MANGROVE PLANTING FOR COASTLINE PROTECTION – TO PLANT OR NOT TO PLANT

by

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Protective Role of Mangroves

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Loss Of Mangrove Forests Contributed To Greater Impact Of Tsunamis!

Mangroves Could Have Reduced Tsunami Damage, U.N. Official Says

January 07, 2005 — By Sam Cage, Associated Press

GENEVA — Damage from the Indian Ocean tsunami could have been reduced if more coastal areas had maintained their protective shields of mangrove swamps and coral reefs, a key U.N. official said Friday.

Tsunami calamity highlights key protective role of coral, mangroves

The Dilemma

- Destruction and degradation of mangroves – blamed for loss of lives and properties after the tsunami
- Action: (Re)planting mangroves to protect the coasts from tsunami !

The Complications

Mangroves no barrier to tsunamis

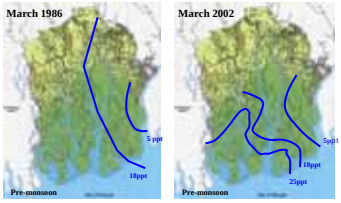
- Kathiresan & Nadarajan, Finn Danielsen et al, UN agencies, NGOs, media, meetings, etc – mangroves provide protection
- Baird, Campbell & Kerr– mangroves & coral reefs provide no protection
- Green belts vs coastal structures

Priority Complications

- Protection of existing mangroves vs mangrove planting along coastlines
- Rehabilitation of abandoned shrimp ponds?

Sink or Swim Together !

- Climate change and sea level rise
- Coastal erosion
- Can the existing mangroves migrate inland? Changes in species?
- Remove coastal bund?
- Research?
- Why planting along coastlines?



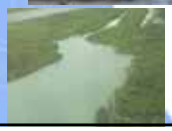
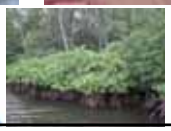
IUCN, 1994 and IWM, 2002)

- 10cm SLR inundates 15%
- 25cm SLR inundates 40%
- 45 cm SLR inundates 75%
- 1m SLR the Sundarbans would be lost (IPCC 2003)

Our Assessment

- Coastal vegetation as well as coastal structures – provide some form of protection
- Coastal sand dune




Our Assessment

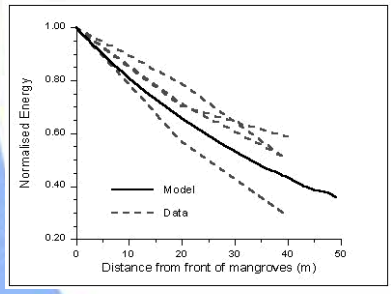
- High casualty areas – estuary areas (river mouth), open beaches
- People choose to live near the coast and river mouth
- Opportunity - rebuilding for better tomorrow?



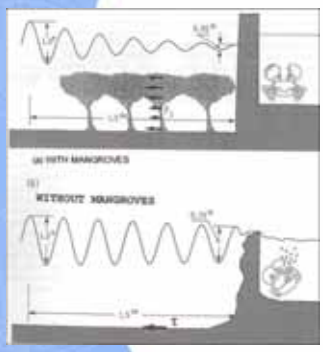


Mangroves for Coastal Protection

- AIMS-IBM-KEPCO project – wave attenuation in mangrove forests



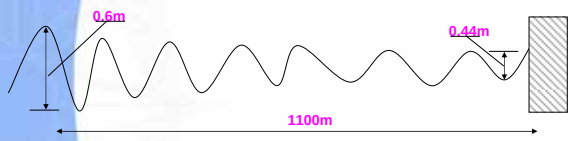
Mangroves for Coastal Protection



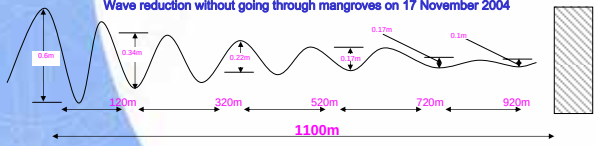
Mazda et al (1997)

Mangroves for Coastal Protection

- Plantation of *Sonneratia caseolaris* since 1995 at Hai Phong - Action for Mangrove Reforestation (ACTMANG)

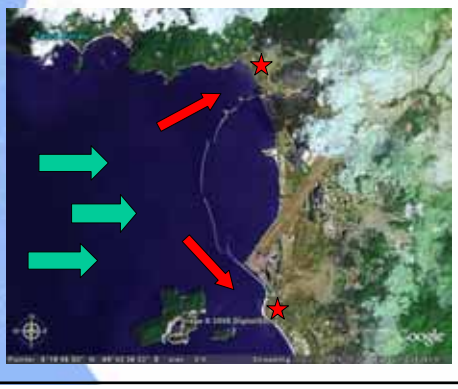


Wave reduction without going through mangroves on 17 November 2004



Wave reduction when going through 920m of planted *Sonneratia* forest on 17 November 2004

Hard Coastal Defense System



Where Mangroves Provide Less/No Protection

1. Close to epicentre
2. Thin fringing mangroves
3. Degraded mangroves (low density)
4. Wave intensity is huge

Damage to Mangroves

Source: DMCR

Back to Nature

- Natural distribution of mangroves
- "Low energy" areas – estuary, lagoon, bay, basin

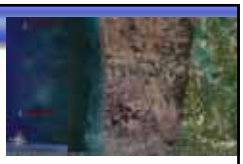
False Alarm!

