CLIMATE CHANGE

ACTIVITY

PLACE YOUR BETS !!!

	RIGHT	WRONG	**BET**	LOSS	GAIN
Only natural factors cause global warming					
Ships (shipping) emit more CO_2 than planes					
The Earth's temperature has risen 0.6°C over the last 100 years					
The Earth's climate has never changed					
Farm animals contribute to global warming					
The Earth was warmer in the 16th century than nowadays.					
The greenhouse effect makes life possible on Earth					
Polar bears are at risk of extinction because of the global warming					
Human activities have influence on climate					
Wind power is a renewable energy					
The sea level has risen 10-20 cm in the last 100 years					
Methane is a greenhouse gas					
Glaciers are advancing in many countries					
			TOTAL		

Grand Total:

UNIT 1. SIGNS OF CHANGE

INTRODUCTION

Climate change has occurred naturally on the Earth many times in the past: the difference today is that the change is occurring extremely quickly and is heavily influenced by human activity. The rapid nature of current climate change reduces the capacity of the Earth to support a well regulated environment with clean air, water, soils and other resources essential to life.

There is a huge amount of evidence of previous global climate change. Dinosaur bones found in areas that are desert today show that they ate tropical vegetation, indicating that the area was not always desert, tree rings, in addition to recorded observations by ancient and modern human communities

1.1. PAST EVIDENCE: THE LITTLE ICE AGE

Vocabulary 1

Activity 1. Match the two columns below to form collocations that are frequently used in Geography

What's a collocation?

Collocation means a natural combination of words. It is a pair or group of words that are often used together.

For example: fast food, game over, make mistakes.

1. farm	a. season
2. frozen	b. peak
3. massive	c. output
4. growing	d. animals
5. agricultural	e. harvest
6. to reach a	f. rain
7. poor	g. flooding

Activity 2. Fill in the first column with the words in the box. Write the word in Catalan in the third column.

to spread, harvest, flooding, famines, growing season,

Term	Definition	Translation
	situation in which water from a river or from heavy rain covers large areas of land	
	the amount of a crop that is collected	
	to gradually affect a larger area or a large number of people or things	
	serious lack of food that causes many people to become ill or to die	
	the period of the year when trees and plants grow	

Activity 4. Read the following text and check the predictions and the collocations you made before.

The Little Ice Age

Western Europe experienced a very cold climate between 1350 and 1850. This period is sometimes called the Little Ice Age.

During this time, the cooler air of the arctic began to spread southward. This caused a higher number of storms and frozen rain affected farmland and killed great numbers of farm animals in Northern Europe due to very cold air during the warmer months. Glaciers in many parts of Europe began to advance, destroying farmland and causing massive flooding.

The climate change of the Little Ice Age had a serious impact on agriculture because it reduced the growing season by up to two months. The impact on agricultural output was significant, with poor harvests that lead to high food prices and famines. In one of the worst famines, millions of people died in France and neighbouring countries in 1693. Food prices reached a peak in the year 1816 – "the year without summer".

The cooler climate during the Little Ice Age had a huge impact on the health of Europeans. Malnutrition led to a weakened immunity to a variety of illnesses, including bubonic plague – the Black Death- which killed a third of the population of Europe in the late 1340s.

Adapted from: OBJECTIVE IELTS, Intermediate. Cambridge University Press (2006)

