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 small trees or shrubs developed a special root and salt filtration system which additionally allows them to maintain water quality. Unfortunately, they are threatened worldwide by pollution, sea level rise and conversion to industrial areas.

FACTS

What are Mangroves?
Mangroves are small trees or shrubs that grow in intertidal areas of coastal and estuarine environments. They are well adapted to the daily inundations of seawater, the low oxygen contents in waterlogged muddy sediments and the salt concentrations that would harm other plants. These include a special root and salt filtration system.
Why are Mangroves important?
Mangrove forests provide nursery areas, habitats 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 an important source for the recreation and tourism industry.

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.

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

Reference
Herbeck et al. 2020. Estuarine, Coastal and Shelf Science.

Interesting links
http://mangroves.elaw.org
http://www.mangrovealliance.org
http://na.unep.net/geas/getUNEPPageWithArticleIDScript.php?article_id=103
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
- Peg (also known as pneu-matophores), stilt or knee roots that enable the plant to draw air in underlying root system

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 Estuarine, Coastal and Shelf Science, Vol. 233; Herbeck, L.S. et al.: Decadal trends in mangrove and pond aquaculture cover on Hainan (China) since 1966: mangrove loss, fragmentation and associated biogeochemical changes. Copyright Elsevier.

Take home messages

→ Mangroves shield the coast and protect erosion
→ A special salt and root filtration system enables them to cope with their wet and salty locations
→ Industry and the environment strongly benefit from Mangroves by using them as source for food, habitat, recreation area, 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