INTERNATIONAL CONFERENCE ON SUSTAINABLE MANGROVE ECOSYSTEM

SUSTAINABLE MANAGEMENT OF MATANG MANGROVE ECOSYSTEM : ISSUES, CHALLENGES AND WAY FORWARD

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Introduction

- Mangrove forest are among the most productive terrestrial ecosystem, natural and a renewable resource.

- A source of fuel and energy, wood and non-wood products, forest-based eco-tourism, food, shelter, education and provide source of income for the local community.

- Coastal protection and conservation of forest biodiversity including genetic resources.

Introduction

- Matang mangroves - systematic management since 1904
  - These forests can be managed for sustainable production of timber resource
  - Maintain the richness and diversity of its ecosystem.

- Matang mangroves is also identified as the best managed mangrove forest in the world.

Management System

- The need for management immediately realised following the efforts of gazettement.
- Gazettement of the island reserves began in 1902.
- First ‘management plan’ was introduced in 1904 to regulate and control the felling of island reserves.
- First comprehensive plan in 1950 (1950-1959) for the whole of matang mangroves and revised once every 10 years.

Management And Working Plans

Policy And Legislation

- Management of forests in permanent reserves forest (PRF) is the responsibility of Forestry Department

- National Forest Policy 1978 (revised 1992) – lists effective conservation and management of natural forest ecosystem including the mangrove ecosystem

- Provides guidelines and strong emphasis on the necessity for sound management, conservation, utilization, development and protection of the mangroves ecosystem.

Policy And Legislation

- Section 4(b) National Forestry Act 1984 – State Forestry Department should prepare forest management and working plan for the PRF in accordance with the principle of sustained yield. The plans are mainly to meet the needs for;
  - Conservation of forest resources
  - Sustainability of the resource base
  - Minimizing reinvestment requirements
  - Environmental quality control
  - Minimal damage to advance growth
  - Reduction of waste
  - Optimum utilization of resources

Management Objectives

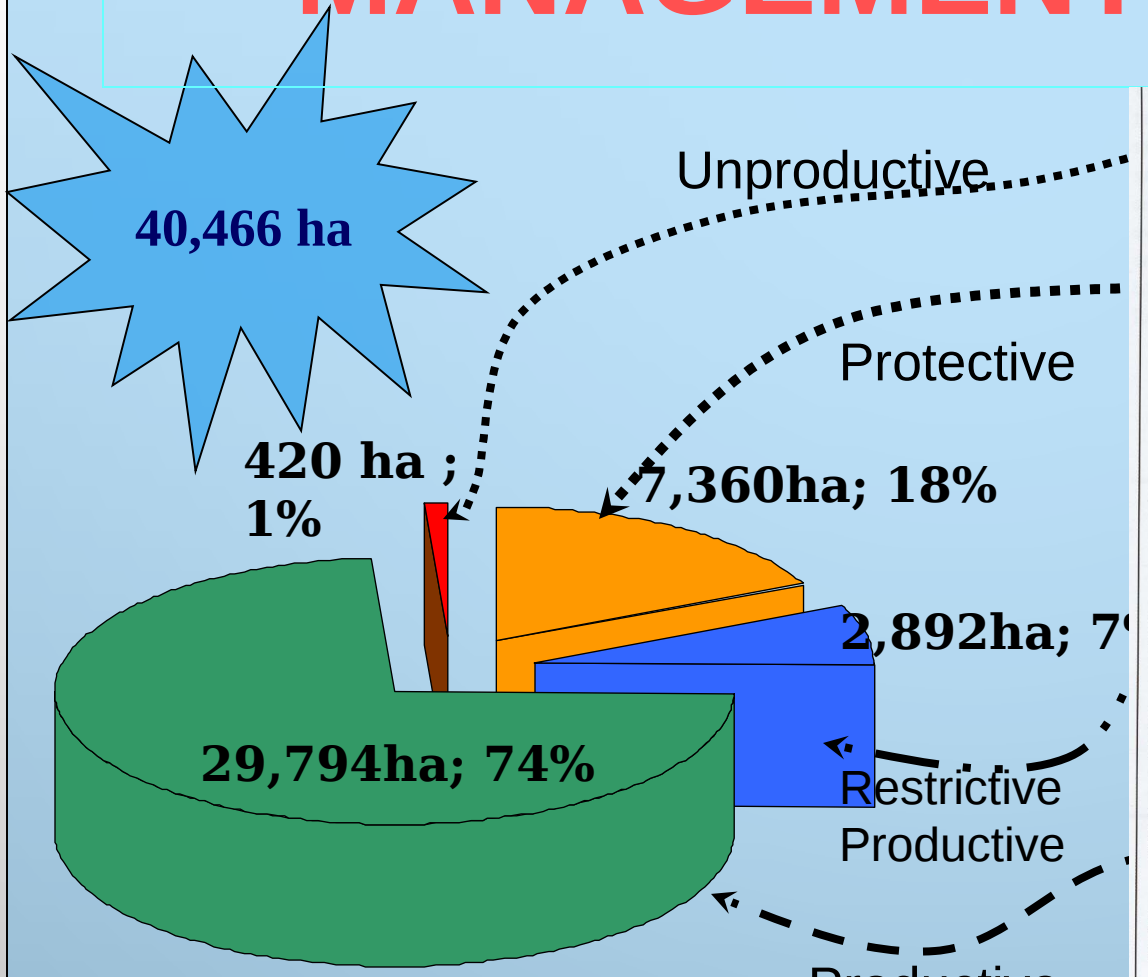
- Production of fuelwood and charcoal.
- Production of poles.
- Production of aquaculture and fisheries.
- Conservation and protection for wildlife, recreation and eco-tourism, education and research.

