

TRAINING LESSON 1 – Part 1

Title	○ Overview on Climate change: causes and effects
Part of the training course referred to in this lesson	X Part 1 General information about sustainability and CE Part 2 Specific Information about: <ul style="list-style-type: none"> <input type="checkbox"/> Wood sector <input type="checkbox"/> Plastic sector <input type="checkbox"/> Agrifood sector
EQF level	Level 3
Where the lesson was tested	//
General Learning objective(s) according to the Bloom Taxonomy https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/	<input type="checkbox"/> Create Produce new or original work (design, assemble, construct, investigate, formulate) <input type="checkbox"/> Evaluate Justify a stand or decision (appraise, argue, defend, critique, select, support) <input type="checkbox"/> Analyze Draw connections among ideas (differentiate, organize, relate, compare, distinguish, test, experiment) X Apply Use information in new situations (execute, implement, solve, use, demonstrate, operate) X Understand Explain ideas or concepts (classify, discuss, describe, identify, locate, translate) X Remember Recall facts and basic concepts (define, duplicate, list, memorize, repeat)
Specific learning objective(s)	<ul style="list-style-type: none"> - <i>To understand what climate change is</i> - <i>To know more about climate change effects on various fields</i> - <i>To understand the difference between climate and weather</i> - <i>To understand and learn about the complexity of the climate change phenomenon</i>
Cognitive, socioemotional and behavioural outcomes	SDG 13 “Climate action” <u>Cognitive learning objectives</u> : the learner understands the current climate change as an anthropogenic phenomenon resulting from the increased greenhouse gas

<p>based on https://www.unesco.org/sites/default/files/2018-08/unesco_education_for_sustainable_development_goals.pdf</p>	<p>emissions; the learner knows about prevention, mitigation and adaptation strategies at different levels (global to individual) and for different contexts and their connections with disaster response and disaster risk reduction.</p> <p><u>Socio-emotional learning objectives:</u> the learner is able to encourage others to protect the climate; the learner is able to collaborate with others and to develop commonly agreed-upon strategies to deal with climate change; the learner is able to understand their personal impact on the world's climate, from a local to a global perspective; the learner is able to recognize that the protection of the global climate is an essential task for everyone and that we need to completely re-evaluate our worldview and everyday behaviours in light of this.</p> <p><u>Behavioural learning objectives:</u> the learner is able to evaluate whether their private and job activities are climate friendly and – where not – to revise them; the learner is able to anticipate, estimate and assess the impact of personal, local and national decisions or activities on other people and world regions; the learner is able to support climate-friendly economic activities.</p>																
<p>Green skill(s) addressed</p>	<table border="0"> <tr> <td><input type="checkbox"/> Creative problem-solving</td> <td><input type="checkbox"/> Management skills</td> </tr> <tr> <td>X Forward-thinking</td> <td>X Impact quantification</td> </tr> <tr> <td><input type="checkbox"/> Monitoring skills</td> <td><input type="checkbox"/> Life-cycle management</td> </tr> <tr> <td><input type="checkbox"/> Analytical skills</td> <td><input type="checkbox"/> Science skills</td> </tr> <tr> <td><input type="checkbox"/> Lean production</td> <td><input type="checkbox"/> Waste management</td> </tr> <tr> <td><input type="checkbox"/> Maintenance and repair skills</td> <td>X Environmental auditing</td> </tr> <tr> <td>X Pollution prevention</td> <td><input type="checkbox"/> Ecosystem management</td> </tr> <tr> <td><input type="checkbox"/> Eco-design</td> <td><input type="checkbox"/> Other _____</td> </tr> </table>	<input type="checkbox"/> Creative problem-solving	<input type="checkbox"/> Management skills	X Forward-thinking	X Impact quantification	<input type="checkbox"/> Monitoring skills	<input type="checkbox"/> Life-cycle management	<input type="checkbox"/> Analytical skills	<input type="checkbox"/> Science skills	<input type="checkbox"/> Lean production	<input type="checkbox"/> Waste management	<input type="checkbox"/> Maintenance and repair skills	X Environmental auditing	X Pollution prevention	<input type="checkbox"/> Ecosystem management	<input type="checkbox"/> Eco-design	<input type="checkbox"/> Other _____
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<p>Duration</p>	<p>20 min</p>																
<p>Structure and content of the lesson</p>	<p>INTRO</p> <p>Over the past thirty years, the "climate change" debate has become increasingly heated and has begun to involve not only the scientific and environmental spheres, but also the political, social, economic, and cultural spheres. In fact, the term "climate change" refers to a phenomenon that happens at the environmental level but has enormous repercussions on all the other areas listed above. While we hear a lot about it, it is not always clear what is meant by "climate change" or what its repercussions are. In this lesson we will define climate change and define its effects.</p> <p>This lecture is not intended to list all the effects that climate change has, but to give an idea of the enormous scope of this phenomenon and how it transcends the boundaries of the environmental and scientific fields to impact so many other areas of our society.</p>																

