

# SANDY BEACHES

This book  
is a part of the  
Honavar coastal  
ecosystem  
series

**Activities on a sandy beach** by

*Dakshin Foundation*

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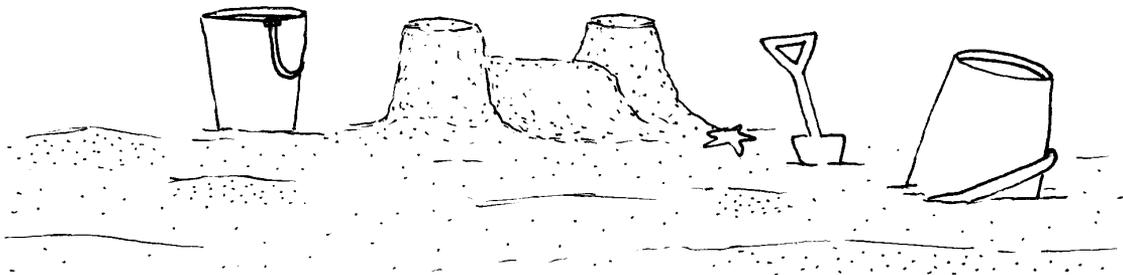


**MY NAME IS:** \_\_\_\_\_

**I LIVE IN:** \_\_\_\_\_

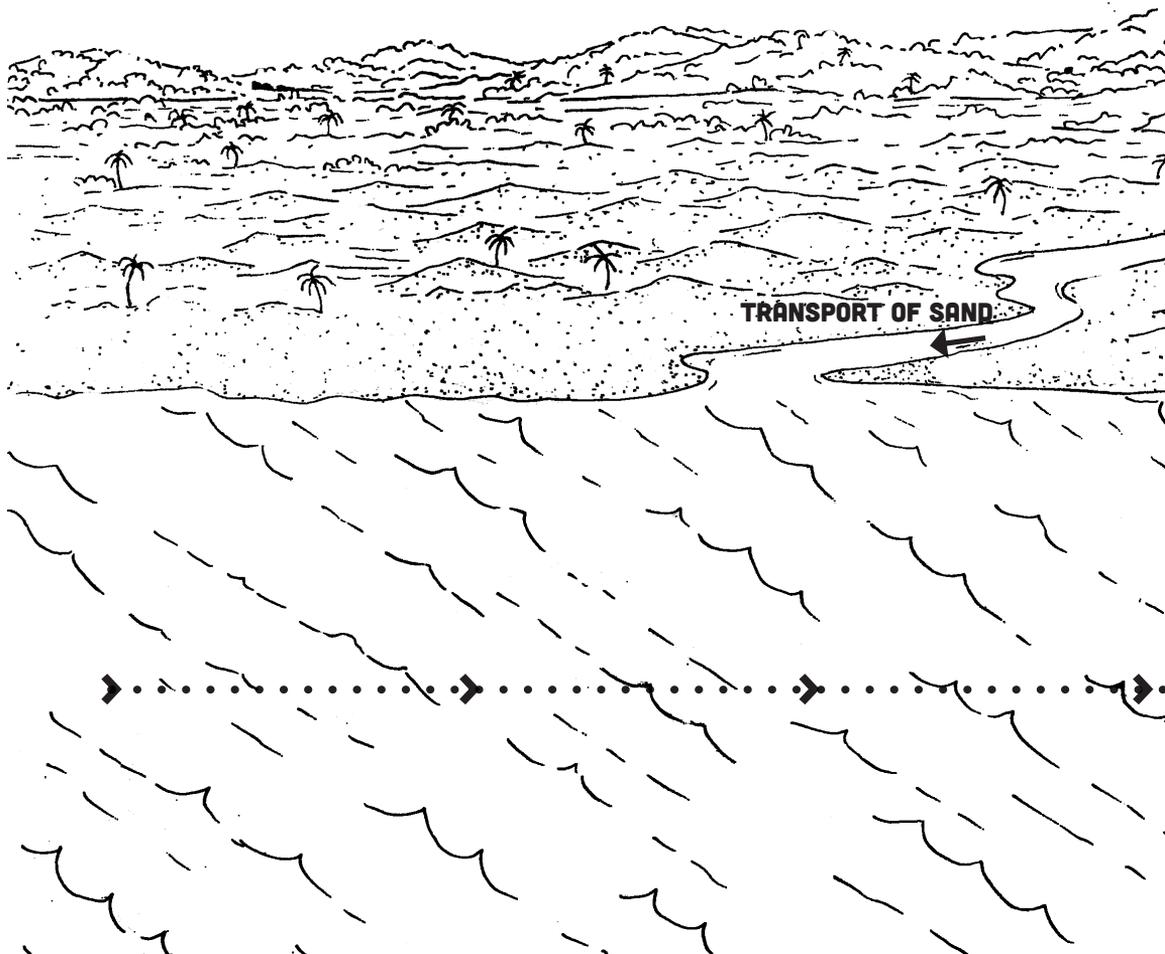
**I AM IN CLASS:** \_\_\_\_\_

**I GO TO SCHOOL:** \_\_\_\_\_



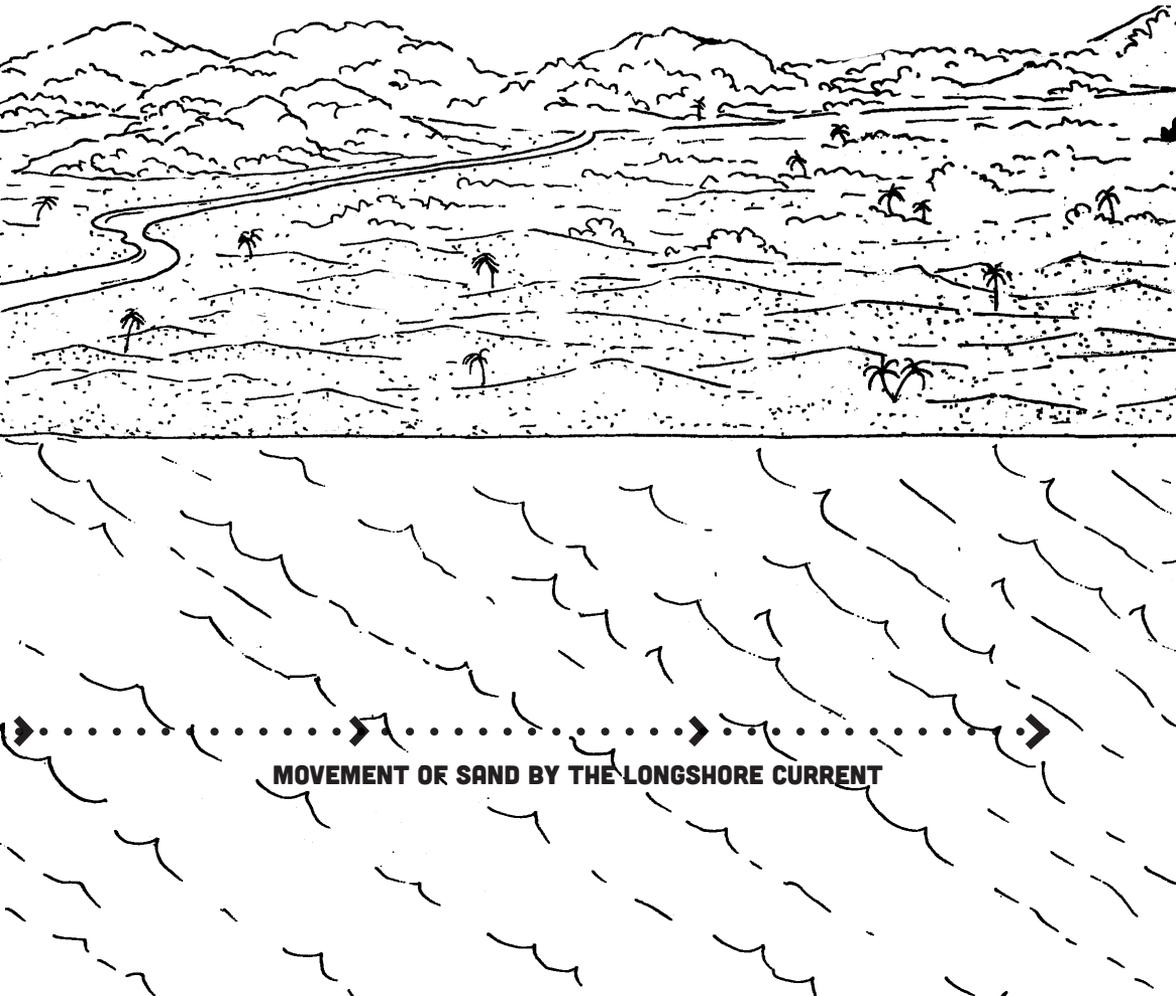
## FORMATION OF A SANDY BEACH

Have you ever wondered where the large amount of sand on beaches comes from? When it rains, sand from hills, mountains, fields and plains are washed into rivers. The rivers in turn carry these huge amounts of silt and sand to the sea. When the sand reaches the sea, waves and the longshore current, an open ocean current that moves parallel to the shore, carry the sand along the beach.



Together the waves and the current gradually deposit sand and silt on to beaches.

Every year, sand is both deposited and taken away from beaches. The cycle of sand loss and sand gain occurs over decades and centuries, resulting in the beach as you see it now. This makes sandy beaches a dynamic habitat, making it a challenging place for organisms to live and survive.