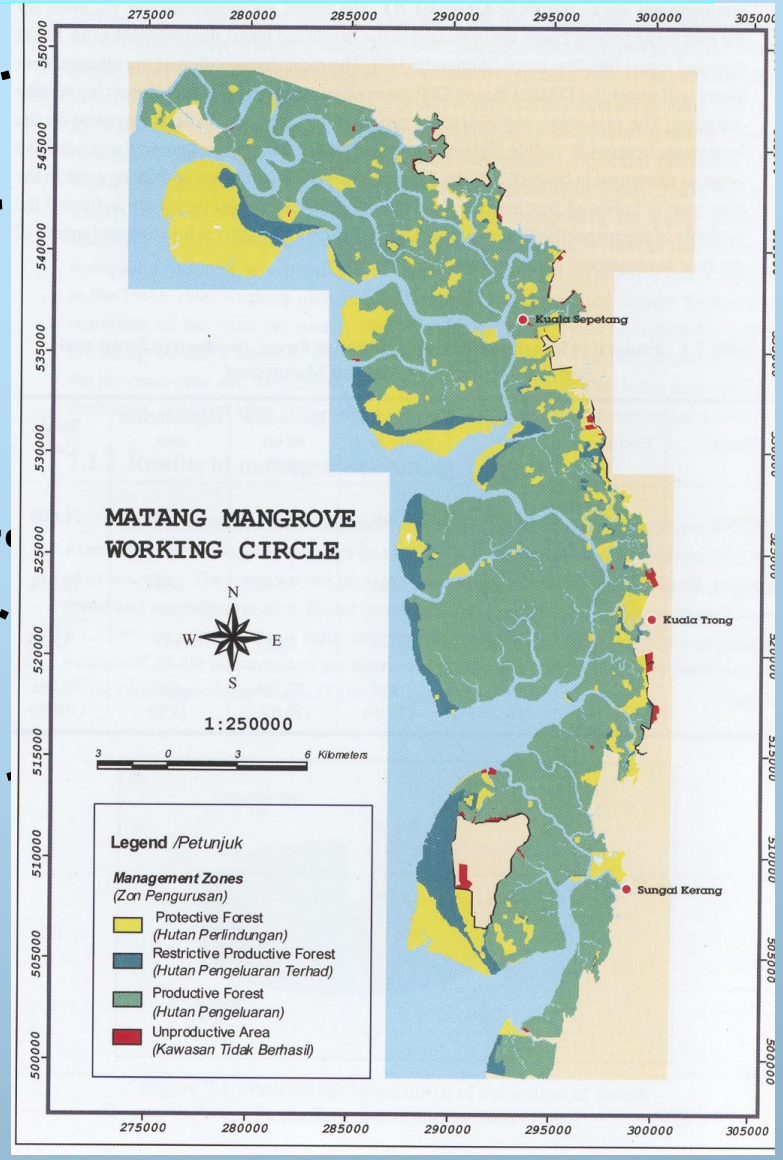
MANAGEMENT ZONING

- Based on management goals and functional roles of all the forest areas.

- A total of 4 management zones identified:
  - Productive zone
  - Restrictive productive zone
  - Unproductive zone
  - Protective zone

