



03 Climate change

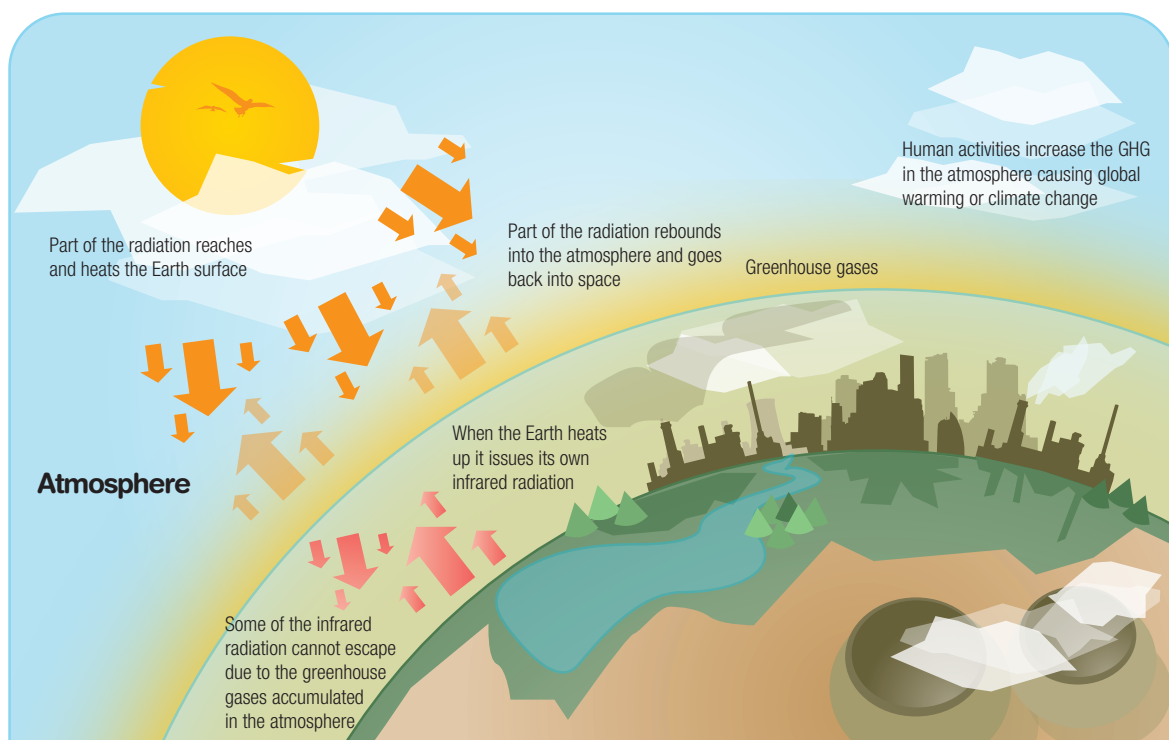
[Mar Asunción Higuera]
WWF/Adena



The greenhouse effect is a natural phenomenon which allows life on Earth. It is caused by a series of gases in the atmosphere which trap part of the sun's heat reflected by our planet. This results in the average global temperature of +15°C, instead of -18°C (see figure 1).

However, more than two decades ago the world scientific community began to alert us to the fact that the Earth was heating up at an unprecedented rate. The climate has always been variable, but the problem with current climate change is that over the last two centuries the rate of these variations has increased significantly. Such acceleration will become exponential if measures are not adopted. When investigating the reason behind this acceleration, a direct link between global warming and the rising emissions of **greenhouse gases** (GHGs) from industrialised human societies is found.

01 Greenhouse effect



[><] Source: UNEP

The main GHG emitted into the atmosphere by human beings is carbon dioxide (CO₂) which comes from burning fossil fuels (coal, oil and gas), used to produce energy and for transport. Other GHGs are methane (CH₄), nitrous oxide (N₂O), chlorofluorocarbons (CFCs) and perfluorated compounds. The concentration of CO₂ eq.¹ in 2005, 397 ppm, is far greater than any concentration over the last 650,000 years. This is principally due to the burning of fossil fuels and, to a lesser extent, land use (see figure 2).

Impacts of climate change

The Fourth Report of the Intergovernmental Panel on Climate Change presented at the end of 2007 concludes that climate change is real and is advancing at a much greater speed and intensity than envisaged.

Amongst the most relevant impacts, the Report highlights rising sea levels which pose a risk to those living in coastal cities, the salinization of aquifers, diminishing icecaps and the resulting risk for water supply to the populations who depend on the rivers fed by them, the extinction of species (up to 30%), a greater risk of heat waves and droughts in some areas, and torrential rains in others (see figure 3).

The most affected regions will be the Arctic, Sub-Saharan Africa, the Asian deltas or the small, low-lying archipelagos, like the Tuvalu archipelago whose inhabitants have already asked New Zealand for refuge in the event that the sea floods their country.

The sea level is already rising and 100 million people who live at less than one metre above sea level are at risk of losing their homes and ways of life. Reduced harvests caused by climate change could result in famines in Africa, India and China, and hundreds of millions of people live under the threat of diminishing freshwater supplies. Poor countries, which are less responsible for the problem, are those who will suffer most and furthermore, lack the resources to tackle the consequences.

