Bachelor of Science (Marine Science) Year 2020

MANGROVE forest

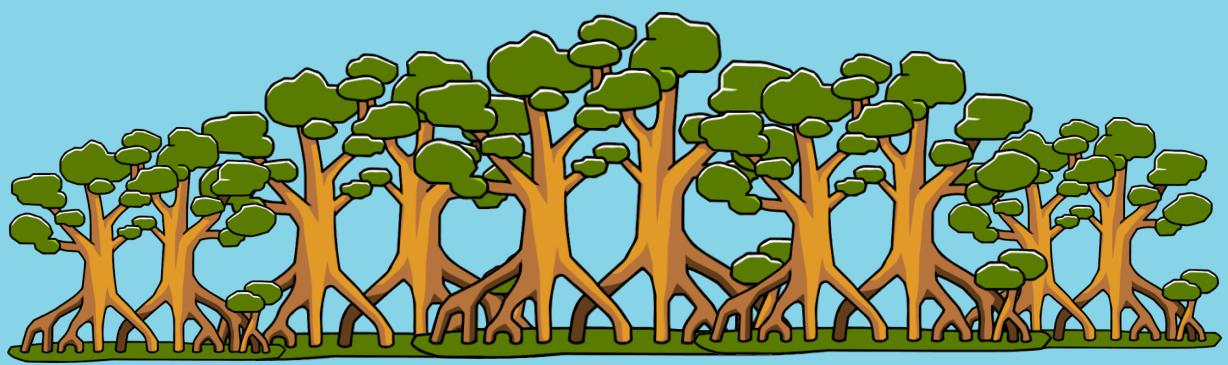
MUHAMMAD SYAFIQ RAFA'IE BIN MOHD NOH
NIK ZAHITIL AZIRA BINTI NIK MOHD ZAMRI
NURUL SHAFIQAH BINTI SHAMSUDDIN
NURUL SHAHIRAH NADIA BT AHMAD ZUHAIRI
MUHAMMAD FITRI BIN ELAIS
NURUL ZAHIRAH BINTI ZAKARIA

Universiti Malaysia Terengganu UMT
MARE
Faculty of Science and Marine Environment FSSM
Co-funded by the Erasmus+ Programme of the European Union
INOS Institute of Oceanography and Environment

INTRODUCTION

Mangrove forests are a rare ecosystem typically found along sheltered coasts where saline soil and brackish water are abundantly grown, subject to intermittent flooding of fresh and salt water. Mangrove trees have specific characteristics that allow them to thrive in the harsh conditions of their habitat, such as tough root systems, special bark and leaf structures and other unique adaptations. The habitat is thick, silty and shallow, combined with the endless ebb and water flow, which provides very little protection for most mangrove plants with aerial or prop roots and buttressed trunks (known as *pneumatrophores* or respiratory roots). The mangrove forest, despite its smelly reputation, is a very diverse and highly active environment. Not only does it perform various ecological roles that are vital to its surrounding ecosystems, but it is also a valuable resource for coastal communities.

Traditionally, coastal communities living within or on the fringes of mangrove forests have relied on their own resources which is mangrove trees for their subsistence. A big source of fishing resources is mangrove forests. Mangrove forest are also place of habitats for different shellfish species, where several fish species, prawns and other marine fauna spawn and feed. Local people have relied on consumable plants and medicinal herbs from the mangrove forests such as the leaves, and the buds. For human, the fruits and seeds of certain mangrove species are used. Some offer a wide variety of medicines. They uses such as Rhizophora bark, which is used to treat injuries, cure diarrhoea, and avoid haemorrhages.



There are many of dominant forests of mangroves such as they shield coastlines from the action of erosive waves and powerful coastal winds, and serve as natural barriers to tsunamis and storms. Next, they stop the entry of salt water into rivers. They also retain, concentrate and recycle nutrients and via a natural filtering mechanism, extract toxicants. Mangrove forest also provide services for coastal communities that rely on timber, wood, food, herbs and other forest products for plants. Lastly, for many fish, crabs, prawns and other marine animals, they are a valuable breeding ground, vital to maintaining a viable fishing industry. The mangroves of Malaysia are more diverse than those of tropical Australia, tropical Africa, the Red Sea and the Americas. Approximately 50 percent of fish landings are associated with mangroves on the west coast of Peninsular Malaysia.