MANAGEMENT ZONING

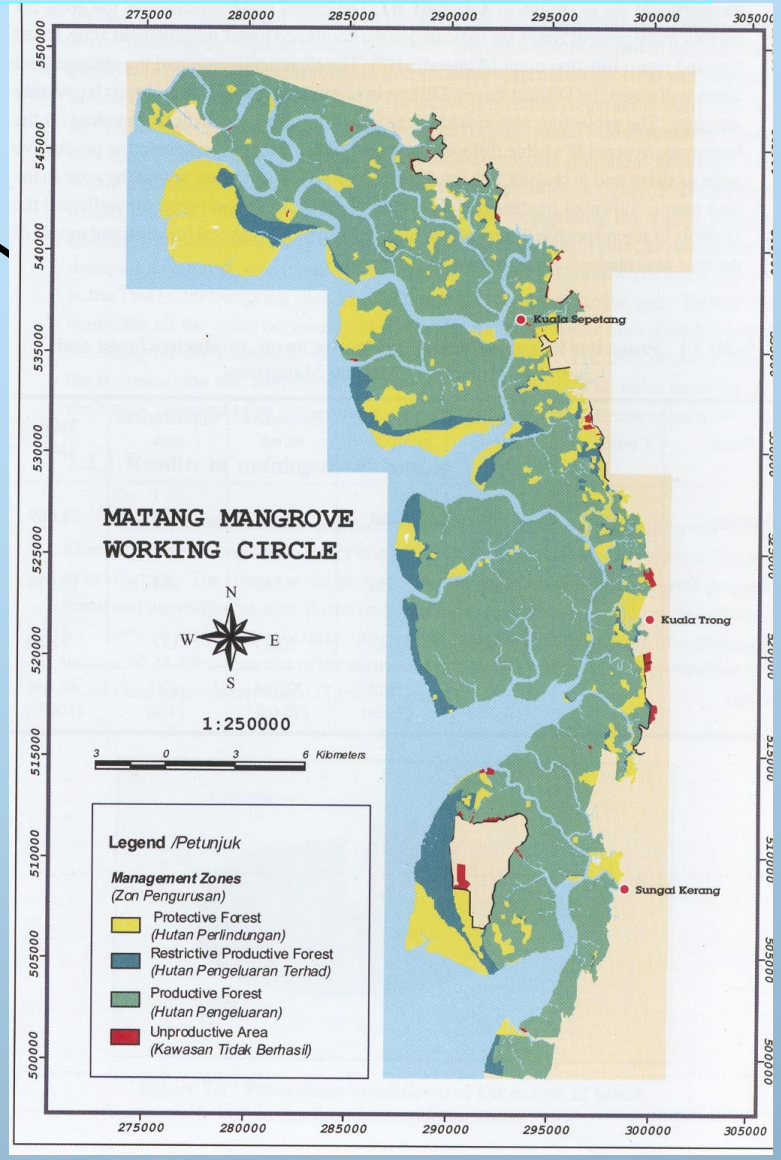




MANAGEMENT ZONING

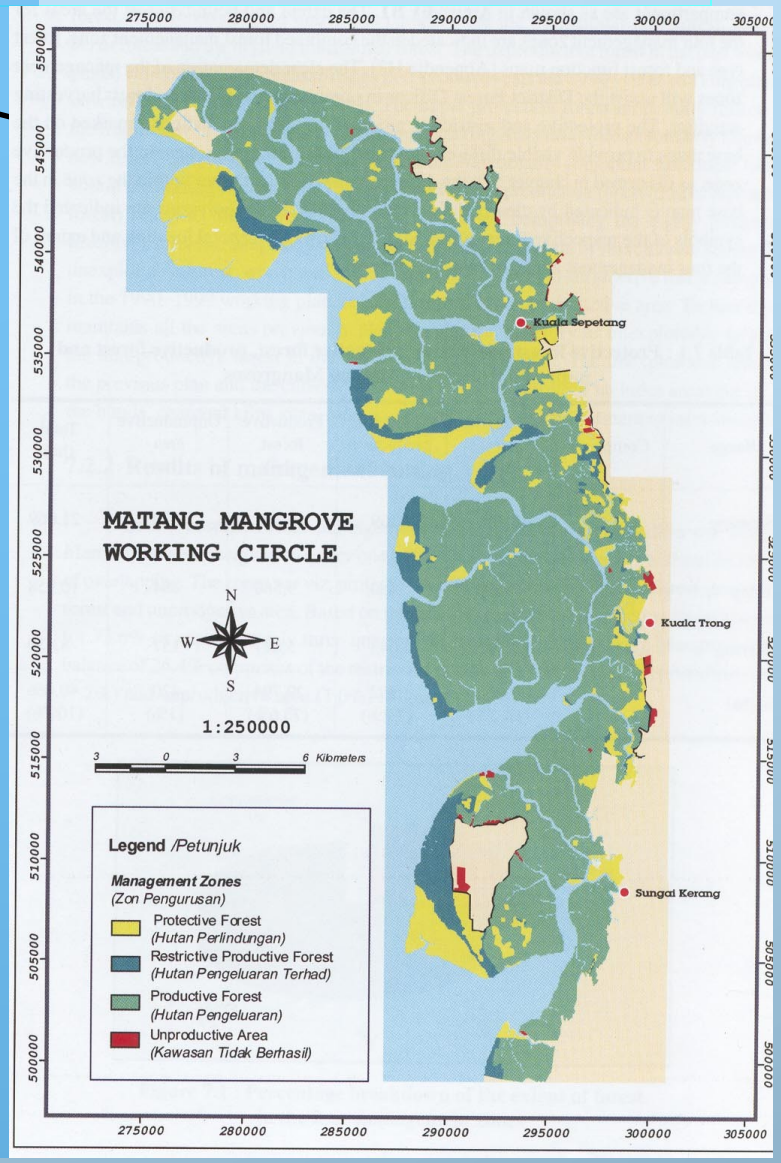
Productive Zone (Productive Forest)

“productive forest comprising Rhizophora Forest & mixed *Bruguiera* Forest”



