

Coral Bleaching

Subject matter: explain the concept of coral bleaching in terms of Shelford's law of tolerance.

Recommended reading: *Coral Reefs and Climate Change - Coral bleaching (p.126-129), Ecosystem resilience (p.130-133)*
 View video: *Coral Reefs and Climate Change - Coral bleaching*

Shelford's law of tolerance: A law stating that the abundance or distribution of an organism can be controlled by certain factors (e.g. the climatic, topographic, and biological requirements of plants and animals) where levels of these exceed the maximum or minimum limits of tolerance of that organism.

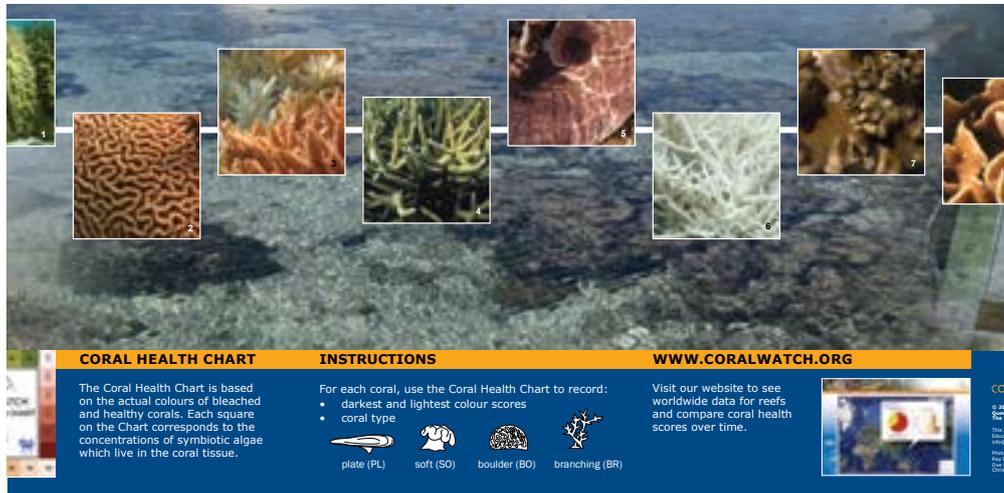
Coral bleaching - Classroom

For each picture, decide if the coral is healthy or bleached. Tick the boxes if the coral is bleached or unhealthy.



Coral Bleaching

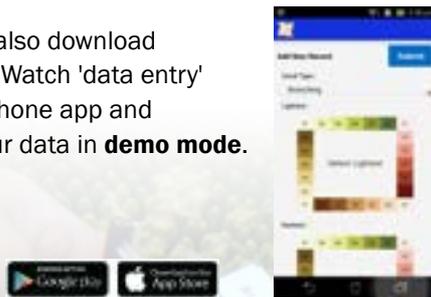
Measuring coral health using virtual reef poster - Classroom



Instructions

- Following the instructions on the back of the Coral Health Chart, match the coral colours on the virtual reef poster with the colour scores on the chart.
- Record your colour scores and coral types on a data sheet that you can download from www.coralwatch.org.

You can also download the CoralWatch 'data entry' mobile phone app and enter your data in **demo mode**.



DATA SHEET

Group name: _____ Your name: _____

Email address: _____

Participation field: dive centre / scientist / environmental / school or university / tourist

Country of reef: _____ Reef name: _____

GPS if possible: _____ Depth _____ m / feet Sea temp: _____ °C

Date of survey: _____ / _____ / _____ Time collected: (ie. 14:00 or 2pm) _____

Weather: sunny / cloudy / raining Your activity: reef walking / snorkelling / diving

***Please note: data will not be accepted on the website if any of these fields are left blank**

Coral Number	Colour Code		Coral Type			
	L=Lightest	D=Darkest	Br=Branching	Bo=Boulder	Pl=Plate	So=Soft
<i>example</i>	L: D2	D: E5	Br	Bo	Pl	So
1	L:	D:	Br	Bo	Pl	So
2	L:	D:	Br	Bo	Pl	So
3	L:	D:	Br	Bo	Pl	So
4	L:	D:	Br	Bo	Pl	So
5	L:	D:	Br	Bo	Pl	So
6	L:	D:	Br	Bo	Pl	So
7	L:	D:	Br	Bo	Pl	So
8	L:	D:	Br	Bo	Pl	So
9	L:	D:	Br	Bo	Pl	So
10	L:	D:	Br	Bo	Pl	So
11	L:	D:	Br	Bo	Pl	So
12	L:	D:	Br	Bo	Pl	So
13	L:	D:	Br	Bo	Pl	So
14	L:	D:	Br	Bo	Pl	So
15	L:	D:	Br	Bo	Pl	So
16	L:	D:	Br	Bo	Pl	So
17	L:	D:	Br	Bo	Pl	So
18	L:	D:	Br	Bo	Pl	So
19	L:	D:	Br	Bo	Pl	So
20	L:	D:	Br	Bo	Pl	So

Check out these resources...

Reid, C., Marshall, J., Logan, D., Kleine, D. (2012)
Coral Reefs and Climate Change: the guide for education and awareness.
 CoralWatch, The University of Queensland, Brisbane, Australia.