The Mediterranean Basin is also seriously affected by lost harvests due to increased droughts and heat waves, as well as floods caused by intensified rainfall over very short periods of time.

Because of its geographical and socioeconomic characteristics, Spain is very vulnerable to climate

change. Over the last century the average temperature has increased by 1.5°C, double the world average. The sea level is rising by 1-15mm per year on the Cantabrian and Atlantic coasts and 0.7mm in the Mediterranean. The Pyrenean glaciers have shrunk by 75% over the last century.

For this century, the models forecast for Spain a greater risk of heat waves, fires and floods. This includes 3-4°C warming in winter and 5-7°C in summer, with more pronounced effects in the interior of the peninsula than on the coasts. The frequency of maximum temperatures will become more common. The quantity of the water resources will drop and their seasonality will change. There will be less rainfall and hydrological resources, with potential decreases of over 20%, especially in the South. Floods in the inland basins and Mediterranean basins will also become more irregular and more erosion is anticipated, which will aggravate existing desertification. The sea level is forecast to rise by 10 to 68cm which will lead to the disappearance of the river deltas. There will also be a significantly higher risk of forest fires.

The energy model and climate change relationship

The production and consumption of energy from fossil fuels has a direct impact on climate change and the existing energy model must therefore change in order to reduce CO₂ emissions. Combating climate change requires a shift towards a model of sustainable development based **on efficiency and equity**, as well as a commitment to renewable energy. This is not easy as it requires a technological and sociological change, although, having said that, the habit of continuing business as usual is just not sustainable.

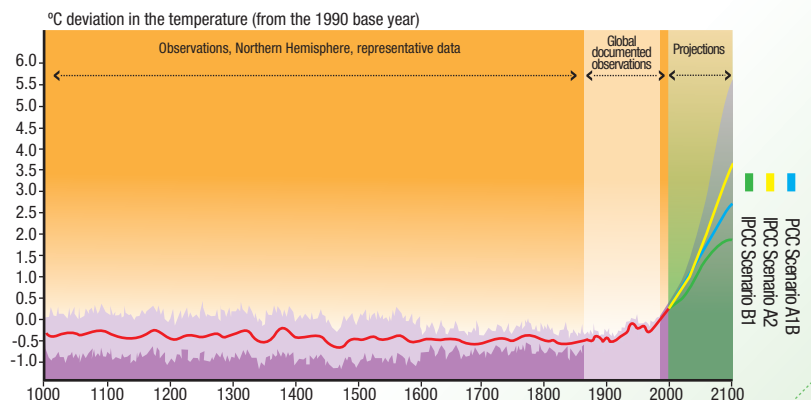
Climate change is a challenge, but it could also provide the opportunity needed in order to commit to real sustainable development. The saving and efficiency measures, as well as the renewable energies, will promote autochthonous development and reduce external dependence.

It is also essential that there is financial flow and technological transfer from the industrialised countries to the developing countries so that they do not have to base

02 Variations to the Earth's surface temperature between the year 1000 and 2100

The future will depend on the decisions made today. According to the Human Development Report 2007/2008, we will be coming close to dangerous climate change when the Earth's temperature increases by more than 2°C over preindustrial levels.

[><] Source: 2001 IPCC Third Assessment Report



¹GHG concentration is measured in parts per million (ppm) of equivalent carbon dioxide (CO₂ eq.).

Causes



Excessive and inefficient consumption



Deforestation



Wasteful and inequitable energy model

Effects



Increase in the level of greenhouse gases



Increase in the surface temperature

Impacts and Consequences



Rising sea level: risk for coastal populations, salinization of the aquifers



Reduction in the quality and quantity of fresh water



Extinction of species and other ecological damage



Climatic alterations: heat waves, droughts, torrential rains...



Health problems



Agricultural losses: lower crop yield, irrigation demands...



Economic problems

[>>] Source: UNDP and Peace Child

their development on environmentally aggressive energy sources.

All of this involves a change to the consumption model; a shift from the wasteful and consumerist lifestyles by the minority to sustainable development for the entire world is needed. Awareness and education play an essential role in destroying the myth that consumption and quality of life are directly proportional.

