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BEACHES

RESOURCE LISTS

PRIMARY ACTIVITIES

INFORMATION SHEETS

SECONDARY PROJECTS

WORKSHEETS

Published by

Wet Paper
14 Milbong Terrace
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Wet Paper wishes to acknowledge the Curriculum Research and Development Group of the University of Hawaii for curriculum ideas during our visit in 1986 as well as Heaneys Printing Factory, Sea World, The Gold City Council Special Projects Section, Ashmore State School and Benowa High School for their assistance in trialling and developing these materials.

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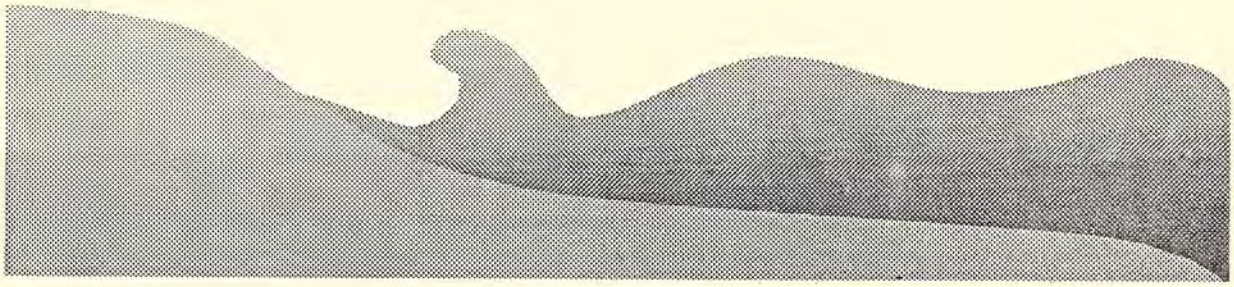
BEACHES WORKSHEETS

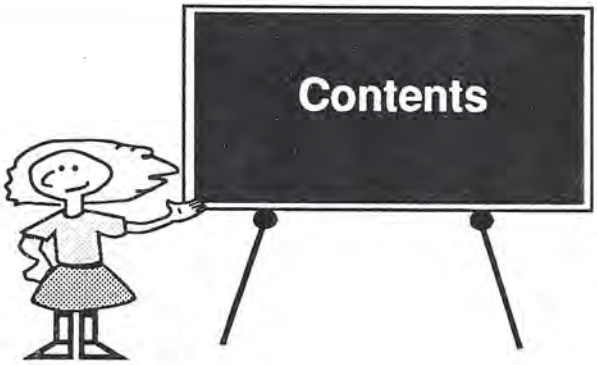


Written by

BOB MOFFATT

Marine Education Specialist
Surfers Paradise Australia

Supported by
GOLD COAST CITY COUNCIL



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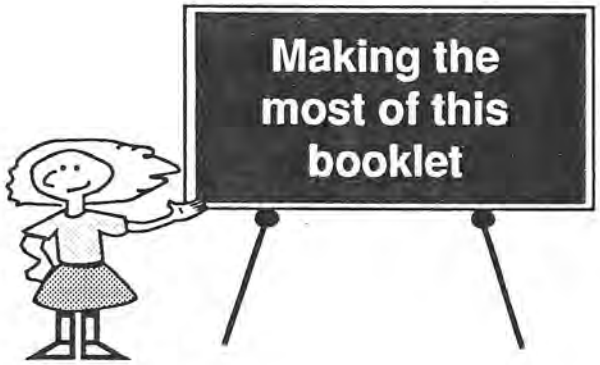


* The materials are designed to be used for a beach excursion.

* The information pages are designed to be used as pre-excursion materials to prepare the students for the beach.

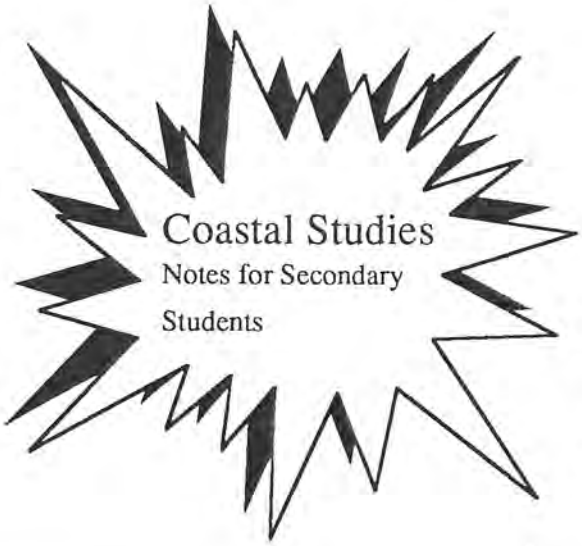
* The contract is for upper primary or lower secondary and has been designed for an interdisciplinary approach.

* Project work is for secondary students. You might like to assign different projects to different students.

* Check out the beach first. Look for effects of tides, surf and identify possible dangers (E.g. needles, slippery rocks, drains, pollution)

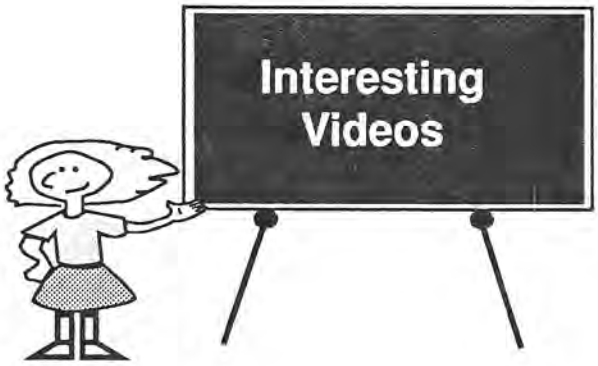
* Make sun cancer awareness a feature of any excursion.

* Answers have been given so that the students can follow up their work after the excursion comparing their results with samples.



Supplementary text

This kit supplements the Wet Paper booklet on **Coastal Studies** which is going through an exhaustive trial period. At time of publication, this book is still in the draft stage, sells for $6.25 and has 84 pages of student notes, classroom activities and assessment ideas. A workbook and exam paper are also available for $5.95 and are still developmental at time of publication.



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Write for a full catalogue of Marine Studies Videos from:-

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Shailer Park 4218

Classroom Video
by John Davis Unit 7/8 Frenches Forest

Weather in Australia
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Encyclopedia Britannia

The Beach - A River of Sand
Britannia Films Private Mail Bag 33
Castle Hill 2154

Yowie Films

The Sands of Time.
16 Boyce St. Glebe

Videos you can borrow

Gold Coast City Council

Southern Gold Coast Beach Nourishment Project
North Kirra Beach Restoration
Gold Coast City Council
Bundall Rd. Bundall 4217

Beach Protection Authority

GPO Box 2595 Brisbane (07 224 4431)
The Great Dune Show
They can be saved
Sand Dune forestry
The Shrinking Coastline
Taken by Storm
Saving the Dunes
Fragile Freeway
Saving the Sand Dunes

Purpose:

To get students thinking about their local beach, where the sand comes from, where it goes and if its loss is any problem to the community.

Apart from the normal excursion paperwork, consider discussing the following topics in class. You can use the next few pages to cut up and paste overhead transparencies or handout materials:

Students might like to research the topics beforehand. The local council library would be a good place to start your research. Some councils have a person who can come and talk to your class. It might be worth calling to see if you can arrange a visit.

Topic 1 General questions

* What are beaches made of?
* What are the forces that build up beaches?
* What are the forces that break them down?
* How does sand return to the beach?
* What steps can be taken to prevent beach erosion?
* What is beach conservation and why is it necessary?
* Who owns our beaches in Australia?
* Where does private property start and finish?
* What rights have property owners to prevent people trespassing on their foreshores?
*

Topic 2 Specific questions

* Where does the sand come from for your local beach system?
* Where does this system start and where does it finish?
* Is beach erosion a problem in your local area?
* Is this a problem and who has the responsibility of for repairing erosion damage?
* How much money is spent by your local council on beach conservation?
* What does the local council do with this money?
* Do you think it is effective and what would you do if you were in charge?
* Is there a policy for beach replenishment?
* Are developers allowed to sub divide building blocks for housing on the beach?
* Has beach erosion been a problem in the past?

Purpose

This page is for the teacher to read to get some possible answers to the questions on the previous page.

Use the illustrations on the next few pages to make overhead transparencies.

*** What are beaches made of?**

Beaches are made of sand. The sand comes from the erosion of rocks and has been washed down to the sea over many years to form the sand budget.

The sand budget moves in a sand system which is governed by the shape of the coastline, prevailing winds, tides and currents.