TOPIC 1 - DEFINITION OF "CLIMATE CHANGE" and ITS CAUSES

The expression "climate change" is composed of two distinct terms, climate and change. It is good to first clarify what is meant by "climate," which is often confused with the term "weather". In fact, although both weather and climate refer to changes occurring in the atmosphere, weather denotes *"the mix of events that occur daily in our atmosphere,"* while climate denotes *"what the weather is like over a long period of time in a given area"* (National Centers for Environmental Information, 2020).

In other words, weather indicates short-term changes in the atmosphere, while climate indicates long-term changes. *"Some scientists define climate as the average weather for a particular region and time, usually taken over 30-years. It's really an average pattern of weather for a particular region."* NASA, 2017).

The second term to be analysed is "change." Changes at the climate level in both the short and long term are normal. The weather is not the same everywhere all the time, and the same can be said of the climate of a given area, which can change over time. So, the problem is not climate change per se, but rather the fact that this change is of great magnitude and much more rapid than in the past. The climate is changing a lot and more quickly. In fact, *"since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas."* (UN, n.d.). Burning fossil fuels generates greenhouse gas emissions, which are the cause of the rising temperatures around the world and of the phenomenon known as "global warming".

The greenhouse gases are also called "heat-trapping" gases, as they trap the heat of the sun in the atmosphere, causing an increase in the temperature all over the world (i.e. global warming) (Climate Change Knowledge Portal, n.d.).

According to the Sixth Assessment Report made by IPCC (2022), the *"GHG (i.e. Greenhouse gas) emission growth slowed since 2010: while average annual GHG emission growth was 2.1% between 2000 and 2010, it was only 1.3% for 2010 – 2019. In order to stop the temperature increase, however, net emissions must be zero."*

We can therefore say, based on these data, that although there has been a significant decrease in emissions from greenhouse gases as of 2019, there is still much to be done in this regard.

TOPIC 2 – CLIMATE CHANGE EFFECTS ON THE ENVIRONMENT AND ON ECOSYSTEMS

The main effects of climate change and global warming on the environment and various ecosystems are:

- Rising temperatures are causing the melting of glaciers and "permafrost" found at the two poles of our planet. The effect of this melting is rising

sea levels. Moreover, 90% of heat produced by global warming is absorbed by ocean waters, which means that the temperature of oceans is increasing as well (P. Thomson, 2021). Consequently, in the future there will be more salt water of a higher temperature, with devastating effects on aquatic flora and fauna. But this phenomenon will not affect "only" the sea, as a rise in the level of the oceans (composed of salt water) will also cause a decrease in fertile soils, which will be "sterilized" by salt (P. Thomson, 2021).

- Coral reefs, which are particularly vulnerable to change in the temperatures, are expected to decline to 10-30% of former cover at 1.5°C warming (UN, n.d.).
- All the above phenomena will increase the risk of extinction of plants and animals that live under certain conditions and temperatures, irreparably damaging the ecosystem.
- Warm ocean's water is more likely to create the conditions for hurricanes and violent storms.
- While in some parts of the world it is raining too much, in other parts many months have passed since the last rainy day. In India, Pakistan and sub-Saharan Africa countries are already experiencing severe droughts that have a terrible impact on agriculture and breeding (Trimarchi, 2012).
- In many areas of the world fires are becoming more and more common. In some cases, warm air (given by climate change and fires) in areas of low atmospheric pressure attracts additional warm air, creating what are now known as "fire tornadoes." (Costa, 2022).

