



ASEAN MANGROVES AS IMPORTANT CENTRES OF BIODIVERSITY AND HABITATS FOR ENDANGERED SPECIES

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ASEAN mangrove forests are at the global centre of biodiversity for mangrove trees, and are also habitats for large numbers of marine and terrestrial species. Unfortunately many of these species are threatened with extinction because extensive clear-felling for woodchips, conversion of mangrove land for industrial development and aquaculture ponds have reduced the area of ASEAN forests by about 50% since the turn of the century.

Much of the loss of mangrove habitat has been for short-term economic gain, which is now affecting important off-shore fisheries and causing increased land erosion. The remaining mangroves are still inhabited by many endangered species and migratory birds, which use the mangroves for shelter and breeding grounds.

THREATS TO MANGROVES

The major concern for conservation of biodiversity and endangered species is the current rate of habitat loss, as well as unregulated (and in some cases, illegal) activities that are directly removing endangered species. The activities include:

- clear-felling for timber, charcoal and woodchip production
- conversion for agriculture (rice, oil palm)
- conversion to aquaculture ponds
- conversion for industrial and urban development
- destructive fishing methods (e.g. miracle holes)
- pollution (oil, refuse, effluent)
- hunting.

BENEFITS FROM MANAGED MANGROVES

Properly managed mangrove forests can provide many long-term and direct economic benefits, as well as maintaining habitat for the high biodiversity. Sustainable industries include:

- rotation logging for charcoal, woodpulp and woodchip production (including reforestation)

- low-impact aquaculture techniques (e.g. cage culture)
- regulated harvesting of the fisheries
- revenue from nature parks
- production of chemicals and medicinal products

In addition, mangrove areas (both managed and unmanaged) provide the following:

- protection of coastline from erosion
- provision of a flood buffer
- support inshore fisheries (nursery grounds for fish, shrimps and crabs)
- aesthetic values
- education and a scientific tool in resource management
- genetic resources and biodiversity

MANGROVES AS CENTRES OF BIODIVERSITY

ASEAN mangroves are highly productive ecosystems, with at least 360 species of fish, 250 species of plants, 330 species of shrimps and crabs and 213 species of birds, mammals, reptiles and amphibians. Mangrove forests compare with coral reefs and tropical rainforests as centres for biodiversity and important gene pools. Unsustainable harvesting of forest resources and fisheries, however, are contrary to UNCED Agenda 21, and the Biodiversity Convention, which all ASEAN countries signed.



Table 1. List of endangered species occurring in ASEAN mangroves.

Species	Threat
Birds	
Purple heron (<i>Ardea purpurea</i>)	} Loss of habitat, hunting (for feathers), reduction of food supply due to over-harvesting
Dusky-grey heron (<i>Ardea sumatrana</i>)	
Black-crown night heron (<i>Nycticorax nycticorax</i>)	
Black bittern (<i>Dupetor flavicollis</i>)	
Great egret (<i>Egretta alba</i>)	
Common bittern (<i>Ixobrychus involucris</i>)	
Lesser adjutant stork (<i>Leptoptilus javanicus</i>)	
Milky stork (<i>Mycteria cinerea</i>)	
Common cormorant (<i>Phalacrocorax carbo</i>)	}
Amphibians	
Crab-eating frog (<i>Rana cancrivora</i>)	Loss of habitat
Reptiles	
Saltwater crocodile (<i>Crocodylus porosus</i>)	Loss of habitat, hunting for skins
Mammals	
Long-tailed macaque (<i>Macaca fascicularis</i>)	Hunting
Malaysian flying fox (<i>Pteropus vampyrus</i>)	Hunting
Proboscis monkey (<i>Nasalis larvatus</i>)	Loss of habitat
Sumatran tiger (<i>Panthera tigris sumatrae</i>)	Killed for skin and bones
Leaf monkey (<i>Presbytis cristata</i>)	Loss of habitat
Javan rhinoceros (<i>Rhinoceros sondaicus</i>)	Loss of habitat, hunting

MANGROVES AS HABITATS FOR ENDANGERED SPECIES

Many species found in the mangroves are currently endangered (Table 1), due to habitat loss and over-exploitation by humans. These animal species are wholly or partially dependant on the mangroves for food, shelter, and for many aquatic species as spawning and nursery grounds.