# ORGANISMS ON A BEACH

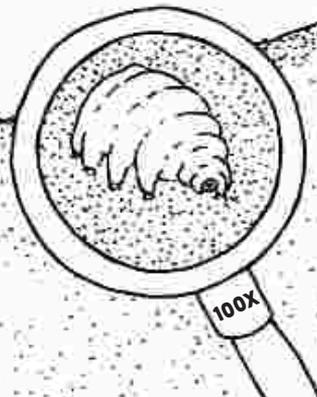
Life on a sandy beach is very different from life in most other regions. The sand, broken seashells, bits of coral and small pebbles that make up a beach are always on the move, constantly being rearranged by the waves.

To a casual observer, sandy beaches may seem completely devoid of life. But on closer observation and some exploration you will see a situation that is quite the contrary. Sand on the beach, where the water can reach up to, is full of creatures of many shapes and sizes. Some are so small that they are able to live in



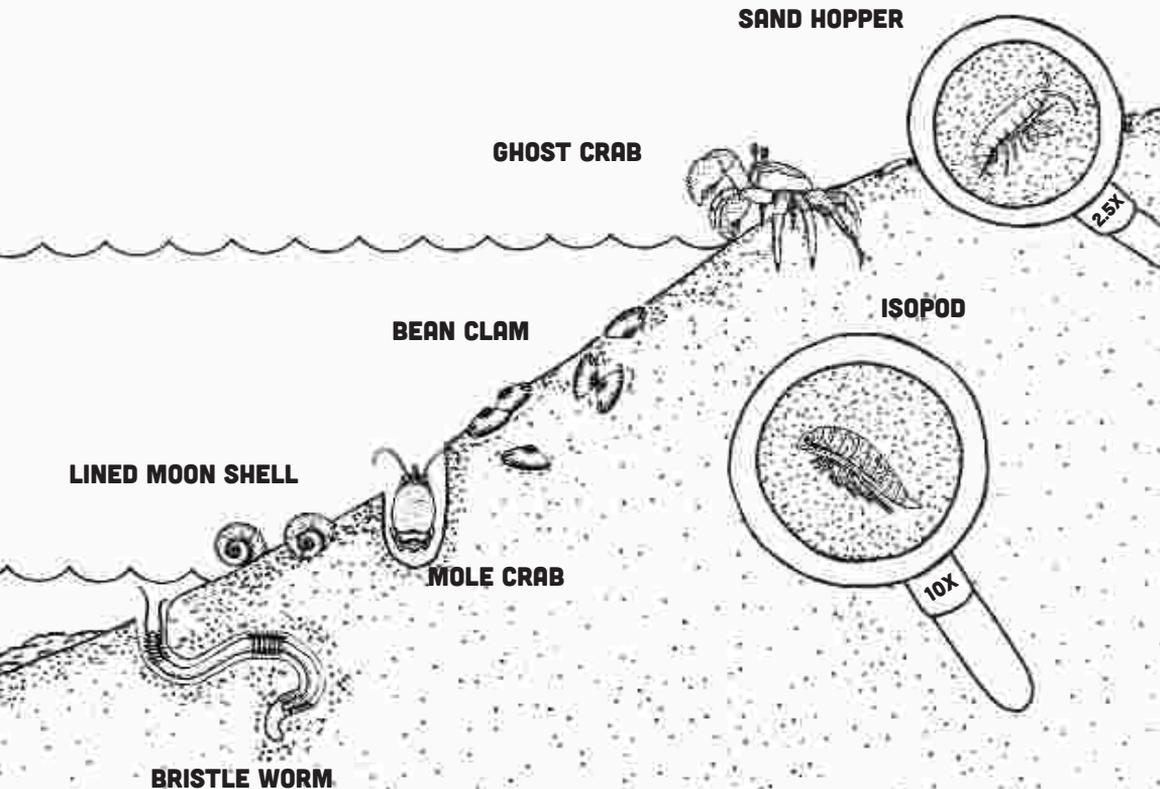
**WATER BEAR**

**SAND DOLLAR**



between the grains of sand and can only be seen using a microscope.

Life in the sand includes clams, whelks, worms, sand hoppers, crabs, and a host of smaller animals — as well as protozoans, microscopic plants, and bacteria. It has been estimated that as many as 100,000 organisms may live in about 1 square metre of sand!



## ACTIVITY 1

### LITTLE CREATURES OF THE BEACH

The beach is home to thousands of tiny creatures that are hard to spot with your eyes. In this activity you will discover this world! This activity requires involvement and supervision by a teacher or a parent.

