**Coastal fieldwork**

Studying the coast provides the opportunity to conduct fieldwork in coastal regions. This fieldwork could investigate the geographic characteristics of the coast and how they change over time.

The following outline suggests one method of conducting fieldwork to meet these two outcomes. It can be based on any coastal region within Victoria. Some alternative options for completing fieldwork are outlined below.

**Outcomes**

1. To describe the geographic characteristics of at least two natural environments and explain how they are developed by natural processes, including extreme natural events
2. To be able to analyse and explain the changes in natural environments due to natural processes and human activity.

**Site**

The fieldwork should be completed at a localised site on the Victorian coast (or elsewhere).

The fieldwork requires students to visit a number of sites which display a diverse range of different coastal features, such as open ocean sandy beaches and sand dunes, protected bay beaches, rocky coasts with wave-cut platforms and cliffs, and coastal wetlands such as mudflats with mangroves and/or saltmarsh.

The sites should be selected to highlight natural processes, though an urban beach site may be included for contrast. Some regions which will offer examples of a number of different types of coast within a reasonably small area include:

- Mallacoota
- Marlo – Cape Conran – Bemm River
- The Gippsland Lakes
- Corner Inlet
- Wilsons Promontory
- Waratah Bay – Sandy Point – Cape Liptrap
- Inverloch
- Phillip Island
- French Island
- Mornington Peninsula
- Queenscliff - Point Lonsdale - Ocean Grove - Barwon Heads - Breamlea
- Port Fairy
- Warrnambool
- Discovery Bay - Cape Bridgewater - Nelson

**Fieldwork and task outline**

Students undertake field investigations at a number of coastal sites to examine different coastal landforms and the agents which produce them. The sites are selected to present a variety of types of coast, and to emphasise how variations in the natural processes and human activities occurring along the coastline contribute to the development of very different coastal features.

Students record their observations of the sites visited. Upon returning to the classroom they collate, interpret and present their information to produce a fieldwork report.

**Skills and knowledge students require to complete the task**

The task requires students to apply the knowledge they have of coastal processes to the information they collect on the trip. It therefore necessitates student master the key knowledge before they commence.

Some of the key skills they will require are:

- Using a Beaufort Scale of Wind Force chart to determine wind speed
- Identifying wind direction (using a compass and flag)
- Determining approximate tidal range (using the large ruler in conjunction with the tide chart)
- Determining approximate distance of intertidal zone (look for visual clues which allow us to determine high tide mark; this information, used in conjunction with the tidal chart, can allow an approximation of the width of the intertidal zone. One stride approximates 1m)
- Field sketching.

**Useful resources**

The following sources may assist with the preparation of background information and to take on the trip:

Bird, C F (1993) *The Coast of Victoria: the shaping of scenery*, Melbourne University Press, Melbourne.

Birch, W D (ed.)(2003) *Geology of Victoria, Geological Society of Australia Special Publication 23*, Geological Society Of Australia (Victoria Division), Melbourne.

GTAV fieldwork book

Gould League (1988) *Coastal Wildlife*, the Gould League of Victoria Inc., Melbourne.

Tidal chart (to work out the best time to visit various sites).

Beaufort Scale of Wind Force chart.

Local tourist information centres and local councils may be able to provide additional information and maps on their region. A fieldtrip map may also be prepared from maps purchased from a specialist, though a topographic map is not required.

**Equipment**

Some of the equipment required is:

| | |
|---|---|
| • map of locations visited<br>• tide chart for the region they are visiting for the day of visit (available from the Flinders University tidal station website)<br>• Beaufort Scale of Wind Force chart<br>• notes/key/pictures on some of the coastal species they may encounter<br>• blank paper with a framed outline for field sketch/s<br>• additional maps, diagrams or transects to provide additional information on the sites | in handbook |
| • books containing keys for identifying coastal species of flora and fauna<br>• tape measure<br>• oranges | one for class |
| • compasses<br>• flag (pieces of fabric will suffice)<br>• camera<br>• watch<br>• clinometer | one between small group of students |
| • handbook<br>• clipboard | for each student |

**Collecting data**

Students should arrive prepared with a handbook which should contain:

- instructions on what they need to do at each site
- a map showing the locations of the sites visited
- some background information on the sites they are visiting
- proforma to record their information (Table 1 and Table 2)
- a framed blank page for their field sketch.

**Table 1: Summary of the natural and human features observed at the sites visit.**

| **Natural features** | | | | |
|---|---|---|---|---|
| mud flats | | | | |
| (loose) rocky beach | | | | |
| cliffs/bluffs | | | | |
| stacks | | | | |
| wave-cut platform | | | | |
| caves | | | | |
| arch | | | | |
| blowhole | | | | |
| sandy beach | | | | |
| sand dunes | | | | |
| sand bars | | | | |
| bay | | | | |
| lagoon | | | | |
| spit | | | | |
| barrier island | | | | |
| headland | | | | |
| open ocean | | | | |
| tombolo | | | | |
| vegetation type | | | | |
| nature of rock/sediment | | | | |
| other: | | | | |
| **Human features** | | | | |
| access track | | | | |
| boardwalk | | | | |
| fences | | | | |
| roads | | | | |
| car park | | | | |
| boat sheds | | | | |
| marina | | | | |
| club rooms | | | | |
| pier/jetty | | | | |
| boat ramp | | | | |
| groyne/s | | | | |
| sea wall | | | | |
| revetment/rampart | | | | |
| breakwater | | | | |
| beach renourishment | | | | |
| shops/kiosk | | | | |
| electricity poles | | | | |
| rubbish bins | | | | |
| signs | | | | |
| toilets | | | | |
| shelter sheds | | | | |
| picnic tables | | | | |
| landscaping/revegetation | | | | |
| visitor information | | | | |
| other: | | | | |