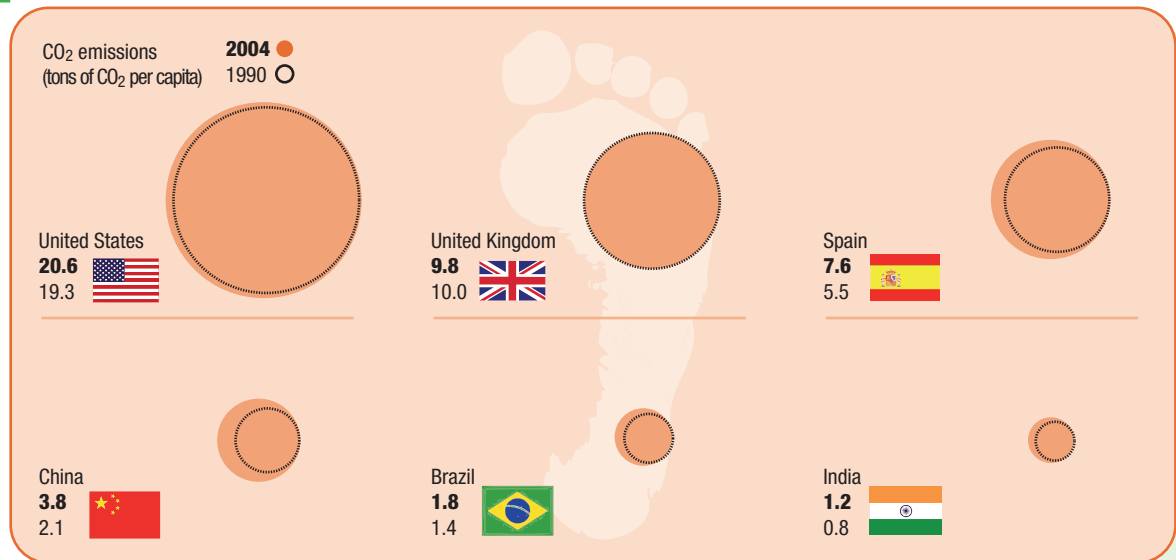
We must act now

Climate change is here but its intensity and impact will depend on the actions we start now to control and reduce the greenhouse effect emissions. The scientific community warns that it is very important that throughout this century the 2°C global temperature increase threshold over preindustrial levels is not exceeded. For this to be achieved, the CO₂ eq. concentration must remain lower than 450 ppm which means that developed countries will have to reduce their emissions by between 25-40% by 2020, and 80% by 2050 as regards to 1990. The

emissions also tend to persist in the atmosphere which means that in order to ensure that we do not cross the **2°C danger threshold**, world emissions will have to stabilise and start to drop in the next 15 years at the very latest.

Combating climate change is a shared but differentiated responsibility (see figure 4). The development model of industrialised countries is based on high energy consumption from principally fossil fuels, those which have historically contributed towards increasing the atmospheric CO₂ levels. These countries also have the financial and technological resources to make the transition to a sustainable energy model based on energy saving and efficiency, and on renewable energies. The developing countries, particularly the fast-growing economies like China, India and Brazil, are rapidly increasing their total energy consumption, although their energy consumption and emissions per capita are still much lower than those of industrialised countries. These countries demand more and more energy, just the same as the two billion people without access to electricity, and it is up to industrialised

04 Some Ecological Footprints (measured in CO₂ emissions) for different countries



[> X] Source: Human Development Report 2007/2008 (UNDP)

countries to provide them with clean technology. Of course, developing countries will have to contribute insofar as they can to making efficient use of energy and implementing sustainable practices which limit the growth in emissions, like avoiding deforestation. In this manner, we would all benefit from limiting the total worldwide CO₂ emissions.

The report prepared by the prestigious economist Stern for the British Government at the end of 2006 shows that the cost of the impact of climate change due to the failure to act against it would lead to a 5-20% decrease in the annual global Gross Domestic Product, being 1% if we act now.

Everybody's responsibility

Climate change is such an enormous problem that many people may feel impotent when it comes to acting, and think that the solution concerns exclusively governments and companies. It is undeniable that these agents have a crucial responsibility on the issue, but it is

also essential that citizens are aware of how our lifestyle influences GHG emissions, and are willing to save and use the energy in a more efficient manner. Citizens must also exert pressure so that administrations and companies do their part.

If we start to pay more attention to wasteful uses of energy used in lighting, heating refrigeration, transport, etc. and become more discerning when we purchase products, i.e. asking ourselves whether we really need them and, if we do, buying the most efficient goods produced under fair conditions, then we will without doubt transmit our principles to society and the decision makers. Individual change by many is the catalyst for social change.

Currently a large part of the population associates "quality of life" with "high levels of consumption" of both energy and products. In order to combat climate change the link between these parameters must be broken. The Earth is telling us that we cannot continue with this model. If we do not pay attention to the symptoms and act accordingly, we will suffer the consequences. We still have time but **we must be prepared to change.** <

bibliography and references:

- > Climate Change 2007: Synthesis Report of the IPCC. IPCC, 2007. Available at: www.ipcc.ch/ipccreports/ar4-syr.htm
- > Evaluación Preliminar de los Impactos en España por efecto del Cambio Climático. Environment Ministry and UCLM. Madrid, 2005.
- > Stern, N.: Stern Review on the Economics of Climate Change. UK, 2006.
- > Two degrees of separation between hope and despair. A young people's summary of the United Nations Human Development Report 2007/2008. Available at: www.ipcc.ch/ipccreports/ar4-syr.htm
- > European Commission Climate Change Campaign: www.ec.europa.eu/environment/climat/campaign
- > Iniciativa CeroCO2: www.ceroco2.org
- > International Panel on Climate Change: www.ipcc.ch
- > United Nations Portal on Climate Change: www.un.org/climatechange
- > WWF Spain, Green Office Campaign: www.officinaseficientes.es