#### Time:

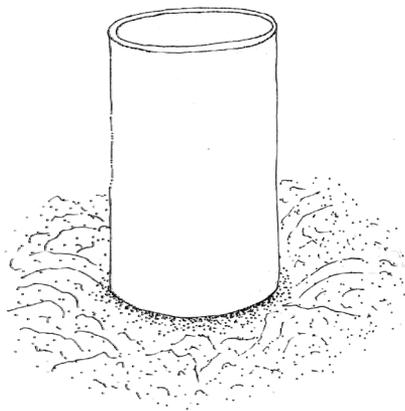
1 hour

#### Materials required:

- PVC pipe or strong cylindrical pipe at least 10 cm wide and 30 cm long
- One large plastic tray
- A mesh with holes of about 0.5 millimetres (a mosquito net or a sieve used for sieving flour can be used)
- A magnifying glass
- Small plastic containers (5-10)
- A pair of forceps and a small paint brush

**Divide yourself into groups of five or six. Find a spot on the beach without much wave action but where the seawater reaches, in the intertidal zone. (Refer to the Introduction booklet to learn more about the intertidal zone).**

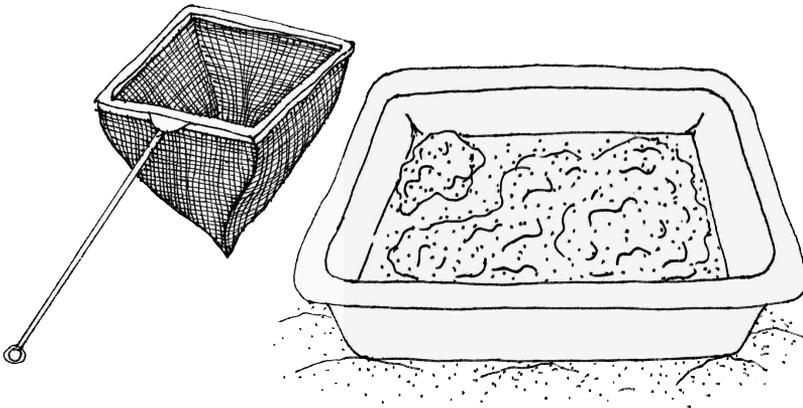
1. Push the pipe about 10 centimetres into the sand after the water recedes. Quickly dig around the pipe and slowly tilt the pipe ensuring that sand within the pipe does not fall out.



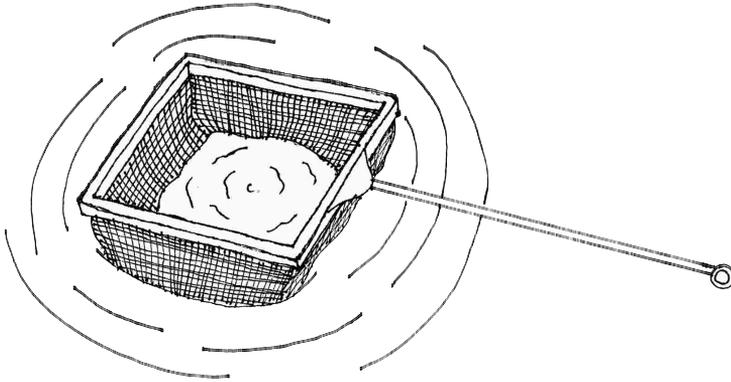
2. Empty all the sand in the pipe into the large plastic tray. Do all of this before the water comes back in!



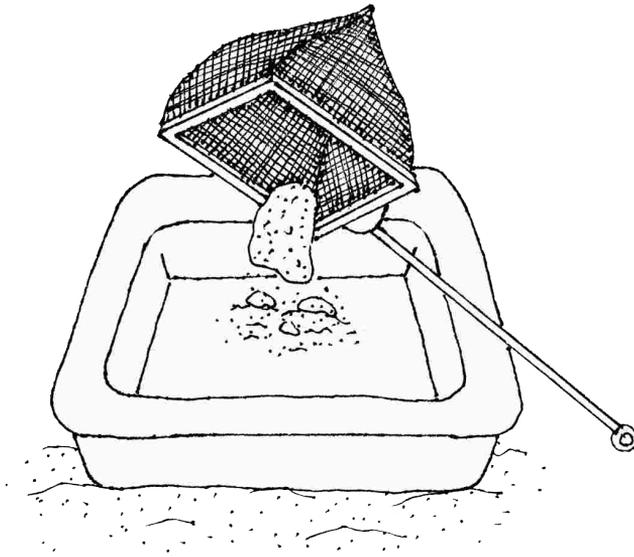
3. Put a small quantity (about one sixth) of the sand in the sieve and gently sieve in the water.



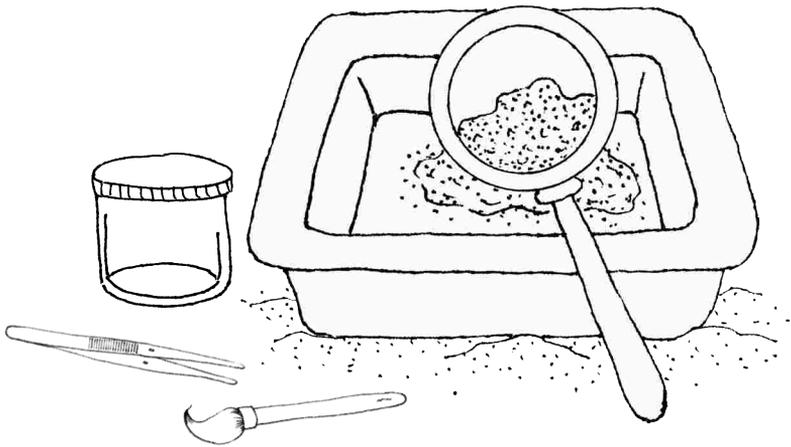
4. Take care not to dip the sieve entirely in water, keeping the top of the sieve above the water level. If using a mosquito net, hold the net so that sand does not escape from the sides. Hold it like a bag and dip it in seawater and shake vigorously.



5. Once you have sieved for three to five minutes, empty the remaining sand into the smaller white plastic tray.



6. Add a little bit of water and spread the sand on the tray gently. Observe the contents of the tray with a magnifying glass.



Can you see anything interesting in the tray? There could be shells, tiny creatures darting around, slender worm-like creatures, etc. Try and remove the excess sand without disturbing the organisms. Use the forceps or brush to gently place the organisms in small containers with a little water and take them to the laboratory/learning centre and observe them under a microscope. The organisms you see here are intertidal organisms. You will learn more about them in the next few pages.

1. How many organisms did you see? Do they look like any of the creatures shown on the next two pages? Try and name them.

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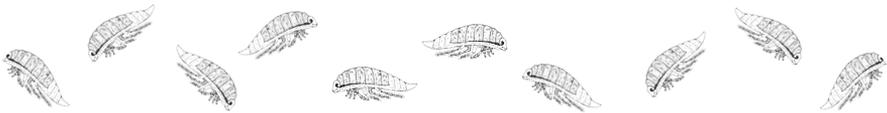
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2. Isn't it interesting that these organisms haven't been washed away by the waves? What do you think helps them stay where you found them? Take a closer look at the organisms for clues.

