Integrated land management to improve long-term benefits in coastal areas of Asian Tsunami affected countries

Presented by
Dr Russell Hanley

General agreement that:
• Current ICM in most of the tsunami affected countries is/was poor
• Clearing of coastal forests, including mangroves, led to higher levels of damage and loss of life
• Valuable ecosystem services should be repaired/replaced where possible

Value of Ecosystem Services from Coastal Forests
• Coastal Protection
• Maintenance of coastal waterways
• Filtration Systems
• Fisheries Productivity
• Maintenance of Biodiversity

Coastal Protection
• A coastal forest buffer zone can provide some protection from storms/tsunamis
• The level of protection varies dependent on local topography, type of forest, likely threats, etc.
• Sathirathai and Barbier 2001 - protection service from coastal forest with an NPV of $3,678/Ha (Thailand)

Fisheries Productivity
• Linkages between coastal forest and offshore and estuarine fisheries productivity
• Scale and value of linkages varies
  – dependent on local characteristics, e.g. latitude, rainfall, type of forests,
  – and the method of estimating the links, e.g. ecological or economic models

Fisheries Productivity
• Sathirathai and Barbier 2001 - fisheries service from coastal forest (mangroves) NPV of $21-69/Ha (Thailand).
• Dudley 2000 - fisheries service from coastal forest (mangroves) of $1376/Ha (Java).
• Pauly and Inglis (1986):
  \[
  \log_{10}(\text{MSY}) = 2.41 + 0.4875 \log_{10}(\text{veg.}) - 0.212 (\text{deg. Lat.})
  \]
Direct use values of coastal forests

- Coastal forests have a long history of utilization within the region
- Uses include food, timber, firewood, charcoal, fibres, dyes, medicines
- Utilization patterns have changed – e.g. the replacement of locally sourced fibres and dyes with imported, often synthetic products
- Sathirathai and Barbier (2001) – estimate value of direct uses from mangroves at $88/ha

The pressures on coastal forests and coastal zones

- Population growth
- Over harvesting of resources
  - Timber, firewood, charcoal
- Conversion of coastal forests to other uses
  - Fish and shrimp ponds
  - Other agriculture
  - Urbanisation and infrastructure development
  - Tourist development
  - Loss of access to common property resources

Integrating coastal forests into land use plans and patterns

- Agroforestry
- Silvofishery
- Multifunction systems
- Tourism and recreation
- Plans and patterns can be developed at different scales e.g. regional, local, individual plots of land

Agroforestry

- Often forestry and agricultural systems are in competition for the available land resources
- However, mixed forestry/agriculture systems are widespread within the region and many have a long history
- There are advantages and disadvantages in mixing forestry with other agricultural systems

Agroforestry

- Advantages
  - Diversification of products,
  - soil conditioning,
  - Erosion control (wind, water)
- Disadvantages
  - More difficult to manage
  - Often longer investment period before returns
  - Monocultures may provide better returns
  - Who owns the trees?

Agroforestry

- Agroforestry, (home gardens and farm forestry), is the most important source of woodfuel for domestic consumption
- Agroforestry (on public and private lands) key strategy for woodfuel production
- Improved natural forest management should be a complementary strategy (FAO 1997).
**Silvofishery models**

- Various combinations of ponds and forest
- Often mangroves, but other tree species can be used above high tide levels
- Crabs, shrimp and fish
- Trees can be inside ponds or adjacent to ponds

**Advantages**
- Diversification of direct use products - fish, timber, firewood, charcoal, green fodder
- Ecosystem services - coastal protection, maintenance of waterways

**Disadvantages**
- More difficult to manage
- Lower productivity because of shading
- Reduced water circulation
- Higher construction costs
- Takes longer to establish
- Who owns the trees?

**Multifunction systems**

- Forestry
- Fisheries
- Livestock
- Beekeeping
- Filtration

**Tourism and recreation**

- Coastal forest can provide benefits to tourism such as:
  - Windbreaks
  - Shade
  - Scenic values
  - Educational interest

**Primavera (2000) has reviewed silvofishery models in 5 south east Asian countries and concludes:**

- Crab fishery models appear to give the highest returns
- There is a lack of good data on optimal designs, but evidence suggests site specific factors are very important
- There is little evidence of individual landholders adopting these models without government subsidy
Economic Analyses of Land Use

• Recent analyses of economic values of coastal forests compared to other land uses
• Generally conclude that the direct use and ecosystem service values of coastal forests are equal, or superior, to other land uses such as fish/shrimp ponds
• Why is the same general trend of loss of forests observed throughout the region?

The problem of who benefits and who pays

• General trend is for common property resources (land) to be captured for private use
• Private land use decisions tend to be made by comparing different direct use values
• Coastal forests appear to have lower direct use values when compared with fish/shrimp farming, agriculture, urban development, etc.
• The value of ecosystem services are usually not included in the comparisons of land use benefits

The problem of who benefits and who pays

• Ecosystem services and benefits are:
  – Often poorly understood
  – Difficult to quantify
  – Widely distributed
  – Of relatively low value to the individual landholder/s

Decision making at the household and community levels

• Long term versus Short term?
  – Establishing forestry resources can take longer than other options
• Land tenure, investment?
  – Security of tenure is essential for longer term planning, as is access to capital
• Economies of scale?
  – On small plots of land mixed farming approaches can be more easily managed
• Risk minimization?
  – Diversification can reduce risk

The Role of Government

• Easterly (2002) noted that “people respond to incentives”
• Land tenure – Security of tenure can alter planning in favour of the long term view
• Planning and enforcement of buffer and other zones – consistency and integration
• Resource taxes and their allocation – those that benefit from ecosystem services pay a premium for those services
Setting goals and timelines

- All affected countries agencies have recognised the importance of an integrated approach
- However, most are currently facing many problems in the implementation of plans that include coastal forests /buffer zones
- It is important to set longer term goals (10-15 years) and work consistently toward them
- Important to design plans that will fit local conditions

An example from Aceh

A unique opportunity in Aceh

- In many areas on the north and west coasts:
  - Erosion of the coastline and subsidence was substantial
  - There is evidence that many of these areas are now accreting
  - Opportunity to grow the coastal buffer zone as the coastline moves seaward