Betting Game.

Aim: predicting and activating prior knowledge about Climate Change.

Procedure:

- In pairs students read the statements and decide if they are right or wrong. They tick (✓) the box in the appropriate column.
- Depending on how sure they are they bet a number (BET column). You can suggest the numbers (e.g. 10, 20, 30...100 or 25, 50, 75, 100).
- Don't answer any question about vocabulary or content while students are deciding their bets.
- When checking the answers students write the number they bet in the Loss or Gain column. Then they add the numbers in each column and put a total. Finally, subtract the totals and get the Grand Total.
- Which pair has the largest number?

KEY

	RIGHT	WRONG
Only natural factors cause global warming		✓
Ships (shipping) emit more CO2 than planes	✓	
The Earth's temperature has risen 0.6ºC 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		✓

UNIT 1. SIGNS OF CHANGE.

Vocabulary 1

Activity 1.

Key

Farm animals / frozen rain / massive flooding / growing season / agricultural output / to reach a peak / poor harvest.

Activity 2.

Term	Definition	Translation
flooding	situation in which water from a river or from heavy rain covers large areas of land	inundació
harvest	the amount of a crop that is collected	collita
to spread	to gradually affect a larger area or a large number of people or things	estendre
famine	serious lack of food that causes many people to become ill or to die	fam (conseqüència d'alguna catàstrofe natural.)
growing season	the period of the year when trees and plants grow	Període de l'any en que creixen les plantes.

1.1.1. PAST EVIDENCE

Activity 3. Predicting.

Tell your students they are going to read a text about The Little Ice Age. They have to predict what The Little Ice Age was, when, where and why it happened.

Activity 5.
After reading the text and checking their predictions students answer the questions. Possible answers:

1. The Little Ice Age was a period with a very cold climate.
2. It happened between 1350 and 1850.
3. It happened in Western Europe.
4. Because the cooler air or the arctic began to spread southward causing a higher number of storms and frozen rain in many countries of Western Europe.
5. Consequences:

- Glaciers in many parts of Europe began to advance destroying farmland and causing massive flooding.
- The cooler temperatures reduced the growing season by two months.
- There were poor harvests that led to high food prices and famines.
- Malnutrition led to a weakened immunity to a variety of illness.

1.2. EVIDENCE TODAY

1.2.1. Temperature Rise

Activity 6.
KEY

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

Activity 7.

Procedure

After students answer the questions, you can ask more questions about the data on the graph and ask students to answer them orally.

KEY

- The average surface temperature is 15,08 ºC
- The temperature in 1890 was 14,68 ºC
- The difference in ºC between 1930 and 1995 was 0,6 ºC (more or less)
- The deviation in 1938 was 0,1 ºC
- The coolest year was 1863

Activity 8.

There are many possible ways of writing a text to describe the information on the graph. Before starting, teacher can ask students some questions about the data on the graph and write their answers on the board as examples. Then, students must write a text with simple sentences **using the expressions in the boxes** to describe how the temperature changed from 1860 to 2005.

1.2.2. Glaciers Retreat

Activity 9.

KEY

1c / 2a / 3d / 4b / 5e

Activity 10.

KEY

1. Alpine glaciers / 2. climate change / 3. average temperature / 4. melt / 5. retreating / 6. decreases / 7. flow

Activity 11.

Vocabulary 2

KEY

Term	Definition	Translation
to melt	to change a solid substance into a liquid	derretir
thin	a thin object has a short distance between two opposite sides	prim
to recede / to retreat	to move back and cover less of a place	retrocedir
to shrink	to become smaller in size	encongir(-se)
length	a measurement of how long something is in distance	llargària
thick	a thick object has a long distance between two opposite sides	gruixut

Activity 12.

There are many different ways to write a text contrasting the two pictures of the Breidamerkurjökull Glacier (Iceland). Students must use the words in the boxes and the structures (e.g. comparatives) used in the example of the Pasterze Glacier (Austria).

Activity 13.

Aim

Search for information about climate change and its causes. Students will consider some of the different viewpoints on climate change. They are going to use Google Earth to see how climate change could affect our planet.

Understand and follow instructions in English.

Procedure

Students need the English version of Google Earth installed in their computers. They must follow the steps they have in their worksheets.

Activity 14.

Put the students into A and B pairs. Give each student A or B sheet. Tell them not to let their partner see their sheet.

Give students time to read and understand their texts. If there is anything they don't understand they must ask you.

Student A starts by asking the first question to Student B and takes notes with the information. Student B asks the first question to Student A and takes notes. They continue like this until they have completed the four questions.

They check what they have written by reading it back to each other.

UNIT 2. GLOBAL WARMING.

Activity 15.

Vocabulary 3

KEY

Term	Definition	Translation
greenhouse effect	When gases in the atmosphere trap heat energy/ infrared radiation and keep the Earth warm.	efecte hivernacle
greenhouse gases	Gases that trap heat in the atmosphere.	gasos d'efecte hivernacle
to release	To let a substance or energy spread into the area or atmosphere around it.	soltar, emetre
to remain	To stay in a particular place or position	romandre
average	The level that is typical of a group of people or things	mitjana
to heat / to warm	To make something hot / warm	escalfar
surface	The outside part of something	superfície
belch	burp, emit stomach gas through one's mouth	rotar

Activity 16.

