

WESTERN INDIAN OCEAN MARINE HABITATS

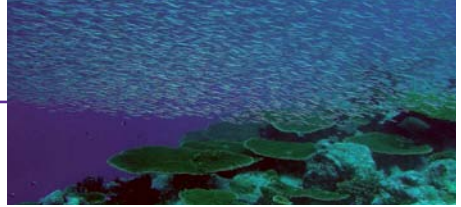
By Garth Cripps and Shawn Peabody

AUDIENCE: CONSERVATION FIELD AGENTS, TEACHERS

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The marine ecosystem encompasses three interlinked components. If any of these components is seriously damaged the health of the entire ecosystem is put at risk. This handbook details the important characteristics of each of these three marine habitats.

Coral reefs

What is coral?

Corals are living animals called polyps, which look like tiny upside down jellyfish. The polyp has a soft body, so it secretes calcium carbonate in order to build a hard case around itself for protection. Polyps live in colonies, and the coral structures that we see on the reef are made up of hundreds of individual coral polyps. Reefs are formed when hundreds of hard coral colonies grow next to and on top of each other in a variety of colourful shapes and sizes.

During the day most species of corals retreat into their skeleton, but at night the polyps emerge and wave their tiny stinging tentacles in the water to catch microscopic organisms in the water called plankton. This plankton is not the only source of food for the corals. In order to obtain more energy for growth, the polyps allow microscopic plants (called *zooxanthellae*) to live inside their tissues. These tiny plants use sunlight, like plants on land, to produce energy for the corals in return for the protection provided by the hard coral skeleton.

Coral reproduction and growth

With careful co-ordination regulated by the moon, coral polyps release a massive cloud of eggs and sperm on only a few nights during the year. The fertilised eggs float around in the water column for a while before they hatch and settle on a hard surface to develop into coral polyps. New colonies can also be formed without the need for sexual reproduction, as they can grow from fragments that have broken off an established colony, or individual polyps can split into many buds that each grow into a new polyp.

Reefs generally grow at a rate of about one to two centimetres per year (the length of a fingernail), so it takes many years for a large reef to form. Different types of coral grow at different speeds. Branching corals can grow quite quickly, at a rate of five centimetres a year. Massive coral such as brain coral, on the other hand, take up to 50 years to reach the size of a football.

The importance of coral reefs

Corals are found in the warm, clear and shallow water of the tropical oceans. Reefs cover less than 1% of the ocean floor, but are home to nearly a quarter of all marine species. They have many functions such as providing food for fish: parrotfish eat the algae living inside the coral, and some butterflyfish feed on the coral polyps themselves. Other fish and marine animals find shelter amongst the branches of the corals or in holes and caves within the reef.

Coral reefs can also bring economic advantages to local communities, through non damaging activities such as tourism. Divers and snorkellers are attracted by the beauty of the reef and the wealth of species living on it. Reefs also act as natural coastal defences, reducing the potentially damaging energy of big waves as they enter the lagoon.

Damage to corals

As has already been mentioned, corals take a long time to grow. They are also fragile and break easily. This combination means that it is very easy to destroy coral, and reefs are in serious danger from both natural and man-made causes. When large numbers of people walk on reef flats in search of octopus, they trample on corals and break them. Boat anchors also destroy corals as they are thrown into the sea and crash into the reef.

Coral reefs are highly sensitive to the impacts of sediments.

A major source of damaging sediments is erosion, which causes soil from the land to enter the sea where the turbidity affects the level of sunlight penetration. As sediments hang suspended in the water, they prevent light from reaching the reef below, preventing the growth of coral because the plants which live in the corals cannot make any food. When soil is washed into the sea it also carries with it the chemicals that farmers have used on their crops. These pesticides and fertilisers can be harmful to corals and other marine life. Other pollution in the form of oil, industrial discharges and litter also create problems.

The more the water is polluted, the more difficult it is for polyps to survive.

The destruction of coral has a negative effect on the whole of the reef community. Fish and other reef animals make their homes in and around the coral, so if too much coral is damaged then there will be no place for them to live. When fish stocks decline because their habitats are damaged or the food chain is disturbed, this impacts upon the livelihood of fishers.

Mangroves

What is a mangrove?

Mangroves are the forest areas between the land and the sea. The trees and plants of mangrove forests can live in either fresh or saltwater. They have salt-filtering roots and salt-excreting leaves that allow them to survive in areas where most other plants would die. About three-quarters of the world's tropical coastlines are lined with mangroves. Madagascar has some of the largest stands of mangroves in all of Africa, with most of these mangrove areas being found along the west coast.

Importance of mangroves

Mangroves are incredibly important to the health and safety of coastal communities. Mangroves shield coastlines from damaging storms and waves. During cyclones and tropical storms, communities with healthy mangroves are protected and suffer far less damage and loss of life than areas where mangroves have been cut down. The long and



tangled roots of mangrove trees also trap sediment, preventing coastlines from eroding and coral reefs and seagrass beds from becoming buried under dirt.

Fish populations and other marine species depend on healthy mangroves for survival. 75% of the world's commercial tropical fish spend part of their lives in mangroves. Mangroves serve as the nursing grounds for many species of fish that then move out to coral reef areas to live their adult lives as in the rabbitfish featured in comic 2. Mangrove roots provide shelter to young fish, crabs, prawns and other species. Without mangroves, many of the fish that live in deeper waters and coral reefs would not exist.

Threats to mangroves

While mangroves play an important role in the health, safety and fishing economies of coastal communities, many people and governments view them as useless swamps. But without mangroves, many coastal areas would literally disappear into the sea.

Mangroves are some of the most threatened habitats in the world. Half of all the world's mangroves have disappeared in recent years. This is mainly due to people cutting mangrove trees down for fuelwood and building materials. Mangrove wood is also used to build fires to boil prawns and smoke fish after they are brought ashore. In many areas, mangroves are being converted into farmland. Pollution is also killing off mangroves.