**Table 2: Summary of the natural processes and human activities observed at the sites visited.**

| **Natural processes** | | | | |
|---|---|---|---|---|
| Time | | | | |
| Tide (refer to tide chart - low/high; H →L; L→H) | | | | |
| Approximation of intertidal zone (m) | | | | |
| Angle of shore slope | | | | |
| Wind direction (direction from which wind emanates) | | | | |
| Wind speed (refer to Beaufort chart) | | | | |
| Approximate height of waves (cm) | | | | |
| Wave frequency (waves/minute) | | | | |
| Longshore drift (time taken to travel 10m and direction) | | | | |
| Wave refraction (evident/not evident) | | | | |
| other: | | | | |
| **Human activities** | | | | |
| Swimming | | | | |
| Surfing | | | | |
| Walking | | | | |
| Fishing | | | | |
| Boating | | | | |
| Graffiti/vandalism | | | | |
| Vegetation clearance/planting | | | | |
| Protection (eg: conservation reserve) | | | | |
| other: | | | | |

**How to collect information**

For each site students should:

- collect information for a radius of 400 metres from their standpoint
- work in small groups, with each student recording their own data
- check their location on the map
- tick the appropriate boxes or enter data in the tables in their handbook (but they should enter additional information as necessary, e.g. the material used for a groyne)
- answer any additional questions posed in their handbook
- take a photo, with the location, aspect and shot number recorded
- refer to their tide chart to determine the stage within the tide cycle
- complete a field sketch for one site.

Also:

- Each group will need a flag, compass and clinometer
- Work out the approximate intertidal range by looking for visual clues, e.g. weed left at high tide, wet sand that has obviously been inundated, the extent of mangroves, which grow from mid-tide mark to high tide in the intertidal zone, checking the tide chart to calculate what stage in the tide cycle it is). One long stride is approximately one metre.
- Use their compass and flag to determine wind direction (winds are named from the direction they blow from) and refer to their Beaufort Wind Speed scale to determine wind speed.
- The wave frequency is calculated by counting how many waves break per minute.
  Constructive waves are $\leq 8$ / minute
  Destructive waves are $\geq 16$ / minute
  Net balance 7-15/ minute
- Longshore drift can be calculated by tossing an orange into the sea and timing how long it takes to move 10 metres along the shore. An orange is used as it will float, it is visible from shore and will naturally degrade in the sea. Before throwing the orange into the surf measure 20 metres along the beach with the tape measure. Stand at the 10 metre mark and toss into the surf zone; this will mean you can still calculate the speed irrespective of which direction it moves. Longshore drift need only be calculated for sites with moderate – strong wave energy, and only one orange needs to be used for entire class. The speed can be calculated back in the classroom by dividing the distance by the time. For example, if it takes 3 minutes (180 secs) for the object to travel 10 metres (1000 cm) then:
  Speed of long shore drift = 1000/180
  = 5.5 cm/sec
- If waves are less than 10 cm in height their frequency and height need not be recorded (they will be constructive waves)
- The general nature of any observed wave refraction can be noted, e.g. bending into bay; bending around headland.
- Students will need teacher assistance to work out the vegetation and rock type or sediment at each site. These descriptions can be quite simple, such as ‘sandstone’ or ‘saltmarsh and mangroves’ ‘dune vegetation including hairy spinifex’. Identification keys can assist, or students may be given some information or explanatory diagrams.
- In recording the human activities at each site students should look for visual clues rather than direct evidence, e.g. if fish cleaning facilities and a boat ramp are present, fishing obviously occurs.

**Other information which could be collected**

- Vegetation transects
- A description of management techniques.

**Assessment task**

Students could complete their fieldwork report as:

- an annotated visual display (AVD)
- a written report
- a multimedia presentation using computer-generated maps.

The AVD/report/presentation should contain a range of geographic media such as maps, diagrams (such as transects or cross-sections), field sketch, photographs, tables, lists as well as text.

It should also contain:

1. A title.
2. The aim of the field investigation.
3. A description of the locations visited on a map.
4. The data should be presented describing the geographic characteristics of each site. This should include, for each site:
    - a description of the type of coast, its location and its natural features (landforms, intertidal zone, slope of shore, rock or sediment, vegetation)
    - a description of the human features observed
    - a table outlining natural processes and human activities recorded on the day
    - an analysis of the dominant agents causing long-term changes, judging from the features observed (erosional or depositional, level of wave energy and why does it have this level of wave energy, how its geographic characteristics have influenced the features observed, the impact of natural processes compared to human activities).
5. A concluding statement evaluating the relative importance of the various natural processes and/or human activities operating at each site.

All geographic conventions should be applied. Geographic media such as maps, photos, diagrams, tables and field sketches should have figure numbers and a clear caption or be annotated. The source of any information gathered, other than the student's own data collected in the field, should state the source.

**Alternative options**

- One site or a number of sites exhibiting a range of different types of coast could be visited.
- The site/s could be visited at different times within its tide cycle.
- A site, for which there is information on its past geographic characteristics, could be visited and information on its current geographic characteristics collected to compare with the earlier information.
- Data can be collected on the various agents causing change, including information on tides, wind, waves, longshore drift and wave refraction.
- Data can be collected on the geographic characteristics of a site or a number of sites, and then analysed with reference to the information covered on how various coastal features are formed.