Activity 5. Now, check your notes and answer the following questions

1. What was the Little Ice Age?

……

2. When did it happen?

……

3. Where did it happen?

……

4. Why?

……

……

……

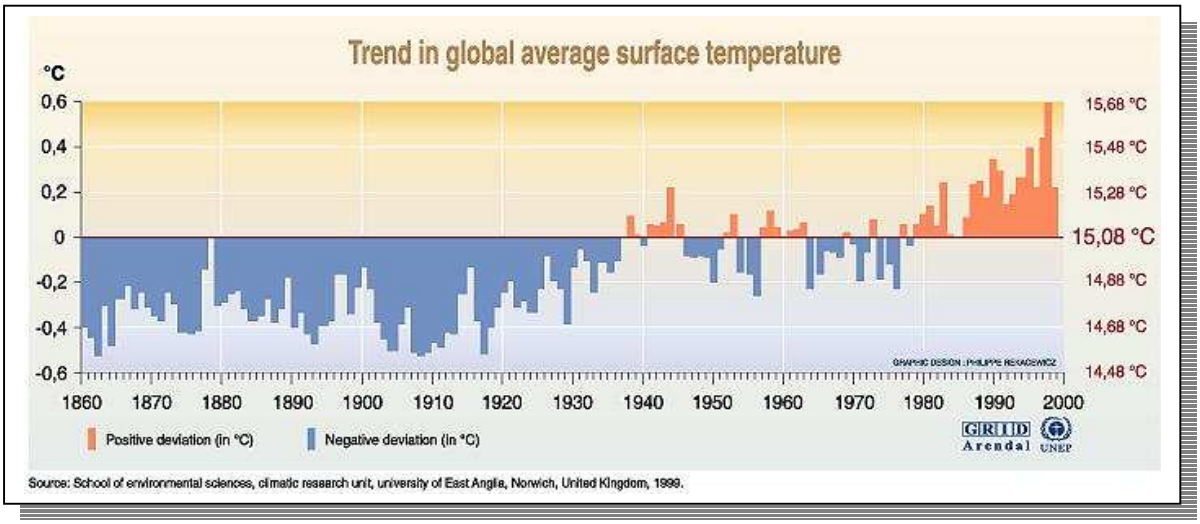
5. Write two consequences

……

……

1.2. EVIDENCE TODAY

1.2.1. Temperature Rise



Source: http://www.climateark.org/overview/14.asp

Activity 6. Describe the graph using the words in the table below

The graph	indicates	the trend in the Earth's average temperature in ºC
The y-axis on the left	presents	the time studied from 1860 to the end of 20th century
The y-axis on the right	shows	the temperature of the Earth's surface
The x-axis		the deviation from the average temperature

Activity 7. Answer the following questions

1.What's the average surface temperature for the period in the graph (1860-2000)?

The average……

2.What was the temperature in 1890?

……

3. What was the difference in ºC between 1930 and 1995

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4. What was the deviation in 1938?

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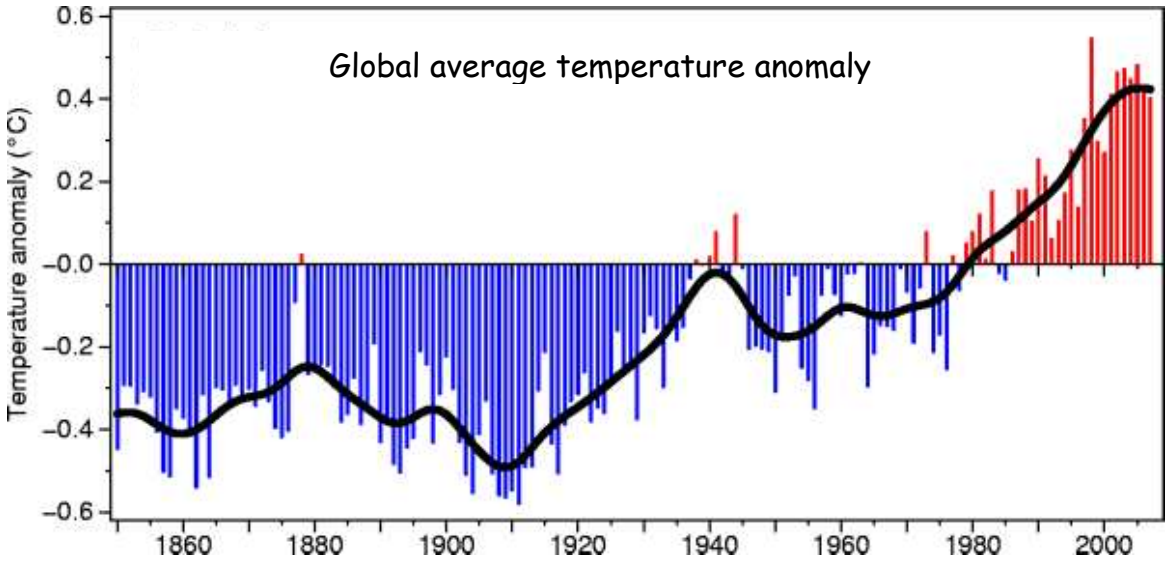
5. What was the coolest year in this 140 year period ?

……

Activity 8. Look at the graph and use the tables below to write a brief text describing the information.



Source: www.school-portal.co.uk

You can begin like this: *The graph shows that the trend in……*

Expressing changes

to rise / a rise to increase / an increase to ao ub	slight / slightly gradual / gradually
to be stable to fluctuate	sharp / sharply dramatic / dramatically clear / clearly
to decrease / a decrease to decline / a decline	

Time expressions

From .....to	Between ..... and	In.....
From....until.....	Since	

1.2.2. Glaciers Retreat

Activity 9. Complete the sentences below with the following endings:

What is an alpine glacier?

a. ...and forms the ice
b. ...near the poles or on high mountains.
c. ...large masses of ice.
d. ...is high and temperatures are cool, even in summer
e. ...are receding.

1. Glaciers are.....
2. Snowfall accumulates during many years.....
3. Most glaciers form where snowfall.....
4. Glaciers are normally found.....
5. Around the world, the fronts of most glaciers.....

Activity 10. Fill in the gaps with the words in the box below

How do glaciers respond to changes in climate?

Alpine glaciers	melt	retreating	climate change
decreases	average temperature	flow	

_____ are very susceptible to changes in the climate. Over long periods, glacial response to _____ becomes obvious. If the _____ on Earth increases, alpine glaciers _____. Nowadays, most glaciers in the world are _____. The opposite is true as well. If the average annual temperature _____ and the snow at high altitude increases, the glacial ice _____ downhill.

Vocabulary 2

Activity 11. Fill in the first column with the words in the box. Write the word in Catalan in the third column.

to recede / to retreat, thick, thin, to shrink, to melt, length

Term	Definition	Translation
	to change a solid substance into a liquid	
	a thin object has a short distance between two opposite sides	
	to move back and cover less of a place	
	to become smaller in size	
	a measurement of how long something is in distance	
	a thick object has a long distance between two opposite sides	

One example of glacier retreat:

Pasterze, Austria.

