



# **TOPIC: CLIMATE CHANGE IMPACT ASSESSMENTS**

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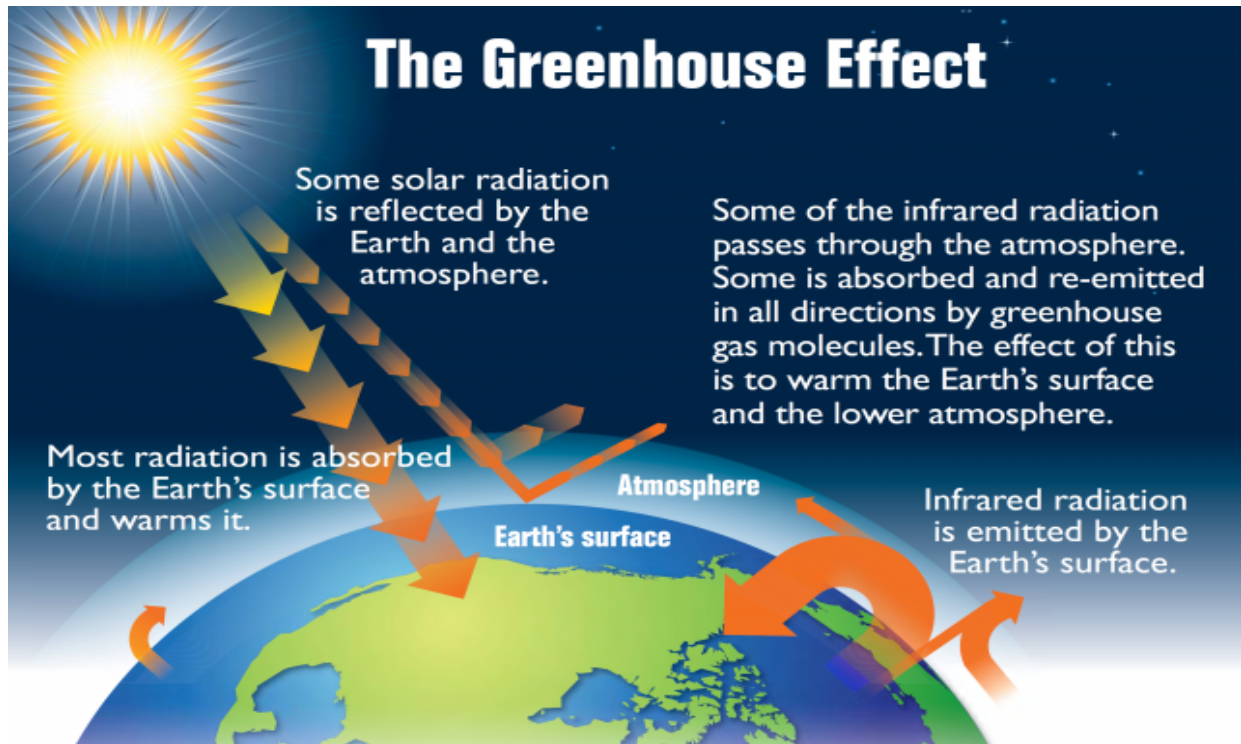


# **CLIMATE CHANGE IMPACT ASSESSMENTS**

Climate change is a heavily discussed topic across several media platforms worldwide and presents a major problem to our everyday lives. As a result, several organizations such as the United Nations Environment Program (UNEP) have made it their goal to combat and address the severity of climate change and the threat it poses to the environment around us. Despite the growing concerns of climate change over the last few decades, many people still underestimate the concerns that others have for climate change as shown in a study where 80-90% of Americans do not see the importance of climate change mitigation policies and concerns. However, evidence of climate change has been clearly witnessed over the last few decades and it is a direct consequence of increased human activity ever since the Industrial Revolution.