KEY

1. Some solar energy passes through the atmosphere.
2. Some solar radiation is reflected by the atmosphere.
3. Some solar energy is absorbed by the Earth's surface and warms it.
4. 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.
5. Some of the infrared radiation passes through the atmosphere and is lost in space.

Activity 17.

KEY

Water vapour: 1,2
Carbon dioxide: 3,4
Nitrous oxide: 5,6
Methane: 7,8
Halocarbons: 9

Activity 18.

KEY

A	B	C
Plants	Oceans	Clouds
Cars and trucks	Fertilizers	Factories and Power Plants
Natural Wetland	Farm Animals	Volcanoes

Activity 19.
KEY

1. Carbon dioxide is released into the atmosphere from factories, power stations and vehicles.
2. Methane is released into the atmosphere from animals' stomach trough their mouth.
3. Halocarbons gases are released into the atmosphere from aerosols.
4. Nitrous gases are released into the atmosphere from fertilisers.

Actity 20.

Procedure

Students use the tables to describe orally the graph on Global Atmospheric concentracion of CO_2

Activity 21, 22.

Play the video "*My CO_2 Film".* Students take notes of the energy-dependent home appliances they are watching: power station, TV, heating, tap, mobile phone charger,…..

Fill in the gaps.
KEY: home / oil and coal / changing / amounts of energy / cope with / together / wasting less energy / find out

UNIT 3. EXPECTED CONSEQUENCES

Activity 23.

Vocabulary 4

Term	Definition	Translation
to bloom	to appear or occur unexpectedly or in remarkable quantity or degree	florir
tide	a flowing stream /the waters of the ocean	marea
to warn	to give notice to beforehand especially of danger or evil	avisar
sewage	refuse liquids or waste matter usually carried off by an artificial usually subterranean conduit	residus
to research	to search or investigate exhaustively / investigation or experimentation aimed at the discovery and interpretation of facts.	investigar
to breed	to produce offspring by sexual union	reproduir-se

Activity 24.

Procedure

1. Students work in pairs. On of them has the worksheet for student A and the other one has the worksheet for student B. In turns, they dictate each other the texts they have in the boxes.
2. Students with the same worksheet make groups of 4 and check what they have written.
3. Two volunteers write on the board an example of both texts. Students check them.

Activity 25,26, VIDEO: "*An Inconvenient Truth*".

Aim

Pupils should learn why climate change is important on a global scale and what its main impacts are (and could be).

Procedure

Students watch the 24-minute sequence of climate change impacts taken from "An Incovenient Truth":

- Scene 07 *Glaciers recede*
- Scene 11 *Rising temperatures*
- Scene 12 *Hurricanes*
- Scene 14 *Precipitation and evaporation*
- Scene 16 *The Arctic*
- Scene 19 *Troubling signs*
- Scene 20 *Antarctica*
- Scene 21 *Sea-level rise*

Photocopy the supplied grid for pupils. In groups of three they write down the main problems that climate change is bringing and note the names of any places that are or will be particularly badly affected. Every student, A,B and C takes notes on two different impacts from the list in the first column of the grid.

Students (individually or in pairs) produce a PowerPoint presentation following the instructions in their worksheets.

Note: Teacher should be aware of some controversial points in Al Gore's film.

Source: *The climate change film pack – Guidance for teaching staff*.

Scene 07 Glaciers recede

Although many of the examples in this scene are well chosen to illustrate the effects of human-induced climate change, the causes of the recession of snows on Kilimanjaro are complex and related to local factors. It cannot be established that this is mainly attributable to human-induced climate change.

Scene 12 Hurricanes

There is insufficient evidence to establish clearly that particular one-off weather events, such as Hurricane Katrina, are attributable to climate change. However, the IPCC concludes that it is likely that there has been an increase in intense tropical cyclone activity in some regions and morelikely than not that humans have contributed to this.

Scene 14 Precipitation and evaporation

It is generally accepted that the evidence remains insufficient to establish a clear attribution for the drying out of Lake Chad.

Scene 16 The Arctic

It is not clear which study Gore is referring to when he talks about Polar Bears drowning. However, a 2005 study by Monnet, Gleeson and Rotterman suggests that 4 polar bears had drowned because of a storm. It also predicts that drowning-related deaths of polar bears may increase in the future if the trend of regression of pack ice and/or longer open water continues.

Scene 19 Troubling signs

The IPCC reports that, if the temperature were to rise by 1-3°C, there would be increased coral bleaching and widespread coral mortality unless corals could adapt or acclimatise, but while there is increasing evidence for climate change impacts on coral reefs the IPCC concluded that separating the impacts of climate change-related stresses from other stresses such as over-fishing and pollution was difficult.

