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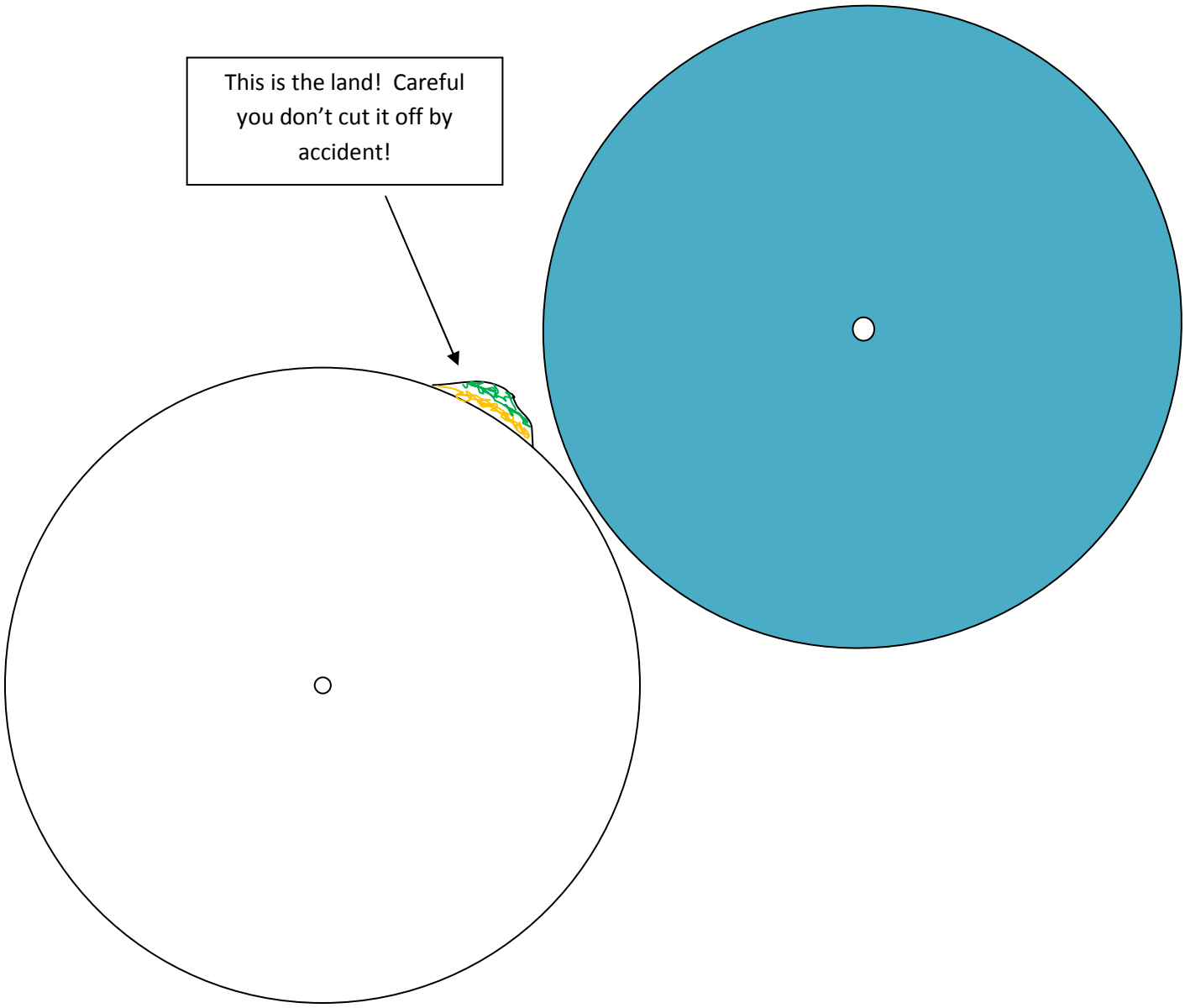
Tide simulator

Tides happen because the gravitational pull of the sun and moon pulls the oceans towards them, making a bulge in the water. You can't see the bulge, but as the earth rotates inside it the sea level rises and falls. Make this simple model to see how it works!