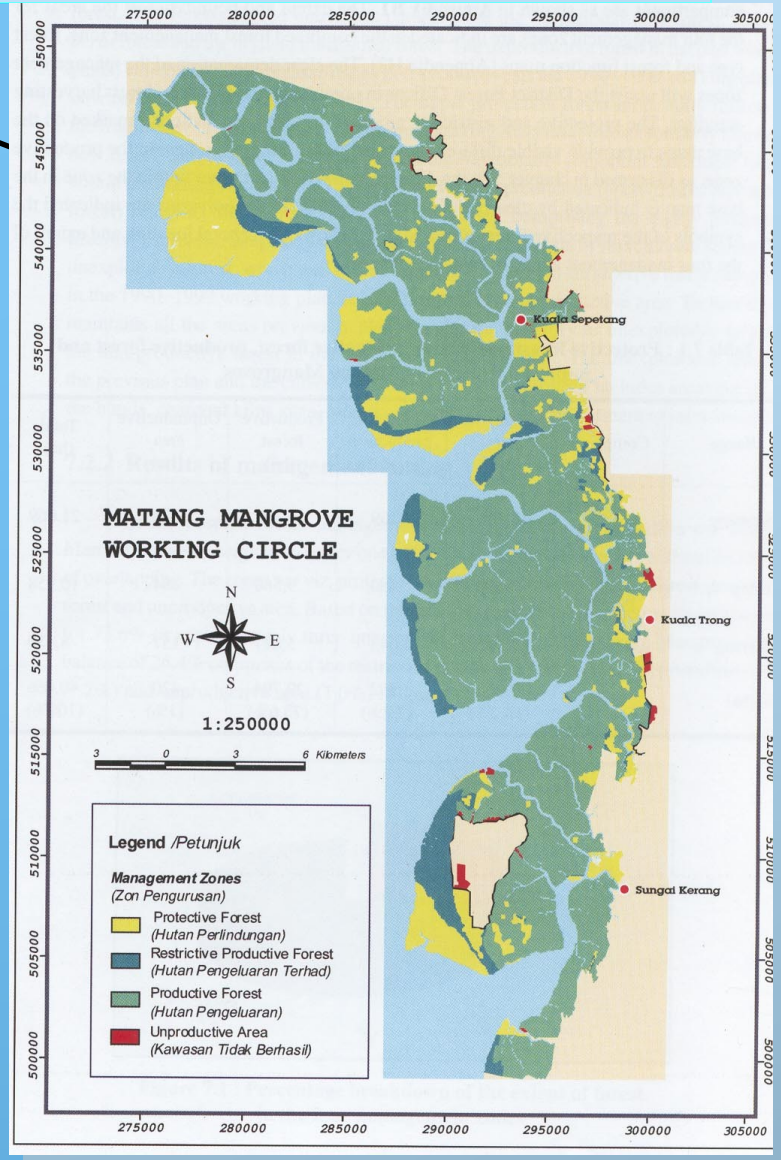
MANAGEMENT ZONING

- **Restrictive Productive Zone (Restrictive Productive Forest)**
  - **a new inclusion, which is necessary to take into consideration the importance placed on the conservation and maintenance of fragile and sensitive ecosystem within the mangrove forest**
  - **The forests under this category :**
    - **transitional new forest;**
    - **seaward Bruguiera forest; and**
    - **the dryland transitional forest**



