

**What could we measure to find out if climate change is happening here?  
What climate change indicators could be measured in our own backyard or school grounds?**

Ask your class what they think might be measured to find out if climate change is happening in the school grounds or their own backyards. This seems to be a simple question, but pupils will need careful thought and discussion to suggest possible answers.

Their suggestions (S) and discussions (D) might include the following:

- S. Measure the temperature.
- D. Temperature measurements can easily show differences in the weather, but changes in climate need many years of temperature data. Daily maximum and minimum temperatures would have to be measured in a specially designed screen (a Stevenson Screen) and their mean values calculated for a year, to give the annual mean temperature. The climate temperature is a 30-year average of annual mean temperatures (according to the World Meteorological Organisation definition). So daily temperature measurements would have to be made over tens of years to show any change in climate.

- S. Measure the rainfall.
- D. Like temperature measurements, rainfall would have to be measured using a rain gauge and recorded daily for many years before changes that might be due to climate change are seen.



Maximum and minimum thermometers in a Stevenson Screen, Darwin, Australia.



A simple rain gauge in use in Germany.

*Stevenson screen image by Bidgee under the Creative Commons Attribution-Share Alike 3.0 Australia license. Rain gauge image by Kolling under the terms of the GNU Free Documentation License, Version 1.2*

- S. Measure the gases in the air.
- D. High tech. instruments are needed to measure air composition. But even if you had those, the air composition locally would be very changeable and so would not give useful data of global air composition. One of the key observatories measuring air composition is on a mountain-top in the mid-Pacific island of Hawaii – high up and far away from continents to give the best chance of measuring ‘normal’ global air.



An air quality measuring station in France.

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- S. Record the first arrival or departure date of migrant birds.
- D. Birds that migrate, usually leave or arrive back around the same date each year, e.g. swallows arriving back in northern Europe from their winter stay in Africa. If you record this date and it changes over time, this may be a climate-change indicator.



A migratory barn swallow, Germany.

*Image by Andreas Eichler under the Creative Commons Attribution-Share Alike 3.0 Unported license.*

- S. Record the presence of key species that might be good indicators of climate
- D. Some insect species seem to be sensitive to climate change, like some butterflies, moths and beetles – there are more of them when it is warmer. You could record the numbers of key butterfly, moth and beetle species, if they are found in your backyard or school grounds, using regular observations, to find out if there are changes over tens of years.



Pearl-bordered fritillary *Boloria euphrosyne* – the numbers of this butterfly seem to be sensitive to climate change.

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The conclusion to the ‘What could we measure to find out if climate change is happening here?’ discussion is likely to be that careful measurements and records would have to be made over many years in your backyard or school grounds to show any change in climate. They would also have to be made over a wider area too, in case your small area was unusual.

The measurements would be most useful if they were connected to a national network of measurements and observations, carried out over many years, to monitor changes in climate.

## The back up

**Title:** What could we measure to find out if climate change is happening here?

**Subtitle:** What climate change indicators could be measured in our own backyard or school grounds?

**Topic:** A class discussion on the likely local impact of climate change.

**Age range of pupils:** 8 years and older

**Time needed to complete activity:** 10 minutes

**Pupil learning outcomes:** Pupils can:

- describe the difference between weather and climate;
- explain how climate can be monitored by long term observations;
- explain how changes in climate might affect their local area.

### Context:

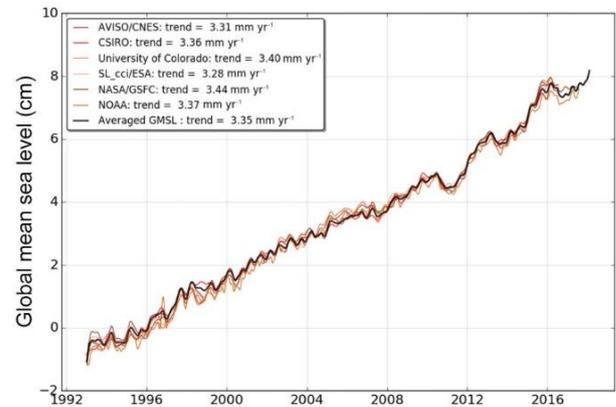
Many areas of the world experience seasonal change, and if climate change is affecting an area, the timing and intensity of seasonal changes are likely to be affected. This Earthlearningidea focusses on potential local impacts of climate change.

In coastal areas, the change in sea level that is likely to be associated with climate change could be monitored (when the Earth is warming, polar ice caps melt at faster rates adding water to the oceans, which then rise; ocean waters also warm and expand increasing sea level).

In the same way as for weather measurements, sea level has to be measured over many years to be able to give a reliable average.

### Following up the activity:

Ask how the ‘What could we measure to find out if climate change is happening here?’ question could be answered in different parts of the Earth, e.g. the Antarctic continent, an equatorial rain forest area, or the Sahara Desert.



Sea level change shown by a range of measurements.

From: <https://www.earth-syst-sci-data.net/10/1551/2018/essd-10-1551-2018.html> under the Creative Commons Attribution 4.0 International license.

### Underlying principles:

- If there is global change in climate, then this should be detectable in different parts of the globe, particularly in the local area.
- Climate change could be detected locally by monitoring weather and sea level over long time spans and by measuring how some species respond that are sensitive to climate.

### Thinking skill development:

Pupils have to apply their constructed idea of climate change to their local area using bridging skills. As various ideas are discussed, refined or discarded cognitive conflict and metacognition skills are applied.

### Resource list:

- none

### Useful links:

See: <https://climate.nasa.gov/> for up-to-date information on climate change.

Useful Earthlearningideas related to climate change include:

- Oxygen isotope sweet simulation (ELI+)
- Interpret Earth temperatures from simulated deep-sea and ice cores (ELI+)
- Ice core evidence for climate change (ELI+)
- Modelling tipping points – by hands
- Back in time

**Source:** Chris King of the Earthlearningidea Team.

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