Sand is added to the system at one end, creeps along the coastline and is lost at the other. Estuaries and bays can act as sinks or places where the sand is lost. Moreton Bay in Queensland is a sink which absorbs the sand as it flows north.

*** What are the forces that build up beaches?**

Small waves are the predominant force that controls the sand buildup on the beach. As a small wave breaks it forces the sand up off the sea-bed. The broken wave is called a wave bore.

This bore carries the sand towards the beach. There are many bores at a time and the net movement is towards the beach.

When the bore stops it loses its energy and drops this sand in a microridge that can be seen on the beach. Some sand runs back, but more bores overtake the sand moving back with the net result sand staying in the swash zone.

As the tide goes out these microridges dry and wind blows the sand up the beach into the dunes.

Sand also moves along the coast in a longshore drift current. The current moves the sand because the waves break on the beach at an angle. Where headlands occur, waves bend around and slow down dropping their sand.

*** What are the forces that break them down?**

Larger waves formed during storms break down the beach. Initially they erode the beach face dragging sand out to sea. The wave bores are very long and drag the sand offshore to a storm bar. The sand runs back forming runnels. There are not enough wave bores to keep the sand there.

The beach keeps eroding till the forces of the storm waves can be absorbed on the storm bar.

*** How does sand return to the beach?**

When the waves get smaller, the sand moves towards the beach again pushed by the wave bores.

*** What do authorities do to prevent beach erosion?**

Some preventative measures have been offshore breakwaters, rock boulder walls, groynes, dumping sand on the beach by trucks or pumping it from offshore (or creeks and rivers). Dune fencing and the planting of beach trees and shrubs has also been part of a prevention programmes. These measures are all designed to maintain beach levels.

*** What is beach conservation and why is it necessary?**

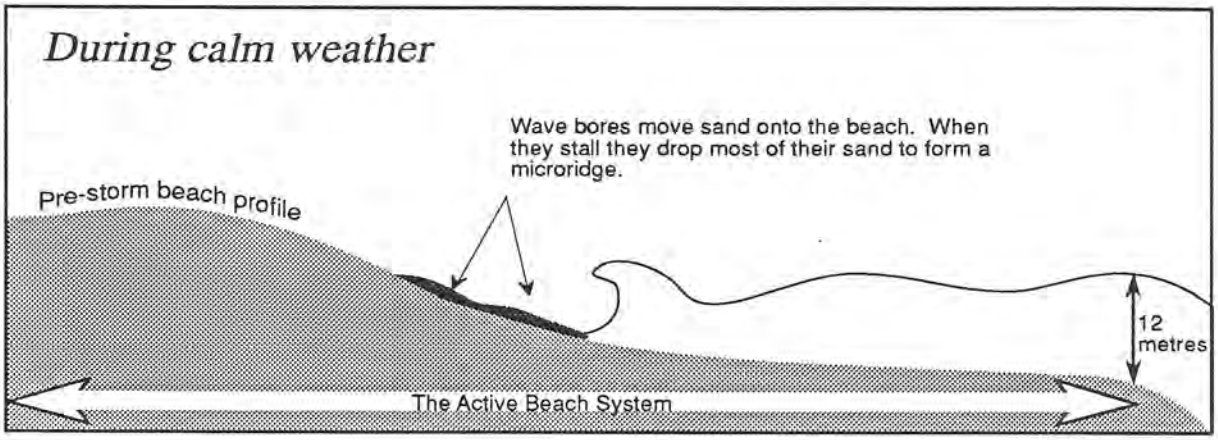
Beach conservation involves the establishment of a programme (often long term) that will allow natural movement of sand while maintaining the natural sand budget. It is necessary for tourism while providing for those aspects of the natural world which are necessary to maintain natures balance. Conservation intends to maintain a balance in nature in terms of human habitation: e.g. protection of beach front sand, maintaining beaches for locals and tourists.

A During calm weather small constructive waves move the sand onto the beach

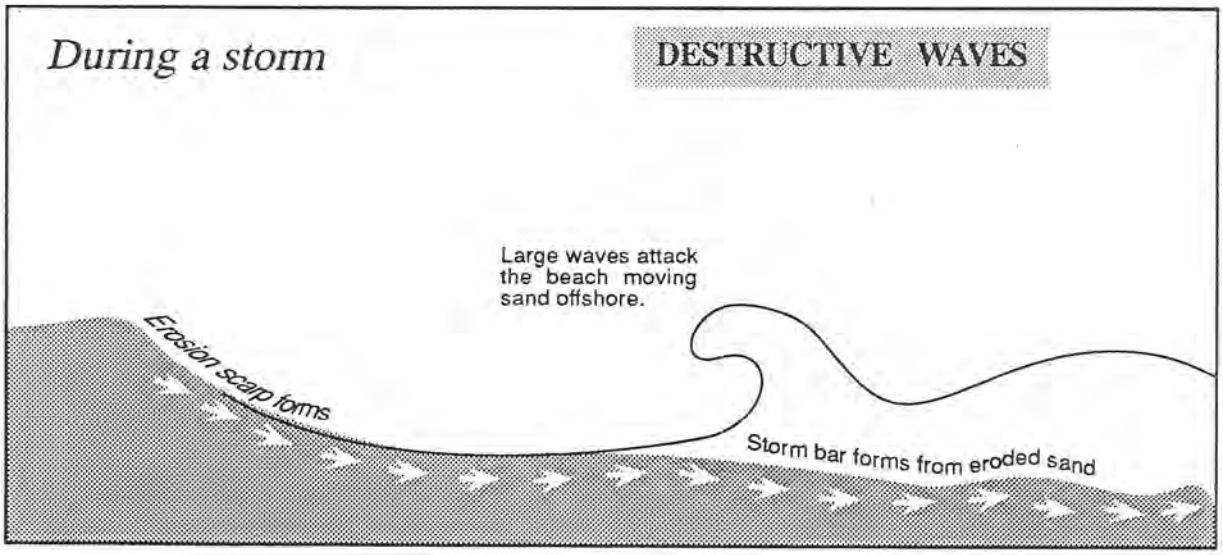
B During storms, destructive waves move the sand offshore to a storm bar

C After the storm the sand moves back onto the beach pushed up by the smaller waves.

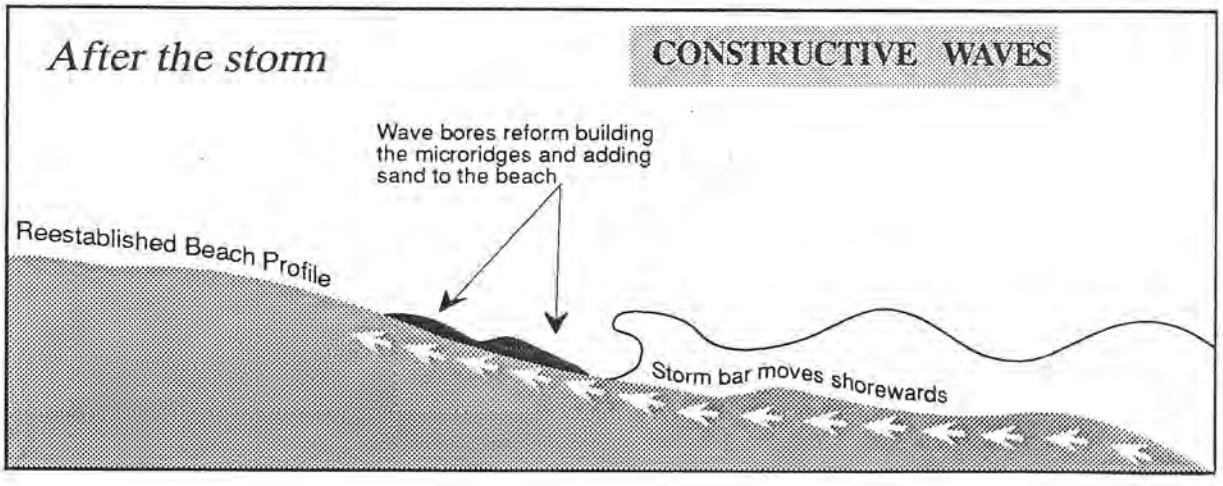
(A)



(B)