Source: www.planetearthpeaceparty.com

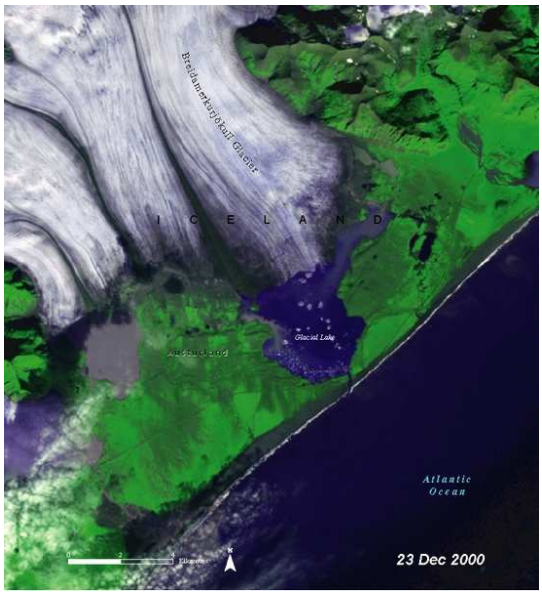
This is the longest glacier in Austria. It was about 2 kilometers longer in the XIX century. But now it is shrinking. An artificial lake, is now in the place where the glacier base was in 1875. The glacier is now about eight Km long and loses about 15 meters per year. However in 2003 the Pasterze decreased 30 meters in length and 6.5 meters in thickness.

Vocabulary

Glacier	Retreat	Long
Base	Decrease	Large
Coast	Length	Small
Ocean edge	Thinning	Thin
Tip	Thickening	Thick
Basin	Melt	Fast

Activity 12. Contrast the two pictures below. Use some of the vocabulary in the boxes and the text in the example on the previous page.

Breidamerkurjökull Glacier, Iceland.



Source: Google Earth

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Activity 13. In this task you are going to use Google Earth to see how climate change could affect our planet.

1. Start Google Earth, then look at the list of layers in the **Layers panel** which is on the bottom leftcorner.

Layers show information placed on top of the Google Earth satellite images of the Earth. For example, they show the borders of countries and the names of cities, or buttons which link to photos of places.

2. Experiment with the different parts of the Layers panel. You can switch different layers on and off by clicking on the relevant boxes to tick or untick them. See what happens to the Google Earth view.

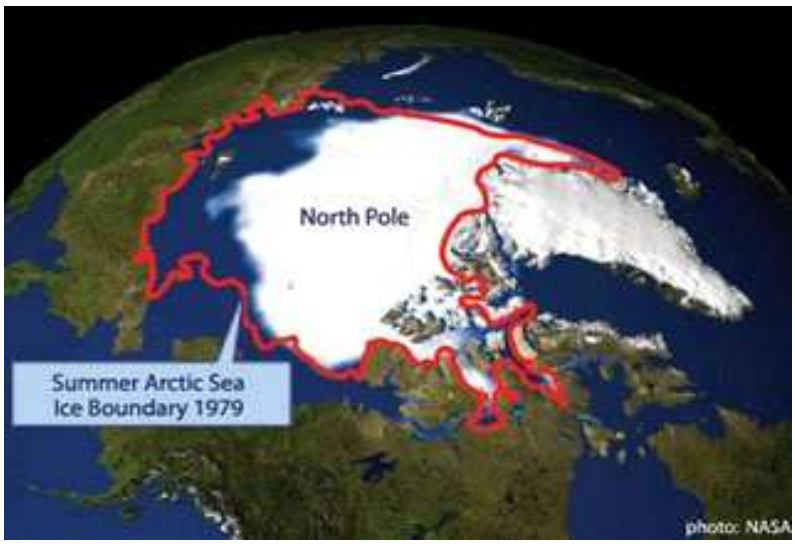
3. You can use the layer panel to find out more about climate change:
- Click the plus icon next to Global Awareness in the Layers list.
- You will see that it expands to show more layers.
- Look for the UNEP icon – this stands for United Nations Environment Programme.
- Click the tick box next to it to switch on this layer.

The UNEP 'Atlas of Our Changing Environment' shows photos of places around the world where the environment is changing.

You can find information on different places by looking for the square blue and black UNEP icons as you explore Google Earth.

1.2.3. Polar Ice Melt

Student A



source :www.oceanvoyager.org

North Pole

At the top of the world, around the North Pole is ocean, with ice thickening in winter and thinning in the summers. The extent of ocean covered by ice is getting smaller each year. The extent of the Arctic sea has decreased by 14% since the 1970s. If the ice cap continues shrinking at the same rate, by the end of this century some projection show that there will be no summer ice at the Artic Ocean.

Activity 14. Read the text above and look at the image. In turns, ask your partner the four questions and answer them with the information he/she gives you.

1. Where is the image from?

.....

2. What is happening?

.....

.....

3. What has happened?

.....