To understand the severity of climate change, one must have a clear understanding of what climate is. Some people may ask “Aren’t weather and climate the same thing?”. However, while climate and weather are similar, there is a key difference between the two terms. Weather is the condition of the atmosphere, a collection of gases which surrounds the earth, over a short period of time while climate is a long-term pattern of weather in a particular area or region. Earth’s climates are moderated largely by the atmosphere which possesses a thin layer known as the ozone (O<sub>3</sub>) layer, located in the stratosphere, which acts as a protective blanket that surrounds the earth and is responsible for absorbing a majority of the harmful ultraviolet (UV) radiation emitted by the Sun. 70% of incoming UV radiation is absorbed by the ozone layer while the remaining 30% is reflected back into space. The atmosphere not only absorbs UV radiation emitted by the sun, but some atmospheric gases also absorb and re-emit

infrared radiation from the atmosphere to the Earth's surface which creates a temperature balance on earth suitable for life.



This process is known as the greenhouse effect and, contrary to what many believe, it is an essential natural process which enables the earth to retain heat from the sun and maintain a temperature that enables us to live relatively comfortably. However, increased human activity such as burning of fossil fuels for energy, deforestation and even the increased production of motor vehicles which makes our lives so much more convenient, has led to an enhanced greenhouse effect where the concentration of emitted greenhouse gases such as carbon dioxide, methane and hydrofluorocarbons have significantly increased over the years and has led to the progressive destruction of the ozone layer and increased global temperatures.

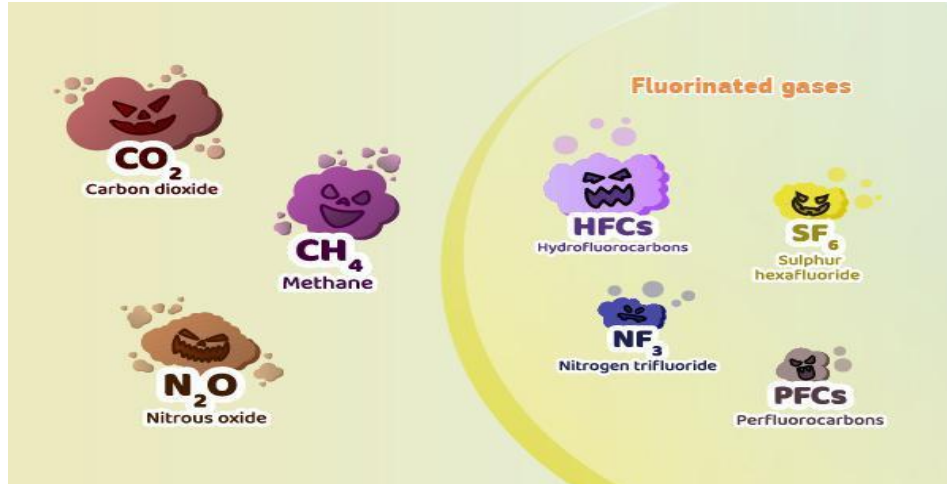


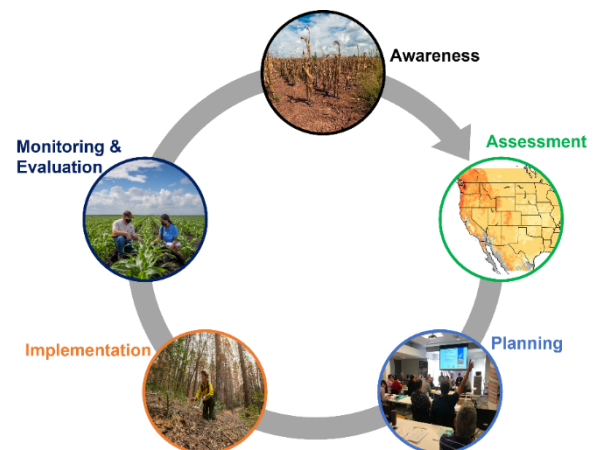
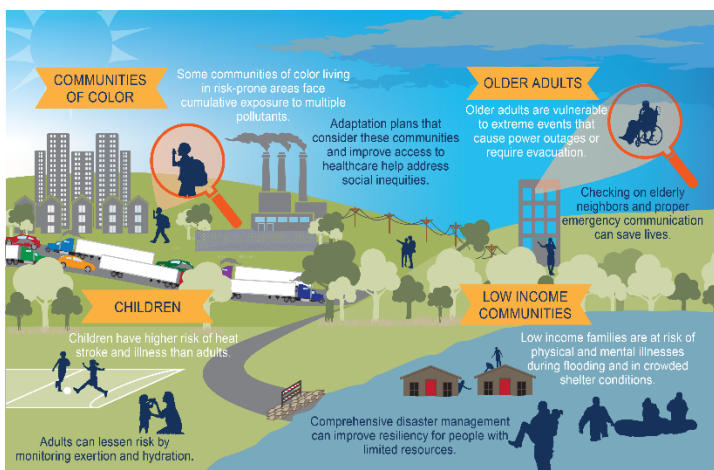
DIAGRAM SHOWING COMMON EMITTED GREENHOUSE GASES