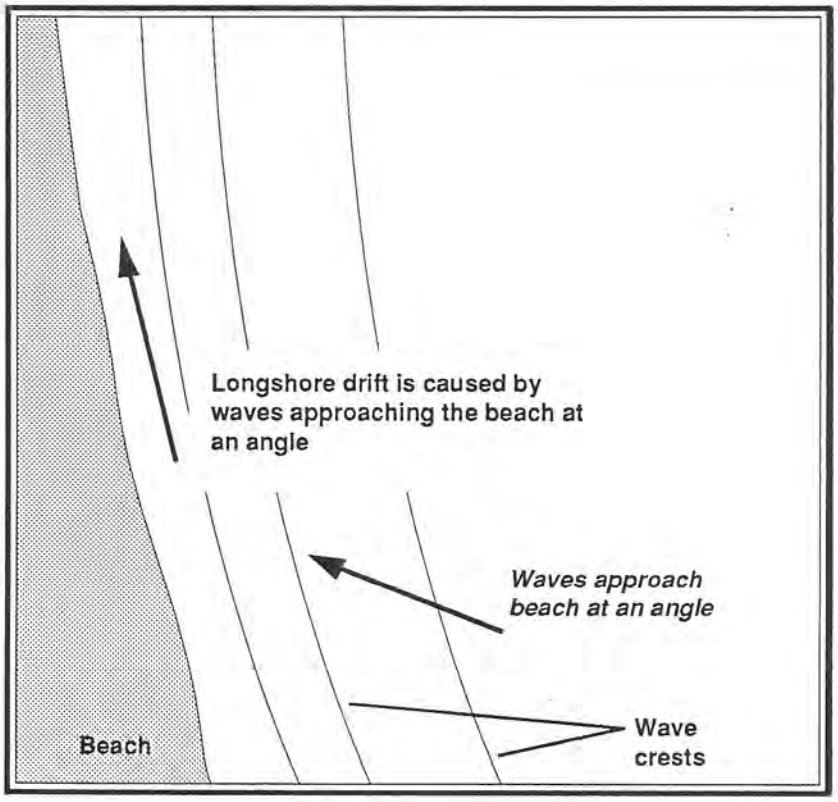
(C)

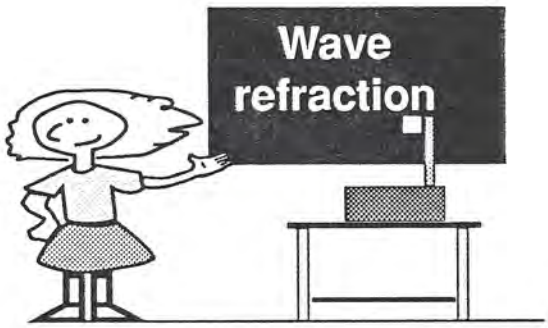


Longshore drift

The waves approach the beach at an angle. This sets in motion a current which moves up the coast . The sand is carried in the current.

Longshore drift is defined as the movement of sand in the surf zone along the coastline.

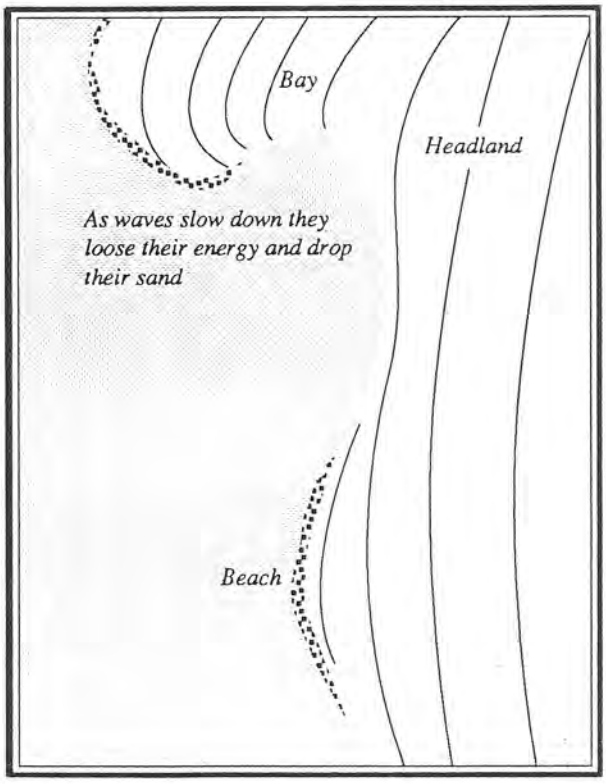




Wave refraction

As waves move around a headland the depth of water decreases. The energy in the wave is absorbed by the sea-bed. Sand is an excellent absorber of energy. The wave slows down and so the sand is dropped.

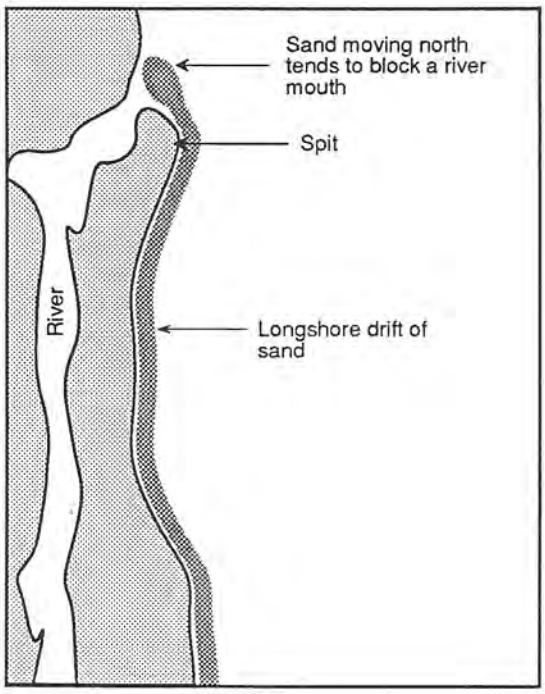
This is why beaches fill in between headlands

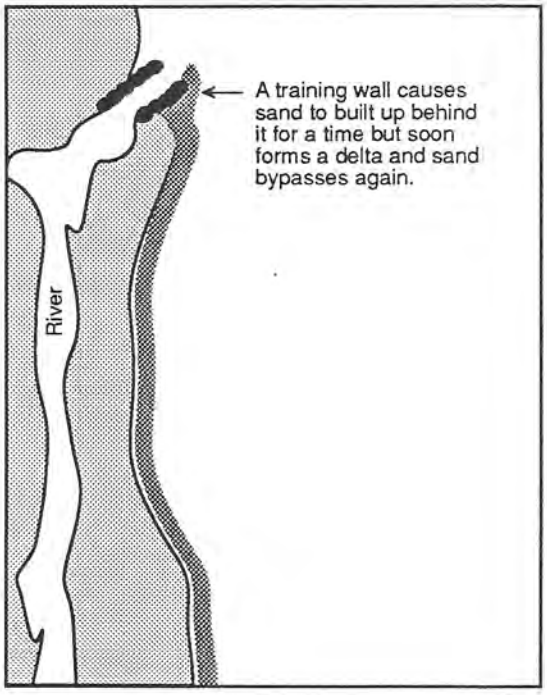


Sand moving along the coastline forms a delta and silts river mouths.

Sometimes training walls are built to stop sand silting up the river mouth.

This works for a time but a sand delta soon builds up making the process ineffective