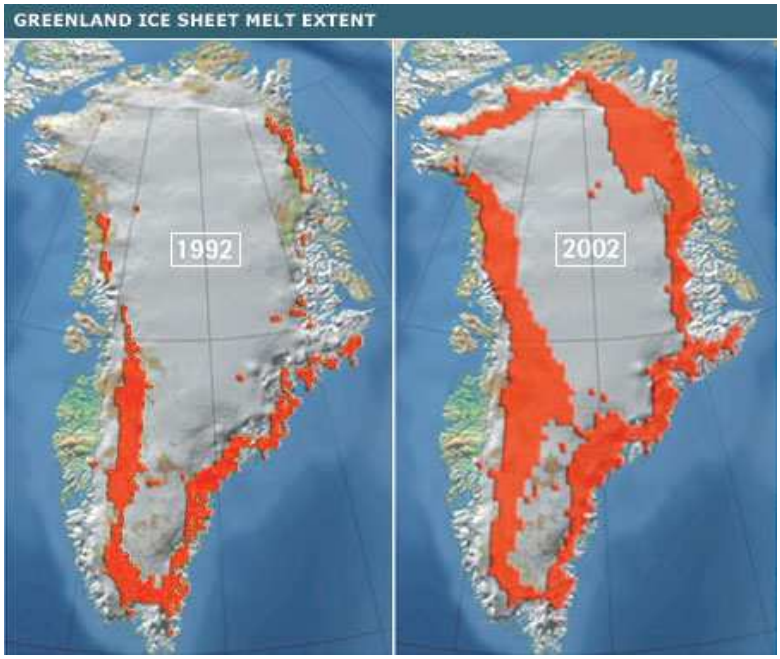
.....

4.What will happen?

.....

.....

Student B



source: www.heartspring.net/images

Greenland

The Greenland ice sheet is, after Antarctica, the second biggest expanse of ice in the world. Some images show how the areas of Greenland that melt in summer have expanded (orange) in recent years. In February 2006 researchers discovered that glaciers in Greenland are moving much faster than before meaning that more of its ice is entering the sea.

Activity 14. Read the text above and look at the images. In turns, ask your partner the four questions and answer them using the information you are given.

1. Where is this image from?

.....

2. What is happening?

.....

.....

3. What has happened?

.....

.....

4. What will happen?

.....

.....

UNIT 2. GLOBAL WARMING

The Sun is the source of all energy on our planet. But many different factors affect how much of the sun's energy goes into the Earth system and how much of it goes out into space. Many different things can affect the climate of our planet. Global warming is the increase in the average temperature of the Earth's atmosphere and oceans in recent decades. To understand why it is happening you should first know about the greenhouse effect.

Vocabulary 3

Activity 15. Fill in the first column with the words in the box. Write the word in Catalan in the third column.

greenhouse, greenhouse gases, surface, to heat / to warm, to release, to remain, average, belch

Term	Definition	Translation
	When gases in the atmosphere trap heat energy/ infrared radiation and keep the Earth warm.	
	Gases that trap heat in the atmosphere.	
	To let a substance or energy spread into the area or atmosphere around it.	
	To stay in a particular place or position	
	The level that is typical of a group of people or things	
	To make something hot / warm	
	The outside part of something	
	burp, emit stomach gas through one's mouth	
	Animals such as cows, sheep, and pigs that are in farms	