In the many areas of Madagascar mangroves are disappearing rapidly. They are being cut down faster than they can grow back.

Seagrass beds

What is seagrass?

Seagrasses are aquatic flowering plants found in shallow near-shore fresh and salt water. They grow completely underwater in soft mud or sand, and need a lot of light in order to survive. They thrive in sheltered areas that have very little current or waves. They are usually found between mangroves and coral reefs.

Why protect seagrasses?

Many scientists think seagrasses are one of the most important habitats in maintaining the health of coastal areas. They keep oceans clean by filtering sediments from the water. They also help fight erosion along coastal areas.

Seagrasses serve as breeding grounds for many species of fish, and they provide shelter, food and habitat for shellfish, octopus, turtles and other sea creatures. Seagrasses are the favourite habitat of a number of species of sea cucumber, and without this habitat this high value resource would be severely endangered. Without near-shore seagrasses, many of the fish found in deeper waters and coral reefs would not exist.

But growing populations along coasts – and the pollution from these areas – are killing off seagrasses. Boat engines and propellers also cut seagrasses causing them to die, and the

nets used for fishing in shallow lagoon waters often tear the plants from the ground.

Seagrasses can also be damaged by hurricanes and cyclones that rip the plants up from the mud or cause dirt and other sediment to smother the plants.

How to use this handbook

This handbook provides an overview of the major marine ecosystems present in the Western Indian Ocean. The text of this document provides general background information for the conservation field agent new to the marine environment or to community and civil society leaders without an extensive knowledge of marine science. This text may also serve as a reference for teachers when introducing the marine environment in the classroom.

The attached comic is meant to reinforce the text of this handbook and also assist fieldworkers in passing this knowledge along to communities and school children. The attached exercises will help teachers to incorporate this material into their curriculum.

Resources for teachers

Quiz questions

1. Choose a marine ecosystem and describe its principle threats.
2. What are coral reefs and what do they eat?
3. Which marine ecosystem is most important to your community? Which is most under threat?
4. How are the three marine ecosystems interconnected?
5. How are marine ecosystems be connected to terrestrial ecosystems?

Mathematics exercises

1. If a mangrove forest is being cut at a rate of 2.5% a year, how many years before it reaches half its original size?
2. A small patch of mangrove forest has 64 mangrove trees, 12 *Rhizophora mucronata*, 21 *Bruguiera gymnorhiza* and 31 *Avicennia marina*. What percentage cover are each of those three species in that forest?
3. Assuming a growth rate of 1.5 cm a year. How long will it take for a coral to reach 20 cm tall? Assuming a growth rate of 5 cm, how long would it take?

LOST AT SEA

INDIAN OCEAN COMMUNITY CONSERVATION HANDBOOK 2
WESTERN INDIAN OCEAN MARINE HABITATS
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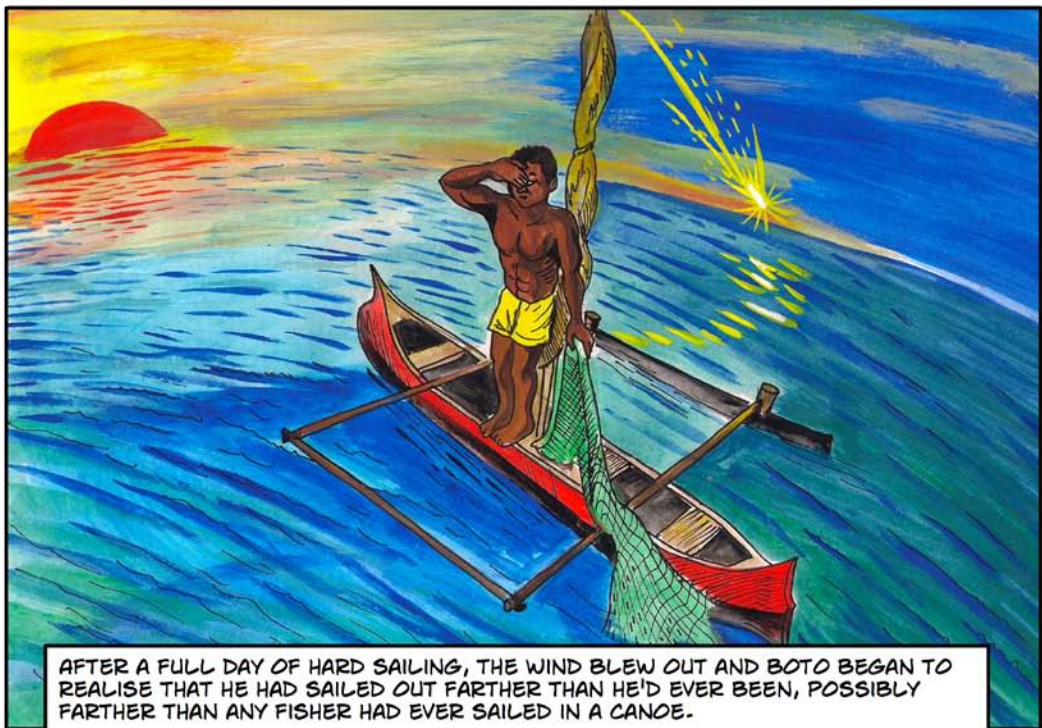
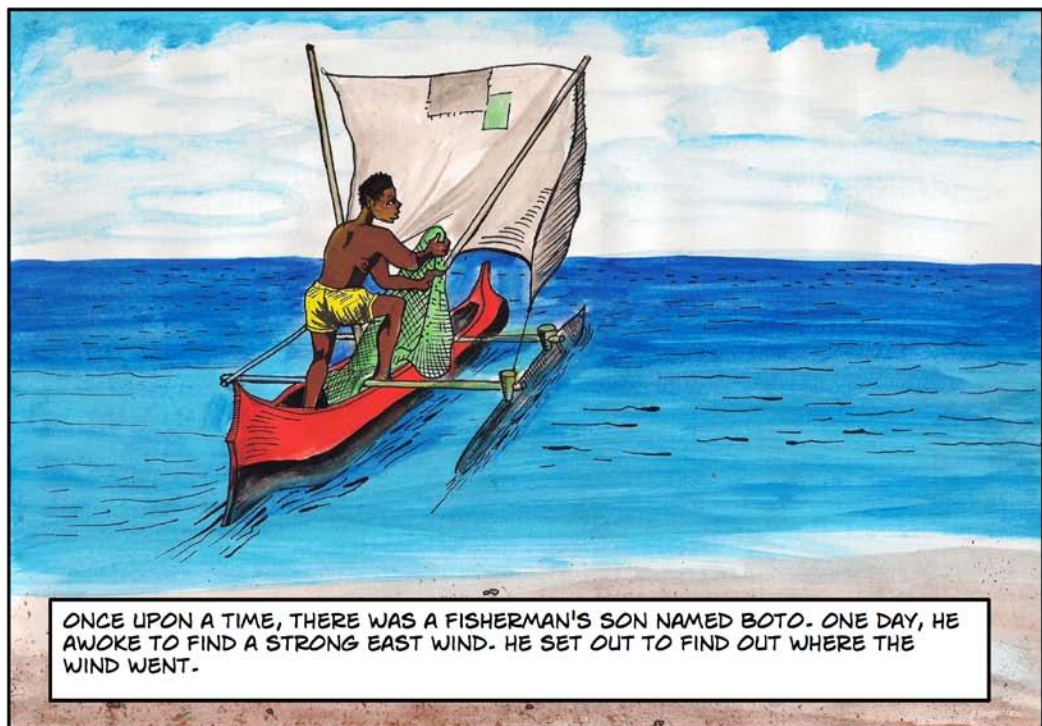


