



Proposed for extension area to be rehabilitated joining another agencies to protect critical area.

Acknowledgement

- The organizing committee of SERI2009
- University of Malaya, Kuala Lumpur.
- Forest Research Institute of Malaysia
- All our postgraduate students and the local villagers of Sg Hj Dorani

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