2.1. THE GREENHOUSE EFFECT

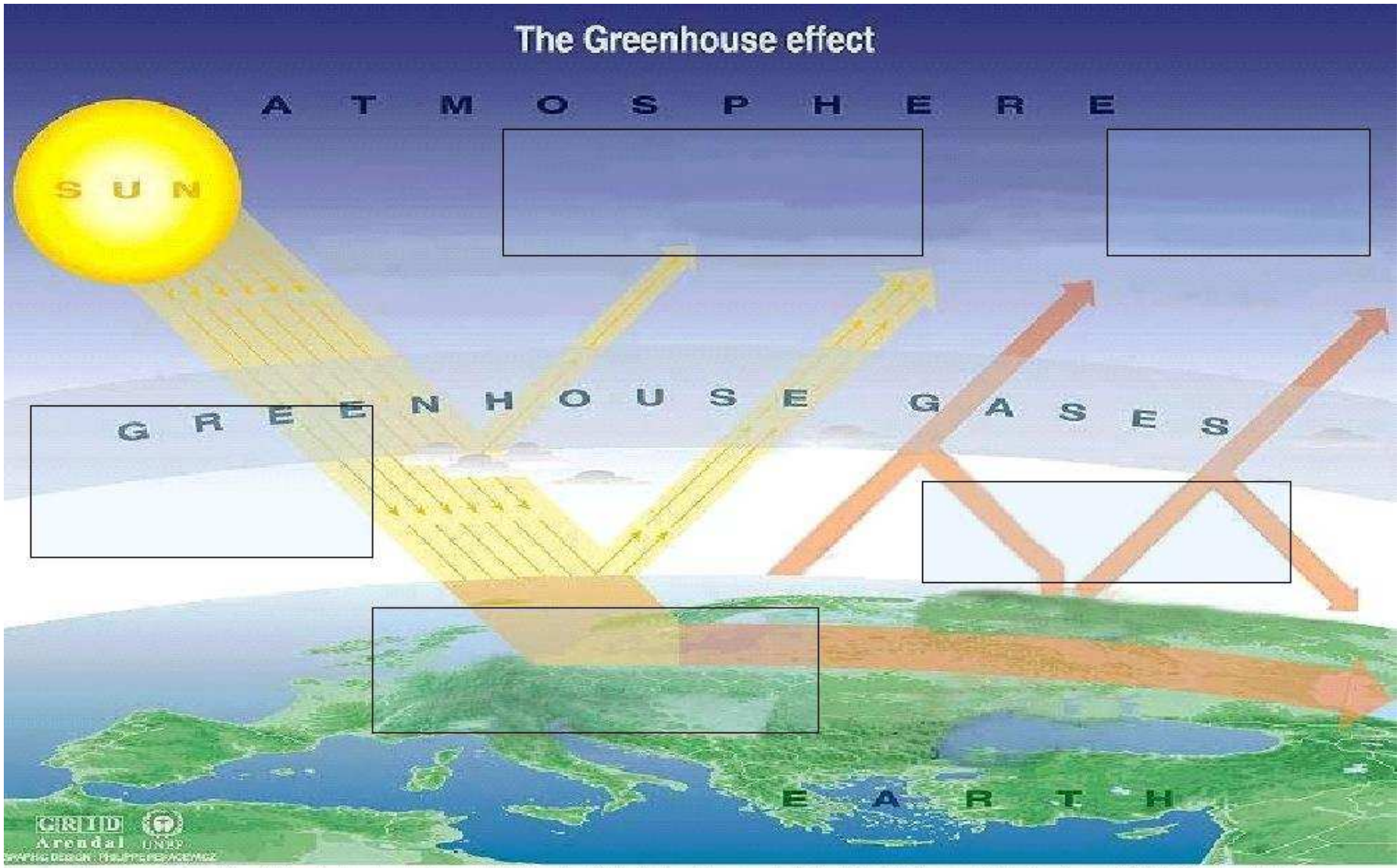
You can hear people talking about the greenhouse effect as if it is a bad thing. It is not a bad thing. The greenhouse effect is a natural process that controls the temperature within the Earth's atmosphere.. Our planet's atmosphere traps energy just like a greenhouse. Energy from the Sun can enter the Earth's atmosphere, but not all of it can easily find its way out again. Greenhouse gases trap the heat that the Earth emits. They act like the glass that heats air inside a greenhouse. Without this effect the planet would be too cold for life: the average surface temperature would be about -18º Celsius.

So, why are people worried about the greenhouse effect?

The problem is that the Earth is warming up very rapidly. This is happening because we are adding more greenhouse gases to our atmosphere, causing a bigger greenhouse effect. The increased greenhouse effect is causing changes in our planet that can affect our lives.

Activity 16. Describe the process of the greenhouse effect. **Look at the picture on the following page. Put the following sentences in the right boxes**.

- Some solar energy is absorbed by the Earth's surface and warms it.
- Some solar radiation is reflected by the atmosphere.
- Some solar energy passes through the atmosphere.
- Some of the infrared radiation passes through the atmosphere and is lost in space.
- The Earth re-radiates this energy as infrared radiation. Some of the infrared radiation is absorbed by the greenhouse gases, warming the Earth's surface and the troposphere.



Sources: Okanagan university college in Canada, Department of geography, University of Oxford, school of geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

2.2. GREENHOUSE GASES

The main greenhouse gases are water vapour, carbon dioxide (CO_2), methane (CH_4) and HFCs. All of them come from natural sources and from human activities. The big problem is that during the last centuriy the amount of these gases caused by human activities has increased a lot.

Activity 17. Sources of greenhouse gases . Fill in the gaps with the following words

methane, carbon dioxide, water vapour, halocarbons, nitrous oxide

_____ is the biggest contributor to the 'natural greenhouse effect'. Human activities have little impact on the level of _____ in the atmosphere.

_____ comes from a number of natural sources, such as the decay of plants, volcanic eruptions and from animal and human respiration. Human activities have increased the amount of _____in the atmosphere by burning fossil fuels to heat homes, run vehicles and in power factories.

Micro-organisms take nitrogen from the soil and put it back into the atmosphere and this process produces _____. It also enters the atmosphere from the ocean. The use of some fertilisers also releases important quantities of _____into the atmosphere.

Some bacteria causes _____ in the animals' stomach and the emissions are produced when they belch. There is also _____ in natural gas deposits. An increase in farm animals is causing an increase in atmospheric methane. Other sources are the extraction of fossil fuels.

These gases very rarely occur naturally. We use _____ as spray can proppellents, solvents and coolants.

Activity 18. In groups of three, choose one column and match the words in the box with the correct paragraph.

