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# PROTECTING OUR FOOD & WATER SUPPLY

**G4005**

**Activities To Build Awareness & Understanding**



**Christine Moorcroft**

**ECO**

**World  
Savers**

# **PROTECTING OUR FOOD AND WATER SUPPLY**

## **Acknowledgements**

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Published by ECO Publishing International Ltd., 2009

ISBN 978-1-907049-04-0

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## Teacher's Guide & Planning

### The Key Issues

- The Earth is becoming warmer.
- What seems like a small rise in global temperature has an enormous effect on plants.
- Crop failure is increasing.

### Additional Activities

#### Language

- Hold a class debate on how to overcome crop failure caused by high temperatures. Different groups could prepare speeches promoting different points of view.

#### Science and ICT

- Plant food seeds such as cucumber, wheat, barley, tomato and raise the temperature of the area around them with heat lamps. Use a digital camera to record the changes and computer software to present them on a time-line. Compare results for the same species at different temperatures and for different species at the same temperatures at different points in their growth.

#### History

- Collect evidence from historical sources about effects of climate change in the past: for example, the Viking age and the 'mini Ice Age' of the sixteenth to nineteenth centuries when the Thames regularly froze over.

#### Geography

- Use internet sources to research the effects of global warming on crops in different countries and how this is affecting people's livelihoods.
- Find out about regions where no crops would grow if temperatures rose permanently and about those that might *benefit* from global warming, but note also the effects of flooding. Consider how the populations could survive.

#### Research

- Research previous periods of global warming: for example, during the tenth and eleventh centuries, when grape vines grew in the north of England and Newfoundland, and when crops flourished much farther north and at higher altitudes than at present in Scandinavia and contributed to a population rise.

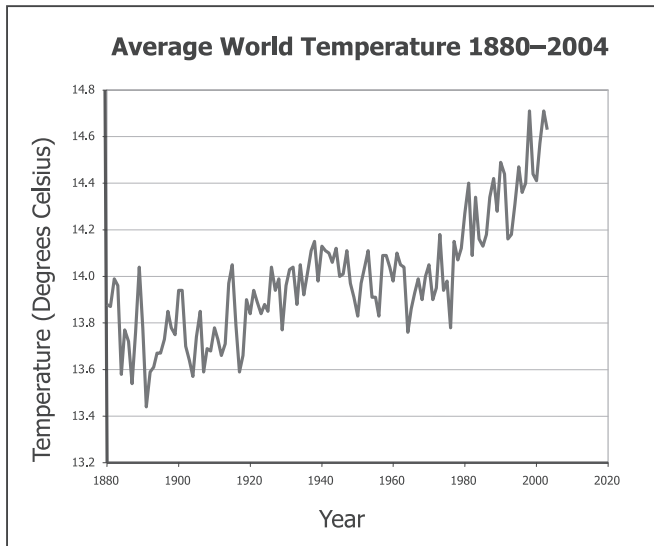
### More Information

Record-breaking high temperatures and drought in 2002 reduced grain harvests in India, the USA and Canada. In 2003 a late summer heat-wave in Europe reduced harvests across the continent. There was a world harvest shortfall of 94 million tons (5% of world consumption). In 2004 scientists from China, India, the Philippines and USA measured the effects of rising temperatures on rice crops: for each 1°C rise in temperature during the growing season the crop fell by 10%.

# PROTECTING OUR FOOD AND WATER SUPPLY

## Too Hot To Grow

The world is becoming warmer. In high temperatures leaves curl up to help keep in moisture. Plants produce food in their leaves by photosynthesis: using carbon dioxide and water to convert light energy into sugar, helped by the green material chlorophyll. Curled dehydrated leaves cannot do this well.



Use the internet.  
Collect facts to support your answer.



- What happened to the world's temperature from 1880-2004?

- Discuss the three solutions for food crops below with your group.
- Write notes so that you can report to the class.

