Project funded by
EUROPEAN UNION

BioLearn

Black Sea
CROSS BORDER
COOPERATION

CLIMATE AND CLIMATE CHANGE

Trainer's Booklet

CROSS BORDER
COOPERATION

Common borders. Common solutions.

www.blacksea-cbc.net

ENEZ
KAYMAKAMLIĞI

Project funded by
EUROPEAN UNION

BioLearn

Black Sea
CROSS BORDER
COOPERATION

BIOLEARN-BSB142
ECO-CONSCIOUS MINDS TO STOP POLLUTION
IN THE VALUABLE WETLANDS OF BLACK SEA BASIN

CLIMATE AND CLIMATE CHANGE

Trainer's Booklet

Target Audience: 14+ years old

District Government of Enez
Gaziömerbey Mahallesi
Cumhuriyet Meydanı Hükümet Konağı
Enez / Edirne
Phone: +90 284 811 6006
E-Mail: enezkaymakamligi@gmail.com

Prepared By
Bilgesu Güngör Tutal
Tora Benzeyen

Design
OmaOma Medya ve Yayıncılık
Erden Gümüşçü / Creative Director
Emirhan Demirci / Graphic Designer

Joint Operational Programme Black Sea Basin 2014-2020 is co-financed by the European Union through the European Neighbourhood Instrument and by the participating countries: Armenia, Bulgaria, Georgia, Greece, Republic of Moldova, Romania, Turkey and Ukraine.

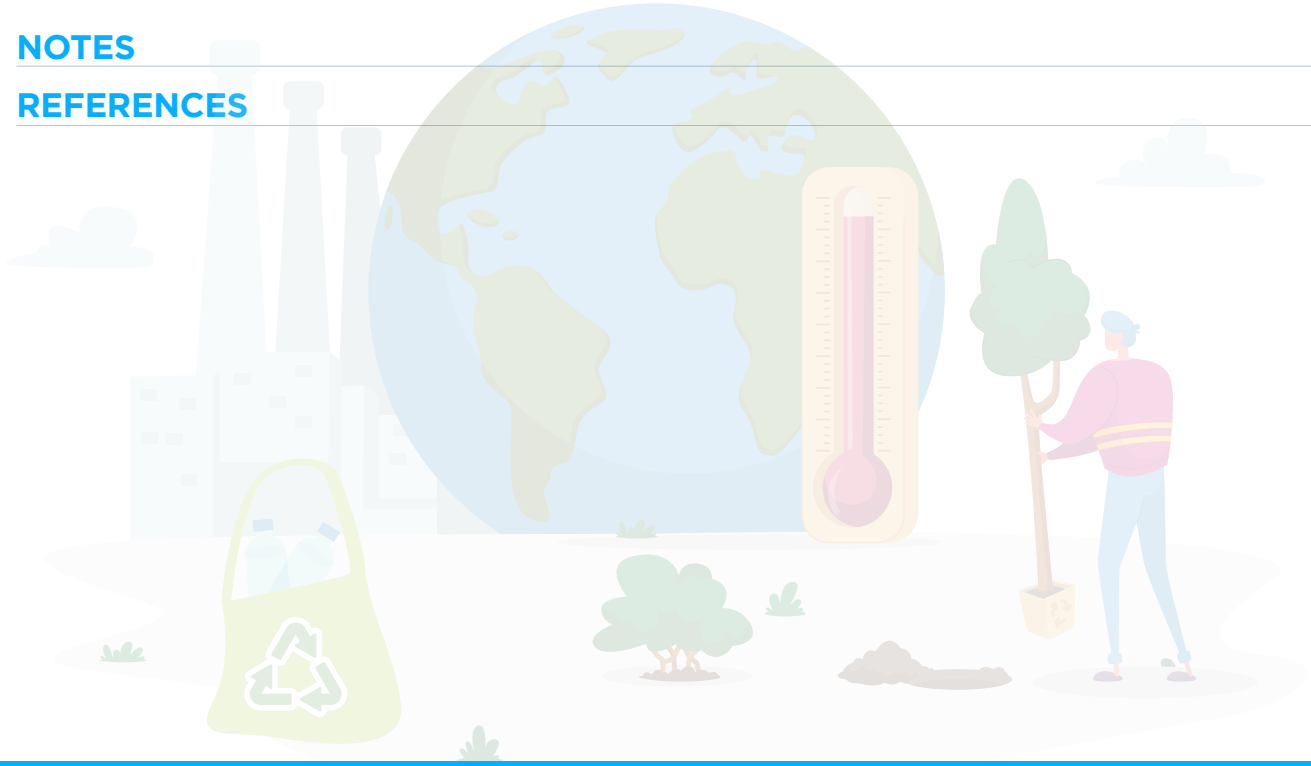
This publication was produced with the financial support of the European Union. Its contents are the sole responsibility of Enez District Governorship and do not necessarily reflect the views of the European Union.