Plants	Natural wetlands	Clouds	Volcanoes	Fertilizers	Oceans
Factories and Power Plants.		Cars and trucks		Farm animals	

A B C

Trees, grass, and flowers help our world. They absorb carbon dioxide from the atmosphere and release oxygen, in a natural process called photosynthesis, using the Sun's energy, water and carbon dioxide. Thanks to plants, not all carbon dioxide

Vehicles that use fossil fuels (gasoline) make greenhouse gasses that cause global warming. Burning gasoline makes carbon dioxide and nitrous oxide that go into the atmosphere.

They are important natural ecosystmes. They also contribute to global warming because bacteria living in wetlands make methane, a greenhouse gas.

They help slow global warming by trapping heat. Heat is absorbed by ocean water.

Many farms put them on plants that contain nitrate and ammonium. These chemicals make nitrous oxide, a very powerful greenhouse gas.

Did you know that cows and sheep contribute to global warming? A greenhouse gas called methane is made in their bellies as they digest the grass and grain they eat. The gas is released from the animals producing 17 percent of the methane in the atmosphere.

They reflect sunlight and keep Earth's surface cool. However, the water vapour within clouds is a greenhouse gas. It traps heat in the atmosphere by bouncing energy back towards the Earth.

They usually burn fossil fuels, putting large amounts of greenhouse gasses into the atmosphere.

Eruptions send ash particles high in the atmosphere. This ash blocks sunlight from reaching the Earth's surface so it can cause cooling. However, volcanoes also release carbon dioxide, a greenhouse gas which causes warming.

Activity 19. Write four true sentences using the words in the table

Carbon dioxide Methane Halocarbons gases Nitrous gases	...is/are released into the atmosphere from...	fertilisers. aerosols. animals' stomach through their mouth. factories, power stations and vehicles.

1-.....

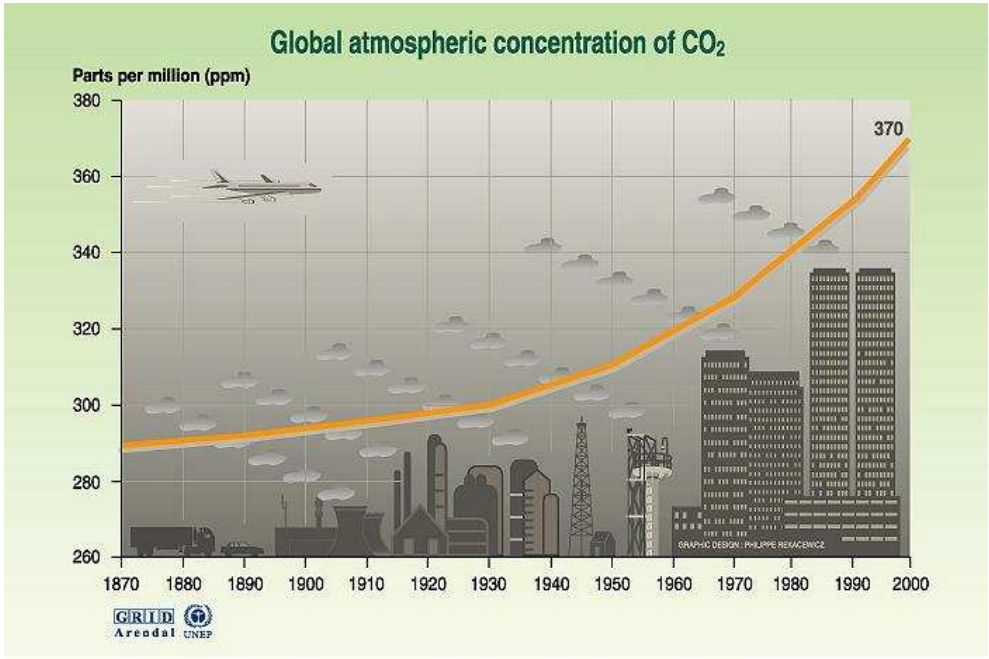
2-.....

3-.....

4-.....

2.3. THE CO_2 EMISSIONS

Carbon dioxide is the most important of the greenghouse gases, forming 80% of the industrialised world's greenhouse gas emissions. About 80 per cent of the world's energy is currently supplied by fossil fuels such as coal, oil and gas, causing great emissions of Co2 to the atmosphere.



Sources: TP Whorf Scripps, Mauna Loa Observatory, Hawaii, Institution of oceanography (SIO), university of California La Jolla, California, United States, 1999

Activity 20. Describe the graph using the words in the box below

The atmospheric concentration of CO_2	increased rose went up	gradually steadily slightly sharply	betwween 1870 and 1930 from 1930 to 2000	going from about 290 ppm to 300 ppm reaching 370 ppm at the end of the period
There is	a gradual rise in a slight rise in a sharp rise in	the concentration of CO_2 in the atmosphere		

The graph	indicates presents shows	the atmospheric concentration of CO_2	in parts per million (ppm)
The x-axis		the time studied	from 1870 to the end of 20th century
The y-axis		the concentration of CO2 in the atmosphere	in periods of 10 years

Activity 21. Watch the video  **and list the sources of CO_2 emissions that appear in it.**

Activity 22. While listening, read the transcription of the video and complete the gaps

Energy-dependent …….. appliances are part of our modern way of life. Most of the energy they use comes from burning gas, ……., which emit, carbon dioxide, CO_2, in to the atmosphere, ……. the planet's climate.