EXISTING MARINE PROTECTED AREAS (MPAs)

A recent survey by IUCN (The World Conservation Union) identified 106 Marine Protected Areas (MPAs) in southeast Asia, with 35 based on mangrove forests and another 48 being a combination of mangroves and coral reefs. Unfortunately, only 3 mangrove reserves and 4 combined reserves have effective management of the resources in place, whereas 69 reserves have either ineffective or no planning or management. These MPAs cover only a very small part of the coastal resources in the region, which are still being disturbed and exploited. Therefore, the endangered species in most protected areas are provided with little or no protection.

STRATEGIES FOR PROTECTING ENDANGERED SPECIES

A four-pronged approach must be adopted to ensure the survival of these national and regional heritage values. These are:

- political support
- establishment of nature parks, reserves and managed areas
- monitoring of management techniques
- public education

It is of paramount importance that governments create the right atmosphere for conservation to develop. Considerable enthusiasm was generated during the 1992 UNCED meeting in Rio de Janeiro for the retention of large areas of natural habitat and biodiversity, especially in countries with tropical mangrove forests.

Planners and policy makers are frequently unaware of the environmental impact of their actions, thus they are advised to work closely with scientists to assess activities that are likely to be destructive (e.g. clear-felling without reforestation) and develop alternative methods of exploitation. Establishment of MPAs is the first step in the protection of endangered animals and habitat. Close monitoring of management efforts is essential in order to modify plans where necessary. This requires the employment of trained park managers in what is termed as 'nature management science'. MPAs should contain areas for limited exploitation, possible only through the development of ecotourism ventures and nature parks and with the assistance of non-governmental organisations (NGOs). Education of the public is necessary to promote low impact activities, and protect mangrove biodiversity.

SPECIFIC NEEDS

ASEAN countries should define their specific needs when planning mangrove reserves, taking into account the following:

- the size of area
- need for protection of 'core' areas
- creation of buffer zones around 'core' areas
- creation of 'corridors'
- reforestation

The area of an MPA must be large enough to maintain a viable breeding population of the endangered species, e.g. the Sumatran rhinoceros requires at least 15 to 30 km² for breeding, shelter and foraging. The requirement for migratory birds, however, is different as roosting and nesting sites must be protected, as well as the mud flats for feeding.

Ideally MPAs should contain 'core areas' with limited or no exploitation permitted to provide a refuge for species that are easily disturbed by encroachment. This would equally

apply in tourism areas like the Sungei Buloh Nature Park in Singapore or in forestry reserves like the Larut-Matang mangrove forests in Malaysia. 'Core areas' are best protected by 'buffer zones' with controlled and reduced exploitation permitted and several core areas should be connected by 'corridors'. In Indonesia, corridors are mandatory as they allow mixing of animal populations between core areas and guarantee a mixed gene pool. For example, the Proboscis monkey is wholly dependant on *Sonneratia* and *Avicennia* mangrove leaves, so 'core areas' with high concentrations of these trees have to be protected, with connecting corridors to allow for movement of animals over a large area in search of mates and new territories.

In areas where tree harvesting has occurred, deliberate reforestation may be necessary to rehabilitate the forests. In some forest reserves, species specific silviculture may be employed (e.g. Matang Forest Reserve, Malaysia), but to conserve biodiversity it will be necessary to undertake mixed plantings, which simulate natural forests.

MANGROVES FOR THE FUTURE

Mangrove forests and related ecosystems should be conserved for their sustainable and renewable resources (timber, fisheries and natural drugs) as well as being retained as reserves of biodiversity, and habitats for endangered species. The ASEAN governments are signatories to the 'Manila Declaration Concerning the Ethical utilization of Asian Biological Resources' to ensure that benefits from these renewable resources will be derived well beyond the 21st century. However, the commitments made during the Rio UNCED meeting have lost their sheen and it may be necessary to re-emphasise these commitments and reinforce the statues and limitations laid down in the Convention on International Trade in Endangered Species (CITES), to eliminate the expanding illegal trade in wild animals and their products.

SUGGESTED READING

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