The increased global temperatures result in changes in various regions' climate throughout the Earth and this change in climate can negatively impact the environment in many ways. The effects of climate change which are being observed worldwide include: accelerated raising of sea levels due to increased melting of glaciers and ice sheets, widespread changes in weather patterns such as increased droughts and increased propensity for strong storms and hurricanes, increased wildfires and changing ecosystems which can result in the extinction of species. The unbearable summer heat of 2016, which was the hottest year ever recorded, the crazy number of named storms and hurricanes in 2020 and the increased number of wildfires in the United States and Australia in the last few years are all as a result of climate change and global warming.

Despite the drastic change in climate in recent years, the average global temperature has only increased by 2°C since pre-industrial times. This change in global temperature is seemingly insignificant, but the average global temperature includes land and ocean temperatures where land temperatures are much more susceptible to dramatic warming with a small shift in global temperature compared to ocean temperatures. As a result, changes in Earth's climate have different effects in different regions of the world which

adds to the complexity of climate change. Some regions will experience more heatwaves and higher temperatures, some regions will receive more rainfall and unpredictable weather patterns while some regions experience more loss of shoreline due to rising sea levels than others. When the impact of climate change on different sectors of society (e.g. infrastructure, human health and agriculture) is taken into consideration, climate change impact assessments are required to aid in the development of procedures/methods to mitigate the effects of climate change on society.

Climate change impact assessments are conducted to diagnose and project impacts of climate/environmental change on all facets of society. Changes in temperature, precipitation and other climatic variables are examined under multiple scenarios of greenhouse gas emissions and the potential impacts of these variables in a specific area or community are considered. The areas/aspects of society impacted by climate change vary slightly from region to region, but the five main areas affected by climate change according to 'Climate Impact and Risk Assessment 2021 for Germany are: natural systems/resources, economic systems that use nature (e.g. agriculture), physical infrastructures, economic systems remote from nature (e.g. manufacture and trade) and social systems (e.g. health and performance). The areas impacted by climate change influence each other, and these relationships are analyzed under different conditions associated with climate change (e.g. increased drought or rainfall) by running multiple simulations. Based on this analysis, adaptation measures and their urgencies are assessed, and this information is provided to policymakers who are responsible for implementing new policies to reduce the risk of climate change.



Climate Change Impact Assessments can be likened to a jigsaw puzzle with many individual pieces that come together to shed light on a bigger picture. However, it requires extensive knowledge on climate change and how the climate has shifted in many regions worldwide over the last few decades. A concerted effort is required to mitigate the effects that the drastic change in climate has brought and climate change impact/risk assessments provides the information we need through extensive analysis to make that first step in addressing the issues of climate change.



- Water, specifically water vapour, is actually a greenhouse gas
- The past eight years, since 2015, have been confirmed to be the warmest years ever recorded.
- USA and Russia have the highest per capita of greenhouse emissions and not China as many people would have assumed.