What to do

- Colour the right hand circle (the sea!) in blue.
- Colour the top of the land in green and the bottom (the beach!) in yellow.
- Cut around both circles really carefully – stay right on the lines and don't chop the land off!
- Make small holes in the centre of each circle.
- Put the sea circle on top of the land circle and put a paper fastener right in the middle.
- Make the tide go up and down by rotating the sea circle and holding the land still.



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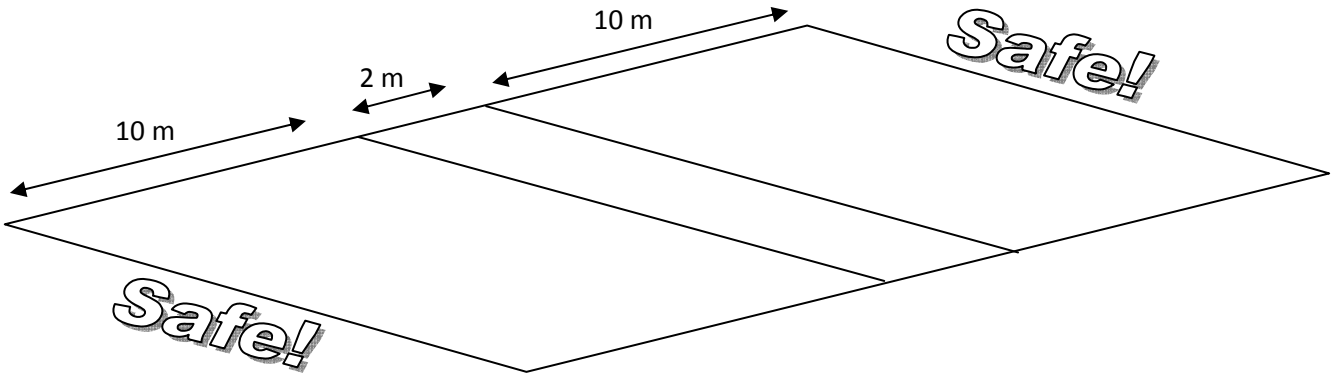
Sharks and rays

This is a fun beach game to test your knowledge!

- Mark out the playing area like this…



- Choose one person to be the referee
- Divide the rest of the group into two teams, the ‘Sharks’ and the ‘Rays’. You can make up other names if you prefer!
- The two teams line up opposite each other in the middle of the playing area. They must stand just behind their own line so the teams are 2m apart.
- The referee reads out a statement which is either true or false. Look on the next page for a list of true and false statements – use them in any order you like! You can also make up more of your own!
- When a true statement is made, the sharks chase the rays – they must catch them before they make it back to the “safe” zone. Any rays who are caught become sharks for the next round.
- If a false statement is made, the rays chase the sharks!
- The game ends when everyone is in one team. Choose a new referee and start again!

