I. BACKGROUND

- Indonesia has some specific condition:
  - Between 3 main world tectonic plates Eurasia, Indo-Australia, Pasifik.
  - Archipelago country sorrounded with the sea
  - Has 8 seismic gap, when earthquakes happened, it will have tsunami effect to the shores area
  - Tsunami frequent has raised. In last 50 years there were 23 tsunami.
  - Tsunami impact: damage of ecosystem (lost of biodiversity)

- To eliminate the damaged, Indonesia need an effective, efisien n low price technology
Simulation Time: 10 minutes
LESSON LEARNED

Coastal areas are vulnerable to Tsunami

Need physical and vegetation barriers

Improper present land use

INDONESIA’S SHORES CONDITIONS

1. Andhesit shores
The materials of this shores are from the sea shell fauna fossils Acropora, Fungia and Porites (Filum Coelenterata). Or from the sea plant fossils Halimeda and Lithohamnion.
2. Sandy shores

- Sand dune as a form of the wind movement
- Main materials is sand, hot and dry at the surface, keep water at the beneath
- Mostly were used to cultivation
- Marginal soil
- Common plant character; (1) Uninfluence by climate; (2) Dry land (sandy, andhesit, clay)); (3) low area; (4) Some times epyphit grow up at the trees; (5) Specially at south Java, west Sumatra n Sulawesi.

3. Muddy shores

- Specific characters (1) mud sedimentation on the bottom; (2) flat topography; (3) on the bay area; (4) weak waves
- Biologic characters (1) mostly fauna below substrat; (2) fauna build a hole, tunnel n more haemoglobin as adaptation on the low oxygent condition; (3) alga Diatomae on the mud surface; (4) a mangrove’s habitat.
- Indonesia’s total mangrove forests ± 7.758.410,595 ha
- Less 120.000 ha from 1980 - 2005 because of turn into cultivation land
Delta Mahakam. Red colour indicate vegetation (a) 1992, shrimp ponds 4% from total mangrove forests. (b). 1998, shrimp ponds grew up 41% from total mangrove forests . (c) Inset from the box showed shrimp ponds pattern expansion on the same area (Husein, 2006)

**SHORE’S REHABILITATION IN INDONESIA**

- At Dec 2004, area covered with dense mangrove forest had a little damage than area with broken mangrove forest
- Some studies shows that shore’s forest effective to prevent the village from the impact of tidal waves and tsunami’s
  - Pratikto et al (2002), mangrove forests reduce force of tidal waves 0.734 joule
  - Utomo (2003), mangrove forest with height 5m and 50 m thickness reduce wave force 25%-30%
  - Istiyanto et al (2003), mixed species of mangrove forests reduce the energy of tsunami
  - Suryana (1998), mangrove forests with 100m width reduce the initial extent of the wave to 80%
1. Mangrove’s rehabilitation

a. On the tidal area’s
   - mangrove’s planting on all tidal’s area
     (reasons of Rhizopora as the main mangrove’s sp plant; lot of mother plant, height of the seeds >20cm, foots breath roots and cattle likes the leaves)
   - variative density; 1 x 1 m, 3 x 3m
     width 50m – 100m to the beach
   - to built a mangrove forest with a high density; rich of biodiversity; shelter of tsunami n abrasion, wind and wave breaker
   - used to do at north Java, east Sumatra, Bali Kalimantan and Papua Islands

b. On the ponds

   - Traditional sylvo fishery
     Mangrove’s planted on the centre of the ponds
   - Komplangan
     Mangrove’s planted on the special area of the ponds
   - Open ponds
     Mangrove’s planted on the dike of the ponds
   - Kao-kao
     Mangrove’s planted on the dike in the centre of the ponds
   - Tasikrejo
     Mixed Mangrove’s, dry field rice, tea jasmine and ponds
2. Shore’s regreenings

- **1985 - 1999**: Regreenings Inpres with Accacia auriculiformis, chasew nuts, gliricideae and coconuts in the shore area’s. It was planted on the farmers fields borders.

- **1999 – 2007**: Planted a Casuarina equisetifolia, Accacia auriculiformis and gliricideae with untu walang pattern. It was planted on the 100 meter from the highest tidal wave points.

- **2007 - ....**: Shores’s reahabilitation with some shore’s species. There were some patterns such as (a) systematic patterns; (b) strip patterns; (c) row patterns and (d) nelder/semi nelder patterns.
Thank you

Hope you can visit my Indonesia lovely country