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3. Record the part of the beach that you found them in. Closer to the high tide line, the low tide line or somewhere in between? (Refer to the Introduction booklet to learn more about the high tide and low tide line)

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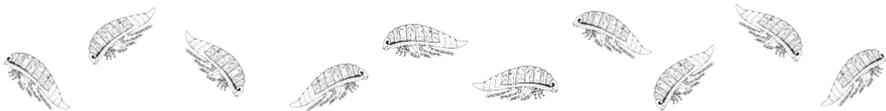
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4. Compare what your group has found with what the others found. Is there a difference? If so what could be the reason?

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# ADAPTATIONS OF ORGANISMS ON BEACHES

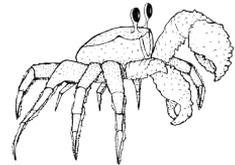
Organisms on sandy beaches need to be able to quickly burrow into the sand or move rapidly with the tide. Many kinds of snails, clams and crabs are specialised in chasing the surf and then digging rapidly into the surface of the sand. Some creatures can dig deep into the sand to protect themselves from the heat and waves.

## Adaptation to exposure due to low tide

Some creatures live in shells. They close their shells tightly during low tide which helps them retain water inside. The shell also prevents water loss from evaporation.

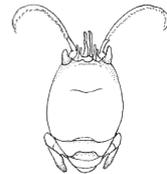


Ghost crabs and other related crabs live above and close to the high-tide line. They come to the intertidal area to soak their gills, and also store some water which helps them breathe for a long time. During low tide, ghost crabs burrow deep into the sand to remain moist.

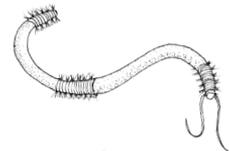


## Adaptation to instability due to wave action

Mole crabs have short bodies and powerful scoop-like hind-legs that allow them to dig quickly into wet sand.

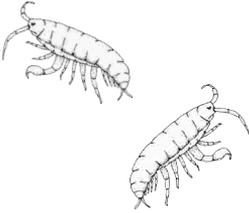
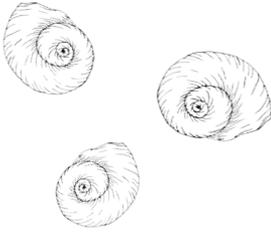


Polychaete worms have developed a slender thread-like body, with numerous feet that enable them to move and dig easily in the sand.



Some animals are so tiny that they are smaller than the grains of sand they live in. The tardigrades have adhesive discs on their feet, with which they cling onto grains of sand so that they are not washed away.





Some creatures have a large, spreading foot that acts as a suction device and helps them glide effortlessly over sand without getting disturbed by wave action. A slime that they secrete over their body helps them glide and also keeps them moist when exposed during low tide.

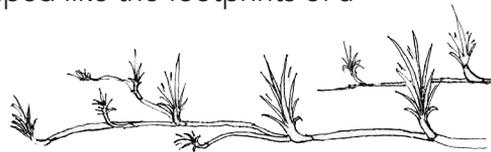
### **Adaptations above the high tide line**

Sand hoppers live in the sand just above the highest point that waves can reach. They prefer to come out of their burrow only during the night - to avoid the birds that feed on them and to escape the excessive heat of the sun. They rarely return to their old burrow and instead use old or abandoned burrows of other organisms, which helps save energy.

Plants closest to the sea are mostly made up of creeping, fast growing grasses with upright leaves that help them avoid burial due to rapidly shifting sands. Their roots reach deep in the sand to find water while their fleshy leaves help them conserve water.

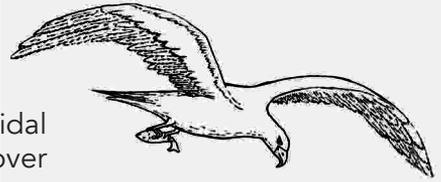
*Spinifex*, sometimes known as Ravana's moustache, because of its thick, pointy leaves, is a common salt tolerant plant found just above the high tide line.

Another example is *ipomea* which is also known as goat's foot morning glory because it has leaves shaped like the footprints of a goat's foot!



## ACTIVITY 2

# SANDY EXPLORERS



In addition to these residents of the intertidal beach, a variety of organisms move up over the beach as the tide rises, and others come down to the shore as the tide falls. All these creatures interact at the interface of land and sea! As you look up and away from your magnifying lens, what do you see?

### **Time:**

30-40 minutes (You can keep adding to this list as you continue to explore the beach)

### **Materials required:**

- Bird identification guide

**Divide yourself into groups of five or six. Find different areas of the beach to explore. Write down every animal and plant you see while on the expedition. If you don't know the name, describe how it looks and what it is doing.**

Don't forget to look for turtle tracks and/or nests at the beach that you are at. Use the bird identification guide to help you identify birds you see. Before you begin, write down how many living things you think you will see. It will be interesting to look at this number later on!

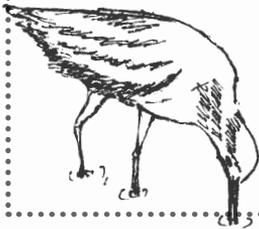
Guesstimate: \_\_\_\_\_

Compare your findings with the rest of the groups. Did all of you see the same things?

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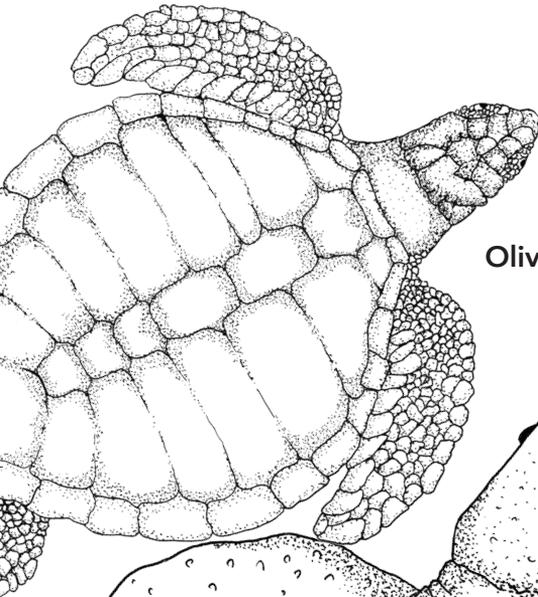
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List organisms that you saw and describe what they were doing at the beach.

