



CLIMATE CHANGE

Thematic STEM Debate 2020 – Primary Sector

Many scientists argue that global warming is contributing to extreme weather conditions across the globe.

Article adapted by the
Primary Science Team

Global warming

What is global warming?

Global warming is the unusual increase in the Earth's average surface temperature. This change in temperature is leaving its impact on Earth, resulting in many changes around the globe. Most scientists believe that global warming is caused by the greenhouse effect.

What is the greenhouse effect?

Imagine an ordinary greenhouse in a sunny garden. Sunlight passes into the greenhouse and reflects off the plants and surfaces inside. Once the radiation is inside, the glass prevents it from passing out of the greenhouse. Now, the trapped heat increases the temperature inside the greenhouse. Similarly, the Sun's radiation enters the atmosphere. Some is reflected from the Earth's surface but cannot escape the atmosphere due to certain gases called greenhouse gases. As a result, the heat is trapped inside the atmosphere. This is called the greenhouse effect.

The gases that cause the greenhouse effect are called greenhouse gases. Greenhouse gases include carbon dioxide, oxides of nitrogen, methane, and CFC's (odourless manufactured chemicals). CFCs are harmful to the earth's ozone layer and have been banned since 1996. Too much greenhouse gases are leading to a rise in the Earth's temperature. We call this temperature rise, global warming.

How do we know that greenhouse gases are causing global warming?

The average global temperature has increased in just the same way as the emissions of carbon dioxide have increased. Levels of carbon dioxide in the atmosphere are [30 per cent higher than 150 years ago](#). Levels of other greenhouse gases like methane are up by an incredible 145 per cent. By linking these facts one can conclude that the increase in greenhouse gases has caused the temperature of the Earth to rise. (Adapted from Democs for Schools Climate Change, pg 18)

Where do greenhouse gases come from?

Major manufacturing countries like the UK and the USA and China emit much greater amounts of carbon dioxide than poorer undeveloped countries. According [to statistics](#), in 1995 an average person in the USA produced 19.6 tonnes of carbon dioxide, this results in five times higher than the world average! People in developed countries use huge amounts of fossil fuel, in industry, to provide energy at home and to run vehicles. All of which produce carbon dioxide, (Democs for Schools Climate Change, pg 18)

Although these countries have one twentieth of the world's population, they are responsible for one quarter of the world's carbon dioxide emissions.

What other factors are contributing to global warming?

The cutting down of the world's forests has a great effect on global warming. This is because when trees carry out photosynthesis, they absorb carbon dioxide from the air thus resulting in cleaner air. The less trees there are, the more carbon dioxide will exist.

What effects of global warming is the world experiencing?

Since 1860, the [average temperature](#) across the world has risen by about 0.5 degrees centigrade. By studying ancient ice in the Antarctic, scientists discovered that the 1990s were the warmest decades for thousands of years. Scientists calculated that the global average temperatures are to rise by 6 degrees centigrade within the next 80 years. (Adapted from Democs for Schools Climate Change, pg 19)

As a result, glaciers all over the planet are melting. At the poles, the ice sheets are disappearing. In 2004 a study reported that Arctic sea ice has thinned by nearly half in 30 years. Polar bears in the Arctic are struggling to survive. Polar bears feed on seals that are trapped on the surface of the ice floes or come close to the surface of the ice for breathing through holes in the ice. The ice is now melting earlier in summer than ever before. As a result, the seals are out of reach of the polar bears, thus leaving them without food.

Moreover, as the polar ice caps melt, this leads to rising sea levels which could flood some cities and islands. Flooding in Bangladesh in 1998 made 20 million people homeless.

Global warming is also affecting the coral reefs. Half the world's coral reefs suffered serious damage due to an increase in temperature. Global warming has also claimed its first extinction. The famous 'golden toad' of Costa Rica has become extinct because the rainforest where it lived now has too many dry days.

Serious diseases like malaria are increasing. Mosquitoes that carry the diseases can now live in places which used to be too cold for their eggs to survive in winter. Some European countries will probably suffer from outbreaks of malaria in the summer if temperatures keep on rising!

The warmer atmosphere is more energetic, and this leads to more extreme weather patterns. It is causing changes in the climate leading to drought in some parts of the world and flooding in other parts. In fact, famines and diseases in central Africa have in recent years left millions starving.

Is there a link between livestock production and climate change?

Livestock consists of farm animals such as cows, sheep, pigs and goats that are kept in an agricultural setting to produce food and labour. Livestock is a large contributor to global food security. Since climate change has substantial impacts on ecosystems and the natural resources upon which the livestock sector depends, due to extreme weather events, such as drought, floods and storms, climate change affects livestock as well. At the same time, livestock food chains are major contributors to greenhouse gas emissions as large amounts of land is taken up by livestock farming.

If livestock production is transformed and new methods are applied, less space will be needed. If 60 percent of the area currently allocated to livestock and food production will be freed and dedicated to the planting of trees in order to remove carbon dioxide from the atmosphere, it could completely counterbalance U.S. greenhouse emissions (which is a major contributor).