Siebeck, U.E., Marshall, N.J., Kluter, A. and Hoegh-Guldberg, O. (2006)
 Coral Reefs 25(3):453-460

Any other relevant information, e.g. average diving depth, species of coral, pollution, long term weather such as drought, flood, heat-wave.

Coral Bleaching

Recommended reading: *Coral Reefs and Climate Change - Acting on coral bleaching* (p.212-214), [CoralWatch Do-It-Yourself Instructions](#)
View video: *Coral Reefs and Climate Change - CoralWatch Intro/How to*

Measuring Coral Health using transects - Field

Instructions

1. Read the instructions on the back of the Coral Health Chart.
2. Make sure you have all your equipment as listed above.
3. Start with recording survey details on your data slate: name, date, time, GPS (if possible), water temperature, depth, activity and conditions.
4. Follow the instructions on the chart and aim to collect data for 20 different colonies using a transect tape.
5. Lay out a tape measure or string with measurements marked on it. To decided what intervals to use on the transect tape you should consider the coral cover in your area. With high coral density you could collect data every half a meter, meter or with low density it might be best to take 2 meter intervals.
6. Swim or walk along the tape, and record data every 50 cm (depending on coral cover).



Teacher notes

- You can do this activity as a random survey. But make sure it is done randomly, don't get students to choose corals they like or the ones that are bleached. Use a set number of steps / fin kicks to determine the next coral you will measure.
- The CoralWatch Virtual Reef Activity is useful preparation for using the Coral Health Chart in the field.
- The CoralWatch data slates contains all required survey details.
- The distance along the transect line between measurements can vary depending on coral cover. If there is no coral underneath the assigned reading, students can pick the closest coral colony.
- Ensure students don't damage the coral as they lay out the tape.
- For future reference, students could mark the start and end of your transect using GPS coordinates.

Equipment

- If snorkelling - mask snorkel, fins
- If reefwalking - booties, hat and sunscreen
- Coral Health Chart
- Waterproof DATA slate (see picture) with pencil
- Underwater camera (if available)
- Viewing tube (if available)
- Do It Yourself leaflet
- Thermometer
- GPS (if available)

Reef name and country:

Your name:

Date and time:

GPS:

(if possible)

Depth: m / feet

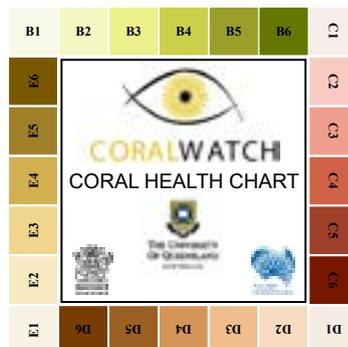
Sea temp: C / F

Sunny / cloudy / raining
Walking / snorkelling / diving
(select code)

Enter all your data online at WWW.CORALWATCH.ORG

Your data is important to us!

Coral No.	COLOUR CODE		CORAL TYPE (please tick)			
	Lightest	Darkest	Branching	Boulder	Plate	Silt
1						
2						
3						
4						
5						
6						
7						
8						
9						
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Example of CoralWatch data slate and Coral Health Chart.

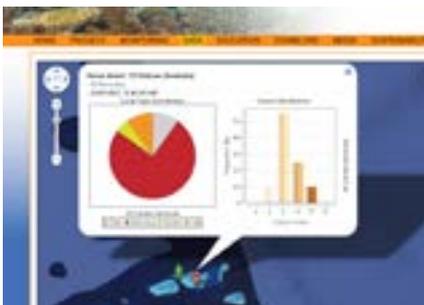
Coral Bleaching

Interpreting live coral bleaching data - Classroom

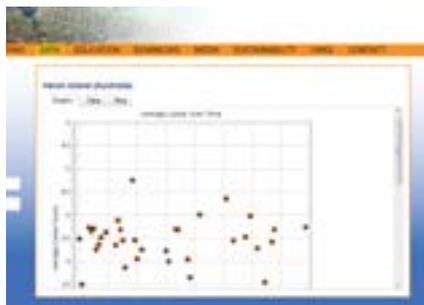


In this activity you will analyse and compare data results from the CoralWatch website.

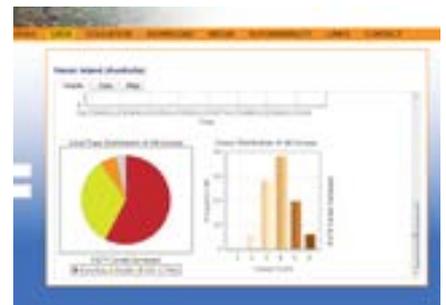
1. Go to www.coralwatch.org and find the map under the data tab showing field data. Visit a site along the Great Barrier Reef and choose one survey.
 - a. What is the name of your reef?
 - b. Which coral type was most abundant?
 - c. Which coral type was the least abundant?
 - d. Which colour score had the highest frequency?
 - e. Who collected this data? Circle the answer.
 dive centre / scientist / conservation group / school or university / tourist / other
2. Compare all surveys conducted on this reef by various people. Go to data/reefs and find the name of your previous reef and view the graphs.
 - a. What is the average colour over time?
 - b. Which coral type was the most abundant at this reef?
 - c. Which colour score has the highest frequency?
 - d. How many corals have been surveyed?
 - e. When was the last survey?



Data results single survey.



Average colour score over time comparing all surveys for one reef.



Average colour and coral type distribution comparing all surveys for one reef.