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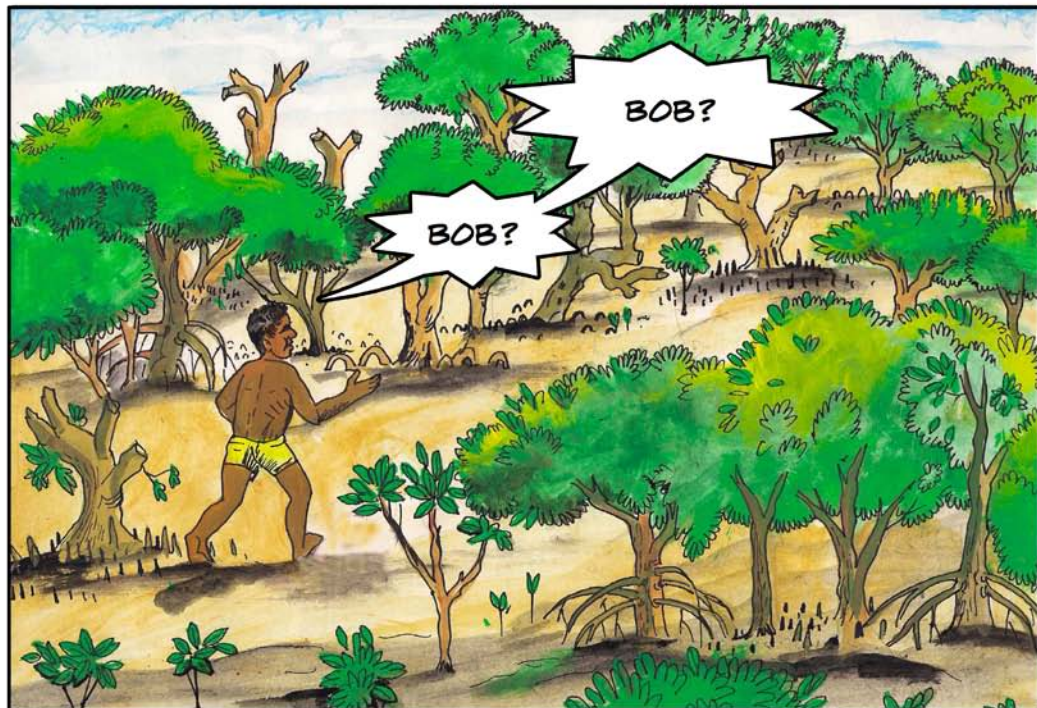


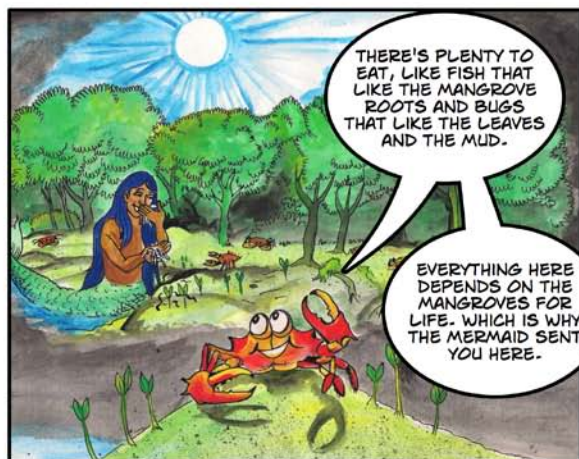
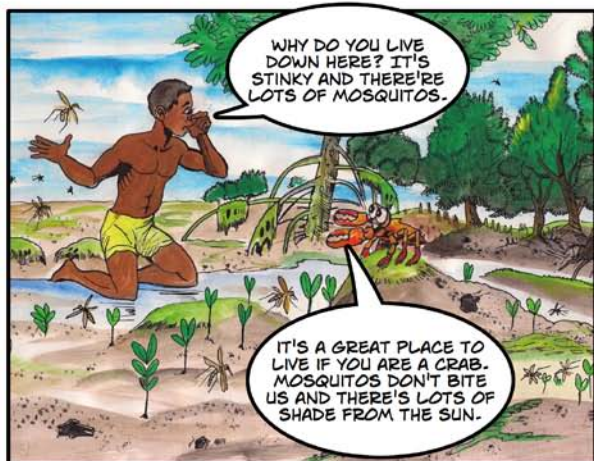












AND AS THE FOREST
DISAPPEARS, THE SAND
AND MUD THAT WAS HELD BACK BY
THE ROOTS RUNS INTO THE
SEAGRASS, KILLING IT.