True statements	**False statements**
1. Phytoplankton are tiny plants that drift in the sea 2. Seaweeds are plants 3. Corals are animals 4. Some people in the world eat seaweed 5. The whale shark is the biggest fish in the sea 6. Whales and dolphins are mammals 7. Sea water is salty 8. The connected waters of the oceans cover 70% of the earth's surface 9. We depend on the oceans for food and energy 10. Mangrove roots trap mud and help to prevent erosion of the coastline 11. Overfishing disrupts the food web 12. Some fish and marine animals are farmed 13. Evaporation is a process by which a liquid changes into a gas or vapour 14. Red coralline algae cements the reef together 15. Starfish can re-grow parts of their bodies 16. Zooplankton are tiny animals that live in the sea 17. Sea cucumbers can be seen in seagrass beds and on coral reefs 18. Some shellfish have eyes 19. Sea urchins walk 20. Fish have noses 21. Octopi shoot ink to escape predators 22. Squid have the largest eyes of any animal (can reach over 15 inches in diameter!)	1. The octopus lives in the forest on mountains 2. All sharks eat people 3. Sea-cucumbers eat sharks 4. Humans can breathe without equipment underwater 5. The ocean floor is flat 6. Crown-of-thorns starfish eat fish 7. Coral reefs are found in every ocean 8. The temperature of the seawater is the same everywhere 9. The world's oceans are not connected 10. Coral reefs are found in dirty cold water 11. No animals live in mangroves 12. Oceanography is the study of rainforests 13. The whale shark eats humans 14. No animals live at the bottom of the ocean 15. The tec-tec is used to make bread 16. Turtles lay eggs on rocky shores 17. Fish don't sleep 18. All fish lay eggs 19. Fish have scales to look pretty 20. All starfish have 5 arms (false because some species have 6) 21. All fish die if they're out of water 22. The sea has always been the same level

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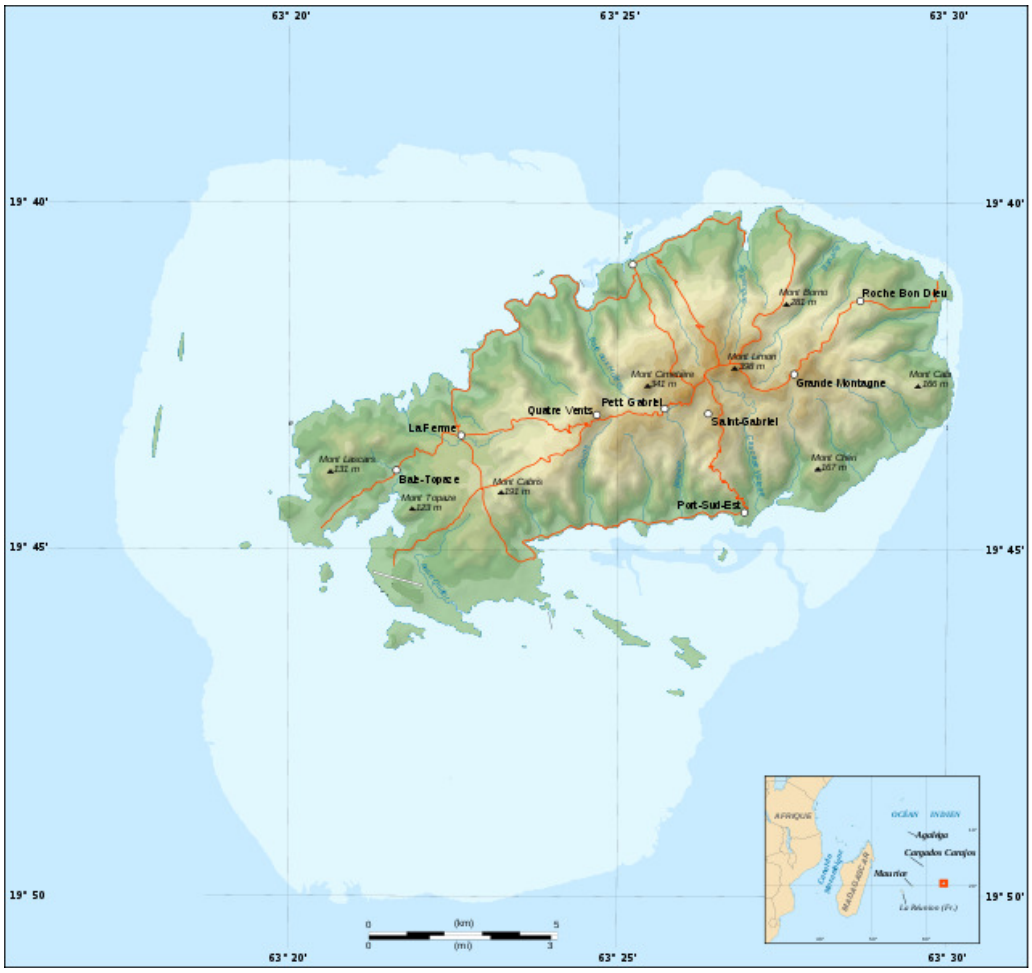
Mapping <u>your</u> seashore