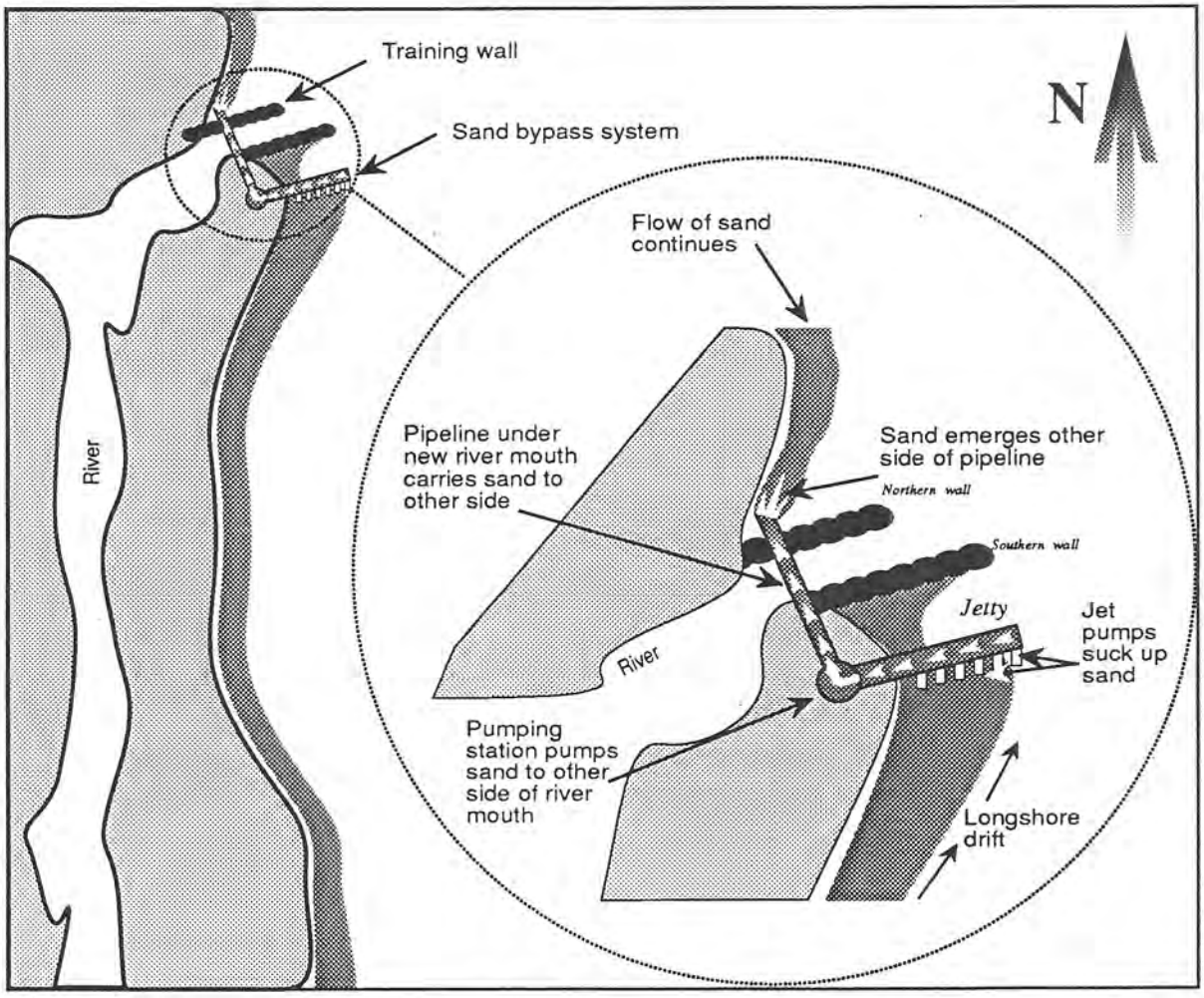
Training walls can be built to stop river mouths silting but may require a sand by-pass system to keep them navigable

In this operation, sand collects behind the training wall on the southern side of the wall.

Strong suction pumps on a jetty suck up this sand which goes to a pumping station.

This station pumps sand under the river in a pipe that emerges on the other side.

The natural longshore drift is allowed to continue.



Upper Primary
Lower Secondary

Purpose and suggested ideas

This contract is multidisciplinary:

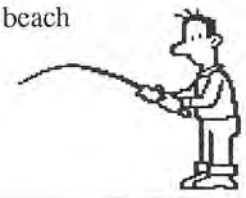
* For Geography students research local landforms
* For Mathematics, they collect litter, classify it and graph results
* For Art, they build a raft out of paddle pop sticks by gluing them together. This raft is then used in the longshore drift experiment. Encourage students to put their names on their raft so that they can trace the path in the longshore drift.
* For Language arts, a story, poem or letter of thanks can be written
* For Social Studies, students find out about their local council and how they are responsible for their local beach
* For Science they complete four beach activities

These are just a few ideas. From my experience in the past, teachers will have little difficulty creating their own. If these few pages only act as a model, they have served their purpose.

You will need

* Some sieves or different mesh size
* Compasses
* Paddle pop sticks
* Glue
* Paints
* Thermometer
* Sun creams and hat
* Old gardening gloves
* Graph paper
* Old spoon

SAMPLE BEACH CONTRACT (3 weeks)

SUBJECT	CORE	OPTIONAL
LANGUAGE 	Match beach words to meanings (Sheet) **Make sure you listen to explanations as we tour the coast line.**	Write a letter of appreciation to the organising teacher telling him or her what you liked about the excursion. *Add any suggestions* that you feel would have made the excursion better 
MATHS 	Form into groups of 4-5 children. Collect about **10** items of rubbish. Sort rubbish into these categories. Plastic Glass Tin Paper Aluminium/alfoil Other *Graph the results of your collection. Which was the most common type of rubbish? Which was the least common type?* You will be supplied with graph paper	**SAFETY** **YOU MUST WEAR GLOVES FOR THIS ACTIVITY** 
SCIENCE	Write up 3 of the 5 experiments you did on the excursion day. 	
SOCIAL STUDIES	The City Council is taking responsibility for beach protection. *What other responsibilities does local government have? How does local government finance such projects?*	*Find out 5 responsibilities of the State Government.* *Find out 5 responsibilities of Federal Government.*
ART 	Design a poster with a catchy slogan to persuade people to wear hats and sunscreen while at the beach.	A beach scene or beach activity sheet. 

Purpose
To have students identify local geographical features

What to do
Colour word and correct meaning the same colour. Give a local example of each

Word	Example	Meaning
Headland		A large stream of water flowing in a channel to the sea.
Beach		A piece of land that juts out into the sea
Creek		Shore between the high and low water mark
Estuary		Stream
River		Two headlands
Groyne		Tidal mouth of large river
Littoral		A landform made of sand which joins the the mainland to an island
Bay		Low man-made rock wall built to trap sand as it moves along the coastline
Heads		A body of water almost enclosed by land but opening to the sea
Tombolo		Two man-made rocks walls used to train a river mouth
Training Wall		Large set of rocks placed to protect beach front property
Boulder wall		Large area of sand deposited by wave action

SCIENCE BEACH ACTIVITIES

Activity 1: The beach environment

Purpose: To locate direction, observe sky patterns and record beach temperature

* Use your compass to find wind direction ... [__________]

* What fraction of the sky is covered by clouds ... [__________]

* Locate hot and cold places on the beach. Measure their temperature and record the place and the temperature in the boxes below. Record the air temperature in the middle box.

Cool>>>Hot

______°C	______°C	Air Temperature ______°C	______°C	______°C

Activity 2: The longshore current

Purpose: To use the raft you made out of ice block sticks during art class, to study the longshore drift

You will need: A raft made from paddle pop sticks.

* Throw your raft out into the waves so you can determine in what direction the beach current is flowing. What direction is it ? ... ... [________]

* Watch the sand in shallow water. Write a good sentence to describe the motion of the small grains of sand.

____

____

____

Activity 3: Which way do the waves break?

Purpose: To use a compass to determine which direction waves are coming from

* Look out to sea. Estimate the size of the waves ? [________]

* Do the waves come to the beach at an angle ? [________]

* Use your compass. Write the direction the waves are coming from ... [___________]

* Write a sentence that would explain how waves are made..

____

____

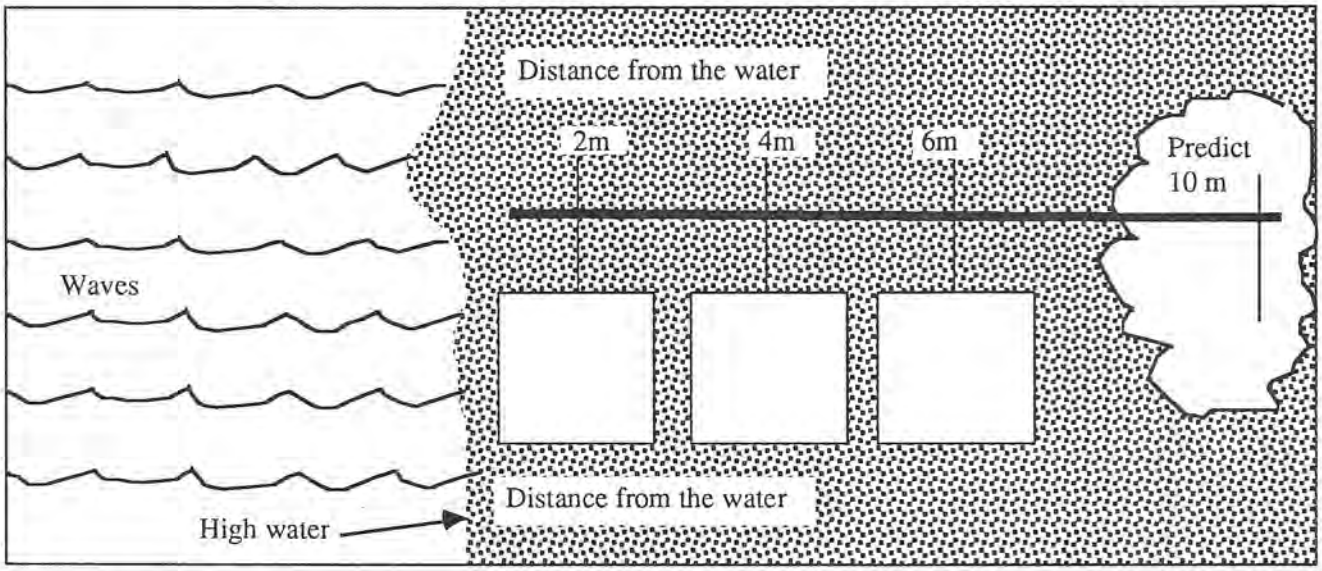
____

SCIENCE ACTIVITIES continued ...