AND WHEN BIG STORMS
COME, THE MANGROVES
AREN'T THERE TO SLOW THE
WAVES AND THE TIDE SO
FLOODING OCCURS.



AND THEN THE
FLOODING BRINGS
MORE MUD AND SAND
TO THE SEAGRASS AND
ONTO THE REEF.

I CAN FIX THIS.
I'M GOING TO
GO TELL
EVERYONE.

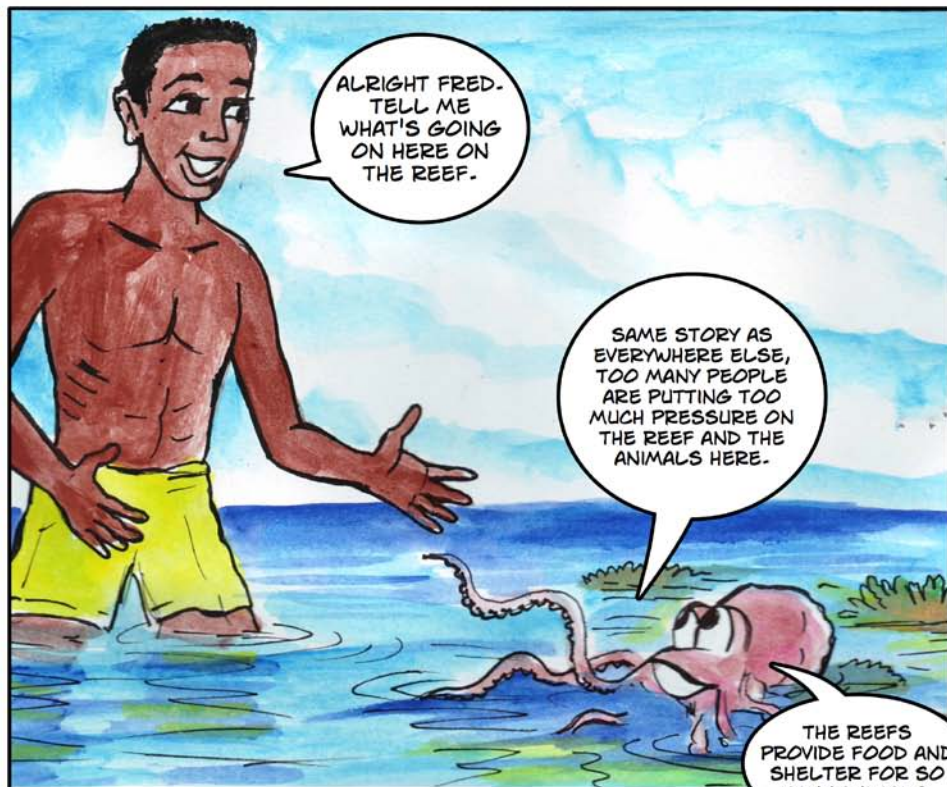
NOT YET! YOU HAVE
TWO MORE FRIENDS
TO VISIT FIRST.