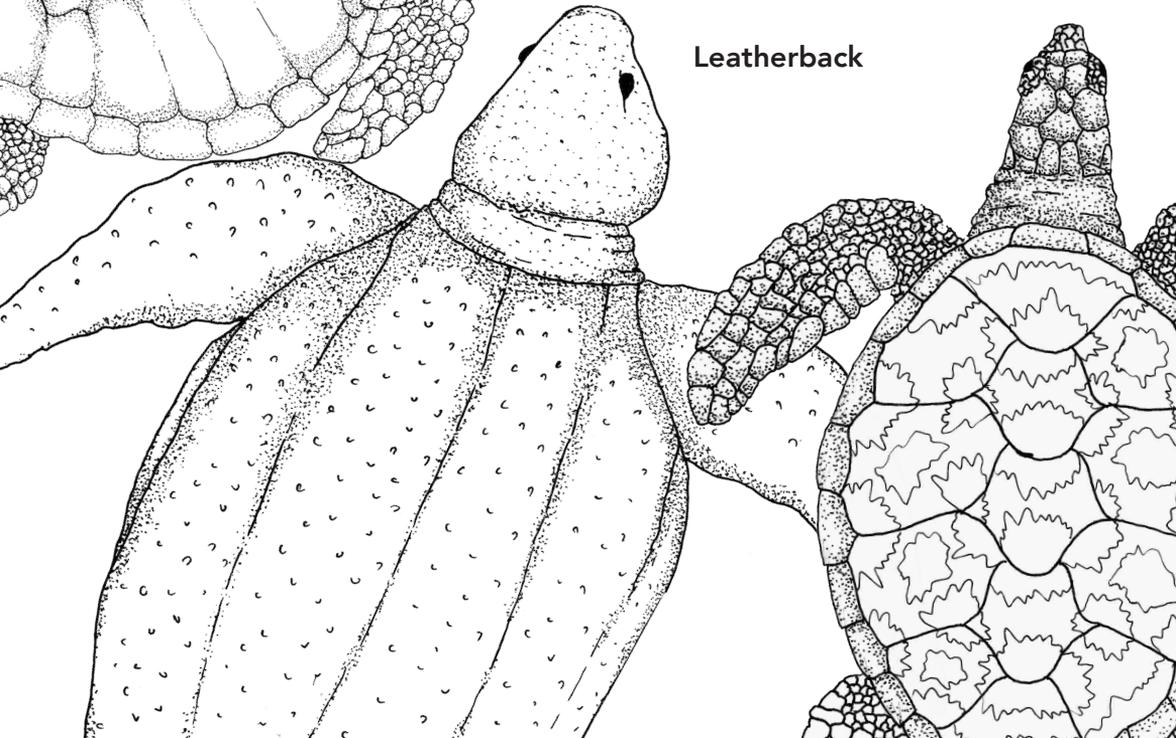


## WHO ELSE IS AT THE BEACH?

In addition to the tiny organisms that reside amongst the grains of sand, the beach has many visitors that come by for various reasons. Birds, reptiles and small mammals are all commonly found, but Honnavar's most awaited visitor is the olive ridley turtle that comes to shore to nest.

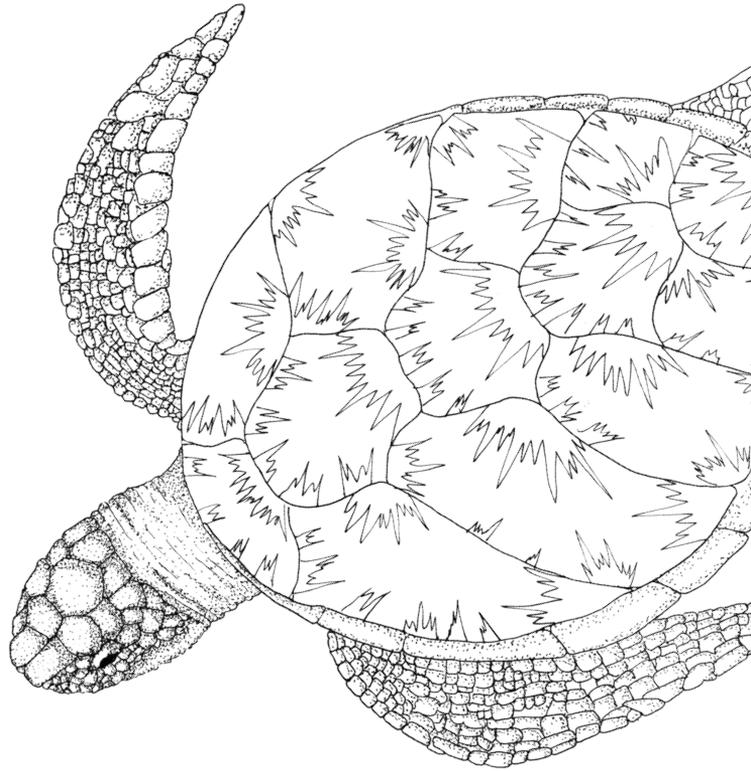


Olive Ridley



Leatherback

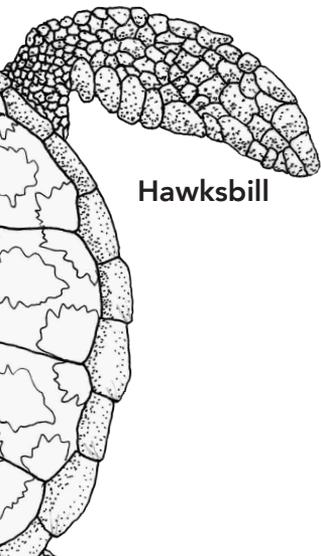
Green



### Sea Turtles

Sea turtles spend most of their lives at sea, but females must come ashore to lay eggs. The eggs take about 7 – 10 weeks to hatch and hatchlings emerge at night. They quickly find the sea due to the reflection of the moon and starlight on water. Olive ridley turtles nest throughout the mainland coast of India and are also found in Honnavar.

Hawksbill



Green and hawksbill turtles nest on the beaches of Lakshadweep and the Andaman and Nicobar Islands (ANI), in addition to nesting leatherback turtles in the ANI. Green turtles are also known to nest on the coast of Gujarat. Hawksbill and green turtles have also been occasionally seen in the waters off the Karnataka coast.

# **IMPORTANCE OF SANDY BEACHES**

Long and broad stretches of sandy beaches are important spaces that provide many different functions. Remember how beaches are formed? Existing beaches provide the space for the natural process of sediment storage and transport. Beaches buffer against storms and their water filtration capabilities helps store ground water. These are only some of the services that beaches provide. Others include:

## **Supporting biodiversity**

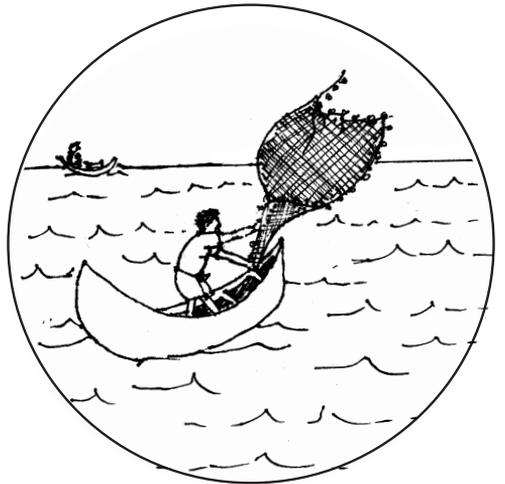
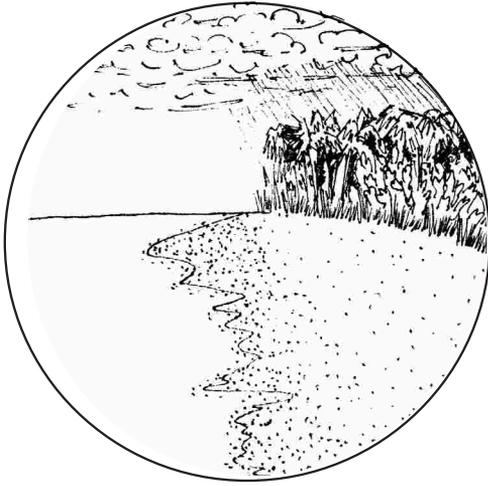
Sandy beaches are often undervalued for the biodiversity of life they support. All the tiny organisms that are found at the beach serve as an important food source for birds, mammals, and fish, creating a rich ecosystem. Beach vegetation plays a large role in holding sand together thus preventing beach erosion due to strong winds.