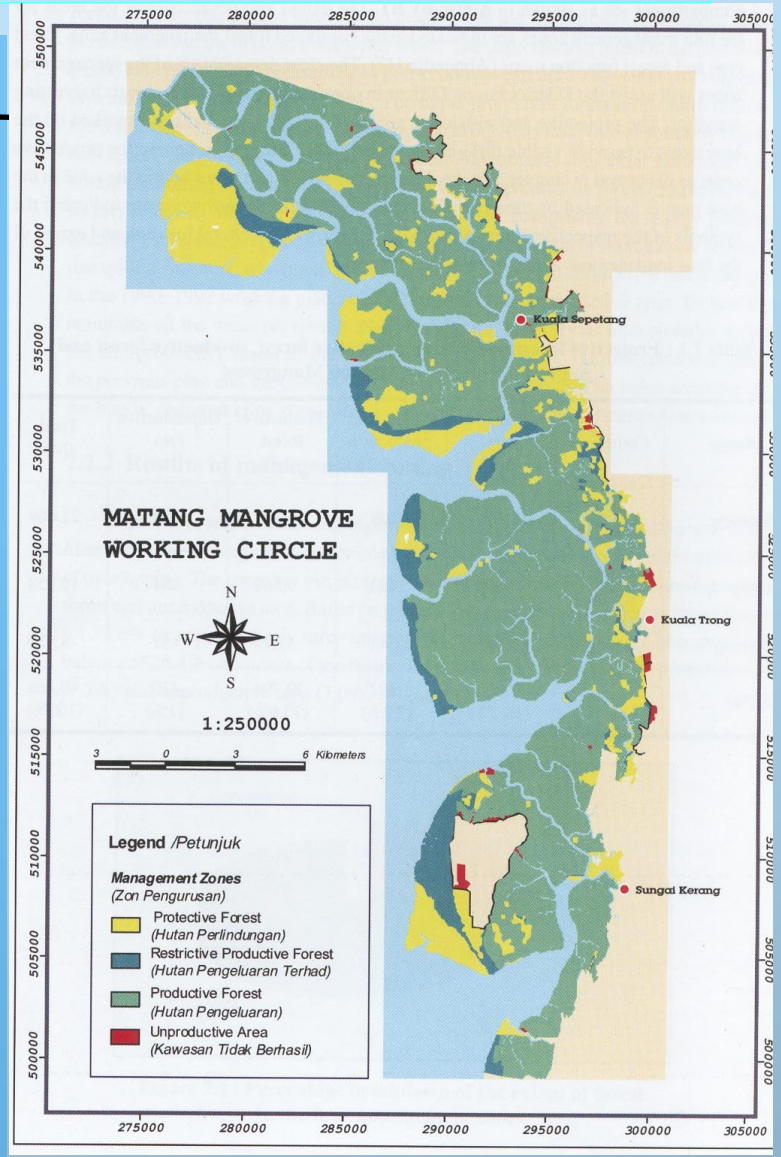
MANAGEMENT ZONING

- **Protective Zone (Protective Forest): The fragile and environmentaly important accreting Avicennia forest and dryland forest, as well as the functionaly important functional forests:**
  - Virgin Jungle Forest;
  - Old Growth Forest;
  - Educational Forest;
  - Research Forest;
  - Eco-tourism Forest;
  - Storklake Buffer Reserve;
  - Archaeological Buffer Reserve



MANAGEMENT ZONING

- **Unproductive Zone (Unroductive Forest)**
  - Bund and Bund Reserve
  - Area cut-off by the Bund
  - Fishing Village Reserve
  - Storklake
  - Disturbed Forest
  - Forest Complex
  - Poles Landing Site
  - Tidal Gate
  - Buffer Reserve



Rotation

- Length of the rotation is bound to effect the timber yield, productivity and biodiversity
- The greatest volume production at the shortest possible time
- Previous rotation periods ranged from 20-40 years.
- Current system adopts a rotation period of 30 years.
- The Matang mangrove has undergone at least 3 cycles and there is no sign of lost of productivity and tree composition.

Silviculture Practices

- Objective – to produce a fully stocked forest of the desired species for the next rotation.

- Based on ecological approach whereby the silvicultural operations are refined or modified to suit the individual forest types within the prescribed silviculture system of each management zone.