Known as red mangrove or *Rhizophora mangle* (name for their red tinted roots). Most well-known mangrove because easily to be seen.

Source: Azgardens, (2021)

Known as black mangrove or *Avicennia germinans*. Grow at wet soil that not heavily oxygenated which are the reasons why their roots grow straight up into the air.

source: Avicennia germinans image, (2011)

Known as white mangrove or *Laguncularia racemosa* which looks much more similar typical tree compared to the black and red mangroves. Live on more solid ground but still get inundated with saltwater from time to time.

source: Mangrove (Laguncularia racemosa), (2020)

THE IMPORTANCE OF MANGROVE FOREST

Mangrove forest as coastal protection. Dense root systems of mangrove forests trap sediments flowing down the rivers and out of the land. This helps to stabilise the coastline and prevents the erosion of waves and storms. In areas where mangroves have been cleared, the coastal damage caused by hurricanes and typhoons is much more serious. The forests also protect coral reefs and seagrass meadows from being smothered in sediments by filtering out sediments.

Can act as a shelter from the storm. The thickets of mangroves that support the tidal mudflats also provide a buffer zone that protects the land from wind and wave damage. Places where mangroves have been cut off from shrimp farms are far more vulnerable to destructive cyclones and tidal waves.

As source of food for the multitudes. The tonnes of leaves that fall from every acre of mangrove forest every year are the basis of an incredibly productive food web. As the leaves decay, they provide invertebrates and algae with nutrients. They feed many small organisms, such as birds, sponges, worms, anemones, jellyfish, shrimps, and young fish. Tides also circulate nutrients among mudflats, estuaries, and coral reefs, thus feeding species like oysters resting on the seabed.

The keystone of a coastal ecosystem. Mangroves, seagrass beds and coral reefs are often found together and work together in concert. Trees trap sediment and pollutants that would otherwise flow into the sea. Seagrass beds provide another barrier to the silt and mud that could smother the reefs. In return, the reefs protect the seagrass beds and mangroves against strong ocean waves. Without mangroves, this incredibly productive ecosystem would have collapsed.