1. Grow the crop farther north where the climate is cooler.	2. Grow the crop on higher ground where the climate is cooler.	3. Find ways to change the plants so that they can cope with higher temperatures.
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Possible solution	
Advantages	Disadvantages

## Teacher's Guide & Planning

### The Key Issues

- Global rainfall patterns are changing: temperate regions are becoming wetter and sub-tropical regions drier.
- Changes in rainfall patterns affect crops, livestock and people.

### Additional Activities

#### Language

- Research and write a newspaper article about how changing rainfall patterns could affect the local area and its inhabitants. Include suggestions as to what action might be needed. Include photographs, maps and charts, using computer software.

#### Maths

- Make accurate measurements and calculations of liquid volume/capacity.

#### Science

- Learn about the water-cycle and investigate evaporation and condensation. Provide cans containing ice and ask the children to observe, record and explain what happens to the outside of the can, then to plan investigations to check their explanations.

#### Geography

- Set up a weather station, measure and record rainfall and store the data using graphing software. Begin a long-term record of local weather and make comparisons with any previous records. Use email to exchange local weather information with schools in other regions and countries.

#### Research

- Find out what different scientists are saying about the causes and effects of rainfall change, and the evidence.
- Use the internet to find out which countries are likely to be the most adversely affected by changing rainfall patterns and what they are doing to deal with its causes and the effects.

### More Information

The quantity of water in the Earth and its atmosphere remains constant but its distribution changes. Water is constantly being absorbed by air, falling to the ground as precipitation (rain, snow, hail), running off impermeable surfaces, soaking through permeable ones, collecting underground, flowing in streams and rivers to lakes and the sea and evaporating into the air. Factors such as temperature, wind, tides, gasses in the air and disturbances such as earthquakes and volcanoes affect this cycle. Scientists are observing and measuring the effects of human activity, such as fossil-fuel burning, on the water cycle. A useful website is [www.worldclimate.com](http://www.worldclimate.com).

# PROTECTING OUR FOOD AND WATER SUPPLY

## Too Dry

Scientists at Environment Canada investigated rainfall from 1925 to 1999. They found that rainfall *increased* in northern Europe, Canada and northern Russia but *decreased* in large areas of southern India, Southeast Asia and Africa south of the Sahara desert.

- Use the internet to find the average yearly rainfall for the countries or regions listed on the chart.
- Find the countries or regions on a globe or world map.
- What is happening to the rainfall there?
- What might it be like there in ten years' time?
- How will this affect crops, livestock and people?



Country or region	Is the rainfall increasing (I) or decreasing (D)?	What it might be like in ten years	Effect on crops, livestock and people
Canada			
Southern India			
Namibia			
Northern Russia			
Zimbabwe			
Philippines			
Southern China			
Norway			
France			
United Kingdom			

## Teacher's Guide & Planning

### The Key Issues

- Bare land becomes vulnerable to accelerated erosion.
- Severe wind and rain increase erosion.

### Additional Activities

#### Language and ICT

- Use a computer to produce reports, with photographs, maps and charts, about soil erosion and preventing it.
- Collect examples of verbs that form nouns following the same pattern as erode/erosion: corrode/corrosion, explode/explosion, decide/decision.

#### Maths and Science

- Investigate ideas for preventing erosion while young plants are growing: for example, by creating wind-breaks and barriers to prevent water erosion.
- Take this opportunity to practise weighing and measuring with precision and recoding data using graphs and charts (by hand or using graphing software).

#### Geography

- Find out about places with soil erosion through loss of vegetation, where crops cannot easily be grown: Easter Island, Iceland, Orkney, deserts. Look at climate details and what inhibits vegetation recovery: very high/low temperatures, low rainfall and so on.
- Look at terraced slopes: tea-plantations in Sri Lanka. Adapt the investigation on page 9 to test the effects of terracing on erosion.