TOPIC 3 – CLIMATE CHANGE EFFECTS ON HEALTH

Climate change also has both direct and indirect effects on human health. The direct effects are related to the fact that the extreme weather conditions that are expected due to climate change and global warming are causing a huge loss of lives. In fact, every year around 13 million people die due to environmental factors (UN, n.d.). Indirect effects of climate change on human health include, for example:

- Respiratory diseases.
- Cardiovascular diseases
- Illnesses related to the lack of water and of uneven distribution of food (malnutrition, cholera, etc.).
- Infectious diseases.
- Mental health diseases (Centers for Disease Control and Prevention, 2022).

TOPIC 4 – THE SOCIAL IMPACT OF CLIMATE CHANGE

The poorest and most vulnerable people, although they are the least responsible for climate change, are the ones who pay the highest price. Indeed, the most

vulnerable people who are already in a state of distress are unlikely to have the means to adequately cope with the effects of climate change (The World Bank, n.d.).

Marginalized groups of the society are already experiencing forced migration and displacement, due to the extreme weather events (rising sea levels, drought, floods, etc.).

This phenomenon has become so common that scientists start to talk about “climate migrants” to indicate people who were forced to leave their homes due to climate stressors (UN University, 2015). Although climate migrants are not legally considered refugees by the international regulations and laws, the fact that this concept exists, and that it’s becoming more popular with time can let us understand the huge impact that climate change is having on people.

Due to these forced displacements to other territories, some experts are also recording a total or partial loss of cultural identity of some populations (The World Bank, n.d.).

TOPIC 5 – THE ECONOMIC IMPACT OF CLIMATE CHANGE

Extreme weather conditions also have a huge impact on the economy of a country. After a flood, for example, a lot of public money must be invested in reconstructions. Moreover, *“severe storms and floods, combined with agricultural losses cause billions of dollars in damages, and money is needed to treat and control the spread of disease.”* (Trimarchi, 2012).

Countries are increasingly financing infrastructure for adaptation to climate change, renewable energy, circular economy, and resilience. *“Although adaptation finance increased more rapidly between 2016-2018, its overall share of total public finance was only 21 percent in 2020.”* (UN, n.d.). The costs associated with the adaptation to climate change in developing countries by 2030 (according to the UN Sustainable Goals) are very high but investing in resilience may be a good way to reduce them significantly.

In some cases, experts have theorised that the lack of food and water resources, or the disappearance of entire territories that will be swallowed by the waters of the oceans may cause real conflicts between states (Trimarchi, 2012).

CONCLUSIONS

Climate change and global warming are having an increasing impact on so many aspects of our lives and our society, that we cannot ignore them anymore. Internationally, states are moving to address these complex phenomena, which require cross-cutting solutions.