MANGROVE FOREST IN MALAYSIA

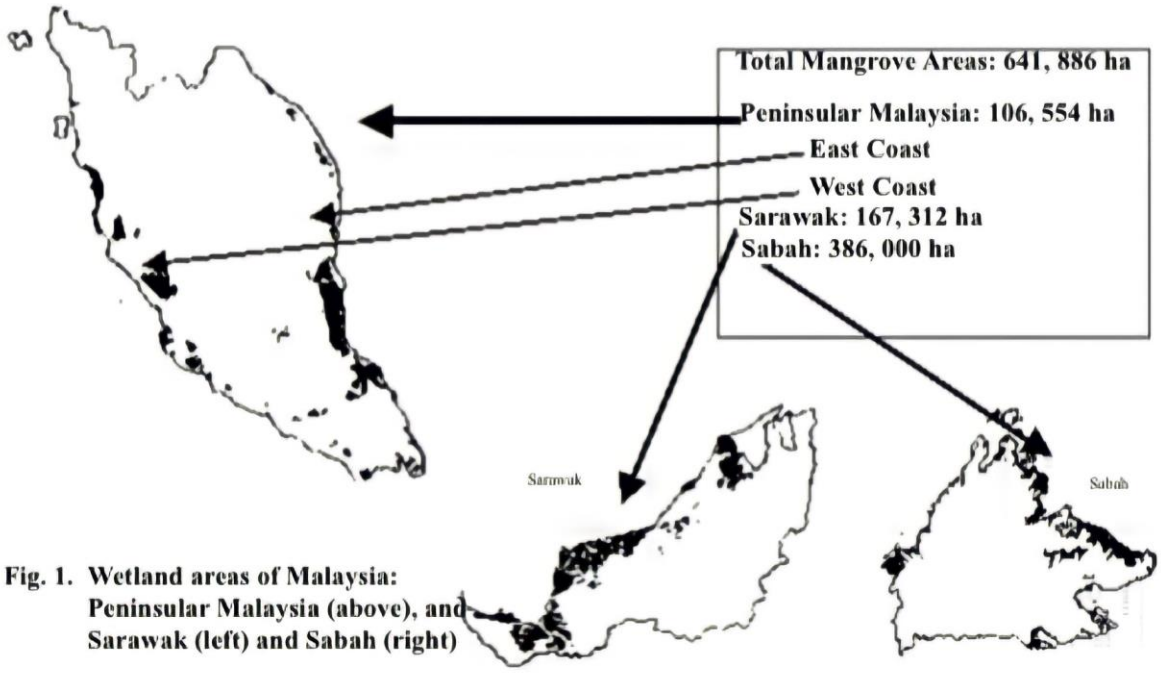
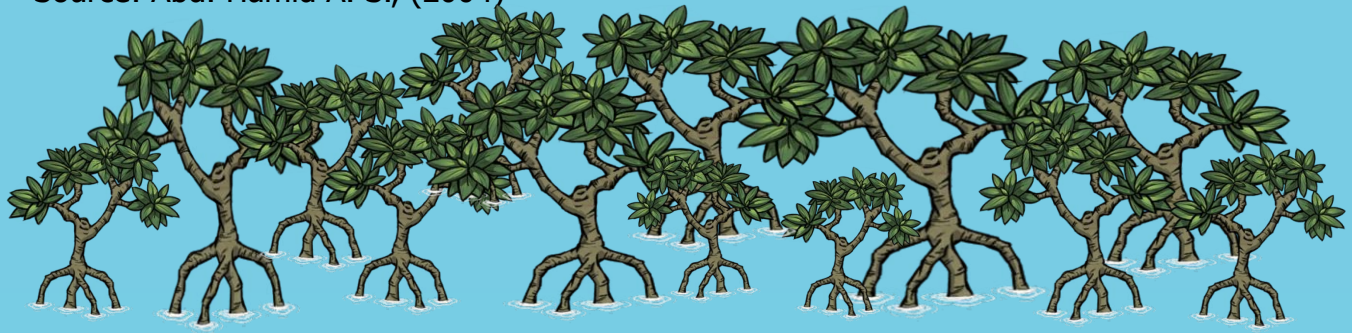


Fig. 1. Wetland areas of Malaysia: Peninsular Malaysia (above), and Sarawak (left) and Sabah (right)

State	Forest Reserve	Stateland	Total
Johore	17,029	8,050	25,079
Kedah	7,949	-	7,949
Kelantan	-	-	-
Malacca	338	100	438
Negeri Sembilan	540	727	1,267
Pahang	2,483	8,990	11,473
Penang	451	-	451
Perak	43,502	-	43,502
Perlis	-	-	-
Selangor	15,090	-	15,090
Terengganu	1,295	-	1,295
Sabah	317,423	49,927	367,350
Sarawak	34,992	133,000	167,992
TOTAL	**441,092**	**200,794**	**641,886**

Extent of mangrove forest reserves and stateland mangroves in Malaysia (Area in hectares – ha)
Source: Abd. Hamid A. S., (2004)



WHAT HAPPEN TO THE ECOSYSTEM IF MANGROVES PLANTS EXTINGUISH?

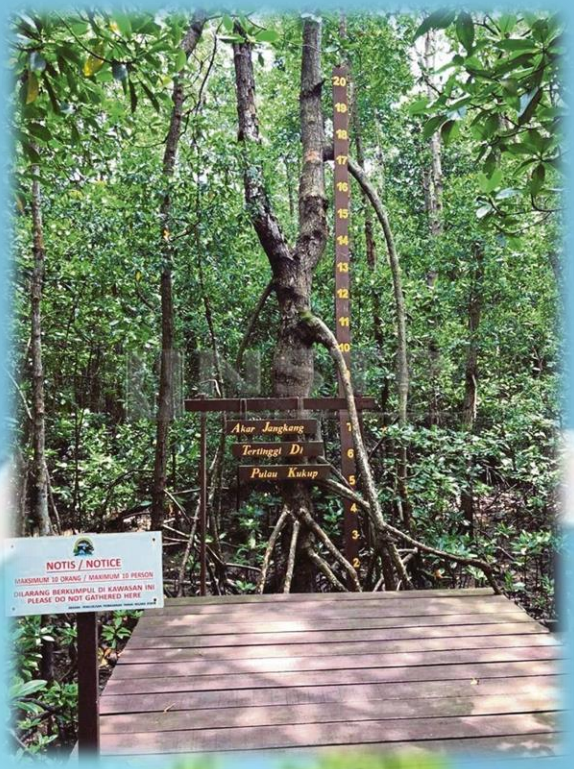
By the 1990s, Malaysia had officially lost half its mangroves as one of the world's largest mangrove-holding countries. While considered to be a highly resilient ecosystem, mangroves can not survive the continuous impact of human activities. Most of the time, the stresses and disruptions imposed by humans on mangroves are lethal and permanent. In our mangroves and marine habitats, there are very obvious changes. They can be conveniently observed by only using applications like Google Earth or Google Maps.