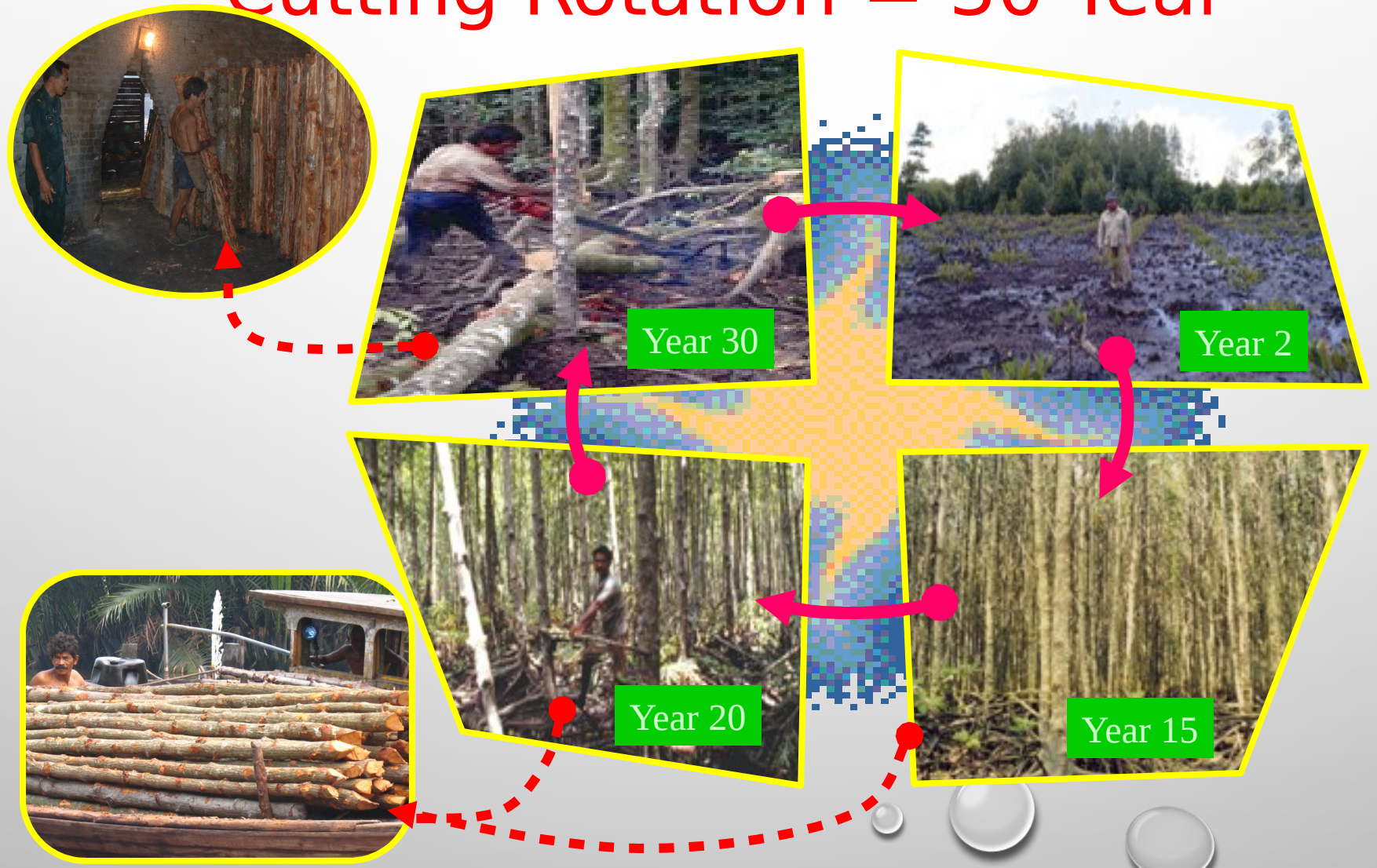
Silculture Operations

Year	Operations
-1	Detailed ground survey and boundary demarcation.
0	All trees are felled, similar to a clear felling operation. Buffers of 3–10m of all trees along the river bank are retained for erosion control and preventive function as well as for seed propagation.
1	Assessment of areas that need planting. Eradication of invading ferns by manual means.
2	A survey to determine and map out the extent and location of subcoupes requiring planting and refilling. Subcoupes with less than 90% natural regeneration will be subjected to enrichment planting of *R. apiculata* (1.2m by 1.2m) and *R. mucronata* (1.8m by 1.8m).
3	First survival enumeration. Refilling imposed if survival of planted seedlings is less than 75%.

Silculture Operations

Year	Operations
4	Second survival enumeration.
5	Third and last survival enumeration. Sub-coupes which have less than 75% regeneration either through artificial or natural means will be planted with potted seedlings.
15-19	First thinning using 1.2 m stick length.
20-24	Second thinning using a 1.8 m stick length.
30	Final felling.

Cutting Rotation = 30 Year



Felling operation

Typical scene of a clear felling operation

Refilling with potted seedlings of *Rhizophora apiculata*

A previously clear felled area which has been successfully planted with *Rhizophora apiculata* more than one year old.

A 12-year old stand

A 15-year old stand ready for first thinning .

A thinning operation conducted entirely with 1.2m stick.

Thinning using axe

Similar stand after first thinning .
The man is seen loading the thinned poles into a wooden barge.

A 30-year old *Rhizophora* stand ready for final felling.

ISSUES AND CHALLENGES

Timber production

- Shortage of timber supply from inland forests in the near future and shortfall in revenue from forestry, the state government has very little choice but to look for alternative sources of timber and revenue.

