

MANGROVES in Hainan, China

Situated in intertidal areas along the coastlines in the tropics and subtropics, mangroves provide habitats for many organisms and act as a buffer zone against erosion. To cope with the high salt concentrations and wet locations, the trees and shrubs developed a special root and salt filtration system which additionally allows them to maintain water quality. Unfortunately, they are threatened worldwide by pollution, overexploitation, sea level rise and conversion to other uses.



Mangroves with stilt roots in Hainan; © I. Nordhaus

FACTS

What are Mangroves?

Mangroves are trees or shrubs that grow in intertidal areas of coastal and estuarine environments. They are well adapted to daily inundations with seawater, the low oxygen content of waterlogged muddy sediments and the salt concentrations that would harm other plants. Mangrove plants developed a special root and salt filtration system.

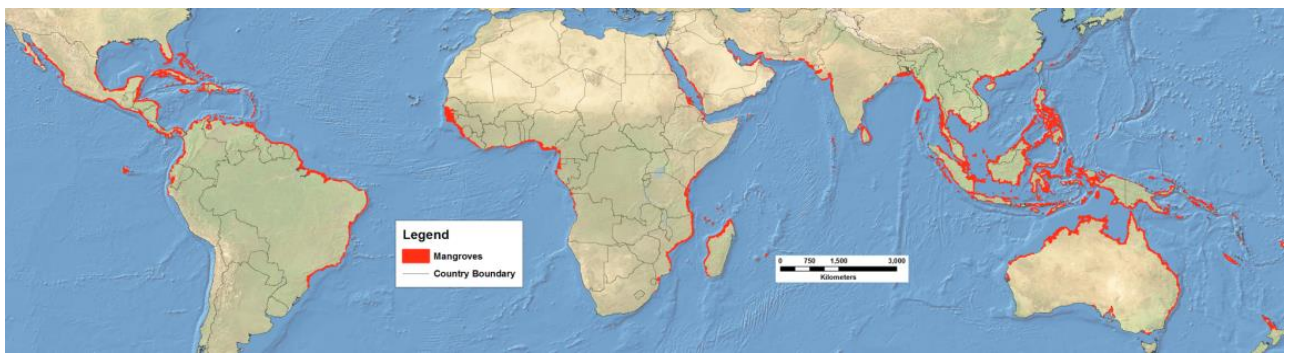


Mangroves in Hainan; © I. Nordhaus

Why are Mangroves important?

Mangrove forests provide nursery area, habitat and food for various aquatic and terrestrial organisms. They act as protective buffer zones that reduce erosion and shield the coasts. Mangroves maintain water quality by trapping sediments and pollutants such as excess nitrates, phosphates, zinc or copper. They are used as construction material, firewood and animal fodder. Mangrove forests are also important natural carbon sinks.

Mangroves grow along coastlines in the tropical and subtropical regions of the world, between approximately 30 °N and 30 °S. There are 16-24 families and 54-75 species of true mangroves worldwide. Indo-Malayan islands hold the richest mangrove diversity, followed by Australia.



World map of the mangrove distribution area (presented in red) (UNEP 2013)

In China, the total mangrove area is about 220 km², 92 % of that occur in three southern provinces: Hainan, Guangdong and Guangxi.



Distribution of China's mangrove forests in 2015 (Chen et al. 2017) Copyright Elsevier.

Interesting facts

...Mangroves cover an approximate area of **130,000 km²** !

... they are present in **118 countries and territories**,
...most Mangroves grow in **Indonesia, Brazil and Malaysia** !

...some insects look like mangrove twigs and leaves to be better **protected** from birds and spiders !

Interesting links

<http://mangroves.elaw.org>
<http://www.mangrovealliance.org>
http://na.unep.net/geas/getUNEPPageWithArticleIDScript.php?article_id=103

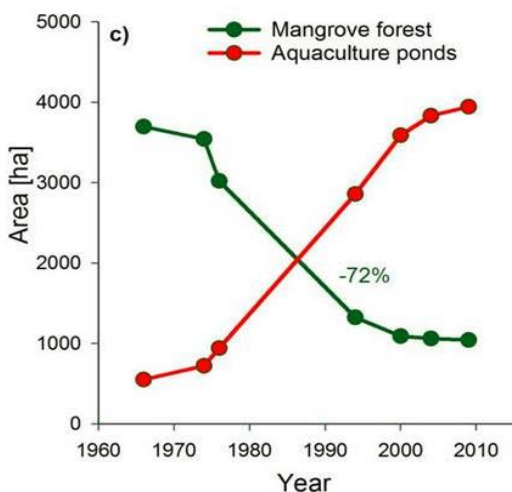
References

Chen et al. 2017. A mangrove forest map of China in 2015. ISPRS J. Photogramm. Remote Sens., 131: 104-120.
Herbeck et al. 2020. Decadal trends in mangrove and pond aquaculture cover on Hainan (China) since 1966: mangrove loss, fragmentation and associated biogeochemical changes. Estuar. Coast. Shelf Sci., 233:106531.

Salt adaption strategy

Mangroves developed special ways to cope with high salt concentrations. These include:

- Leaves with a waxy coat that limits saltwater intrusion
- Salt-secreting pores on the leaves to excrete excess salt
- Removing salt by accumulating it in branches and leaves before dropping them
- Concentration of salt in the sap



What are the threats?

The loss of mangroves is mainly caused by anthropogenic activities. Main threats to mangroves are:

- Conversion of mangrove areas to industrial areas (especially aquaculture), agricultural land, and human settlements
- Overharvesting for firewood, construction wood, pulp or charcoal production etc.
- River changes, tidal barriers, drainage and flood mitigation works
- Pollutants such as fertilizers, pesticides, oil spills and toxic chemicals
- Climate change, associated with sea level rise
- Hurricanes and cyclones

Drastic losses of mangrove area (72%) and direct conversion to aquaculture ponds (55%) were observed along Hainan's east coast between 1966 – 2009

The figure was published in Herbeck et al. (2020).
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Take home messages

- Mangroves shield the coast and protect it from erosion
- A special salt and root filtration system enables them to cope with their wet and salty locations
- Humans and the environment strongly benefit from mangroves by using them as source for food, habitat, construction material or other
- The replacement of a sink for land-derived substances (mangroves) with a source (aquaculture) impairs the functions and services of adjacent ecosystems

Imprint

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