This map shows the Island of Rodrigues: you will need a simple map of the place where you live. It could be a printed map like the one above or just a simple outline drawn on a large piece of paper or a whiteboard. You could even paint it on a wall!

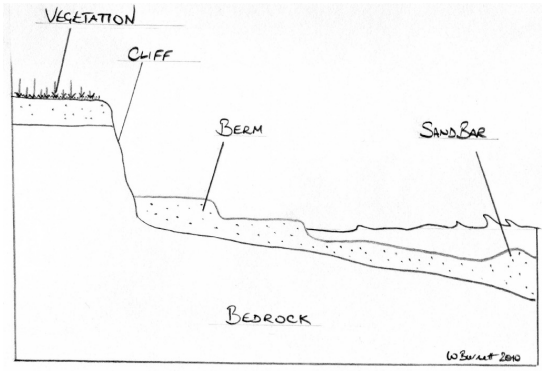
Use **different colours** to show on the map where you would find different habitats, including sandy beaches, rocky shores, mangroves, coral reefs. Also mark on how people use the coast – towns, harbours, fish landing stations or hotels, for example.

You can find out about where the different habitats are by asking people or by using library or internet resources. The most fun way to find out would be to explore for yourself, but remember you must always tell someone where you are going and when you will be back.

When you have completed your map, discuss why the different types of shores are where they are. Think about things like which way it is facing. Where does the wind usually come from? Is there a headland or reef protecting it? Also think about the reasons why people may have chosen to use (or not to use) those particular shores for certain activities.

Creating a shore profile

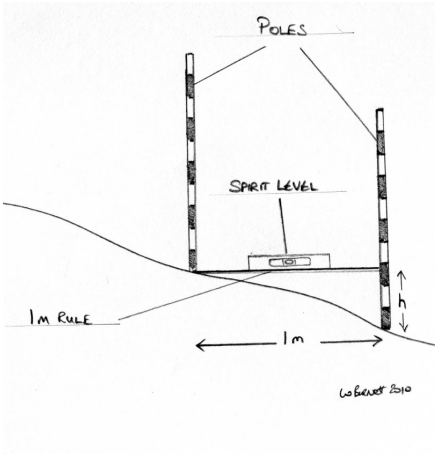
A **shore profile** is what a slice through the beach would look like from the side. It shows how steep the shore is, and whether the slope is even or not. We can map the distribution of organisms from our transect survey onto the profile and get extra information about the height of each quadrat as well as just its distance from the water's edge. We can also show the maximum and minimum height of the tide on the profile. The shore profile can change due to the effects of storms, sedimentation or human activities, so it is useful to be able to record the profile.



You can measure the profile using very simple materials.

What you need

- Metre rule
- 2 poles marked in cm
- 50m tape measure
- Spirit level
- Graph paper



What to do

1. Use tape or string to attach the spirit level to the metre rule.
2. Start near the bottom of the beach. Unroll the tape so it runs straight up the shore.
3. Stand one pole vertically on the lower end of the tape. Stand the second 1m along the tape.
4. Using the meter rule and spirit level as in the diagram, determine the vertical height gain *h*.
5. Work your way along the tape, recording the vertical height gain every meter, until you reach the top of the tape. You could use the table on the next sheet to record your data.
6. Plot a line graph of total vertical height gain (Y axis) against horizontal distance (X axis) on the graph paper. This graph is a "cross section" of the shore!
7. Add explanatory notes to your graph.

