

# Climate change

## Kitchen El Niño

This fun experiment will allow students to understand the climate pattern known as “El Niño” and will give students a better understanding of how El Niño affects natural disasters in Australia.

### Instructions

- ▶ Organise students into small groups
- ▶ Read aloud to students the information on El Niño provided below
- ▶ Following reading the El Niño information provide each group with the equipment and instructions for the experiment. Ensure there is one adult per group to supervise the use of very hot water
- ▶ Allow the students to run the experiment. Allow 10-15 minutes for completion
- ▶ Following completion of the activity explain what’s happening (page 2) during the experiment

### Read to students

#### The El Niño Effect

Australia’s climate sometimes swings from dry conditions one year to floods the next. This is due to a phenomenon around the Pacific Ocean called the Southern Oscillation. The most well-known extreme of the Southern Oscillation is the drought-causing El Niño (el-neen-yo).

El Niño is the Spanish word for the boy-child, a reference to the baby Jesus. The name was given because an El Niño event is characterised by the appearance of warm ocean currents off the coast of South America at Christmas time (the time of the birth of the boy-child - Jesus).

But what does this have to do with Australia?

In normal years the cool water in the eastern Pacific near South America is blown west, and is warmed by the tropical sun along the way.

When this warm water reaches the coast of Australia it warms the air, making it rise and creating cumulo-nimbus clouds that bring summer rain.

In an El Niño year, the circulation across the Pacific weakens, so the upwelling of cool waters is reduced, the warm water stops before it gets to Australia and we have a drought.

The effects of El Niño reach right around the globe. When we have droughts, large areas of Indonesia, India and Southern Africa also experience dry conditions; Peru gets floods, and parts of North America get very warm.

What is the current situation for Far North Queensland?

Where could you find more information about these climatic effects and what they mean for Cairns?

## Curriculum links

11	Geography	ACHGE012: Geographical Knowledge and Understanding; Overview of natural and ecological hazards	An overview of the nature of natural hazards (atmospheric, hydrological, and geomorphic) and ecological hazards
11	Geography	ACHGE013: Geographical Knowledge and Understanding; Overview of natural and ecological hazards	The concept of risk as applied to natural and ecological hazards
11	Geography	ACHGE014: Geographical Knowledge and Understanding; Overview of natural and ecological hazards	The temporal and spatial distribution, randomness, magnitude, frequency and scale of spatial impact of natural and ecological hazards at a global scale
11	Geography	ACHGE015: Geographical Knowledge and Understanding; Overview of natural and ecological hazards	The role of spatial technologies in the study of natural and ecological hazards
11	Geography	ACHGE023: Geographical Knowledge and Understanding; Depth and study of an ecological hazard	The magnitude, frequency, duration, temporal spacing and effects of the hazard
11	Geography	ACHGE024: Geographical Knowledge and Understanding; Depth and study of an ecological hazard	The diffusion and resulting spatial distribution of the hazard, and how an understanding of biophysical and human processes can be used to explain its spread
11-12	Earth & Environmental Science	ASCSES102: Science Understanding; The cause and impact of Earth hazards	Human activities, including land clearing, can contribute to the frequency, magnitude and intensity of some natural hazards (eg drought, flood, bushfire, landslides) at local and regional scales
11-12	Earth & Environmental Science	ACSES106: Science Understanding; The cause and impact of global climate change	Climate change affects the biosphere, atmosphere, geosphere and hydrosphere; climate change has been linked to changes in species distribution, crop productivity, sea level, rainfall patterns, surface temperature and extent of ice sheets
11-12	Earth & Environmental Science	CSES108: Science Understanding; The cause and impact of global climate change	Climate change models (eg example general circulation models, models of El Niño and La Niña) describe the behaviour and interactions of the oceans and atmosphere; these models are developed through the analysis of past and current climate data, with the aim of predicting the response of global climate to changes in the contributing components (eg changes in global ice cover and atmospheric conditions)
12	Earth & Environmental Science	ACSES094: Science as a Human Endeavour; The cause and impact of earth hazards	People can use scientific knowledge to inform the monitoring, assessment and evaluation of risk
12	Earth & Environmental Science	ACSES097: Science as a Human Endeavour; The cause and impact of earth hazards	Scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability
12	Earth & Environmental Science	ACSES098: Science Understanding; The cause and impact of Earth Hazards	Earth hazards result from the interactions of Earth systems and can threaten life, health, property, or the environment; their occurrence may not be prevented but their effect can be mitigated
12	Earth & Environmental Science	ACSES103: Science Understanding; The cause and impact of Earth Hazards	The impact of natural hazards on organisms, including humans, and ecosystems depends on the location, magnitude and intensity of the hazard, and the configuration of Earth materials influencing the hazard (for example, biomass, substrate)

# Build your own EL NIÑO

**Warning:** This activity involves hot water and an electrical appliance. Make sure there's an adult around to supervise.

## Instructions

### You will need:

- ▶ A large glass pyrex baking dish or plastic Tupperware-type container
- ▶ Red and blue food colouring
- ▶ Water
- ▶ A funnel
- ▶ A hairdryer or fan

### Method:

1. Half-fill a large glass pyrex baking dish or plastic Tupperware container with very hot water. Add red food colouring to the water (taking care not to scald yourself!).
2. Next, in a separate container, mix up some very cold water with blue food colouring. Using a funnel, carefully add this cold water to the bottom of the baking dish. Notice how the hot and cold water do not mix. This represents an El Niño situation, where the warm water on top prevents the cooler water from rising to the surface.
3. To set up the conditions normally experienced, direct a stream of air from a hair dryer or fan over the surface of the water. (Warning: keep the electrical appliance well away from the water itself. If the hair dryer should come into contact with the water, you should turn it off at the power point. Do not reach in to fish it out).

### What's happening?

As the air blows over the surface of the water, the hot water will move to the other end of the container. The cold water will rise to the surface near the fan, replacing the hot water. This represents the usual winds that drive the warm water west to Australia.

Turn off the fan, and look at the slope between the hot and cold water. Does the water return to El Niño conditions now that the wind has stopped?

Of course, the ocean's water is not exactly half hot, half cold. The warm layer is really a thin surface layer.

While this model helps you understand the processes at work, it doesn't give an accurate representation of El Niño.

For scientists to understand what's happening in real life, they have to closely monitor the oceans and the atmosphere. While their understanding is increasing, there's still a lot to be learned.