From the table of above, average height of the coastal areas, you can understand how many mangroves are left to protect you from the rising sea and the vicious waves. Ponder how much space there is left for fish and marine life to live. At the same time, this will lead you to understand the stress that coastal communities are facing, not just to protect their livelihoods, but also to preserve supply for the demanding markets that include you, me and everyone around us. Mangroves are important ecosystems that support many physical and biological processes and provide numerous significant ecological services to both humans and nature. The loss of these habitats and ecosystems would interrupt the aquatic and terrestrial regulation of natural processes, such as water, carbon and nutrients, which could jeopardise the survival of neighbouring habitats and animals. Since the loss of mangroves and coastal habitats will have an impact on our economy and social well-being, it is very important to use the situation to protect mangrove forests from rising sea and ferocious waves. Mangroves reduced the wave impact by re-using the energy of water flowing inland. Mangrove belts several hundred metres wide have been shown to be able to reduce wave height by between 5 and 30 percent.

In addition, the destruction of mangrove forests will also result in the loss of these habitats, and ecosystems would disrupt the control of natural processes, such as water, carbon and nutrients, which could threaten the survival on both the aquatic and terrestrial sides of neighbouring habitats and species.

HOW TO PRESERVE THE MANGROVE FOREST?

Enforcing the environment law. As we all know, nature is none own by anyone thus it is the government responsibilities to protect the national treasure. Strict fine and punishment should be imposed for those who break the rules and regulations regarding violation of law related to the mangrove ecosystem.



Mangrove trees at Pulau Kulup Johor National Park in Pontian.
Source: Aldrie amir, (2018)

Panasonic Group in Thailand planted small-leave mangrove trees at the Bangpu Nature Education Centre.
Source: Bangkok Post Public Company Limited, (2020)

Next is the silvicultural treatment. It is a process by which the crops constituting a forest are tended, removed and replaced by new crops, resulting in the production of stands of distinctive form This is because of the mangrove characteristic itself that have the rapid growth ability. Mangrove also have good regenerative potential where mangrove stands can recover rapidly from natural and Human-induced disturbances, including logging.

Gazetting all remaining mangrove forests within forest reserves or protected areas are one of the most effective way to preserve mangroves. This protected area is under surveillance from authorities. Some mangrove forests are already gazetted such as the Matang Forest Reserve in Perak, the Kuala Selangor Nature Park in Selangor, the Bako National Park in Sarawak, the Kota Kinabalu City Bird Sanctuary and Sepilok Forest Reserve in Sabah. But many other mangrove areas are still without any protection.

Mangrove forest in Penaga, Kepala Batas.
Source: Imran Hilmy, (2019)

Mangrove 4 Life (M4L) campaign parcipated by Berjaya Hotel and Resort.
Source: Radzlan (2016)

Campaign also can be held in order to create awareness and volunteering activity. Awareness can be easily spread through media social nowadays meanwhile for the volunteering activities can be done in community. Example of volunteering activity that can be done is tree planting at the mangrove area. This will ensure the sustainability of the mangrove in the future.