With vast tracts of arable land no longer needed for food production, even smaller or densely populated areas like Malta, will have an opportunity to become major food sources.

How long has Malta been active in fighting Global warming?

On the 10th August 1988, David Attard, professor of International law at the University of Malta in a letter to the Editor of the Times (London), stated that there is the need of “a comprehensive global strategy to protect the weather and climate as part of an effort to ensure that our planet remains fit to sustain human life.” Professor Attard suggested that a strategy should be initiated by the United Nations (UN) to declare climate as a common heritage of mankind and to establish mechanisms to protect this natural resource.

Thanks to Professor Attard’s letter entitled “Weather as a World Heritage”, Malta brought to the attention of the world community, the urgent need to conserve climate in the interests of present and future generations of mankind.

Letter to The Times (London) published on the 10th August, 1988

WEATHER AS A WORLD HERITAGE

From Prof. D.J. Attard

Sir, I refer to your front-page article, "Soggy summers may be with Britain for good" (August 2), which considered the phenomenon of a steadily rising average annual rainfall in the upper latitudes of the northern hemisphere and the very high temperatures in more southerly latitudes from the Mediterranean across northern India.

Significantly, on the same day, *The Times* of Malta reported that the local meteorological office had registered the hottest average July temperatures (3.3°C higher than the mean) since records started being kept.

The stratospheric ozone depletion (through, e.g., the uncontrolled emission of chlorofluorocarbons) has serious detrimental effects on the health and well-being of mankind. Solar ultra-violet radiation induces skin cancer, cataract, and suppresses the human immunity system, affects the yield of certain crops, reduces productivity in aquatic plants, and leads to a degradation of certain industrial products.

Prime Minister Brundtland of Norway's distressing statement that the impact of world climate change "may be more drastic for mankind than any other challenges except for nuclear war" not only reflects her tremendous foresight but also demonstrates the need for a comprehensive global strategy

to protect the weather and climate as part of an effort to ensure that our planet Earth remains fit to sustain human life. A formula must be devised to ensure that short-term gains and the long-term needs of mankind are balanced.

May I utilise your distinguished newspaper to suggest that the first phase of this global strategy would be a UN resolution declaring the weather and climate to be part of the common heritage of mankind and that the appropriate mechanism be established to protect these natural resources in the interests of mankind? (The common heritage principle has already been incorporated in the 1982 UN Convention on the Law of the Sea with respect to certain areas of the seabed, ocean floor, and subsoil).

Such an endeavour should include a comprehensive study, on an interdisciplinary basis, of the changes in the atmosphere, geosphere, and biosphere and the interaction of these changes with human activities. The formidable work undertaken within the UN system should be coordinated to ensure that limited resources are utilised in the most effective manner and that the results of research, particularly in meteorology and hydrology, are applied in the interest of mankind.

Yours,
D.J. ATTARD,
PO Box 60,
Sliema, Malta.

August 8

The resolution presented by Malta and co-sponsored by another twenty States was unanimously adopted in the plenary meeting of the General Assembly on the 6th December 1988.

The Maltese initiative was the beginning of a difficult process that led to two international legal instruments: The United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP).

The Kyoto Protocol in brief

On February 16, 2005, the Kyoto Protocol became part of international law. This protocol gives each of the industrialised countries of the world a limit to the amount of greenhouse gases they can emit into the atmosphere. Each country is given a target to reach.

The Kyoto Protocol is regarded as a breakthrough in the fight against climate change and a victory for international diplomacy. Nevertheless, the USA, the world's greatest emitter of greenhouse gases, refuses to take part.

How is Malta trying to meet its target?

Malta has taken various measures on a national level. In recent years, Malta has adopted several strategies aimed at achieving its greenhouse gas emission reduction commitments and in adapting to climate change.

In 2009, the Government adopted a “National Strategy for Policy and Abatement Measures Relating to the Reduction of Greenhouse Gases” containing easing measures aimed at reducing greenhouse gas emissions and including the implementation of renewable energy sources, electricity efficiency and conservation. In order to do this, the Government issued schemes for the promotion of solar water heaters, photovoltaic panels, and energy saving appliances. Energy-saving lightbulbs were distributed to each household according to the size of the family.

Malta has adopted its National Renewable Energy Action Plan which has also been submitted to the Commission. In fact, the government is actively supporting development of renewable sources of energy, such as onshore and offshore wind energy, solar photovoltaic and solar thermal energy, as well as

energy from waste. The government is also purchasing electricity from Sicily by means of the interconnector and has also built a second power-station using gas instead of heavy fuel oils which will emit less greenhouse gases. It is hoped that 10% of our electricity will come from renewable sources soon.

Malta has been taking serious steps towards recycling. This is a direct result of an EU scheme to increase recycling of biodegradable rubbish, such as paper and organics that when piled into landfills produce methane, a far more potent greenhouse gas than carbon dioxide. For this reason, a new recycling plant is scheduled to be built in Magħtab in the near future.

Other incentives to reduce greenhouse gases include grants on purchasing of electric vehicles (with an attractive scrappage scheme) while limiting the importation of conventional fuel powered vehicles.

