HEALTH, SAFETY
& ENVIRONMENT
Keeping KAUST Safe

Class Activities Book:

The Magnificent Mangrove

Changing Environment *(Exercise 1)*

Objectives	This exercise illustrates the characteristics of mangroves and their role in an ecosystem. Students investigate mangrove habitats with the teacher, using the help of self-designed visuals, field activity in class discussions.
What material do you need?	Cardboard in different colors for self-designed visuals, as followed: • Fish and other species living in mangrove forests • Living mangroves • Dead mangroves • Houses • Dike(s) • Water and land can be drawn on the board • Marker and big paper, scissors • Tape to fix the visuals on paper, a wall or the board
Description	This exercise involves the students' active participation. Involve as many of them as possible. Let them first make the self-designed visuals as described above. Then create a natural mangrove environment on a big paper or on the board by using these visuals. Place one house, three living mangroves and some fish on the paper and let the students describe what the natural environment of mangroves looks like. Now change the setting: let some mangroves turn into dead ones because of sea-level rise, take fish away and put the dike as well as new houses on the paper. What has changed? Let the students describe!
Relevance and learning effect	By actually comparing the natural setting of mangrove forests with the changed one the students visualize the change due to several threats. Explain with the help of the visuals what that change means for coastal communities and the environment

Marine Pollution *(Exercise 2)*

Objectives	This exercise is to let the students see the effect of waste on mangrove seedlings. To show the negative impact, a living mangrove seedling is best for presentation if possible.
How many people and what material do you need?	• Presentation in front of class • A few living mangrove seedlings, different in size (from a nursery) • Plastic bags and other waste
Description	Waste and especially plastic bags are a big problem for young mangrove seedlings. Due to tides, currents and waves they become lodged to mangroves and may pull or even break them. While showing the students the effect of plastic bags on young mangroves you can explain this to the audience. Tell them, how dangerous plastic bags can be to mangrove seedlings because of the change of low and high tide.
Relevance and learning effect	Students get a vital impression of the dimensions of a small mangrove seedling and a big plastic bag and why waste is dangerous especially for young mangrove trees. This can be combined with a clean-up at a nearby mangrove site. And if possible, plant the seedling after getting the proper approval

What is a Mangrove *(Worksheet 1)*

Read the following short text and try to answer the questions below.

Mangrove forests are a unique ecosystem of marine plants growing at the margins of tropical coastlines around the world. These plants, mostly trees, are called mangroves. About 70 species of mangroves exist all over the world.

Mangroves grow in saline coastal habitats in the tropics and subtropics. They need slow currents and plenty of fine sediment for root attachment. The distribution of the species is based on the salinity and substrate gradients.

Mangroves are very salt tolerant plants that grow in brackish salty water. In such an environment they provide habitat and food for other species living under these conditions. Small fish for example can hide and grow up in mangrove forests. Mangroves also clean the water and prevent the coastline from erosion. And when a storm is coming, they are a natural protection for our houses and livelihood. We have to protect the mangroves, so that they can protect us.

1. Where do mangroves usually grow?

2. Which conditions are important for mangroves to grow?

3. What are the benefits or mangroves and why do we have to protect them?

Mangrove Benefits *(Worksheet 2)*

a) Have you ever seen mangroves?

Mangroves are fascinating trees. They grow on many coastal areas in Saudi Arabia, on the Red Sea coast and on the Gulf Sea coast. Have you ever seen mangroves? Where did you see them? What do they look like?

b) Tree of Life

Mangroves are not only great to look at. They have several very important functions; both for the environment and for the coastal communities. Read the following short text and try to find out why they are so important. Put each answer into one of the leaves.

Mangroves are important trees for the coastal ecosystem, many fish and other animals as well as for our daily life. When a storm or a typhoon is coming, mangroves protect the coasts from erosion and floods. Many young fish need the mangroves growing up so they can hide there from enemies and leave when they get bigger. Many species also get their food in mangrove forests. Mangroves are also important for the people. They are a rich source of fishery products as well as a source of firewood. They protect the houses near the coast from storms and flooding.

Where Do Mangroves Grow? *(Worksheet 3)*

What does a mangrove tree look like? And where does it grow?
Try to draw a picture of how you think a mangrove tree looks like. Put it somewhere on the line below, where you think it fits best.