### **Activity 1:**

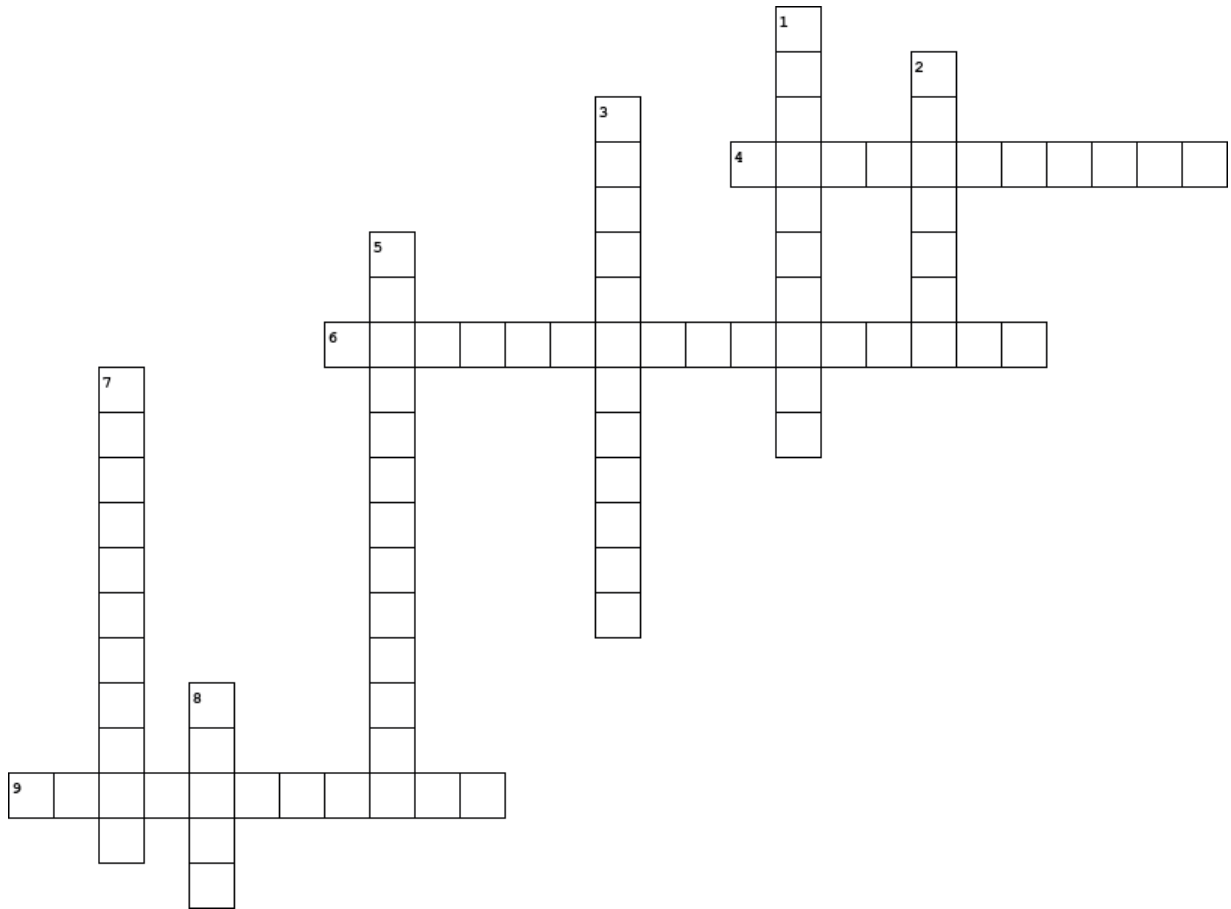
Name: \_\_\_\_\_

Date: \_\_\_/\_\_\_/\_\_\_

Class: \_\_\_\_\_

**Instructions:** *After reading the overview of Climate Change Impact above, use the information above to complete the crossword puzzle below.*

## Climate Change Crossword Puzzle



### Across

4. The burning of \_\_\_\_\_ resulted in the significant increase of greenhouse gases in the atmosphere
6. Necessary for life but can cause global warming
9. The lowest region of the atmosphere

### Down

1. Collection of gases that surround the earth
2. Long term pattern of weather in a region
3. The highest region of the atmosphere
5. A common greenhouse gas
7. This type of radiation emitted from the sun is harmful and is absorbed by the ozone layer
8. This molecule is responsible for absorbing UV



**Activity 2:**

**Name:** \_\_\_\_\_

**Date:** \_\_\_/\_\_\_/\_\_\_

**Class:** \_\_\_\_\_

**Instructions: Using the information from ‘Climate Change Impact Assessments’, answer the following questions. (Additional reading may be required).**

**1) The \_\_\_\_\_ served as the main ‘catalyst’ for global warming and climate change.**

- a) *Industrial Revolution*
- b) *destruction of the ozone layer*
- c) *Great Depression*
- d) *Both ‘a’ and ‘c’*