We also waste large ……. unnecessarily, which only increases CO_2 emissions affecting the climate even further.

We are now producing more CO_2 than the world can ……..

We can only tackle climate change, if we all act, now – ……. – by using and ……. and therefore, reduce the CO_2 emissions we are each responsible for.

To …….. more about climate change and how to reduce your CO2 footprint, go to: direct.gov.uk/Act On CO2.

UNIT 3. CONSEQUENCES

3.1. EXPECTED CONSEQUENCES

Activity 23. Fill in the first column with the words in the box. Write the word in Catalan in the third column.

Vocabulary 4

to warn / warning research tide sewage bloom to breed

Term	Definition	Translation
	to appear or occur unexpectedly or in remarkable quantity or degree	
	a flowing stream /the waters of the ocean	
	to give notice to beforehand especially of danger or evil	
	refuse liquids or waste matter usually carried off by an artificial usually subterranean conduit	
	to search or investigate exhaustively / investigation or experimentation aimed at the discovery and interpretation of facts.	
	to produce offspring by sexual union	

Activity 24. Mutual Dictation **Student A**

Warmer temperatures cause oceans to expand, and melting glaciers add to the volume of water. Both result in rising sea levels.

……

…… and ……

……

Many species and ecosystems, already at risk from human development, will not be able to adapt to new climatic conditions.

……

but some ……

and, ……, ……

……

In some areas, rainfall will be less predictable.

……, ……

……, and ……

……

Activity 24. Mutual Dictation **Student B**

……
……
……

Warmer temperatures can extend the habitat for the insects and climate change will favor the spread of diseases like malaria.

……,
already ……, …
……
……..

Population is increasing and water demand is rising but some areas will experience less annual rainfall, and, as glaciers are melting, they will not provide / feed water to some rivers.

……
……

Coastal erosion, saltwater intrusion into freshwater supplies, and coastal storms all combine to threaten coastal areas and cities.

Activity 25. WHAT ARE THE MAIN IMPACTS OF CLIMATE CHANGE? (An Incovenient Truth)

	The Impact of Climate Change on:	Recent changes: facts and figures	Names of the places affected
A	Glaciers all over the world		
B	World air temperatures		
C	Rainfall, evaporation and drought		
A	The Arctic circle		
B	Biodiversity		
C	Sea-level rise and inhabited areas		

3.2. WHAT WILL THE IMPACT OF CLIMATE CHANGE BE ON *OUR PLACE*?

Activity 26. PowerPoint presentation.

a. Choose one of the main areas of impact looked in the film "An Incovenient Truth" and think how it could have impact on your community.

Remember that the impact could be physical but don't forget to think about the concept of interdependency. For example:

- What products may no longer be sold in local shops due to changes occurring in the regions where these product are made?
- How might the holiday destinations of local people, family and friends change?
- Might more refugees need to come and live here if their own countries become uninhabitable?

b. Your presentation must include the following points

Title and brief introduction

The cause for the changes (1 or 2 slides)

The effect (1 or 2 slides)

The direct/indirect impact on your community (1 or 2 slides)

Activity 27. You are going to listen to three radio advertisements. Look at the pictures and identify the places where the action is happening

Place: Listening:

Place: Listening:

Place: Listening:

Place: Listening:

Place: Listening:

Place: Listening:

Activity 28. Listen again while you read the listening transcripts. Then, answer the following question:

What's the purpose of these radio adevertisments?

LISTENING TRANSCRIPTS

1. High Street radio advertisement

SFX: Bubbles from an aqualung.

VO: *(His voice has a bubbling sound effect as if he is deep sea diving.)* With rising sea temperatures, the effect of climate change will certainly be felt down here.

SFX: The sound inside a high street Fish and Chip Shop. Traffic etc. outside.

VO: *(now normal)*…but it will also be felt here on our High Streets…

FISH 'N' CHIP SHOP OWNER: Salt and vinegar on the cod, mate?

VO: *(To Fish 'n' Chip Shop owner.)* Yeah thanks. *(To us)* …Climate change is going to affect *all* our lives. But if everyone works together we can all tackle it.

Find out more and how you can get involved: visit climatechallenge.gov.uk - now.

Tomorrow's climate is today's challenge.

2. 'Dukes Head' radio advertisement

SFX: Polar wind.

VO: *(Shouting a little to be heard over the sound of the wind.)* Looking at the melting polar ice caps it's all too easy to see the effect that climate change is already having here.

SFX: The sound inside a pub…

VO: *(now normal)*…It may not be quite so easy to see it here yet, in the Duke's Head

BARMAID: Ice with that?

VO: *(To barmaid.)* Thanks. (To us.) But just think how many times someone in the pub says, 'funny weather we're having'?

Climate change will affect us *all*, But if everyone works together we can all tackle it.

Find out more and how *you* can get involved, visit climatechallenge.gov.uk.

Tomorrow's climate is today's challenge.

3. 'Here' radio advertisement

SFX: The sounds of the rain forest.

VO: Climate change is certainly making itself felt here in the Amazon rain forests.