References

National Centres for Environmental Information (2020). *What’s the difference*

	<p><i>between weather and climate?</i> Available at: https://www.ncei.noaa.gov/news/weather-vs-climate#:~:text=Whereas%20weather%20refers%20to%20short,time%20in%20a%20specific%20area.</p> <p>NASA (2017). <i>NASA – What’s the difference between Weather and Climate?</i> Available at: https://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html</p> <p>The United Nations (n.d.). <i>What is Climate Change?</i> Available at: https://www.un.org/en/climatechange/what-is-climate-change</p> <p><i>Climate Change Knowledge Portal (n.d.). What is Climate change?</i> Available at: https://climateknowledgeportal.worldbank.org/overview</p> <p>Intergovernmental Panel on Climate Change, IPCC. (2022). <i>Climate Change 2022: Mitigation of Climate Change</i>. Working Group III Report. Available at: https://www.ipcc.ch/report/ar6/wg3/</p> <p>Thomson P. and the United Nations (2021). <i>Interview: Moving the needle on the sustainable blue economy</i>. Climate Action. Available at: https://www.un.org/en/climatechange/peter-thomson-sustainable-blue-economy</p> <p>The United Nations (n.d.) <i>Climate Action Fast Facts</i>. Climate Action, Digital Library. Available at: https://www.un.org/en/climatechange/science/key-findings#nature</p> <p>Centers for Disease Control and Prevention (2022). <i>Climate Effects on Health</i>. Available at: https://www.cdc.gov/climateandhealth/effects/default.htm#:~:text=The%20health%20effects%20of%20these,and%20threats%20to%20mental%20health.</p> <p>United Nations University (2015). <i>5 facts on climate migrants</i>. Institute for Environment and Human Security, Bonn. Available at: https://ehs.unu.edu/news/news/5-facts-on-climate-migrants.html</p> <p>The World Bank (n.d.). <i>Social dimensions of climate change</i>. Available at: https://www.worldbank.org/en/topic/social-dimensions-of-climate-change</p> <p>Trimarchi M. (2012). <i>Top 10 worst effects of global warming</i>. Sustainability Org. Available at: https://sites.google.com/site/sustainabilityorgil/home/news-updates/Top-10-Worst-Effects-of-Global-Warming-1212</p> <p>Costa F. (2022). <i>California – La fine del sogno</i>. Strade Blu – Mondadori S.p.A. Milano, ISBN 9788835720362</p>
<p>Interactive questions for R3</p>	<ol style="list-style-type: none"> 1. “Climate” indicates what the weather will be like in a long period in a specific area. <ol style="list-style-type: none"> a. True b. False

	<ol style="list-style-type: none"> 2. The greenhouse gases are also known as... <ol style="list-style-type: none"> a. Fossil fuels b. Heat-trapping gases c. Warming gases 3. Climate migrant status is equated with refugee status and can be granted to an individual forced to leave his or her land due to climate change, according to Article 13 of the Charter of Human Rights. <ol style="list-style-type: none"> a. True b. False
Keywords	Climate change, global warming, pollution, greenhouse gas
Questions for reflection	<ol style="list-style-type: none"> 1. Make research on how your region/country's climate has changed over the years. 2. What type of actions can be effective to cope with global warming? 3. What individuals can do in order to mitigate climate change effects? 4. Can you think and share some more effects of climate change on our society?
Additional resources	<p>Articles:</p> <ul style="list-style-type: none"> - The Economist (2022). The challenge of the era. Special Reports. All articles available: https://www.economist.com/special-report/2022-11-05 - National Geographics (n.d.). Effects of global warming. Available at: https://www.nationalgeographic.com/environment/article/global-warming-effects - Kane, S., J. Reilly, and J. Tobey. 1992. An empirical study of the economic effects of climate change on world agriculture. <i>Climatic Change</i> 21: 17-35. Available at: http://www.ciesin.org/docs/004-154/004-154.html <p>Documentaries:</p> <ul style="list-style-type: none"> - <i>Before the Flood – Point of no return</i> (2016) by Fisher Stevens - <i>An Inconvenient Truth</i> (2006) by Davis Guggenheim - <i>I am Greta</i> (2020) by Nathan Grossman <p>Videos:</p> <ul style="list-style-type: none"> - Fonda J. (2022). How to transform your climate concern into action. TEDTalks. Available at: https://www.youtube.com/watch?v=zihlv2nHEAw - The economist (2021). See what three degrees of global warming looks like. Available at: https://www.youtube.com/watch?v=uynhvHZUOOo
Icons & related info for the hints of the PowerPoint presentation	 <p>This hint is used to indicate that there's a link to other websites with additional information.</p>

	 <p>This is used within the PPT to indicate that something important is written/ to invite the reader to pay attention to essential information.</p>  <p>It indicates a question for reflection.</p>
<p>Author(s)</p>	<p><i>Carlotta Maria Crippa, Public Institution “eMundus”</i></p>