## **Open spaces**

Beaches are also ideal places to get some fresh air, play around with friends and explore. What better place to spend an evening than on the beach?

## **Livelihood**

This space is also valuable to everyone who depend on fishing for a living. It is here that the fisherman haul their boats, sit and mend their nets, lay their fish out to dry and auction the fish and sell it to merchants who transport the fish to other markets.



## ACTIVITY 3

# HOW WE USE OUR BEACH

Talk to a member from a fishing community to understand how they use the beach and how important it is to them. What would happen if they lost access to the beach?

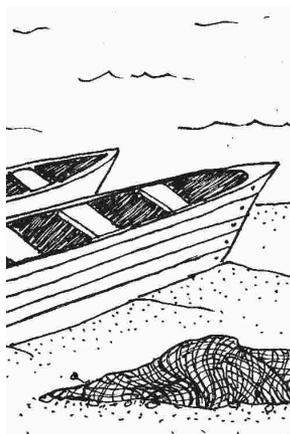
If you are conducting this interview as a class, set-up a meeting with only one person so all of you can ask questions together. Make sure you maintain order while asking your questions as a group, ask questions in turn and pay attention while others are speaking. Don't forget to introduce yourself before the interview and thank the person for giving you their time!

Remember, conducting an interview is hard work so prepare a list of questions before your interview and try to capture the importance of the beach for the fishing community.

Given below are a list of sample questions. What would you like to ask in addition to or instead of these? Remember to record your answers so you can share your findings later.

### Sample questions:

1. Who all in your family use the beach?
2. How often do they come to the beach?
3. What do they use the beach for?
4. Does anyone need to use the beach for their job?



### Additional Questions:

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# THREATS TO SANDY BEACHES

Sandy beaches are not important for just people who live on the coast, but also for a wide range of animals and plants. Sadly, like every other ecosystem in the world, there is a danger that we might lose these.

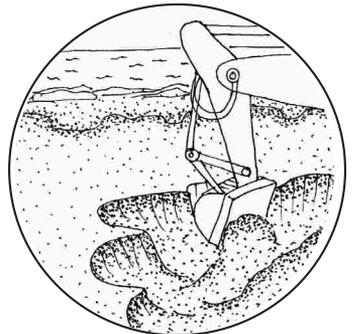
Threats are of two kinds - natural and human-made. Storms, winds, cyclones or earthquakes are natural threats. A large storm is capable eroding an entire beach by removing a lot of sand. But the sand quickly gets deposited back and if left undisturbed, the beaches re-form over time. Often human actions cause much more long-lasting and irreversible damage in comparison to natural threats.

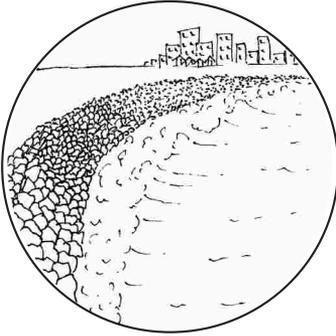
It is possible to lessen the negative effects of human activities by better practices and sharing more information amongst the community.

**Here are some direct human-made threats to sandy beaches:**

## **Sand mining**

Beach sand is heavily mined for construction although there are rules that don't allow this. Excavation of sand from beaches weakens the coast and exposes it to erosion, while permanently destroying nesting sites for turtles and feeding grounds for shore birds. Along with excavation, the movement of trucks over these sensitive ecosystems results in the destruction of these beaches and the plants that help keep beach sand together.





### **Hard protective structures like seawalls**

Sea walls, built to protect human settlements from the action of tides and waves prevent the sea from depositing sand and other materials on the beach, restricting the natural process of shaping and growth of beaches. They also present a physical barrier, preventing turtles and other intertidal organisms from using the shore.



### **Development**

Increasing human population has led to more construction along the coast. Buildings, homes, and roads are made after razing and digging out tons of sand and plants at the beach, threatening beach structure and ecology.



### **Pollution and Trash**

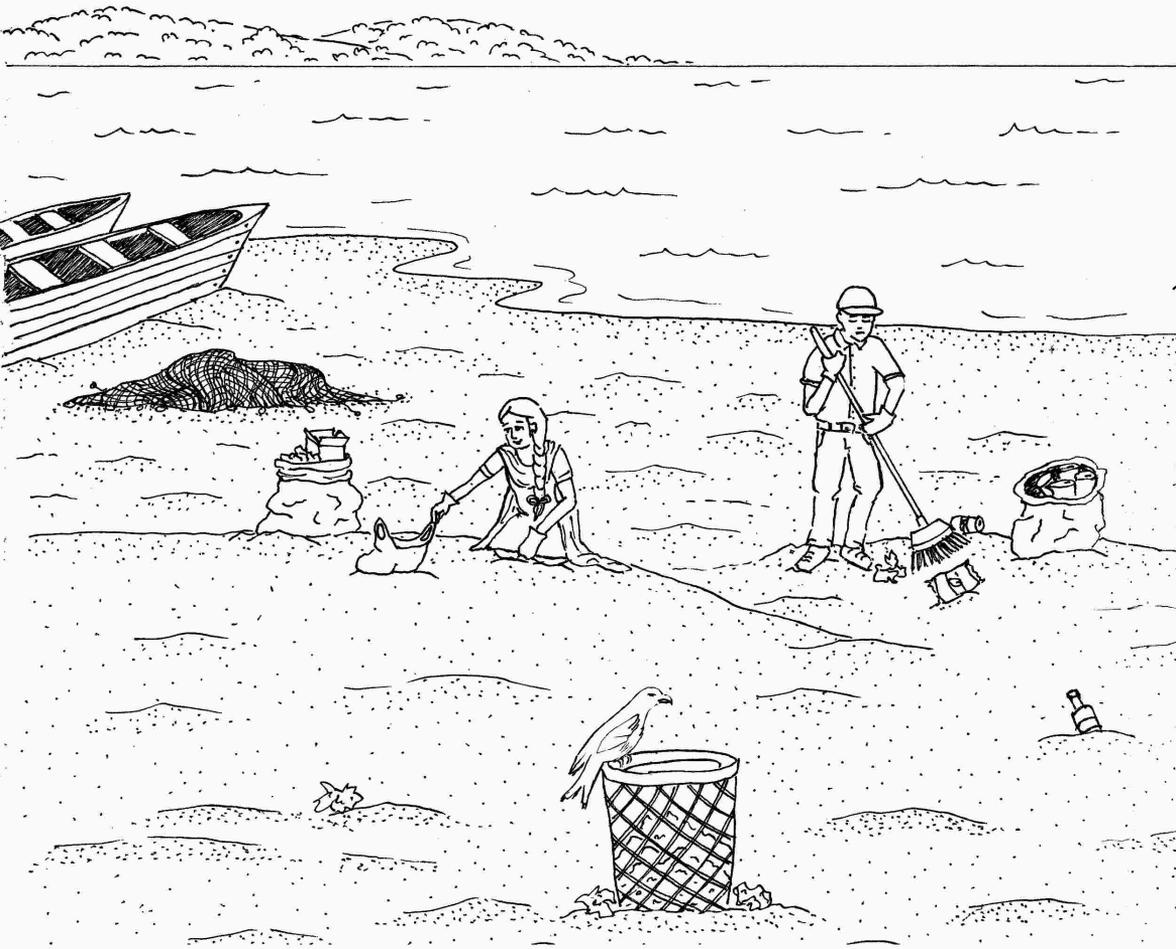
Pollution of all kinds is affecting beaches. This includes the release of untreated sewage, industrial waste, run-off of agricultural fertilizers and pesticides and oil spills in the sea. Littering on the beach not only makes beaches look ugly but is also harmful to beach organisms through choking or entanglement.

