Reef Profile

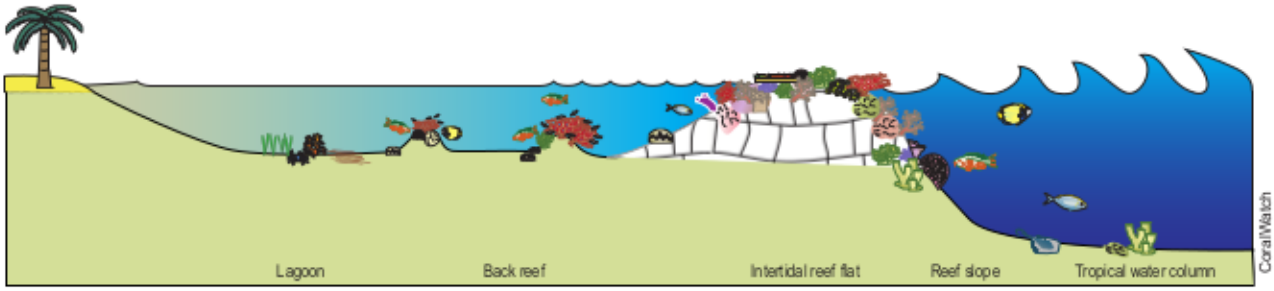
The aim of this activity is to investigate the relationship between the reef profile and location of organisms and substrate types. You will experiment on the reef flat, measuring the changing depth, different coral types and whether the bottom is covered in sand, live coral, rubble or algae as you travel from the shore to the reef crest. Appropriate footwear and sun protection are required and please pretend that every living thing you see is a puppy – you wouldn't stand on a defenceless little puppy would you?

Time

Two hours

Tools

- CoralWatch chart
- Two measurement staffs with 10cm segments along their lengths
- 20m of string with markings
- Spirit level to be attached to the string
- Waterproof slate with pencil



Reef zonation

Background

As you walk or snorkel across a reef, you will encounter a number of different zones which differ in their position, depth, light availability, dominant substrate, wave action, salinity and tidal range. Each area contains animals and plants that have adapted to the particular conditions and micro-habitats that form there. Sometimes you can tell which zone a reef organism may come from just by looking at its shape or morphology.

Working from the ocean inwards, reefs typically consist of an outer reef slope, a reef crest, a lagoon and a reef flat lying adjacent to land (if there is any around). Large colonies of all coral types are found on the reef slope while delicate branching corals can survive in lagoons where they are protected from high energy wave action. The reef crest is a terrace of cemented rubble and coral fragments exposed at low tide and constantly subject to high energy waves and strong currents. It is typically covered with scattered blocks of coral rock and fragments of coral head wrenched from the outer reef margins during storms. Any living corals tend to have 'short and stubby' (digitate) or encrusting growth forms in order to survive and produce copious amounts of mucus to preserve them through hours of exposure at low tide. Rubble is cemented together with coralline algae into a solid raised ridge which stops seawater flowing out of the lagoon and reef flat.

The reef crest and slope are frequently dissected by perpendicular channels or 'spur and groove' formations created by the constant high energy ebb and flow of water on and off the reef flat. Reef flats can range in width from a few metres to several kilometres and can be subdivided into beach, beachrock, gutter, inner and outer reef flat with patches of live coral separated by narrow, sandy-bottomed channels. Corals tend to grow upwards to the low tide level and then expand outwards, forming micro atolls.

Field activity

1. Decide on a suitable location in which you will walk to conduct the survey (avoiding large areas of live coral and using sandy tracks if possible).
2. Position a staff upright on the edge of the water with one of end of a 20m string attached at its base (the length of string can be altered depending on your reef).
3. From the shoreline, walk out 20m, hold the second staff upright and pull the string tight, raising and lowering it along the staff until it is level (when the bubble is in the centre of the window on the spirit level).
4. Stop and make the following observations of the area around you and record them in the 'Reef profile data' table:
   a. distance travelled
   b. height of string on the staff
   c. dominant coral type nearby (branching, boulder, plate or soft)
   d. substrate (sand, coral rubble, algae, live coral)
5. Leave the staff furthest from shore in place and carry the other staff from its current position out towards the reef crest, making sure the string is once again level before making your height measurements.
6. Repeat this procedure until you have reached the edge of the reef.
7. Use these observations to plot the reef profile in the area provided.

Teacher Hint
Laminate 'Coral growth forms' to take in the field.

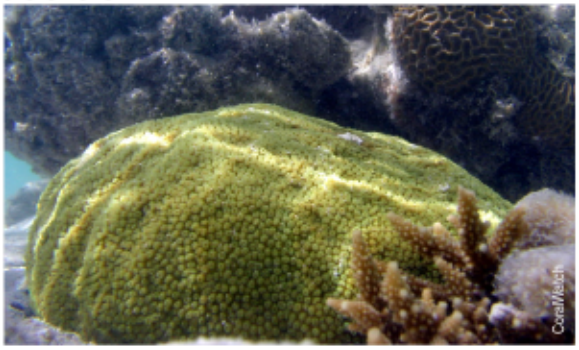
Reef profile drawing

Distance (m)

Coral growth forms

Massive boulder

Platygyra sp.



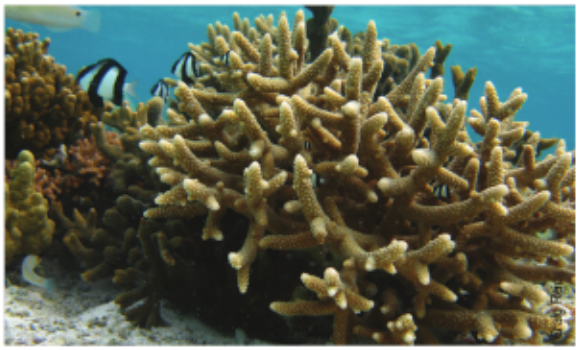
Porites sp.