REFERENCES

American Museum of Natural History. 2020. The Importance of Mangrove Forests: Diverse Ecosystems, (December 30, 2020). https://www.amnh.org/explore/videos/biodiversity/mangroves-the-roots-of-the-sea/why-mangroves-matter

Avicennia germinans image. (2011). Discoverlife.org. https://www.discoverlife.org/mp/20p?see=I_STA141&res=640

Azgardens. (2021, January 05). Red Mangrove or Rhizophora mangle. Retrieved January 10, 2021, from https://azgardens.com/product/red-mangrove-rhizophora-mangle/

Bangkok Post Public Company Limited. (2020). Panasonic takes part in mangrove plantation, conserving the earth and restoring the balance of nature. https://Www.Bangkokpost.com. https://www.bangkokpost.com/thailand/pr/1698044/panasonic-takes-part-in-mangrove-plantation-conserving-the-earth-and-restoring-the-balance-of-nature

Dr. A. Aldrie Amir. (2018, December 29). There's benefit in them mangroves. NST Online; New Straits Times. https://www.nst.com.my/opinion/columnists/2018/12/444986/theres-benefit-them-mangroves

Hamid Bin, A., & Shukor, A. (n.d.). THE USE OF MANGROVES IN MALAYSIA. https://repository.seafdec.org.ph/bitstream/handle/10862/966/RTCmangrove_p136-144.pdf?sequence=1&isAllowed=y#:~:text=The%20mangrove%20forests%20in%20Malaysia

Impact on Mangroves. 2020. New Straits Times, December 30, 2020. https://www.nst.com.my/opinion/letters/2020/04/587028/impact-mangroves

Imran Hilmy. (2019, November 14). 'Gazette mangroves as forest reserve.' The Star Online. https://www.thestar.com.my/news/nation/2019/11/15/gazette-mangroves-as-forest-reserve

Matalone, S. 2020. "Mangrove: Definition, Types and Facts" Study.com (21 December, 2020) . https://study.com//academy/lesson/mangroves-definitiontypes-facts.html

National Oceanic and Atmospheric Administration U. S. Department of Commerce. 2020. "What is a mangrove forest" National Ocean Service, (January 4, 2020). https://oceanservice.noaa.gov/facts/mangroves.html

Radzlan. (2016, April 13). Berjaya Hotels & Resorts Strengthens Its Commitment To Caring For The Environment With New Csr Campaign – Mangrove 4 Life. Berjaya Hotel. https://www.berjayahotel.com/media-centre/news/berjaya-hotels-resorts-strengthens-its-commitment-caring-environment-new-csr-campaign-%E2%80%93-mangrove-4-life.html

Romañach, S. S., DeAngelis, D. L., Koh, H. L., Li, Y., Teh, S. Y., Raja Barizan, R. S., & Zhai, L. (2018). Conservation and restoration of mangroves: Global status, perspectives, and prognosis. Ocean & Coastal Management, 154, 72–82. https://doi.org/10.1016/j.ocecoaman.2018.01.009

White Mangrove (Laguncularia racemosa). (2020, December 15). Retrieved January 10, 2021, from https://www.lazynaturalist.com/white-mangrove-laguncularia-racemosa/

Special Thanks

University Malaysia Terengganu
- Institute of Oceanography and Environment, INOS
- Faculty of Science and Marine Environment, FSSM

MARE (Marine Coastal and Delta Sustainability for Southeast Asia)
European Union Erasmus+

The project by first year students
Bachelor of Science (Marine Science), Year 2020
Course Fundamental of Marine Science (MMS3009)

Mangrove Forest

Muhammad Fitri bin Elais (S58913)

"Don't be greedy, it's time to be greenly."

Muhammad Syafiq Rafa'ie bin Mohd Noh (S59311)

"Appreciate me when I'm here and don't regret when I'm gone-nature."

Nik Zahitil Azira binti Nik Mohd Zamri (S57757)

"Keep our world clean and green. Save trees, save the environment because earth is like our home and we must make efforts to keep it clean and green."

Nurul Zahirah binti Zakaria (S59042)

"If you can't clean your surrounding then don't make it dirty."

Nurul Syafiqah binti Shamsuddin (S59153)

"I hope the government and NGO can work together to save and restore the mangrove forest."

Nurul Shahirah Nadia binti Ahmad Zuhairi (S59073)

"I think I love the ocean because it's calm, beautiful, infinite but also angry, harsh and magnificent. And that intrigues me."