## PROTECTING SANDY BEACHES

We have learnt how valuable and important sandy beaches are to people who live on the coast and the organisms that depend on it. But how do we protect them?

Now that you know about some of the threats that sandy beaches face, find out which of these are present in your area. Keep a record of these threats each time you see them. Is it possible to prevent them?

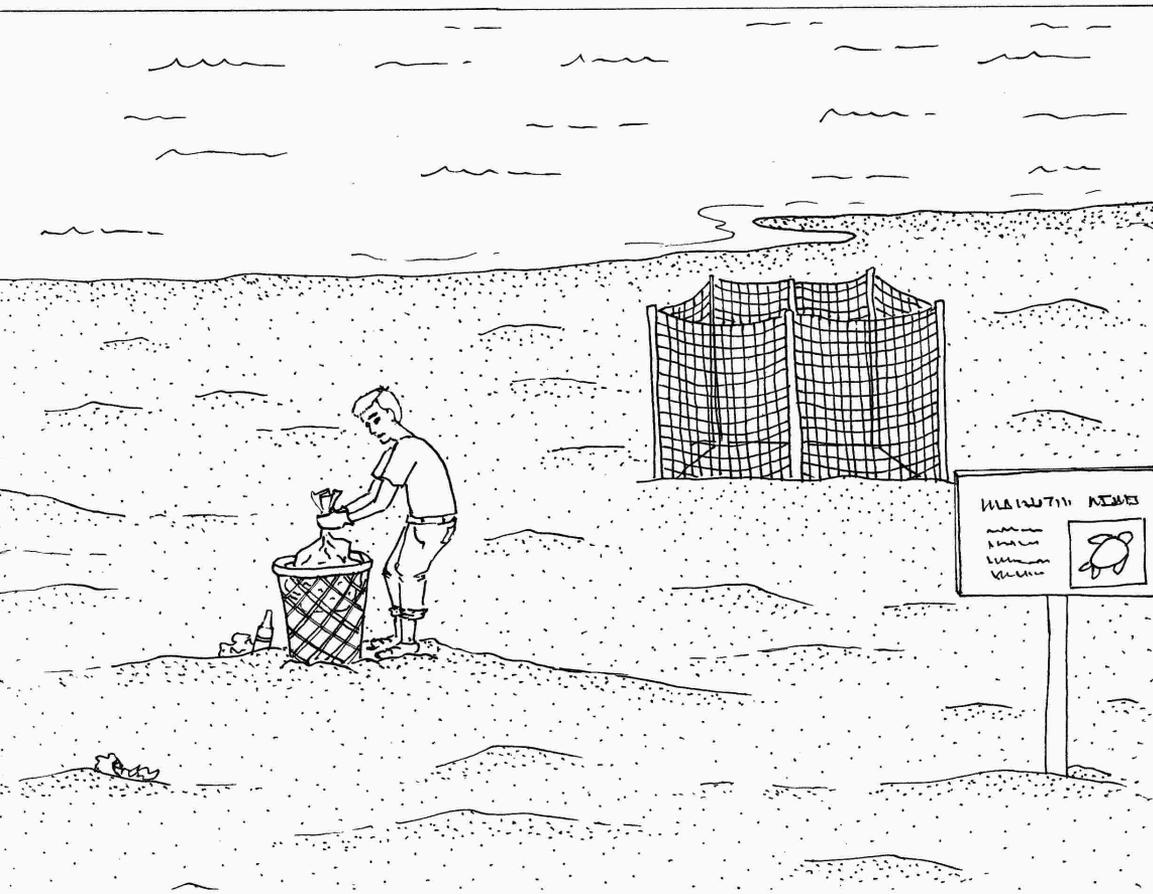
Let us look at garbage as an example. How can prevent it from collecting on the beach?



You could try to:

- Organise a beach clean-up regularly (Refer to Activity 4).
- Ask for help to place dustbins along the beach so waste is disposed off responsibly.
- Ask for help to put up sign boards to prevent people from littering on the beach. While you are at it, also put up sign boards to tell people why plants at the beach are important, asking to cause them no harm.

After the activity spend 10 minutes to share and discuss your findings with your classmates, friends or family.



## ACTIVITY 4

### KEEP YOUR BEACHES CLEAN!

Organise a beach clean-up with your class. At the end of the exercise tabulate the different kinds of waste found, it's possible source and discuss its possible impacts. You can also organise a presentation for the community of your findings, along with an exhibit of the waste you found.

**Time:**

1 hour

**Materials required:**

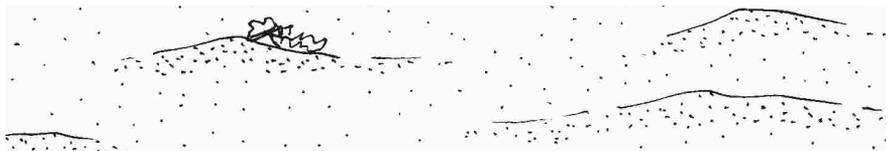
- Gloves
- Large trash bags (use old sacks or gunny bags)