#### Research

- Use the internet to find data on the sizes of deserts over the years. Describe what has happened: for example, whether their area has increased or decreased.
- Read Dr Ray Weil's illustrated recount of soil erosion in Ethiopia. Identify the key points makes. Link this with work in science by repeating his experiment. See <http://soil.gsfc.nasa.gov/stories/erosion.htm>

### More Information

Background erosion is a natural process that removes soil at about the same rate as it is formed. Accelerated erosion is loss of soil at a much faster rate than it is formed. It is the result of human action such as overgrazing or inappropriate cultivation methods (including powerful agricultural implements). These make the soil vulnerable to rain and wind, which detach the soil and move it to other locations. Accelerated erosion affects cultivated and uncultivated areas, causing problems at the erosion site and deposit site.

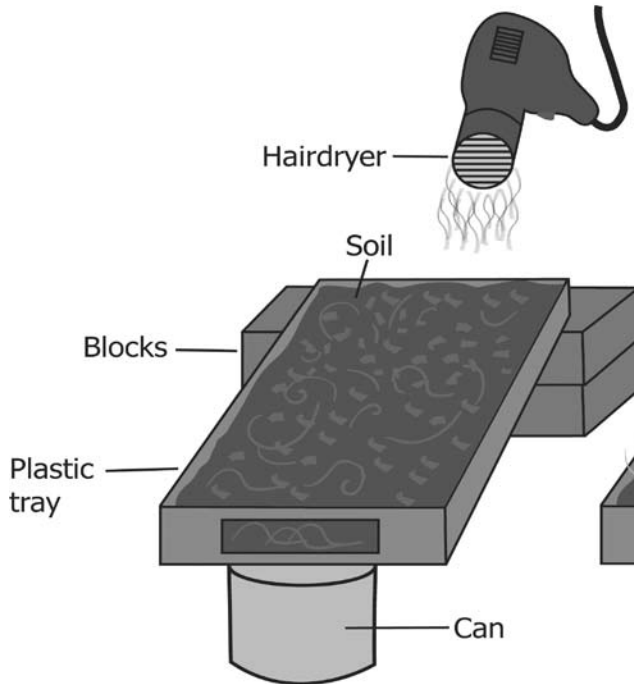
# PROTECTING OUR FOOD AND WATER SUPPLY

## Disappearing Soil

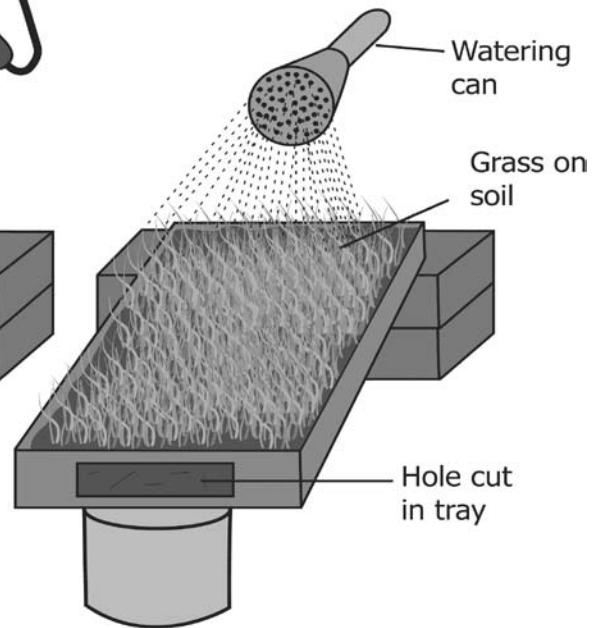
Most food crops need soil. In some places soil is being eroded (washed or blown away).

- Find out how this happens. Try this:

### 1. Blow with a hairdryer



### 2. Pour water on to it



- What happens when rain lands on sloping ground?
- What difference do plants make?
- What happens if you make the slope steeper?
- Record your results on a chart:

Height of top of slope (cm)	Amount of soil blown away (g)		Amount of soil washed away (g)	
	Grass	No grass	Grass	No grass

Think about:  
 – how to look after land with no crops.  
 – how to alter the slope of land.



- What can be done to stop rain and wind eroding soil?

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