

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

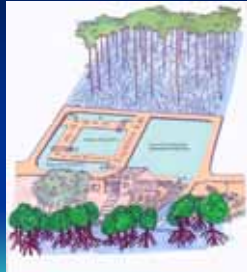


Diagram from: AICAR - MOF Project FISRA12
Mixed Silvofishery Mangrove Forests Models in the Mekong Delta

Silvofishery models

- Advantages
 - diversification of direct use products - fish, timber, firewood, charcoal, green fodder
 - ecosystem services - coastal protection, maintenance of waterways



Silvofishery models

- 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



Silvofishery models

- 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

Tourism and recreation

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



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?

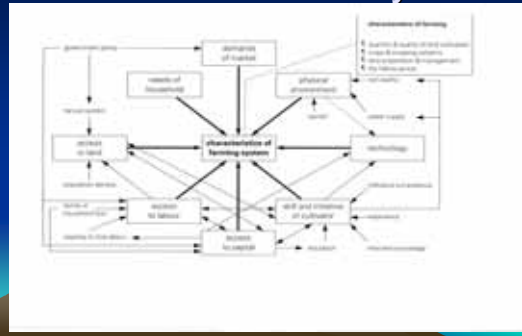
The problem of who benefits and who pays

- 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



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

- *Easterley (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