

## SANDWATCH

Ocean acidification, beach width monitoring and marine debris  
South Coogee Primary School, Perth, Australia  
21 October 2013

### Ocean Acidification: Background Information

Carbon dioxide is added to the atmosphere when fossil fuels are burnt,

When carbon dioxide is dissolved in the ocean a chemical reaction occurs that produces carbonic acid,

An increase in carbon dioxide leads to an increase in carbonic acid production and a lowering of the ocean pH level or increasing acidity,

Ocean water becomes more acidic which inhibits shell growth in marine animals e.g. mussels, crabs, oysters, fish, and slows the growth of coral.

### Experiment discussion

When vinegar (acetic acid) is added to the samples, those containing calcium carbonate will react producing carbon dioxide (gas bubbles) and calcium acetate.

Which samples produced bubbles?

Shells                      Yes or No

Sand                        Yes or No

Limestone Rock        Yes or No

Granite Rock            Yes or No

Cuttlebone              Yes or No

Ask the students to:

- List all the animals on the beach that have shells or skeletons made of calcium carbonate,
- Write down how ocean acidification will affect the beach and coral reefs,
- Write down how ocean acidification may affect the food chain and global fisheries.

Discuss with the students what can be done to:

- Reduce carbon dioxide emissions
- Improve the health of coral reefs e.g. by reducing pollution, preventing over fishing, creating marine protected areas.
- Make people more aware of ocean acidification.

Websites for more information

[www.sandwatch.org](http://www.sandwatch.org)

[http://oceanacidification.net/docs/OAA\\_Factsheet.pdf](http://oceanacidification.net/docs/OAA_Factsheet.pdf)

[www.epa.gov/climatestudents/impacts/signs/acidity.html](http://www.epa.gov/climatestudents/impacts/signs/acidity.html)

[http://www.cisanctuary.org/ocean-acidification/hands\\_on\\_activities.php](http://www.cisanctuary.org/ocean-acidification/hands_on_activities.php)

## **Ocean Acidification Experiment**

### **Aim:**

To determine which coastal resources may be subject to the effects of increasing ocean acidification.

### **Introduction:**

Students from South Coogee Primary School, under the guidance of teacher Steven Lushey, Coastcare Officer Craig Wilson and City of Cockburn, Environment and Waste Education Officer Vicky Hartill, visited Coogee Beach on Monday 21 October 2013 to complete a series of Sandwatch activities. Activities for the excursion included ocean acidification experiment, beach width measuring and marine debris survey.

### **Methods:**

At each of the three monitoring sites, samples of the following materials were collected and stored in plastic cups.

Shells

Sand

Limestone Rock

Cuttlebone

Granite Rock (collected off site)

Approximately 20 mls of Acetic acid (white vinegar obtained from a supermarket) was added to each of the samples and any reaction recorded.

### **Results:**

<b>Resource</b>	<b>Reaction</b>
Shells	Bubbles formed
Sand	Bubbles formed
Limestone Rock	Bubbles formed
Cuttlebone	Bubbles formed
Granite Rock (collected off site)	No reaction

### **Discussion:**

Resource materials that contained calcium carbonate reacted with vinegar (acid) forming bubbles of the gas carbon dioxide as the calcium carbonate dissolves..

As the oceans become more acidic due to increasing levels of dissolved carbon dioxide, marine organisms that rely on the formation of calcium carbonate to build their shells or skeletons (crabs, oysters, coral and others) will be affected.

The release of carbon dioxide into the atmosphere is expected to increase ocean acidification.

Carbon dioxide is produced from the burning of fossil fuels or from natural causes such as volcanoes.

We need to reduce the amount of carbon dioxide being released into the atmosphere in an attempt to reduce the level of ocean acidification.

## **Beach Monitoring**

### **Beach Width**

Measure the width of the beach from the marker stick to the high water mark and record on the data sheet.

Site 1: Jetty

Site 2: Beach Access Path

Site 3: Port Coogee Seawall

Site	2011	2013
1: Jetty	42.6 metres	48.6 metres
2: Beach Access Path	24.6 metres	27.7 metres
3: Port Coogee Sea Wall	19.6 metres	8.3 metres

**Discussion:**

The width of the beach at sites 1 & 2 has changed slightly, however site 3 has narrowed noticeably. The presence of the Port Coogee rock wall may be affecting the beach width and a further reading in another 12 months will confirm any trends.

Beach Width Measurement Sites



Site 1: Jetty



Site 2: Beach Access Path



Site 3: Port Coogee Sea Wall

### **Marine Debris Survey**

While you are searching the beach for the ocean acidification experiment samples, collect any marine debris that is on the beach and record the type of debris it is on the data sheet then bag it.

### **Discussion:**

48 students cleaned 450 metres of Coogee Beach collecting 7 kg and debris. Very little debris was present and comprised plastic food wrappers and empty drink bottles.