

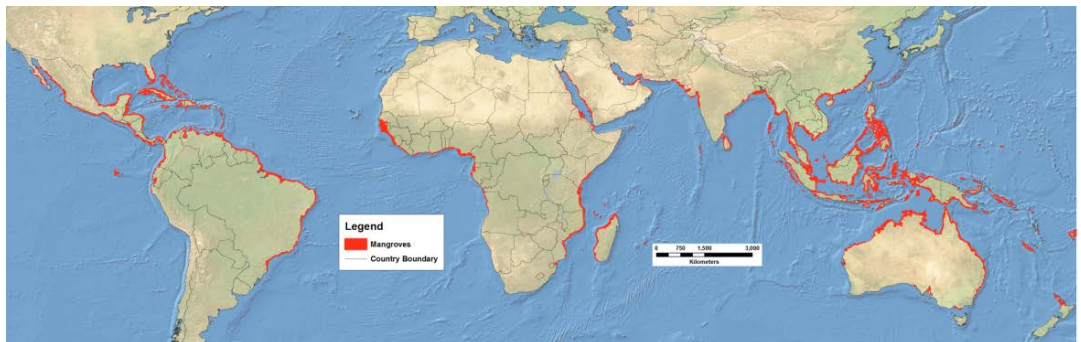
What are mangroves?

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 they important?

Mangrove forests provide nursery areas and habitats as well as 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. Mangrove trees are used as construction material, firewood and animal fodder. Mangrove forests are also an important source for the recreation and tourism industry.

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



Mangrove distribution

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. 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



In the world, mangroves cover an approximate area of 130,000 km² in 118 countries and territories. The top three countries are: Indonesia, Brazil and Malaysia.

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

Mangroves with stilt roots in Hainan



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Salt adaptation 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 pneumatophores), stilt or knee roots that enable the plant to draw air in underlying root system

Peg roots of mangroves in Hainan



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Further interesting fact

- 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. *Isprs J Photogramm Rem Sens* 131: 104-120.
 Romañach et al. 2018. *Ocean Coast Manage* 154: 72-82.
 Li & Lee 1997. *Forest Ecology and Management* 96 (3): 241-259.