**2) What is the difference between climate and weather?**

- a) *Weather describes the atmospheric conditions prevailing over an area/region over a long period of time while climate is the short-term change in atmospheric conditions.*
- b) *Climate is the atmospheric conditions prevailing over an area/region over a long period of time while weather is the short-term change in atmospheric conditions.*
- c) *Climate and weather are one and the same with no differences in the terms.*
- d) *None of the above*

**3) Which of the following is not an effect of climate change?**

- a) *Increased sea levels*
- b) *Extinction of certain animal species*
- c) *Radical changes in weather patterns*
- d) *Increased crop production*

**4) Which of the following greenhouse gases is most abundant in the atmosphere?**

- a) *Carbon monoxide*
- b) *Methane*
- c) *Carbon Dioxide*
- d) *Water vapour*

5) With the exception of burning fossil fuels, which of the following contributes the most to global warming?

- a) *Transport*                      b) Mining                      c) Deforestation                      d) Agriculture

For questions 6-9 determine whether each statement is true or false. If the statement is true, place 'T' beside the statement and if the statement is false place 'F' beside the statement.

6) *The Greenhouse Effect is not natural. It is solely as a result of human activities over the years.* \_\_\_\_\_

7) *The ozone layer is located in Earth's stratosphere.* \_\_\_\_\_

8) *The change in climate each region experiences due to global warming can vary from each other.* \_\_\_\_\_

9) *Ozone is composed of 2 oxygen atoms bonded together.* \_\_\_\_\_

10) **If the global temperature has increased by approximately 2°C since 1880, by how much did the global temperature increase each decade (assuming that the temperature increased by the same amount each decade since 1880)**

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**Activity 3:**

**Name:** \_\_\_\_\_

**Date:** \_\_\_/\_\_\_/\_\_\_

**Class:** \_\_\_\_\_

**Climate change is one of the most contentious and controversial issues that society faces today. Due to the conflicting views and beliefs on this issue, there are several misconceptions of climate change that people believe as fact. In this activity we aim to get our facts straight by using the knowledge you have gained from the worksheet to separate the myths from facts.**

**Directions:** For each statement below, indicate whether the statement is a myth or fact by ticking the adjacent box under the corresponding column. If the statement is a myth, explain your reasoning.



Statement	Fact	Myth	Explanation
Increased CO <sub>2</sub> emissions is more beneficial than detrimental since plants will benefit from increased concentration of CO <sub>2</sub>			
The earth has experienced multiple major changes in climate since its creation such			

<b>as the Ice Age. Therefore, the recent climate change that we are experiencing is most likely as a result of natural causes.</b>			
<b>Transportation, Energy and Industry sectors are the main contributors to climate change</b>			
<b>Human activity is mostly to blame for drastic changes in climate over the last few decades.</b>			
<b>I haven't felt any temperature change when I go outside. It is still hot/cold like it has always been for the last few years</b>			
<b>Due to climate change, average wildlife population has decreased</b>			
<b>Renewable energy is too unreliable and expensive. It is more economically feasible to use fossil fuel as an energy source. Thus there is no effective way to stop climate change.</b>			
<b>Climate change can result in negative health effects by increasing the spread of diseases.</b>			

**Activity 4:**

**Name:** \_\_\_\_\_

**Date:** \_\_\_/\_\_\_/\_\_\_

**Class:** \_\_\_\_\_

## **CLIMATE CHANGE IMPACT/RISK ASSESSMENT**

**In this exercise, you will use the knowledge you have obtained from reading the overview on Climate Change Impact Assessment to write your own Impact/Risk Assessment based on the country/region you reside in.**

**Recall:** *In Climate Change Impact Assessments, you must make a note of:*

- 1) The current climate of your country/region*
- 2) The areas impacted by the climate of the country/region*

(For the sake of the exercise, focus on the main areas mentioned in Impact and Risk Assessment 2021 for Germany: natural systems/resources, economic systems that use nature, physical infrastructures, economic systems remote from nature and social systems.)

- 3) How the areas relate to each other*
- 4) How the change in climate affecting one area influences another area*

**Country/Region:** \_\_\_\_\_

**Climate (for the past year):**

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**Areas affected by climate:**

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_

<b>Climate</b>	<b>Effect of Climate on Mentioned Areas</b>

**During your down time, try to run a simulation using the above steps with different climates.**



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