SFX: Leafy English suburb. Birdsong, distant traffic.

VO: Here, in Britain, the effects may not be quite so obvious…yet. However, climate change will affect us *all*, but if everyone works together we can all tackle it.

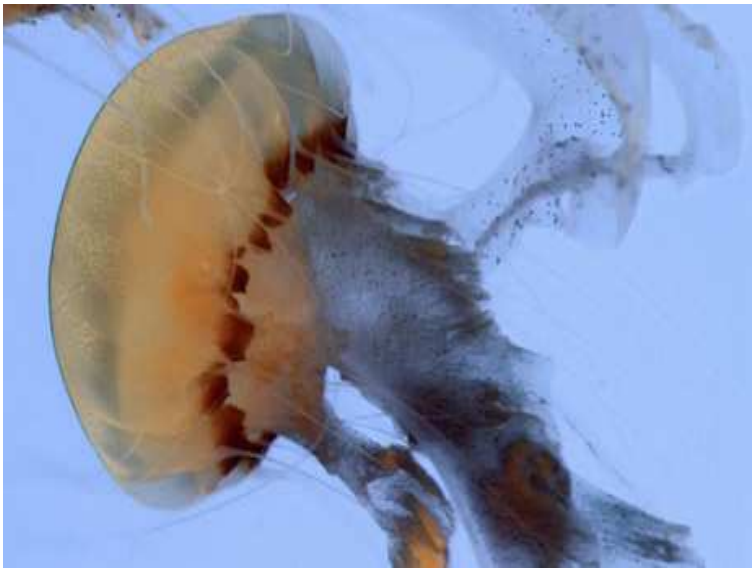
Find out how you can get involved: visit climatechallenge.gov.uk

Tomorrow's climate is today's challenge.

Activity 29. Read the text, check your predictions and fill in the gaps.

The Guardian | Friday February 29 2008

Scientists warn of new plague of jellyfish



Costa Brava to suffer summer invasion

Paul Hamilos Madrid

Scientists in Spain are warning that the plagues of jellyfish that have been a big problem for Mediterranean swimmers in recent years will return this summer.

In November, scientists at the Barcelona-based Institute of Marine Sciences (ICM) began studying the life cycles of jellyfish off the Costa Brava, and were alarmed to detect large numbers of them growing in the winter, ready for an assault on Spain's beaches.

According to Josep-María Gili, research professor at the ICM, these groups were born last autumn, and the summer tides will carry them inland from deeper waters, causing the plagues that have seen millions of jellyfish wash up on Spain's beaches in recent years.

Brainless menace

Jellyfish are brainless invertebrates, made up of .....water. They cannot swim, but are propelled by winds and the sea's currents. There are more than ..... species, the largest of which have tentacles of up to ..... metres. About ..... produce a sting that can be harmful to humans.

In ....., the Red Cross treated ..... people who had been stung on the beaches of Catalonia, while on a single day in August, 400 bathers were treated at a beach in Málaga. In December hundreds of swimmers were stung off south-eastern Brazil.

As a result of over-fishing, the jellyfish do not have to face their usual predators and competitors, which usually regulate population growth. "*For us the major problem is the global disequilibrium in the sea caused by over-fishing*" said Professor Gili. Numbers of large fish such as swordfish and red tuna, which eat jellyfish, have been drastically reduced as have the smaller fish, such as sardines and whitebait, which compete for food with the jellyfish.

According to Gili, the recent growth in jellyfish numbers "*is a message from the sea that something is wrong. People need to realise that adult fish, play an important role in the sea - they are the principal carnivores. We must change the laws about over-fishing and the type of fishing*."

Dr Reyes Tirado, at the Greenpeace research laboratories in Exeter, said the plagues were not just caused by over-fishing: "*Our activities on land also play a big part ... overloading of coastal waters with nutrients both from sewage and from agricultural fertiliser runoff are also important,*" she said. "*Excess nutrients can have disastrous effects on coasts, causing blooms of algae and helping jellyfish populations to increase*".

Global warming has also caused the ideal conditions for jellyfish to breed: mild temperatures, little rain and a lack of the usual winter rainstorms. "*Add to these factors the warmer waters and changing marine currents caused by climate change and the problem of jellyfish invasions will be much worse in the future*." Plagues of jellyfish are nothing new, but recently the blooms are more general and populous.

Another cause of the problem is the decrease in leatherback turtles, a principal predator, which have been driven to the point of extinction because the beaches where they lay eggs have been used for tourism.

Adapted from The Guardian February 29, 2008

Activity 30. Read the fragment of the article and take notes.

Reason
Who:
.....
What:
.....

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Reason
Who:
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What:
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Reason
Who:
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What:
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Activity 31. Read the following sentences and decide if they are true or false.

	T	F
Jellyfish assault Spain's beaches in winter		
Plagues of jellyfish are recent and new		
Professor Gili sent a message to the adult fish in the sea		
Jellyfish breed more easily in warm waters		
Small fish, such as sardines and whitebait eat jellyfish		
Agricultural fertilisers are nutrients for jellyfish		
Red tuna is one of the jellyfish predators		