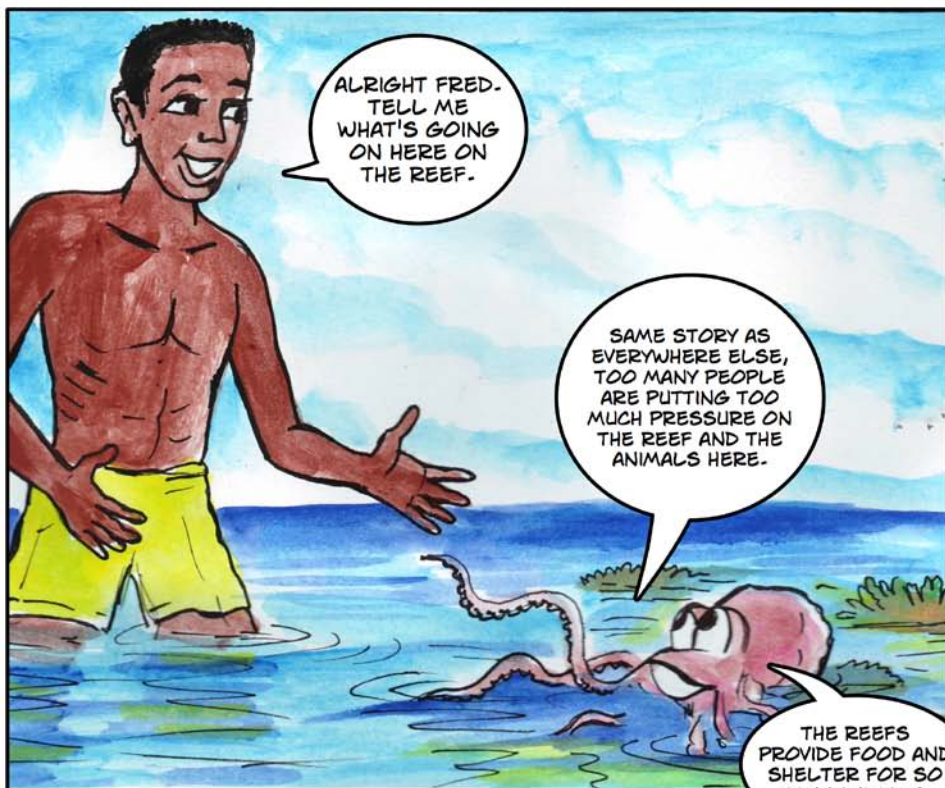


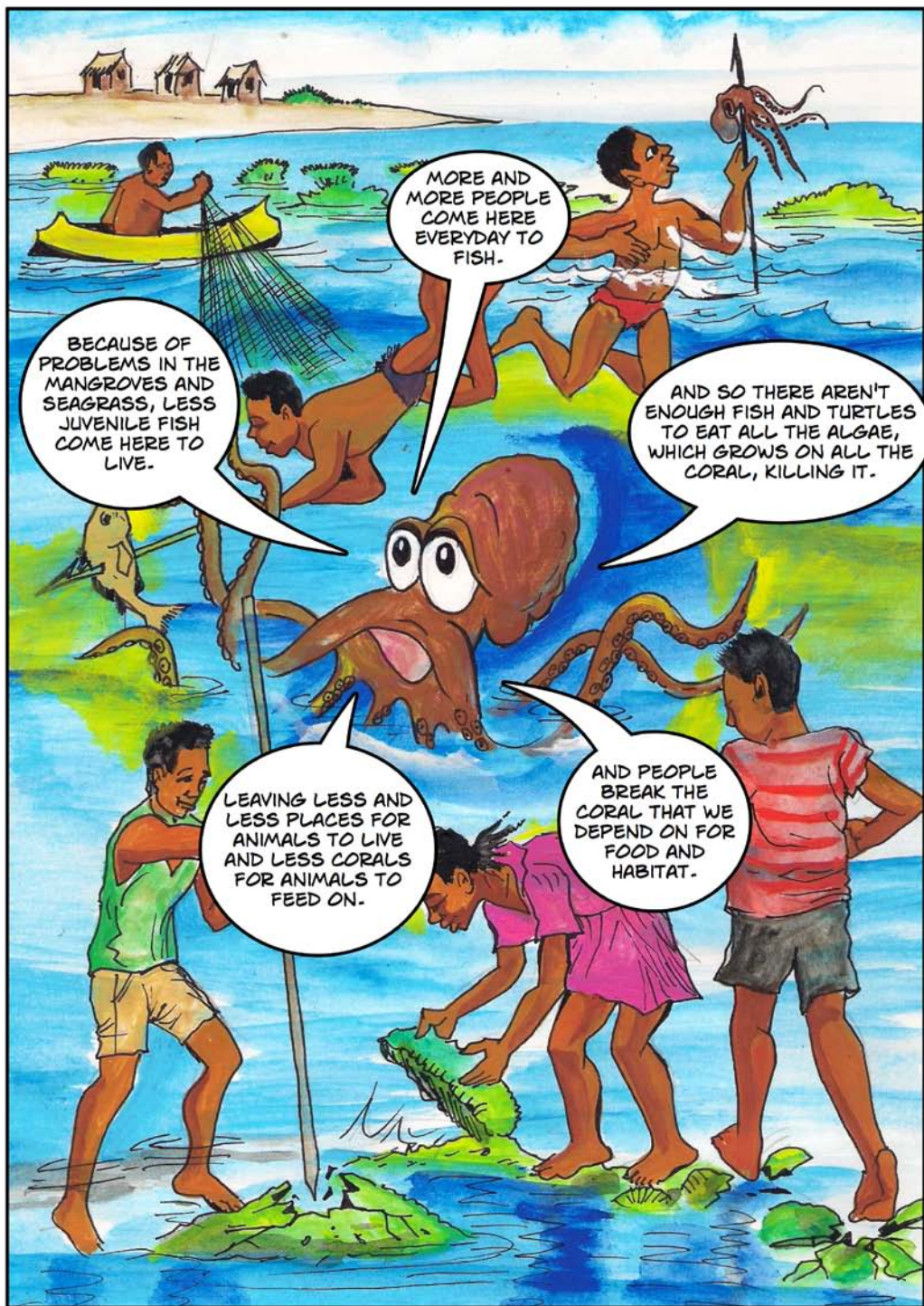
MATTHEW?
HELLO?











MORE AND MORE PEOPLE
COME HERE
EVERYDAY TO
FISH.