Plate

Acropora sp.

Acropora sp.

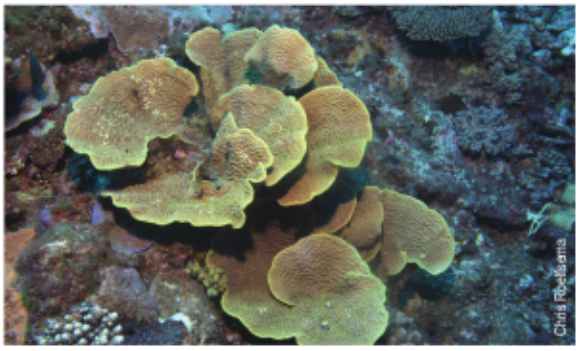
Branching



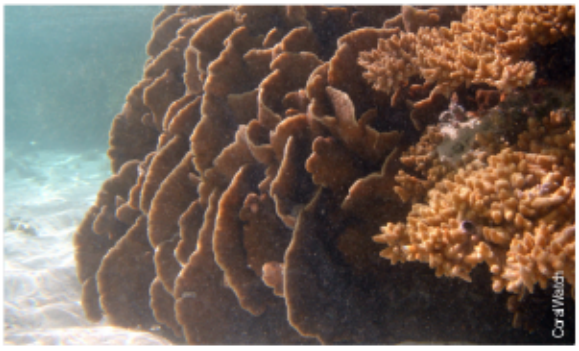
Acropora sp.

Acropora sp.

Foliaceous



Turbinaria sp.



Pavona sp.

Coral growth forms

Free living

Fungiidae sp.

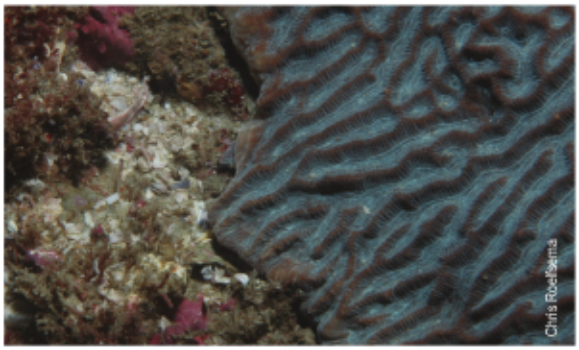
Fungiidae sp.

Digitate

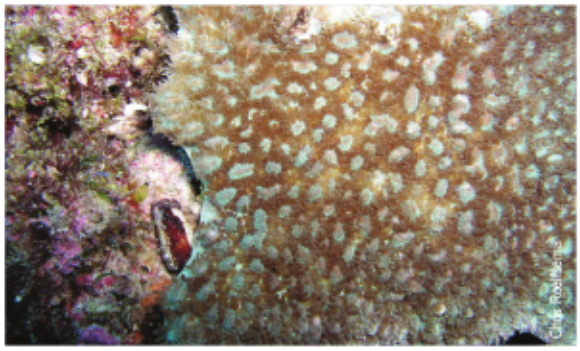
Pocillopora sp.

Stylophora sp.

Encrusting



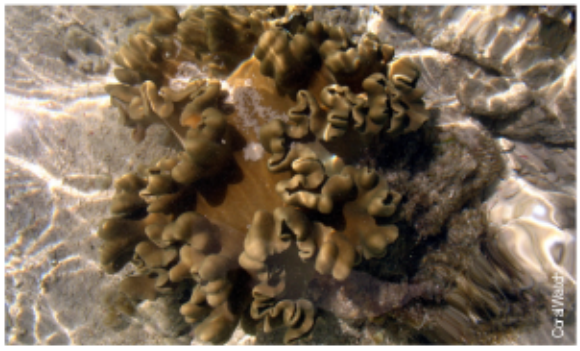
Goniastrea sp.



Hydnophora sp.

Soft

Lobophytum sp.



Sarcophyton sp.

Reef profile data table

Observer(s):

Location: Date:

Weather conditions: windy / calm / cloudy / sunny

Distance (m)	Height difference	Coral type (Br, S, Bo, Pl)	Substrate (sand, coral, rubble, algae, live coral)

Questions

1. State which part of the reef flat was deepest and why this may be so.
2. Are there dominant coral types present on any part of the reef flat?
3. How does this relate to the abiotic conditions of the region surveyed?
4. Explain why there are clearly defined channels present on the reef flat.
5. What limits the growth of corals on the reef flat?
6. Describe the relationship between the physical features of reef zones and the animals you observe in each.

Research projects

1. Describe, with the aid of a diagram, the consequence of blasting a channel through a reef crest, in terms of water levels and flow and the effects this has on substrate and organisms on the reef flat.
2. Evaluate whether a relationship exists between coral colour, depth and coral type.

References

Reid et al. (2009) Coral Reefs and Climate Change: The guide for education and awareness. CoralWatch, The University of Queensland, Brisbane. (See Coral growth page 92 and Zones across the reef page 94)

Hutchings PA, Kingsford M, Hoegh-Guldberg O, Australian Coral Reef Society (2008) The Great Barrier Reef: Biology, Environment and Management. CSIRO Publishing

Moffat B, (2009) Marine Science for Australian Students. Wet Paper Publications, Brisbane

UQ Centre for Remote Sensing and Spatial Information Science; www.gpem.uq.edu.au/CRSSIS/