Sea-side

Mangroves and Friends (*Field Activity*)

Objective:	Participants will learn to distinguish among the two mangrove species commonly present in KSA based on vegetative and reproductive characteristics. They will also become familiar with the common mangrove friends ie. other cohabitation organisms. If there is only one mangrove species available, the field station comparison can be of the same type of mangrove
Summary:	Participants will examine leaves, stems/trunks, aerial roots, flowers, flints, and propagules of *Rhizophora mangle* (red mangrove), and/or *Avicennia marina* (grey mangrove).
Materials:	Clipboard Data sheets Pencil Plastic bags
Procedure:	Break the large group into smaller groups of equal size. Each small group will examine two mangroves to compare (comparing mangroves of the same species is possible if only one is present at the location). Collect samples of flowers and leaves at each site for detailed examination in the laboratory session.

Field Station 1. At this station you will examine the vegetative and reproductive parts of *a mangrove plant.*

Leaves
Sketch or trace the shape of a leaf:

What is the leaf arrangement (alternate or opposite)?

Are there hairs, glands, or other structures on the blade or petiole?

Stems/Trunk
Describe: color
texture
shape

<u>Aerial Roots</u>
Describe type (prop, drop, pneumatophores, etc.):

Sketch the aerial root system:

(Laboratory/Class Part of Field Station 1)

Flowers

Sketch or trace a flower:

How many petals?
How many sepals?
How many stamen?

Fruit/Propagule

Sketch a mangrove fruit and/or propagule:

Field Station 2. At this station you will examine the vegetative and reproductive parts of *a mangrove plant.*

Leaves
Sketch or trace the shape of a leaf:

What is the leaf arrangement (alternate or opposite)?

Are there hairs, glands, or other structures on the blade or petiole?

Stems/Trunk
Describe: color
texture
shape

<u>Aerial Roots</u>
Describe type (prop, drop, pneumatophores, etc.):

Sketch the aerial root system:

(Laboratory/Class Part of Field Station 2)

Flowers

Sketch or trace a flower:

How many petals?
How many sepals?
How many stamen?

Fruit/Propagule

Sketch a mangrove fruit and/or propagule:

Comparing Two Mangroves *(Datasheet)*

		Mangrove (A)	Mangrove (B)
Leaves	Length (in cm)		
	Shape & feel		
	Color, top & bottom of mangrove		
Trunk	Diameter (in cm)		
	Feel		
	Color		
Roots	Shape		
	Soil type		
	Is it on the coast, or in water?		
Flowers	Can you see any flower?		
	If you do, what color is it?		
	What does it smell like?		
Fruits	Can you see any fruit?		
	If you do, what color is it?		
	How long is the fruit? (in cm)		

Based on what the teacher taught you and the information you've gathered, can you identify the type of mangroves (A) and (B)?

Mangrove (A):

Mangrove (B):

Observing Birds in a Mangrove Forest (*Checklist 1*)

☐ Caspian Tern

☐ Clamorous Reed Warbler

☐ Common Kingfisher

☐ Crab Plover

☐ Goliath Heron

☐ Little Bittern

☐ Saunders Tern

☐ Sooty Gull

☐ Spur-Winged Lapwing

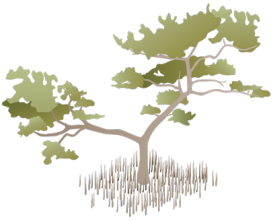
☐ Striated Heron

☐ Marsh Harrier

☐ Western Osprey

Observing a Mangrove Ecosystem (Checklist 2)

☐ Flower

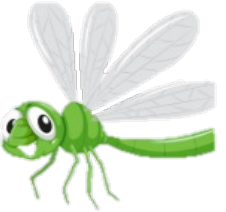


☐ Grey Mangrove

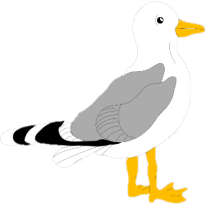
☐ Fruit

☐ Nest

☐ Bee



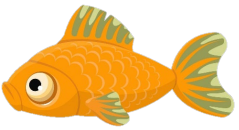
☐ Dragonfly



☐ Bird

☐ Crab

☐ Snail



☐ Fish

☐ Butterfly

☐ Red Mangrove