Other things to do…

Make a giant version of your profile on a wall in your classroom. Add pictures to show which creatures you find at each position on the shore.

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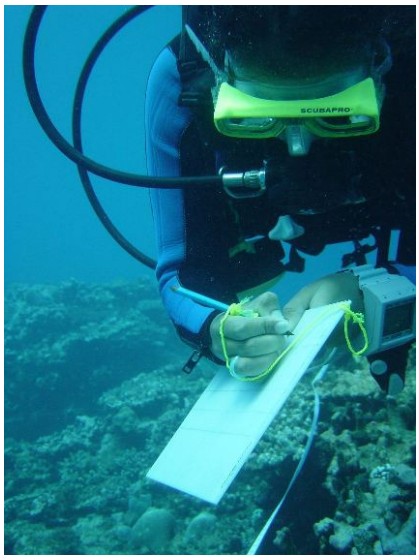
The sea – still a mystery



Studying the land environment can be a challenge, but research activities remain far simpler than conducting anything similar in the ocean. Only really tough land environments like the polar ice caps or arid deserts provide the kind of practical challenges comparable to working at sea. Only in the last century has Man been able to really explore underwater by SCUBA diving and using submersibles. We know more about space than the deepest parts of the ocean.

Marine scientists have to face a whole different set of problems to researchers on land. Even simple tasks like taking field notes or communicating with the rest of the research team become a challenge. Think about the reasons why it is so difficult to work underwater, and how these challenges can be overcome.

- Imagine you are a scientist about to conduct a survey of the animals and plants living on a particular piece of coral reef.
- What would you need to consider when planning your survey? Where might you find the information?
- What equipment would you take with you?
- What would you do after the dive?

Not all underwater research involves divers conducting surveys:

- How would you collect a water sample from 30m? You need to ensure that the water came just from 30m and not from the water column above. It is not as simple as just dropping down a bucket. Can you design a piece of equipment, which can be operated from a boat, to carry out this task?
- How would you collect a sample of sediment from the seabed? Can you design a piece of equipment to do this?

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Speaking the same language

Marine scientists use ecological terms. Imagine you are diving on the reef around your island. In order for you to complete your scientific survey 'dive', you will need to use these terms. Here is a list of some of the terms you might need… just to make sure we are speaking the same language!

Marine	Environment	
Organism	Species	Genus
Ecosystem	Habitat	Niche
Adaptation	Benthic	Pelagic
Sessile	Nocturnal	Dispersal
Food chain/food web	Producer	Consumer
Carnivore	Herbivore	Omnivore
Predator	Prey	Scavenger
Nutrient	Photic zone	
Plankton	Phytoplankton	Zooplankton

Working in pairs, see if you are 'speaking the same language'. Find a partner, and each pair take one card. Work independently to give a definition of your ecological term and think of a marine example – you may need to use reference books or the internet to find information. Does your definition agree with your partner's? Without mentioning the word, explain your definition and give your example to the rest of the group – can they guess the word?

Using the right language

Download a short clip (just two or three minutes) of underwater film from the internet or use a short section of a DVD.

Turn off the sound and write your own commentary on what is going on. Make sure you use the proper ecological terms to describe what you see.

Alternatively, if you have a video camera, you could shoot and narrate your own short film about one aspect of marine life on a local beach.

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Introducing ecology quiz

1. What causes the tides?.....

2. What is the name given to the highest and lowest tides? .....

3. Where do you find particularly strong currents?.....

4. Animals that strain their food out of passing seawater are called .....

5. Why do you only find marine plants in shallow water?.....

6. What is a habitat? .....

7. Name one of the physical factors that affects the type of seabed in a particular location.....

   .....

8. Animals that eat only one particular type of food are called.....

9. Why can it be an advantage to animals to live in a particularly harsh environment?.....

   .....

10. Describe three ways that animals protect themselves from being eaten by other animals

    .....

    .....

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