Activity 4: **Where does the water go ?**

Purpose: To find out where the water table is on a beach

* Use a spoon, a small shovel or your hand to dig a hole in the sand near the waters edge until you reach water. Use a metre stick to measure the distance from the top of the sand to the water table. Record the results in the diagram



Predict the depth at

(a) 3 metres

(b) 8 metres

Safety First

Make sure you wear some old gardening gloves for this activity.

Activity 5: **Litter study**

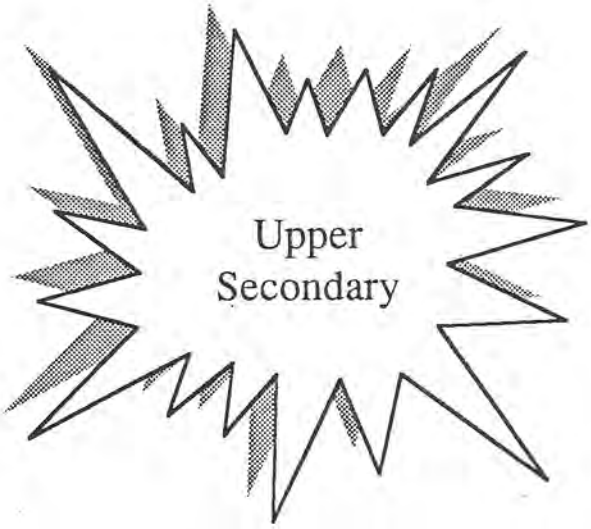
Purpose: To see which type of litter is most predominant on the beach

* With your partner choose a part of the beach or dune area. Collect as much litter as you can within a set time. Your teacher will tell you.. At the end of this time sort the litter out into groups or types based on a classification system you come up with. Make sure you record the system so you can tell your classmates later.

* Make a summary using the table below. *Make sure you dispose of all litter properly when finished*

Type	Number

Type	Number



Purpose and suggestions

Beach projects have been designed for secondary school students.

Each focuses on a particular aspect of the beach. Times have been indicated but will vary depending on weather conditions. Do not attempt to do all the projects. One approach would be to divide them up amongst class members. Another would be to select which project was suitable to your local beach and concentrate on that. Take a sample of sand back to school and analyse it.

Make sure you check out the beach before you go there. The surf will also vary from day to day.

The Projects

The Sand 18
The Beach... 20
The Boulder Walls 22
The Dunes 24
The Beach Breaks 25
The Visible Beach Profile 27
The Point Surf 29
The Longshore Drift 31

The Sand

Students Name _____

Teacher _____

Purpose:

To identify the types of particles that make up sand.

You will need:

* handful of sand
* sieves of various sizes
* magnifying glass
* sticky tape

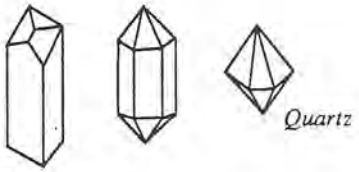
What to do:

Carefully sieve the sand and separate out the particles.
Now look carefully for shells, minerals and other materials

Read this

Carbonate sands are made from the dead remains of animals. They contain calcium carbonate which was extracted from sea water by the animal when it was alive.

Non carbonate sands are those that formed from rocks. Quartz and feldspar are two very common non carbonate sands..



Time required
15 minutes

Questions to answer:

1. What does your sand sample contain?

   .....

2. Name any one carbonate component and say where it came from?

   .....

   .....

3. Can you see any quartz and feldspar?
   (Use a magnifying glass to get a closer look)
   See if you can draw what the edges look like in the space opposite.

3. Can you see any minerals in the sample?
   What do they look like

   .....

4. Use pieces of sticky tape to collect a sample of your sieved sample and stick it into the space below giving them names.

Sand Answers

1. Most of the sand consists of grains of silica as well as lesser amounts of shell and mineral.

   Silica is extremely hard and highly resistant to abrasion, but shell readily abrades and becomes rounded and smooth in the swash zone.

   Angular and whole pieces of shell are very recent additions to the visible beach.

2. Carbonate sands are made from the dead remains of animals that had calcium carbonate in them. Non carbonate sands are made from minerals that eroded in the hills long ago.

   Sometimes sand can be squashed together to form indurated sandstone. This sand comes from carbonate and non carbonate sands that once supported land based animals and plants. When these died, they formed the black parts whose ever increasing layers compressed the mixture together. So chemicals leaching out of the dead remains may have added to the" cementing" process.

   Peat is formed from organic matter being squeezed together by water pressure. It is found in the sand because some areas off the coast were once swamps and later a number of beaches existed with distinct beach faces.

3. Zircon, Rutile, Magnetite. The heavy minerals are about twice as heavy as the shell and silica and are usually black.

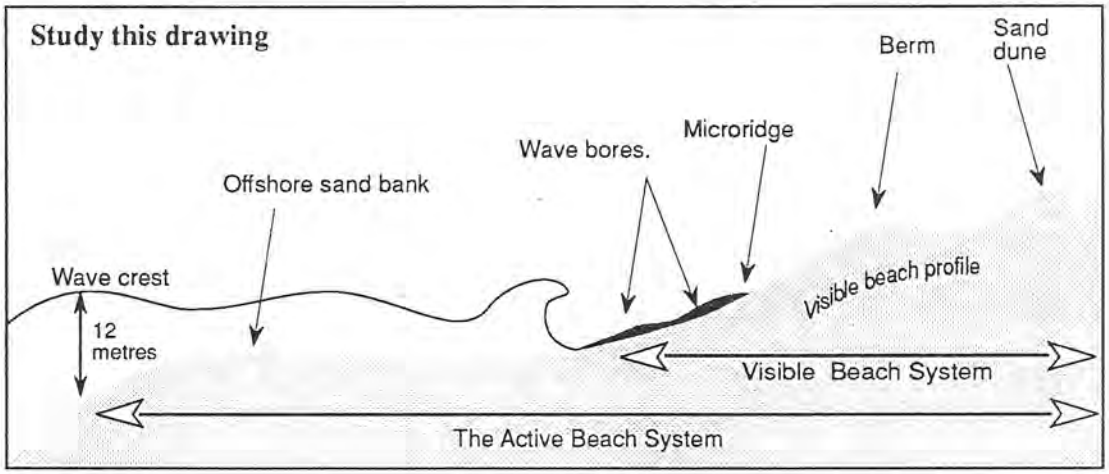
The Beach

Time required
20 minutes

Students Name _____ Teacher _____

Purpose:

To identify the components of a beach as shown in the diagram below and draw a plan view of the beach you are visiting



✍ **Beach checklist.**

Look carefully at the beach and check if any or all of the following are present

☐	Waves	☐	Wave bores
☐	Micro-ridges	☐	Beach berm
☐	Sand dune	☐	Dune plants

✍ **Make a plan drawing in the space below.**
(A plan view is one if you were looking at the beach from above).

Now answer the questions opposite.