Scene 20 Antarctica

It is not clear what "Pacific nations" Gore is referring to in the section dealing with evacuations to New Zealand. It is not clear that there is any evidence of evacuations in the Pacific due to human induced climate change. Teaching staff may wish to use this as an example of the need in scientific presentation to give proper references for evidence used. However, the IPCC does predict that for small islands sea level rises will exacerbate storm surges and other coastal hazards and that, by the middle of this century, climate change will reduce water resources to the point where they become insufficient to meet demands in low rainfall periods.

Scene 21 Sea-level rise

Pupils might get the impression that sea-level rises of up to 7m (caused by the complete melting of Greenland or half of Greenland and half of the West Antarctic shelf) could happen in the next decades. The IPCC predicts that it would take millennia for rises of that magnitude to occur. However, pupils should be aware that even smaller rises in sea level are predicted to have very serious effects. The IPCC says that "many millions more people are projected to be flooded every year due to sea-level rise by the 2080s" (i.e. within pupils' own lifetimes).

Activity 27, 28. Listening.

Students listen to three radio advertisments and identify the pictures with the places where the action is happening.

In activity 28 students can work in pairs if you wish. After listening and reading the transcripts they think about the aim of the radio advertisments and write a short answer to the question.

The main goal of these advertisments is make people know that the effects of climate change will affect our lives although, at the moment, they are not so obvious in our local commnunities as they are in other places (sea, poles, rainforest).

Activity 29. Predicting.

Procedure

Give students a copy of the following page (Teachers' Notes, page 9). They must predict what numbers are, where it is happening and why.

Activity 29.
KEY

1) 94-98%
2) 200
3) 60
4) 70
5) 2006
6) 21.000
7) 400

Scientists warn of new plague of jellyfish

60

94-98%

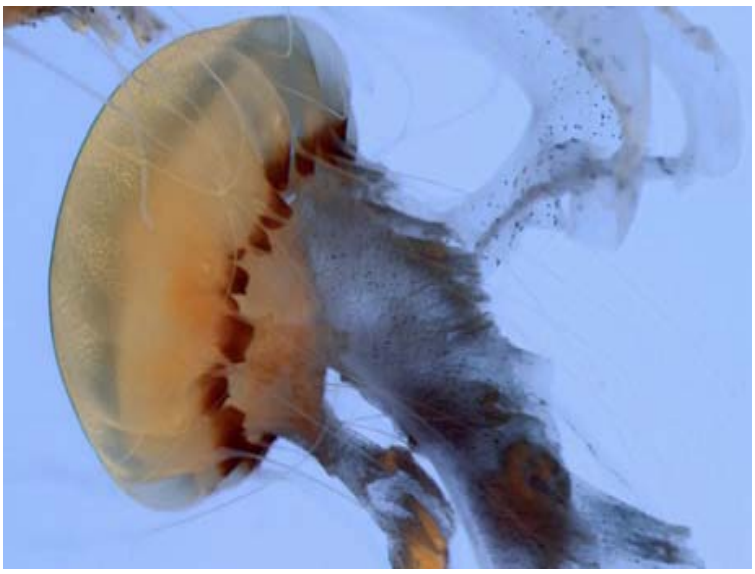
400

2006

70

200

21000



Scientists warn of new plague of jellyfish

60

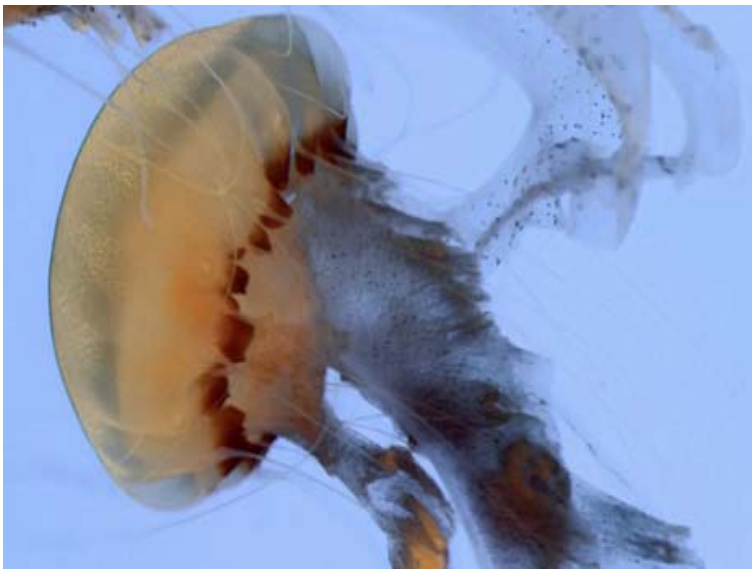
94-98%

400

2006

70

200 21000



Activity 30.

In groups of three, each student reads one of the following boxes and takes notes to answer the questions (who and what). In turns, they transfer the information to the rest of the group in order to complete the worksheet.

Then, you can give your students page 31 (students' worksheets) so that they can have the complete article.

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*. 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."

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*" said Dr Reyes Tirado.

Activity 31.
KEY

	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	✓	