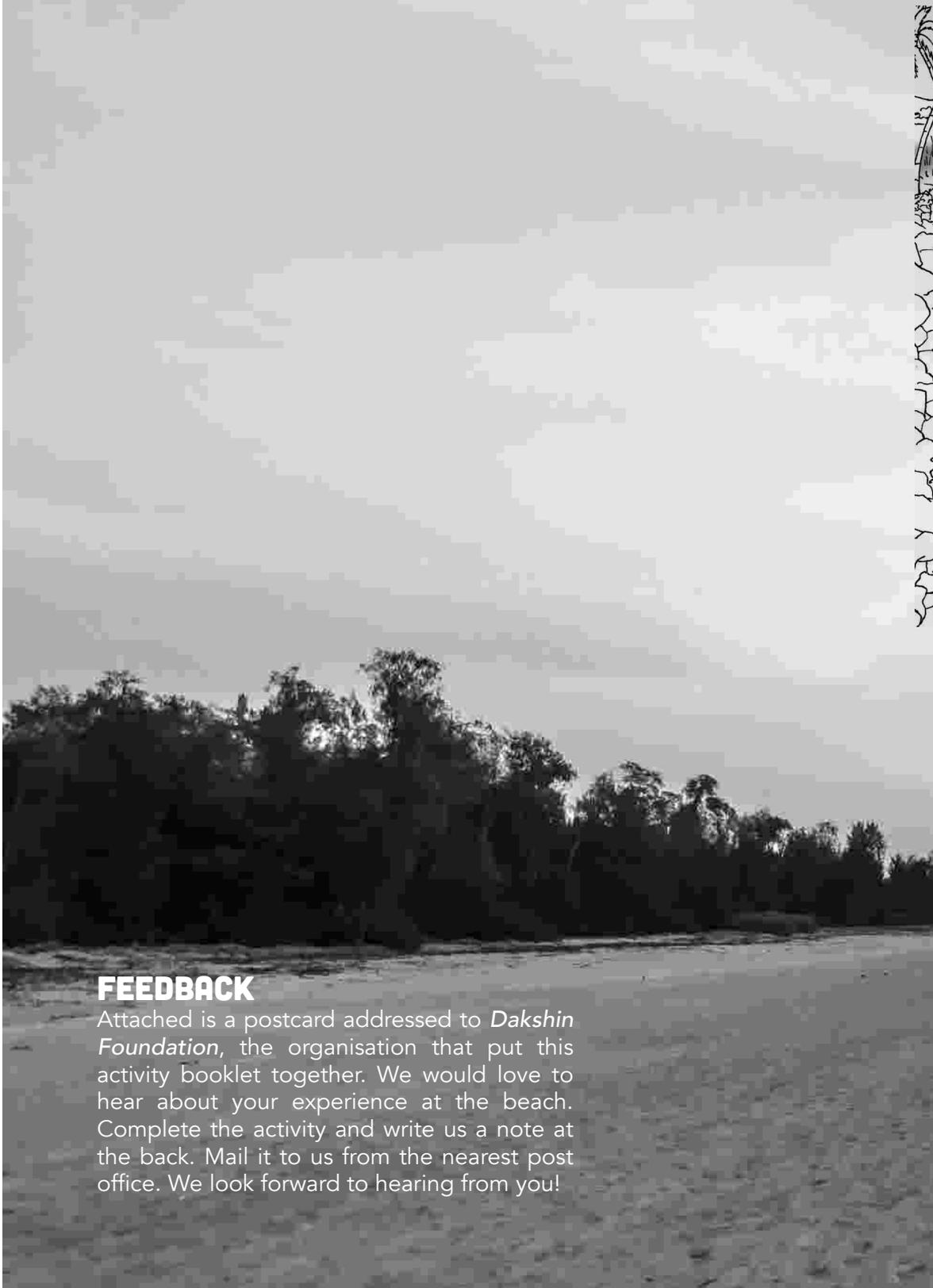
**List the waste that was found here:**

	Waste	Source	Impact
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

After the activity spend 10 minutes to share and discuss your findings with your classmates, friends or family.

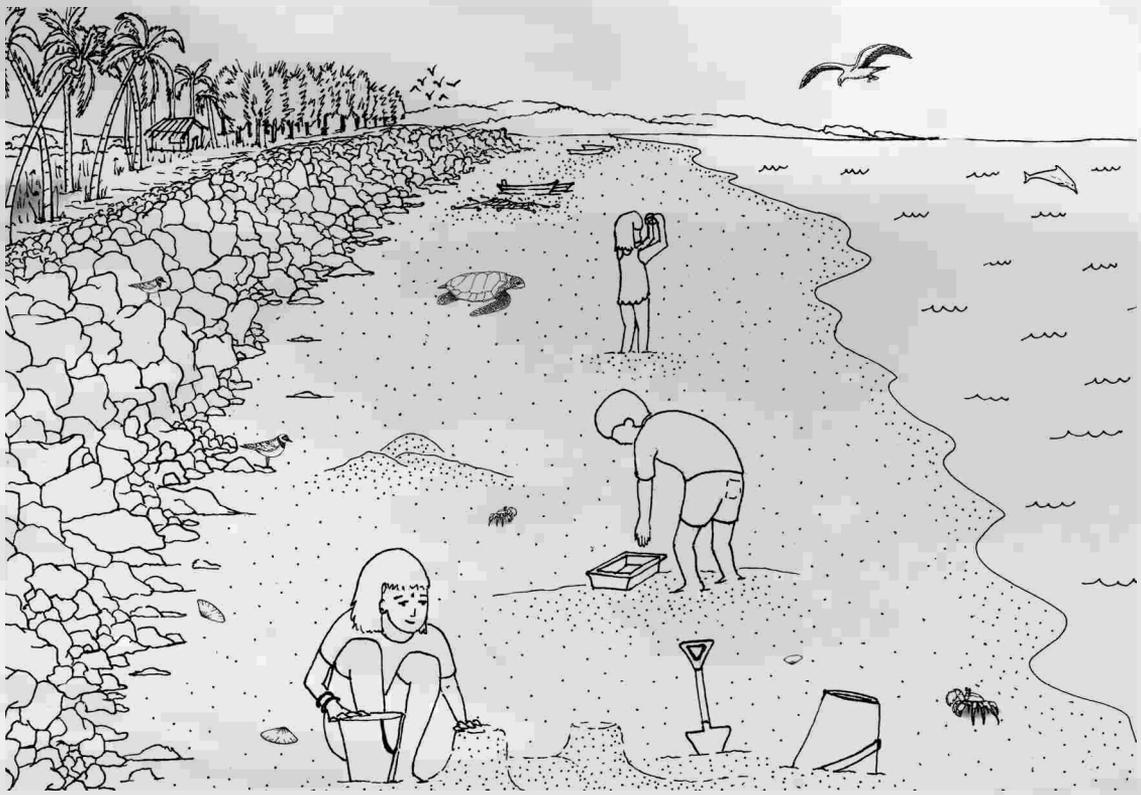
Did you make anything using the waste collected? Draw, describe or paste a picture here.





## FEEDBACK

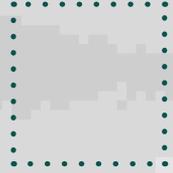
Attached is a postcard addressed to *Dakshin Foundation*, the organisation that put this activity booklet together. We would love to hear about your experience at the beach. Complete the activity and write us a note at the back. Mail it to us from the nearest post office. We look forward to hearing from you!



How many of the following can you find hidden in the peaceful scene? Write down the number next to the organism.

1. Olive ridley turtle
2. Palm tree
3. White bellied sea eagle
4. Little ringed plover
6. Casuarina tree
7. Ghost crab
8. Clam shell
9. Sea wall
10. Indo-pacific humpback dolphin

POSTCARD



• Dakshin Foundation, Flat no  
• A-001, Samvridhdi Gardenia  
• Apartments, 88/3 Byataranapura,  
• near Sahakar Nagar A Block,  
• Bangalore 560092