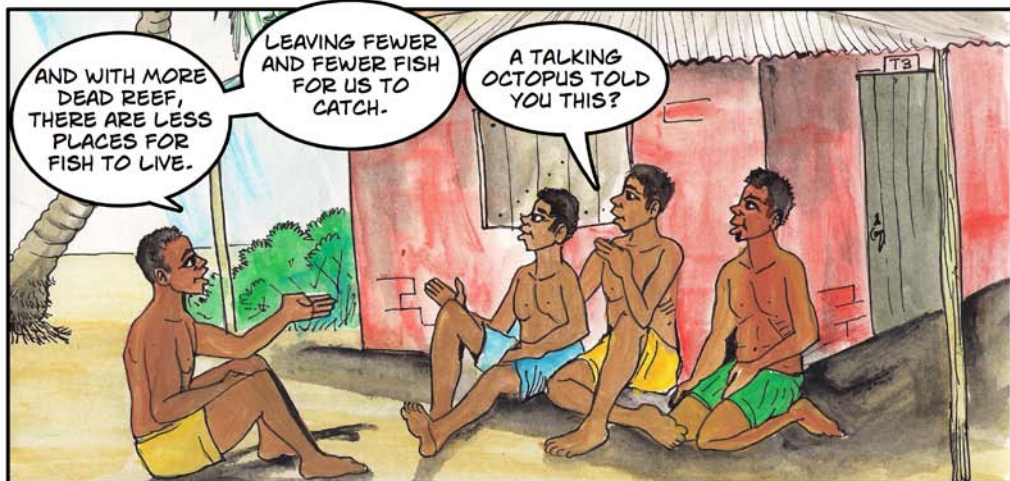
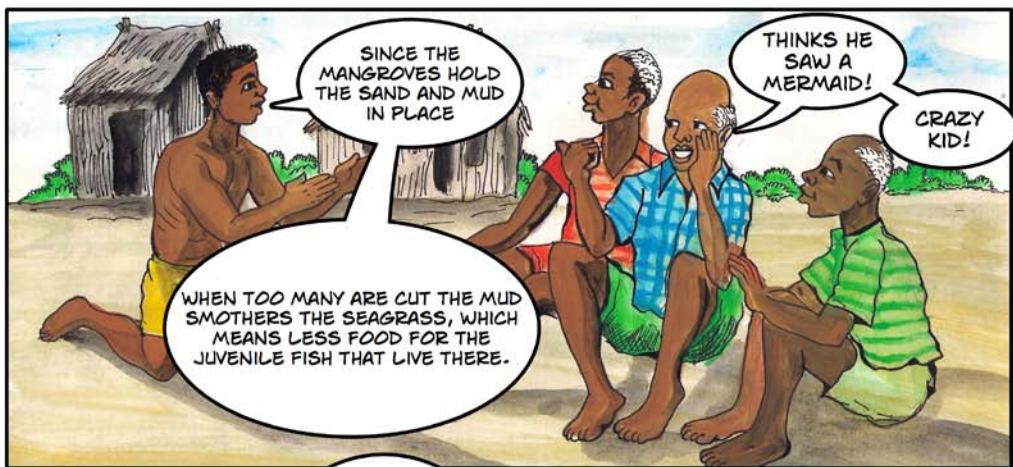
BECAUSE OF
PROBLEMS IN THE
MANGROVES AND
SEAGRASS, LESS
JUVENILE FISH
COME HERE TO
LIVE.

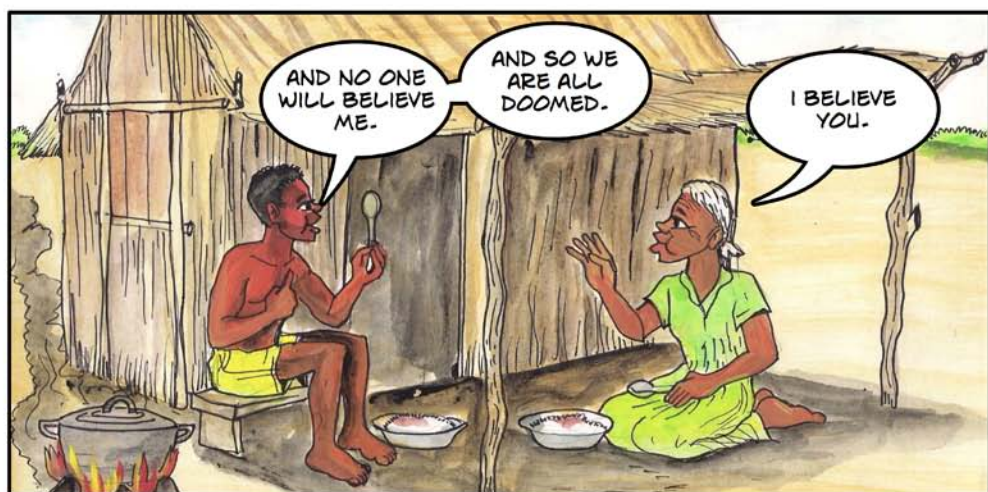
AND SO THERE AREN'T
ENOUGH FISH AND TURTLES
TO EAT ALL THE ALGAE,
WHICH GROWS ON ALL THE
CORAL, KILLING IT.

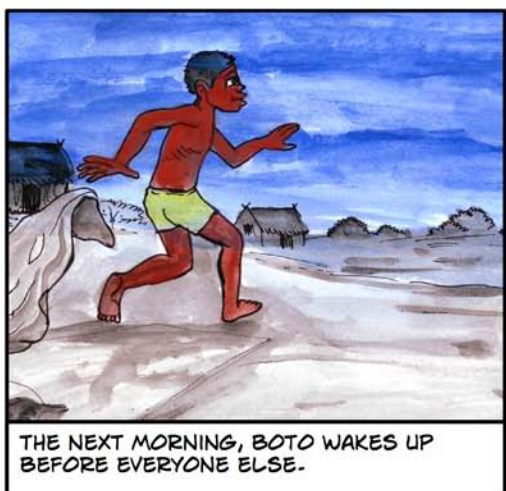
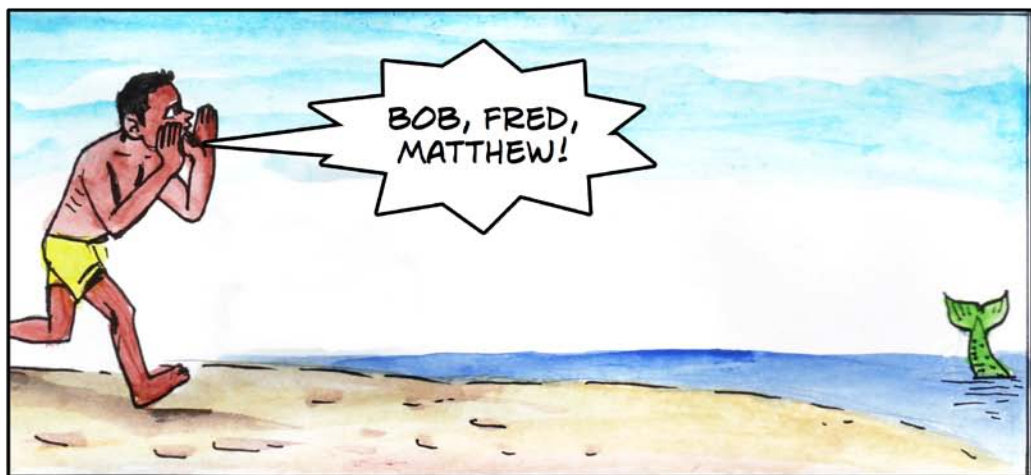
LEAVING LESS AND
LESS PLACES FOR
ANIMALS TO LIVE
AND LESS CORALS
FOR ANIMALS TO
FEED ON.

