

## Climate Change

### Objectives

By the end of this lesson the student will:

- investigate some of the natural processes and human activities which cause climate change
- define the term *climate*
- give two causes of climate change
- define the term *Greenhouse Effect*
- give some of the human activities that contribute to the *Greenhouse Effect*
- recall factors involved in setting up an observation station.

### Background

Students should study the following web pages then answer the questions given below.

- Climate Education: <http://www.bom.gov.au/lam/climate/index.htm>
- Australian Climate Zones:  
<http://www.bom.gov.au/lam/climate/levelthree/climch/humzone.htm>
- Climate of The 20th Century:  
<http://www.bom.gov.au/lam/climate/levelthree/c20thc/index20.htm>
- Long - Term Climate Variability in Australia:  
<http://www.bom.gov.au/lam/climate/levelthree/climch/clichv2.htm>
- The Greenhouse Effect:  
<http://www.bom.gov.au/lam/climate/levelthree/climch/clichgr1.htm>
- How Ozone is Destroyed:  
[http://www.bom.gov.au/lam/Students\\_Teachers/ozanim/ozoanim.shtml](http://www.bom.gov.au/lam/Students_Teachers/ozanim/ozoanim.shtml) (*This will automatically download a 120K animation*)
- Health and Climate:  
<http://www.bom.gov.au/lam/climate/levelthree/cpeople/health1.htm>
- Reference Climate Stations:  
<http://www.bom.gov.au/climate/change/refernce.shtml>

### Resources and actions

Students will need access to the internet to study the content found in the list of links above. Print off the worksheet for them to write on:

[http://www.bom.gov.au/lam/Students\\_Teachers/Worksheet10.shtml](http://www.bom.gov.au/lam/Students_Teachers/Worksheet10.shtml).

Use the following solutions as a guide to assist them. They may come up with other appropriate solutions.

### Questions & solutions

1. Define the term 'climate'.  
*Students may use anyone of these, preferably the longer more detailed*

definition.

**Climate** is what you expect; **Weather** is what you get.

**Climate** is about long-term records, trends and averages;  
**Weather** is the day-to-day experience.

**Climate** is the sum or synthesis of all the weather recorded over a long period of time. It tells us the average or most common conditions, or extremes, or counts of events, or frequencies. **Weather** is a description of conditions over a short period of time - a "snap shot" of the atmosphere at a particular time.

If **weather** is the watch then **climate** is the calendar.

2. What are some of the extreme climatic events we experience in Australia? Give at least three examples.  
*Any three of these: cyclones, storms, extreme temperatures, drought, floods and bushfires.*
3. What causes climate change? Give at least two causes.  
*El Niño, changes in the amount of solar energy reaching the Earth, Volcanic eruptions (affecting changes in the amount of solar energy reaching the Earth), the movement of ocean currents, land temperatures, changes in sea-ice in polar regions and increases in greenhouse gases.*
4. What is The Greenhouse Effect?  
*The greenhouse effect is a natural warming process of the earth. When the sun's energy reaches the earth some of it is reflected back to space and the rest is absorbed. The absorbed energy warms the earth's surface which then emits heat energy back toward space as longwave radiation. This outgoing longwave radiation is partially trapped by greenhouse gases such as carbon dioxide, methane and water vapour which then radiate the energy in all directions, warming the earth's surface and atmosphere. Without these greenhouse gases, the earth's average surface temperature would be about 35 ° Celsius cooler.*
5. What are some of the human activities that contribute to the Greenhouse Effect? List as many as you can.  
*Deforestation, burning fossil fuels and the use and release of chlorofluorocarbons, halons, methane and nitrous oxide.*
6. One of the roles of the Bureau of Meteorology is to monitor climate change. Observation stations are set up at selected site around Australia to monitor the changing climate. What things do we need to think about when we set up a climate station?
  - *Distribute them across Australia*
  - *Locate in areas away from large urban centres, but close enough to provide useful data about the weather of those centres*
  - *Set them up where there is the likelihood of continued, long-term operation.*

**Time**

45 - 50 minutes.

**Assessment Task**

Q. 2, 3, 4 and 5