- Tsunami affected areas – no significant mangrove areas along the coasts!
- Why blamed mangroves for the destruction caused by the tsunami?
- Why mangrove planting – fixing a broken coast?

Back to Nature

- Study in west coast of Johor (Teh and Lim, 1993) – "Gain some, lose some"
- Dynamic coastal process – sediment deposition
- Kedah & Seberang Prai (Penang)





Human Activities

Back To Nature
- Natural Regeneration (self-repair)


Underestimate the nature!

Back to Nature

- Tanjung Piai (Johor)
- Oil spill (1997)



Pioneering The Coast

High salinity areas:

- *Avicennia marina*
- *Avicennia alba*
- *Rhizophora stylosa*
- *Sonneratia alba*
- *Aegiceras floridum*

Low salinity areas (i.e. delta-freshwater)

- *Kandelia candel*
- *Kandelia obovata*
- *Sonneratia caseolaris*
- *Sonneratia apetala*

Avicennia alba

Avicennia marina

Aegiceras floridum

Rough, Rush & .....
- Malaysian Experience (Kedah)



June 2005



Feb 2006

Rough, Rush & Harsh Reality
- Malaysian Experience (Kedah)


April 2006


July 2006

Dumping Money Into The Sea

Dumping Money Into The Sea
- Malaysian Experience (Kedah)




Dumping Money Into The Sea
- Malaysian Experience (Penang)


Dumping Money Into The Sea - Indonesia (Aceh)

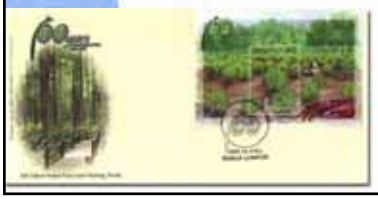
- Many projects have failed (Erika Check 2006; Sukristijono Sukadjo – pers.comm.)

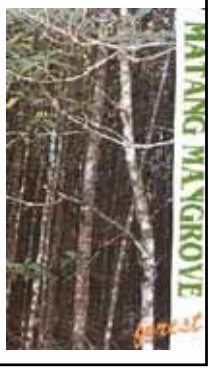
Seed Waiting & Wasting

- Unnecessary increase in price of seeds
- Over-collection of seeds

Living In The Shadow Of Matang's Success

- *Rhizophora apiculata*
- Seed easily available
- Estuary vs coastline
- High rainfall; 15 ppt





Rehabilitation of Abandoned Shrimp Ponds

The Philippines – Wrong Places; Wrong Species

Photo: JH Primavera

Mangrove Planting on Mudflats?

Doing It Right!

- Critical steps for successful mangrove rehabilitation (Lewis, 1999)

1. Understand the individual species ecology (autecology)
2. Understand the normal hydrologic patterns that control the distribution and successful establishment and growth of targeted mangrove species
3. Assess the modifications of the previous mangrove environment that occurred that currently prevents natural secondary succession
4. Design the restoration program to initially restore the appropriate hydrology and utilize natural mangrove recruitment for plant establishment
5. Actual planting, after through Steps 1-4

Mangrove planting along the coastlines in the Philippines

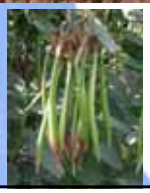
July 2004

December 2005

SEAFDEC/AQD
JH Primavera

Mangrove planting along the coastlines in China (Hai Cang, Xiamen)

Xiamen ICM Programme



Where Planting Is Not Possible

Serious Erosion Problem

Other Alternatives / Options

Other Alternatives / Options

Raising the Bar!

Other Alternatives / Options

- Casuarinas (+ *Osbornia octodonta* + *Pemphis acidula*)






Other Alternatives / Options

Conclusions

- Misleading information, poor utilisation of natural knowledge and scientific information
- Setting the priorities:
  (1) protect the existing mangroves
  (2) rehabilitation of abandoned ponds
  (3) (re)planting along coastlines
    - assessment & planning
    - hydrology (Lewis – 5 steps)
    - right (pioneer) species & right places
- Other options are available
- Doing-Nothing – Save money
- Fund – research, better coastal planning