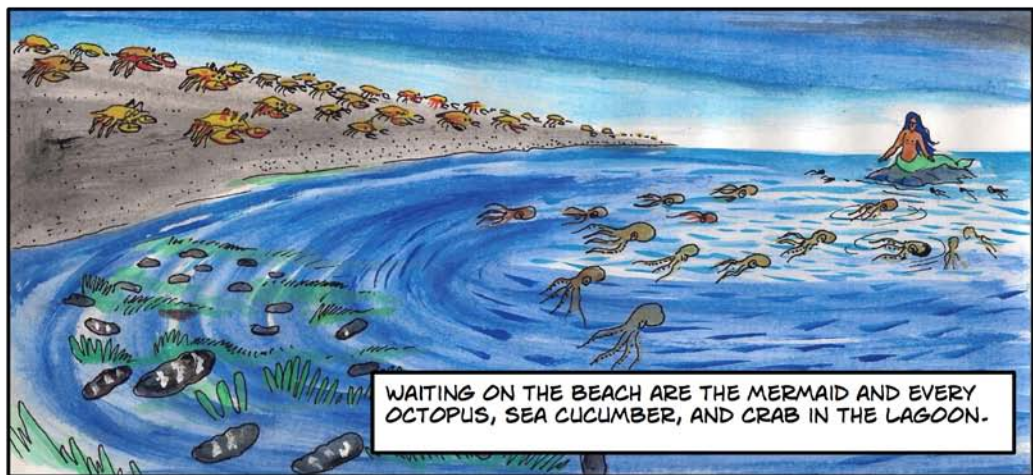
AND PEOPLE
BREAK THE
CORAL THAT WE
DEPEND ON FOR
FOOD AND
HABITAT.







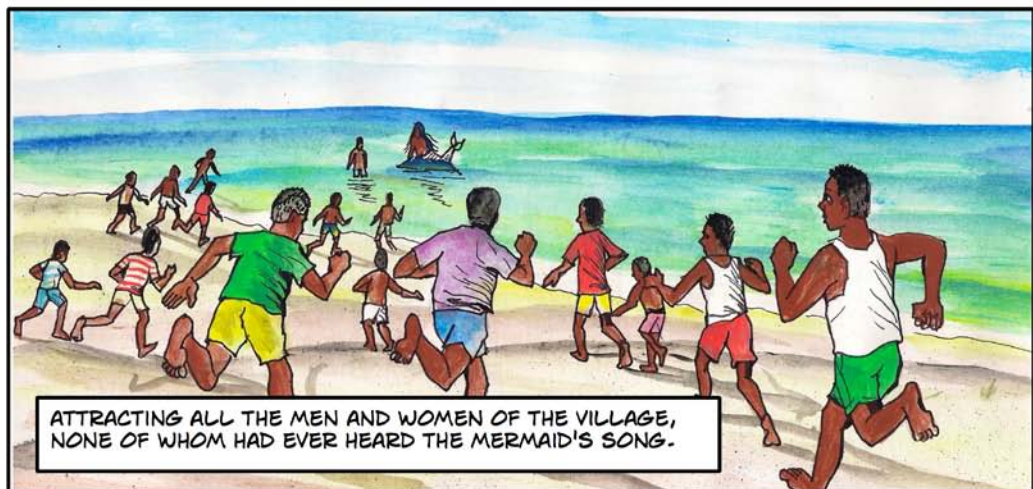




WAITING ON THE BEACH ARE THE MERMAID AND EVERY OCTOPUS, SEA CUCUMBER, AND CRAB IN THE LAGOON.