Questions

1. Is the beach in a storm mode or beach building mode?

   _____

2. What happens to the sand when the wave bores stop?

   _____

3. To what depth does the active beach system operate?

   _____

4. What happens in the active beach system during a storm?

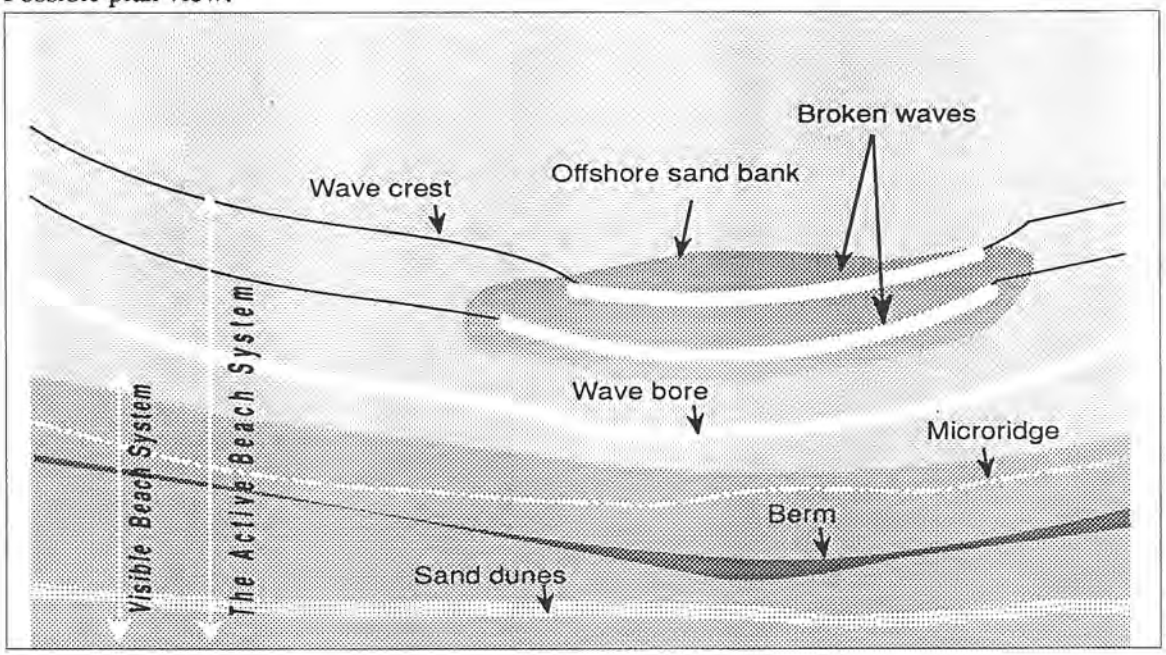
   _____

   _____

Plan view

Beach Project Possible Answers

Possible plan view:



Note that the idea here is to get a plan view to reinforce the idea that the beach is a river of sand with one bank the surf zone and the other, the beach.

1. Observation made on the day. The micro-ridges can be seen if the beach is building. Runnels are seen if the beach is eroding.

2. The answers here largely depend on the surf. A low tide situation will make the waves break out on an offshore bar.

   At high tide a larger swell will have breaking waves, but a small swell will have no break. Waves break when they reach a water depth nearly equal to the wave height at that point.

   This is why a wave front will break at different zones along its crest that have a different height. The waves will therefore break further offshore than at high tide.

   High wave energy close in moves sand offshore. The offshore sand bar then makes the waves break further out and protects the beach inshore from further erosion.

   The waves breaking on the shore at low tide will be very small or the waves breaking at high tide will be on a storm bar if the surf is high or there will be no erosion scarp at high tide or there will be an erosion scarp but no exposed rock wall or threat to housing

3. About 12 metres.

See also the information pages at the start of this booklet.

The Boulder Wall

Time required
15 minutes

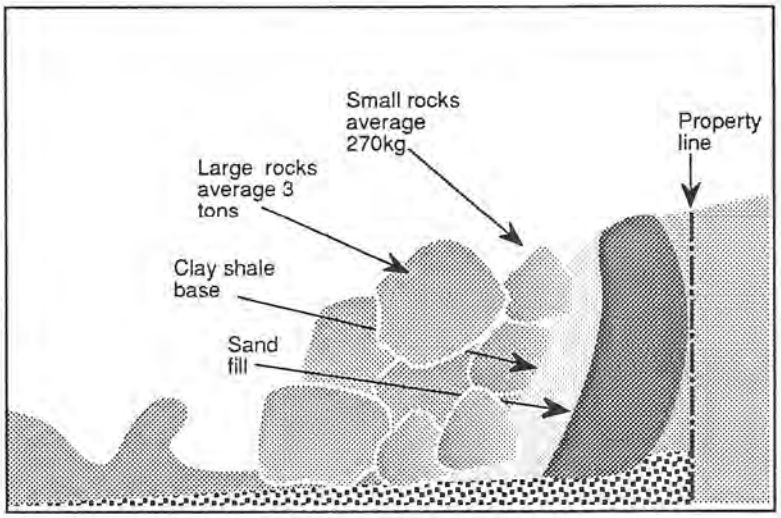
Students Name_____ Teacher_____

Purpose

To identify the components of a boulder wall and suggest reasons for its construction

What to do

Identify the parts of the boulder wall shown above, then answer the questions below:



Questions to answer

1. Who do you think should pay for the installation of a boulder wall on a beach front property? In your local area, who pays?

.....

2. Why is it necessary for beach fronts to have boulder walls ?

.....

.....

3. Give one reason why these walls are not a solution to beach erosion.

.....

.....

4. Why have a clay shale base to a boulder wall ?

.....

5. Why do boulder walls sink ?

.....

6. Are there boulder walls on your beach and if so where are they ?

.....

7. What does the term RL apply to, in the construction of a wall ?

.....

8. How high above RL 0 should a boulder wall be constructed?

.....

9. What is armour facing and why is it important ?

.....

Boulder Wall Answers

1. In most cases, the property owner. Check with local authorities.

2. So that the property does not fall into the sea if the reserve sand budget is exceeded by periods of intense wave action.

3. A wave has its own unique energy... H^2T^2 so the wave energy cannot be increased or multiplied. It loses energy as it breaks on the boulder wall; some of the wave energy is reflected back colliding with an incoming wave. This sets up a new energy area in front of the wall moving sand more quickly than it would have if the wave had been allowed to break gently on the beach.

4. The impervious clay-shale behind the wall stops the sand from being washed away.

5. Waves scour out at the toe of the wall causing it to sink

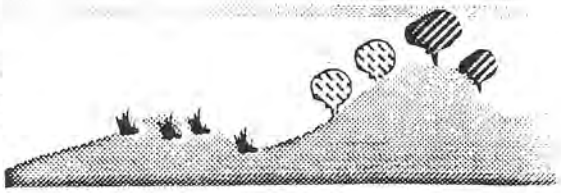
6. Depends but if they are they are under the fence just beside the footpaths.

7. RI means reduced sea level. All measurements for height are taken from this point.

9. 4.9 metres.

10. The outermost layer of rocks facing the sea. The face boulders have to be heavy enough to smash-up the impacting wave without being dislodged itself. The larger the waves that can reach the wall, the

The Sand Dunes



Students Name_____ Teacher_____

Purpose: To identify the major plants on a dune, see where they live and suggest reasons for their importance.

Time required
30 minutes

You will need:

* A poster from your local Beach Protection Authority with photographs of local dune plants. In Qld you can obtain one from the Department of Environment and Heritage, GPO Box 2595, Brisbane 4000
* A Note pad and pencil

1. Conditions

Date of study: ..... Time: .....
Wind Direction: ..... Wind Speed: ..... Temperature: .....

2. Species Present

Look carefully at the dune system. Use the poster to identify the plants listed below. Place a tick in the box if located and make a quick sketch of the back of this page.

☐ Banksia	☐ Pandanus	☐ Pig Face	☐ Vigna
☐ Coastal Wattle	☐ Ipomoea	☐ Snake Vine	☐ Sand Spinnifex
☐ Beach Bean	☐ Sesuvium	☐ Oenothera	☐ Casuarina

3. Distribution

Make a quick profile sketch of the dune (like the one above). Design a colour code to match the species you identify and draw lines in the box above to show the distribution of vegetation.

☞

(i) Which plant is dominant (a) Nearest the sea ? .....
(b) Nearest the land ? .....
(c) In the middle of the dune system ? .....

(ii) Explain the relationship between size of plant and position on the distribution ?
.....
.....

4. Which is the best plant at holding the sand together? .....

5. Is there any evidence of beach erosion. If so where? .....

6. Is there any evidence of pollution? If so what? .....

7. Does the amount of organic matter change as you go inland? .....

The Beach Breaks

Time required
40 minutes

Students Name _____ Teacher _____

Purpose: To record surf conditions on a beach and suggest reasons for its appearance.

What to do: Look carefully out to sea and answer the following questions:

Surf Report:

Date:	Wind Speed	Water Clarity	☐ murky ☐ clean
Time:	Water Temperature	Wind Direction	.....
Taste of Surf	.....	Wind Type	☐ offshore ☐ on shore
Smell of Surf	.....	Wave Height	☐ 0 - 0.5 m ☐ .5 - 1.0 m
Wave Colour	.....		☐ 1 - 1.5 m ☐ 1.5 - 2.0 m
Wave Sound	.....		☐ 2.0 - 2.5 m
Beach conditions	.....	Tide	.....
Wave Shape	☐ Smooth ☐ Choppy ☐ Broken White Caps ☐ Clean lines approaching the shore	Wave Direction	☐ Straight in ☐ Up the coast ☐ Down the coast ☐ Other .....

2. Is there any correlation between wind direction and wave direction ? ..... If so what is it? .....

.....

3 Do waves break further out on an offshore sand bar? .....

4. Look at the waves as they break on the beach. How far does the water run up the beach?

.....

5. Does all the water that runs up the beach return to the surf? ..... If not where does it go?

.....

6. Can you see a rip?..... If you can, how can you tell and what steps should you avoid when swimming near a rip?

.....