- This includes looking into sustainable commercialization and utilization of timber from mangrove.

Competing Land Use Demand

- Mangrove ecosystems are subject to increased pressure of socio-economic activities or development such as marine fishery, aquaculture, agricultural activities, human settlements and tourism.

- Degree of interests - both compatible and competing uses, it is a challenge to balance these diverse interests without jeopardizing the many functions of the mangroves.

Competing Resource Utilization And Diversification

- The economic value of the mangrove resources would be higher if there was more information on better utilization of its timber.

- Limited utilization of products mainly by local community for sources of building materials, firewood and charcoal production.

- Very few attempts to identify new products.

- The economic potential of the many non-wood goods and services provided by mangroves has yet to be explored.

Maintaining The Healthy Mangrove Ecosystem

- The mangrove ecosystem is also known to serve many other functions. Maintaining such functions can be challenging in view of the rapid rate of development.

- It is anticipated that the impacts from these threats will increase as more development takes place, and may affect the capacity of mangrove ecosystem to provide many of its functions effectively.

- There is a growing concern over the adaptability of mangroves to the impacts of global warming. However, not much is known about how the mangroves respond to these potential threats and the appropriate mitigation measures that can be taken at the local level.

Reserve Boundaries And Security Of The Resource

- Safeguarding the resources from external threats can be difficult with the long perimeters of reserves and absence of boundaries demarcated on the ground.

- To demarcate all of them is a very costly exercise.

Natural Hazards

The natural threats to mangroves include the following;

- Cyclones, typhone and strong wave action;
- Browsing and trampling by wildlife and livestock;
- Attack by crabs on young seedling;
- Insect pests such as wood borers and caterpillars; and
- Weeds which often occupy deforested mangrove areas

WAY FORWARD

Government Initiatives

- After the tsunami tragedy in 2004, the Malaysian Government implemented replanting programmes along the coast area around the country.
- Implementation of the project “Planting Mangroves And Other Suitable Species along the National Coastal Area” to preserve the coastal area

- From the total planted area of 2,711 ha (2005 – 2016) ;
  - 1,528 ha (56%) in Peninsular Malaysia;
  - 801 ha (30%) in Sabah; and
  - 382 ha (14%) in Sarawak.

Intergrated Planning And Management

- Co-ordinated planning among the various agencies to ensure that the whole mangrove resource of both land and water is effectively managed.
- Maximum benefit to the local population and the state.
- Integrated approach towards managing the mangrove resources.
- Important bench marking for any future management of mangrove forest areas.

Management Of Non Productive Forest

- Avicennia forest - turned into bee farm for the production of honey and bee wax;
- Dryland mangroves - contain many plant and herbs with medicinal properties used;
- Nypa forest - managed for the production of alcohol and sugar.

Product Development

- Quality of charcoal currently produced can still be further improved to meet a higher standard
- Potential to develop more products from the bark removed to produce tannin and an ingredient for making glue
- Collection of wood distillate - to improve on the quality and efficiency
- Currently R&D conducted to produce mangrove wood furniture, uses of tannin in oil and gas industry and use of mangrove timber vinegar for insect repellant.

Local Communities Involvement And Awareness

- Local communities are part of the ecosystem of the mangrove forest. The local communities can help to ensure the success of the management and development of the mangrove forest

- The local authorities should change their paradigm by encouraging the local people to participate in any mangrove forest management planning.

- A workshop were held among the local populations ;
  - To raise awareness among all stakeholders of the importance of mangrove
  - To garner local support for mangrove conservation and biodiversity protection
  - To understand the purpose of the mangrove and their role in protecting the area

Research And Development

- There is still room for improvements in all aspects of management of Mangrove forests;
  - Hydraulic parameters of the planting site
  - Breakwaters
  - Mangrove soil
  - Planting stock
  - Mangrove phenology
  - Innovative planting
  - Pests and diseases

Conclusion

The Matang Mangroves have been managed systematically and sustainably for the over a century. It is the testimony of exemplary showcase of sustainable forest management with a good planning, administration and management, conservation and protection of the forest.

Thank You

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