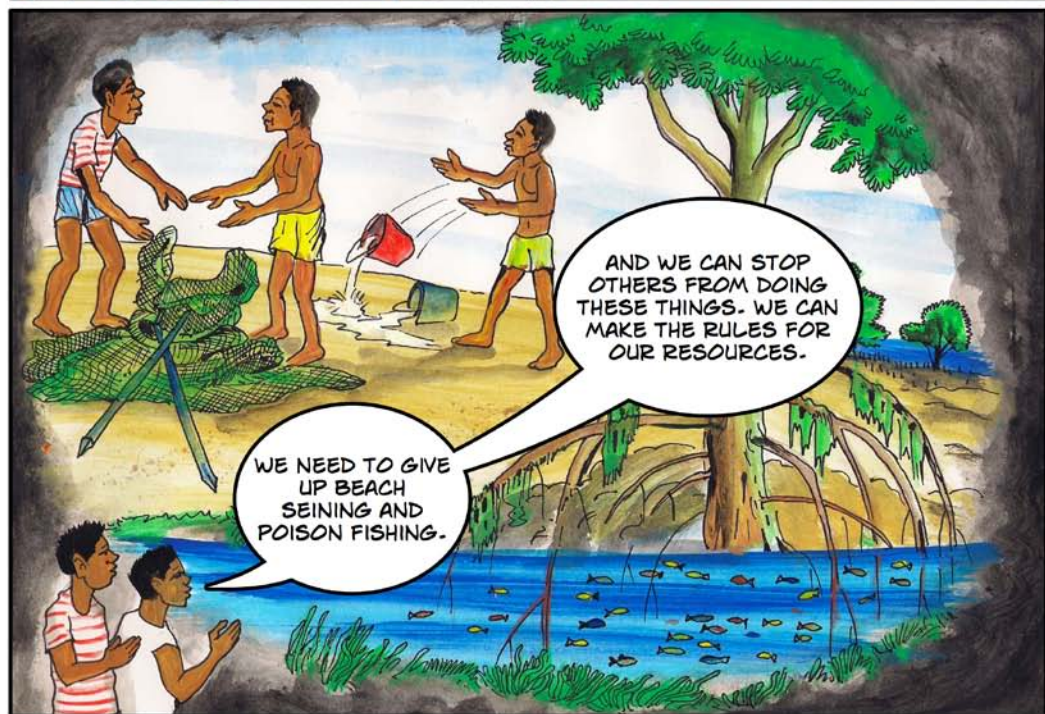
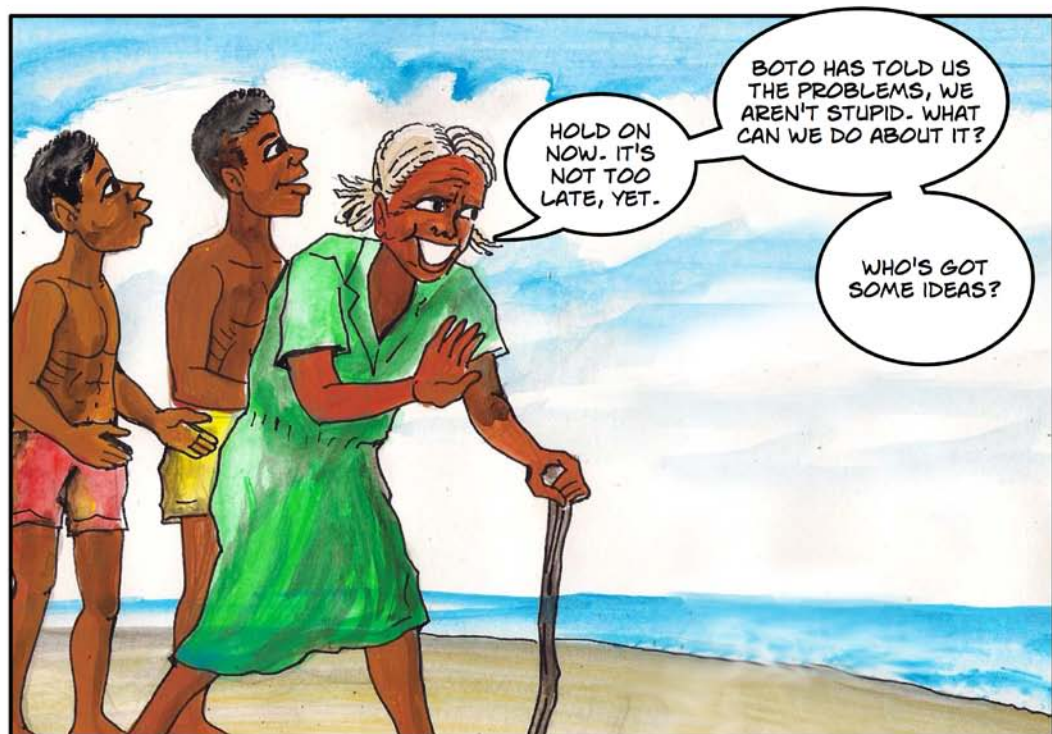
SHE SINGS OUT INTO THE MORNING.

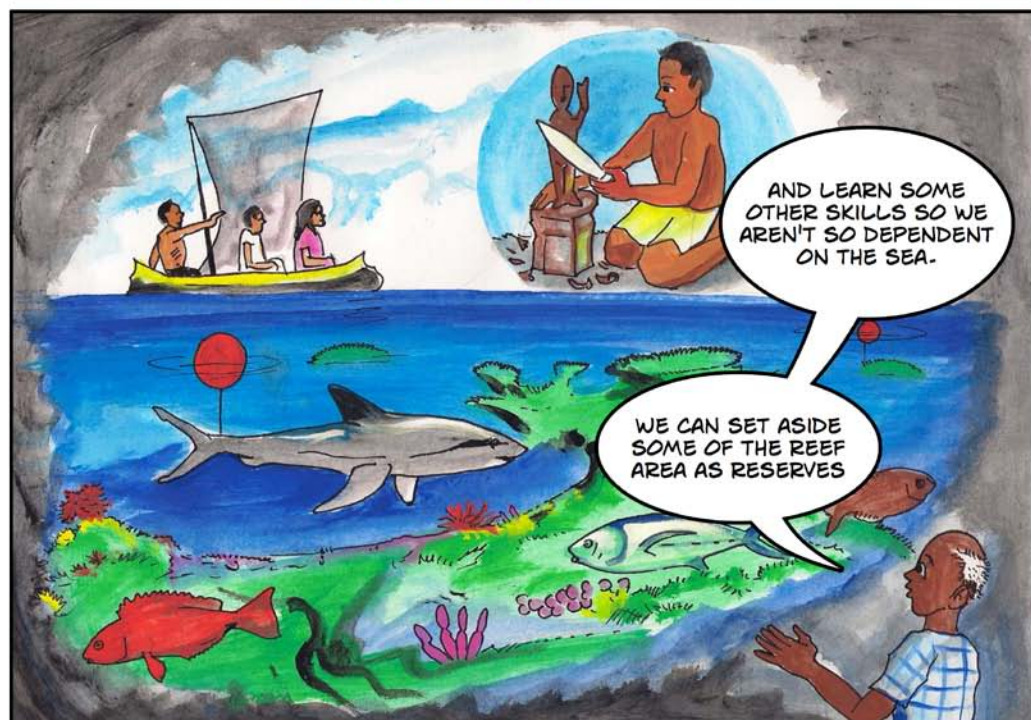


ATTRACTING ALL THE MEN AND WOMEN OF THE VILLAGE, NONE OF WHOM HAD EVER HEARD THE MERMAID'S SONG.











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