Turn over for extension activities if you have more time.

(This section will take about 40 minutes)

EXTENSION ACTIVITIES

1. How many people are on the beach and what are they doing ?

.....

.....

2. What makes waves break?

.....

.....

3. Observe a group of surfboard riders. How do these surfers get "out the back" ? Is there any particular area they avoid ?

.....

4. How do surfers use sand bars ?

.....

.....

5. Are there patrolled areas on the beach ? ..... If so, is there any relationships between where the flags are placed and the sandbank offshore?

.....

.....

6. What is the time between waves ? Is anything carried in with the waves ? If so what ?

.....

7. How big are the waves that break on the shore ? Are they as big as those that break out the back?

.....

8. Can you suggest any reason for this ?

.....

.....

9. Do the waves run up the beach evenly or are there any indentations (cusps) along the beach at regular intervals ? If so, can you suggest reasons for this ?

.....

.....

10. What are swash marks and can you see any on the beach ?

.....

.....

11. Is there any evidence that sand moves in the surf ? How can you tell ?

.....

12. Are there any swimmers in the water ? Are they body surfing? If so where and how do they do it?

.....

13. Find out what a boggy board is. Are there any surfers in the water using one ? How is this different from surfboard riding ?

.....

14. Is there any evidence of pollution ? If so what and where ?

.....

.....

15. Is there any beach erosion ? If so where and make a description your note pad.

.....

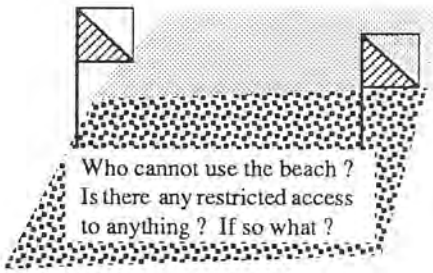
.....

16. Look in the beach litter and make a description of what you can see. What origins do these materials have? Answer in your note pad.

.....

.....

.....



The Visible Beach Profile

Students Name _____

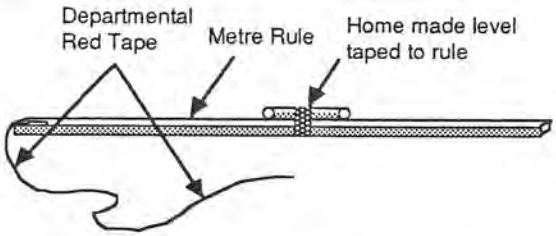
Teacher _____

Purpose: To draw a beach profile

You will need: A profile stick

What to do:

1. Make a profile stick like the one shown above and practice on a slope at school to record the change in heights down a slope or bank.



Time required
40 minutes

Your Measurements

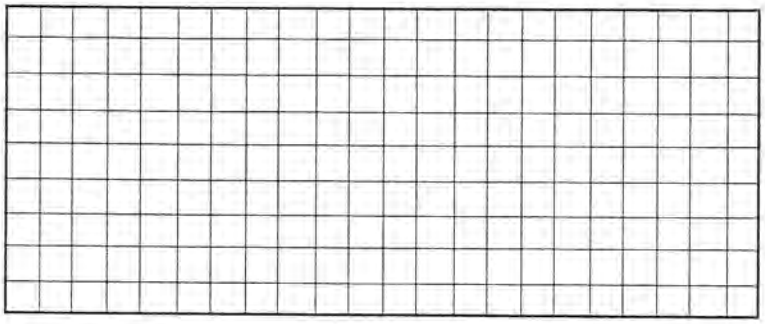
Fall in	Calculated value below datum	Fall in	Calculated value below datum

2. Start at the top of the bank. Call this your datum point. Now position the stick so that it becomes level. Pull the tape down to the ground and then move it to the stick and read off the fall.

3. Repeat this at a number of stations down the slope so that you continue to record the fall from the datum.

4. When you get to the swash zone (that's the area where water runs up the beach) measure it.

5. Back in class or at home, recalculate all your measurements so that you can see how far each station is below the datum point. Now plot a profile of the beach slope



Questions:-

1. Is there any evidence of beach erosion? How can you tell?

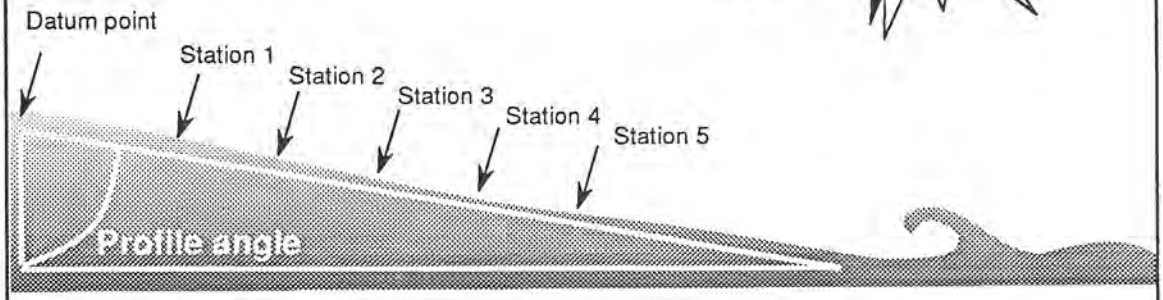
2. How wide was the swash zone? How will this change over time?

3. Make a prediction of how this profile will change over the year. What part of the profile is missing.

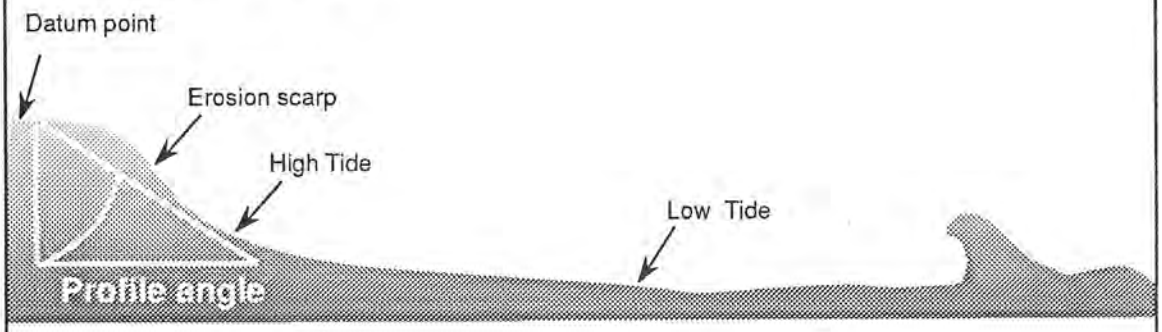
4. Work out the profile angle and compare it with others in your class. Are all the same?

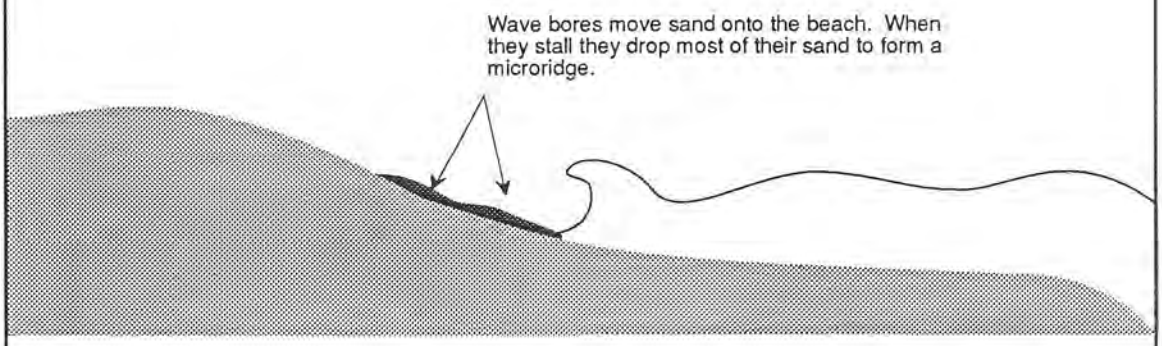
Answers

Typical beach profile



Eroded beach profile

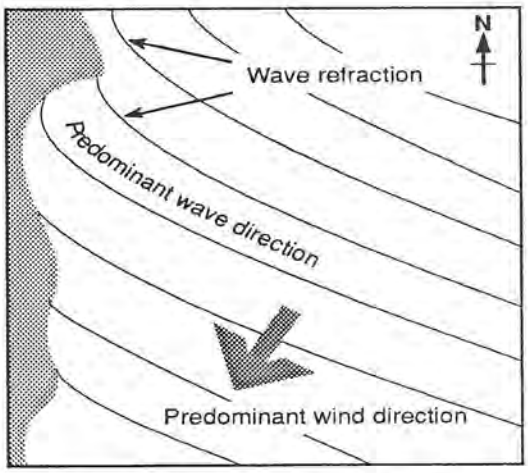




The swash zone is the maximum distance the wave bore travels up the beach. It can be identified by the "wet bit". The wave bore is the broken part of the original wave as it runs up the beach.