Malta has also commitments to assist developing states in meeting the challenges of climate change under the Fast-start finance pledge. Malta has made an €800,000 total pledge over the years 2010 to 2012. Funds are directed towards projects in Africa. The selected projects seek to improve environmental living conditions and to create adaptation strategies in African states.

Is Covid-19 leaving an impact on the environment?

Due to Covid-19, in a matter of months, the world has been transformed. Extensive travel restrictions have been put in place, many businesses such as bars, cinemas and theatres have operational restrictions and people have been told to stay in their homes as much as possible.

All these changes have also led to some unexpected repercussions. As industries, transport networks and businesses have closed for a considerable amount of time, it has brought a sudden drop in carbon emissions.

Compared with this time last year (2019), levels of pollution in major cities across the globe have reduced significantly due to the measures to contain spread of the virus. In China, for example, emissions fell by 25% at the start of the year. In Europe, satellite images show that nitrogen dioxide (NO₂) emissions had faded away over northern Italy, Spain and the UK during lockdown.

Malta has also reported a drop of up to 70% in air pollution back in March. In May 2020, Dr Mark Scerri, a lecturer in Environmental Management and

Planning at the Institute of Earth Systems, cited that a significant decrease in the concentration of nitrogen dioxide was recorded at an average of 30% due to the fact that fewer cars were on the road. However, it is still too soon to see if these figures will have a lasting effect or if they will revert back once everything is back to 'normal'.

Both Dr Mark Scerri and Environmental Economist Dr Marie Briguglio agree that air pollution is making our planet difficult to live in for those who suffer from respiratory diseases. Dr Briguglio explains that "Most pollution sources are directly and intimately linked with economic activity and we expect a substantial decline in pollution when economic activity declines."

Vincent Attard, Nature Trust Malta Executive Director, notes other signs of environmental change during this period. Closing down of parks to humans has encouraged wildlife to flourish and marine biodiversity seems to be improving, with dolphins venturing closer to Maltese shores. Vincent Attard states that, "These are all blatant signs that the planet is healing as a result of humans slowing down." They validate the argument that the climate crisis and climate change in general is a result of human activity, and that we still have some power to change things.

Professor Raymond Ellul, who runs the Geographical Atmosphere Watch (UM) in Gozo, recommends that although the short lock-down was beneficial and brought a significant drop in air pollution, much more is needed than this phase to make a dent in global greenhouse gas levels. He claims that "At present we are headed for a 3-5 degree Celsius increase in temperature in the Mediterranean. Perhaps the COVID-19 situation will finally result in people and politicians realising that we cannot continue with exponential economic growth." The recent decrease in traffic at land, sea and air resulted in a decrease in emissions, he is hoping for more permanent solutions to improve our quality of life with regards to air and global warming.

Is it possible to keep the positive new norms?

Covid-19 have led to such an intense change so fast. A global pandemic that is claiming people's lives certainly should not be a way of bringing about environmental change either. No one wanted emissions to be lowered this way. But, if anything, it has also shown the difference that communities can make

when they look out for each other – and that is one lesson that could be invaluable in dealing with climate change.

Glen Peters of the Centre for International Climate and Environment Research in Oslo have noted that overall, 2020 may still see a drop in global emissions of 0.3%. Greta Thunberg, a Swedish environmental activist who has gained international recognition for promoting the view that humanity is facing an existential crisis arising from climate change, is also doing her part during this pandemic by promoting digital activism instead of physical protests. Moreover, the biggest annual climate conference, COP26, is now scheduled to be held virtually in November 2020.

During these challenging times, while humanity is adapting to a “temporary” new norm, it is a good idea to introduce lasting habits which are coincidentally good for the climate. Remote working from homes which leads to less travelling, more environmentally friendly measures such as protected/restricted areas (where humans are not allowed to venture in), cutting down on food waste, planting of trees wherever possible and perhaps more attractive incentives to use electric vehicles and machinery could lead to a positive impact on the environment.

We can all do our part to improve the situation! Small changes lead to larger ones. One can start by taking small steps such as implementing electricity/energy saving measures at home, recycle and reuse objects, walk to places or use public transport rather than using one’s own vehicles.

It all depends on us. Are we willing to change our lifestyles to save our Earth? If we save the Earth, we are eventually saving ourselves.

How will you do your share?

References:

[https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/7218-Democs for Schools Climate Change.pdf](https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/7218-Democs_for_Schools_Climate_Change.pdf)

<https://mra.org.mt/climate-change/climate-change-introduction/>

<https://www.wired.com/story/coronavirus-pandemic-climate-change/>

<https://www.bbc.com/future/article/20200326-covid-19-the-impact-of-coronavirus-on-the-environment>

<https://bigthink.com/technology-innovation/livestock-disruption?rebelltitem=1#rebelltitem1>

<http://www.newslettereuropean.eu/every-cloud-silver-lining/>

<https://www.um.edu.mt/think/pandemic-breather/>

<https://www.um.edu.mt/newspoint/news/2020/03/quantify-pollution-drop-mark-scerri>

<https://www.um.edu.mt/newspoint/news/features/2020/05/drop-air-pollution-mark-scerri>