The Point Surf

Time required
15 minutes



Students Name _____

Teacher _____

Purpose: To record how surfers make use of wave refraction and suggest reasons why.

What to do:

1. In the space below draw an outline of the beach and headland system as if you were looking down from an aeroplane. Now draw in the direction the waves are travelling. Mark in where the rocks are and where the sand begins. Note also the areas where waves break and where sand accumulates. Complete the date, time, wave height, wind direction and tide information in the spaces provided.

Date: ..... *Time:*.....

Wave Height: .....

Wind Direction: .....

Tide: .....

2. Can you tell where the water is flowing the fastest? ..... Mark this on your drawing. What evidence do you have for this ?

.....

3. Are there any surfboard riders out in the surf? .....If so.....

   (a) Where are they surfing .....

   (b) How do they get out to the break point? .....

   (c) Is there any special pattern to their surfing? .....

4. Why does the wave slow down near the rocks? .....

5. Find out and record the difference between refraction and diffraction? .....

.....

6. Does the tide make any difference to the size and breaking pattern of the point surf? .....

.....

7. Is the rip at the point the greatest at ☐ full tide ☐ half tide ☐ low tide. Why? .....

.....

Turn over for extension activities if you have time

Extension Activities

1. Look carefully at the waves as they break. Make a note of where sand is. Why is the sand only carried where the waves are breaking ?

.....

2. When do waves drop their sand ?

.....

3. Check in the boxes below the materials that go to make up the headland:-

❑ Rock ❑ Shale ❑ Trees ❑ Houses ❑ Clay ❑ Concrete ❑ Sand

❑ Other/s .....

4. By using some reference point, try to determine the distance between wave crests .....

5. What is the time between waves ?..... Now calculate the speed at which the waves are travelling

6. How many waves are passing a fixed point in per second? .....

7. Why do surfers avoid certain waves ? .....

8. Is there any reflection of waves as they strike the headland? .....If so where does this occur?

.....

9. Do waves pass through each other ? ..... If so where ? .....

10. There are three main types of waves. Spilling, plunging or surging. Observe all the waves that break on or around the headland and record where these occur.

❑ Plunging .....

❑ Spilling .....

❑ Surging .....

11. Do all waves have the same colour? ..... Record the colours you see .....

12. Do waves smell any different when you are close to the sea compared to on top of the headland?

.....

13. What evidence is there that the headland is eroding ?

.....

14. Look for animals on the rocks. Do they have any special means of hanging on as the surf breaks over them? If so record these in the table opposite:

Animal	Special means of attachment

15. Record any special place body surfers prefer to swim as compared to surfboard riders

.....

.....

Long shore drift

You will need
30 Minutes

Students Name _____

Teacher _____

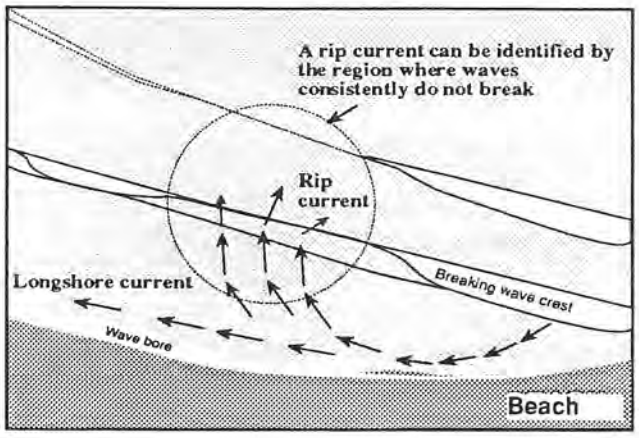
Purpose

The aims of this project are to:-

(a) discover if long shore drift is consistent in direction and speed along a straight stretch of beach when measured at 15 m intervals at the same time.
(b) find out if long shore drift is consistent at different distances from the shore.
(c) manipulate data in graphical form.
(d) estimate the positions of rip currents and describe some of their effects.
(f) Optional if activity can be completed over tide:- to estimate if the long shore drift changes before and after high and low tides.

Definitions

The long shore drift is the natural movement of sand that is transported by waves that are oblique in the surf zone.
Oblique waves hold an unbalanced proportion of their power that is inclined along the beach instead of at right angles
to it. Waves breaking at right angles to a beach are completely balanced and cannot generate a drift of sand



Importance

Long shore drift moves sand along the coastline, making problems for mariners wishing to enter and exit from rivers and bays. A rip is an underwater channel that returns incoming water out to sea resulting in a current moving away from shore. The rip current stops outside the active beach system.

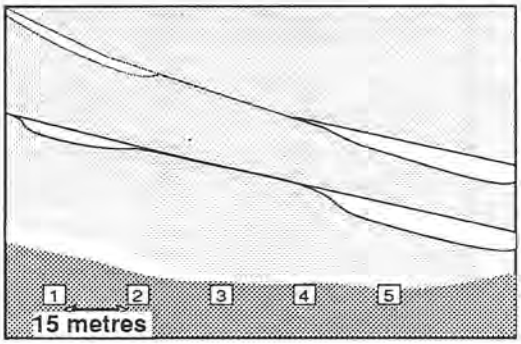
Surfers use these rip currents to paddle out in because they can be identified by places where waves consistently
don't break.

You will need:

A straight stretch of beach
two oranges
data sheet, pencil, hard surface to write on
watch with second hand

What to do

Mark out 5 stations, 15 metres apart on the beach with your foot.



1. You are going to study long shore drift in close and out far. Decide which partner is going to throw the orange far and which close.

2. At a pre-arranged signal, such as a whistle, look to your teacher. At the second signal, and it must be emphasised **pre-arranged,** you caste your oranges into the sea and the timekeeper starts the watch.

3. You then follow your oranges and any variations. If the orange comes in, you should throw it out again.

4. After one minute the timekeeper signals and you are to mark the position of your orange in the sand opposite where the orange is. After two, three, four and five minutes, recording data accurately in the tables provided.

Longshore Drift Data Sheet

Name _____ Teacher _____

Team Station _____ Ornage throw (circle one)
Short Long

Date _____

Rip Yes ☐ No ☐

Wind speed _____

Direction _____

Surf height _____

Ocean substrate offshore _____

Short throw

Minutes	Drift direction	Distance

Notes _____

_____

_____

Long throw

Minutes	Drift direction	Distance

Notes _____

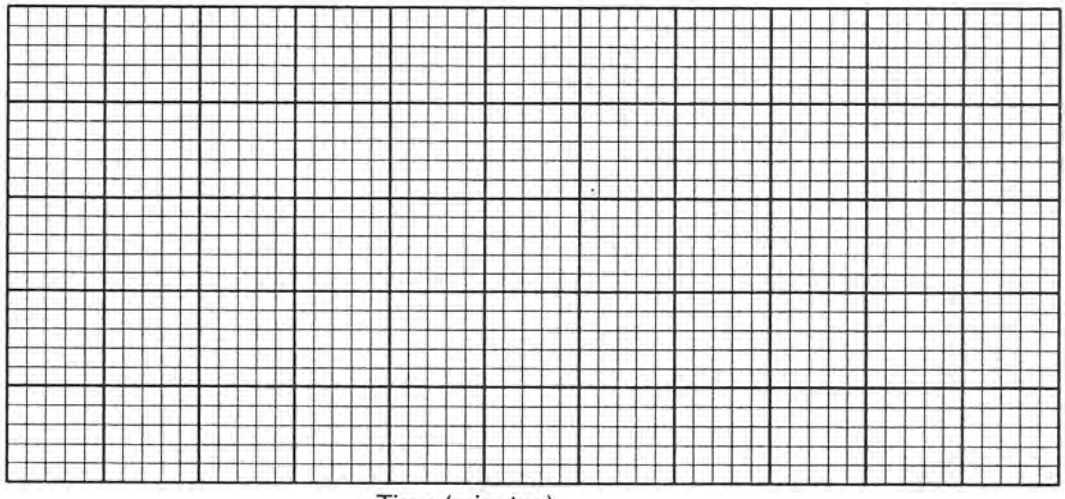
_____

_____

Distance travelled (m)

Short

Long



Time (minutes)

WET PAPER PUBLICATIONS

Snorkelling

Fisheries Biology

Classroom Navigation

The Barrier Reef World

Introduction to Boating

Introduction to Marine Engines

A Study of Seawater

Coastal Studies

Oceanography

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