/ biolearn2

/ BioLearn-BSB-Project
-100523088197753

www.bio-learn.org

Contents



About The Project

BIOLEARN (Eco-Conscious Minds to Stop Pollution in the Valuable Wetlands of Black Sea Basin - BSB142), which was initiated on 01.01.2020 within the scope of the first call for proposals of "Joint Operational Programme Black Sea Basin 2014-2020" where the Directorate for EU Affairs is the national authority, is led by District Government of Enez.

Representatives of the following partners are as follows:

1. District Government of Enez-Turkey
2. Division Directorate of Edirne under First Regional Directorate under General Directorate of Nature Protection and Nature Parks of Ministry of Agriculture and Forestry - Turkey
3. Foundation Caucasus Environment - Georgia
4. Agricola NGO - Ukraine
5. Green Balkans / Stara Zagora NGO - Bulgaria
6. Management Body of Evros Delta and Samothraki Protected Areas - Greece

The overall objective of the project is to provide information, experience transfer and capacity building training between partners and develop a common environmental protection and education approach, methodology and organizing campaigns that will raise awareness in the society to reduce pollution in important wetlands in the Black Sea Basin.

The main activities to be carried out within the scope of the26-monthsproject are as follows:

1. Establishment of a total of 4 environmental protection and training centres, one of which is on the shores of Gala Lake, and providing environmental protection training to visitors and especially to students. By providing equipment for the other 6 existing centres, there will be a network of 10 activity and training centres.
2. Workshops to be held in Bulgaria and Greece, focusing on discussions about examples of

successful training and awareness-raising campaigns for the protection of wetlands, sharing experiences and preparing the materials to be used in training which will be applied in all centres. Capacity building training for trainers.

3. Organizing massive and synchronized cleaning campaigns to reduce pollution in wetlands.
4. Award-winning photo contest and exhibition focused on wetland protection.
5. Organizing a wetland pollution-based painting contest and exhibition in primary and secondary schools.

Outputs of the Project:

1. "Stop Pollution" and "Save Nature" environmental education and activity centres, one of which is mobile, will be established in 5 countries and will sustainably carry out training and awareness-raising activities.
2. A report will be prepared on the nature and rate of pollutants in 5 wetlands in the Black Sea Basin.
3. A guide with examples of good practices consisting of training and campaigns focused on protecting wetlands will be prepared.
4. A wetland protection training set consisting of 12 sections will be prepared especially for students. Training sets will also be shared on the internet.
5. After 10 people from 2 each partner country received trainer's training, they will train 25 people in each region (totally 125 people) and the sustainability of training activities will be ensured in the established centres.
6. A painting competition on environmental protection will be held in at least 15 primary and secondary schools and paintings selected by the jury will be exhibited.
7. Pictures taken in 5 regions with the participation of professional photographers will be exhibited. With the mobile 'Stop Pollution' vehicle, the exhibition will travel to 5 countries.
8. An environmental cleaning campaign will be held simultaneously with the participation of 1500 people in 5 regions.
9. With the international conference to be held in Georgia, the outputs of the project and future action plans will be shared with the public.

For more information, you can visit the project website: www.bio-learn.org

About The Booklet

This training booklet is a part of the training set prepared under the “BIOLEARN-BSB142 / Eco-Conscious Minds to Stop Pollution in the Valuable Wetlands of Black Sea Basin” project. The booklet is prepared to attract the attention of the countries in the Black Sea basin to the importance of wetlands, to prevent pollution in wetlands and to develop ecological literacy of the participants accordingly.

This training material targets groups age 14 and older and consists of two parts which are the educator booklet and participant booklet. The trainer booklet has detailed activity application instructions, necessary information on the subject, assessment questions and recommendations to enrich the activity.

Application Notes

- Before starting the activity, it is recommended to view the entire booklet and to get ready for the topic by using the information in the booklet.
- At the beginning of the activity, necessary materials and worksheets should be distributed to the participants.
- When activities are applied, it is important to undertake a facilitator/guide role and to ensure the active participation of the participants.
- The activities in this booklet are planned to be completed in a short time. All of these activities can be applied consecutively or one or two of the activities can be applied in desired order depending on the development stages and interest levels of the participants.
- Presenting the activities with a natural narrative rather than reading the information text in the instructions and keeping the interest of the participants with questions and answers would present positive benefits.
- The activity instructions can be followed exactly or adapted based on participants’ ages, development stages and interest levels without diverging from the activity purposes.

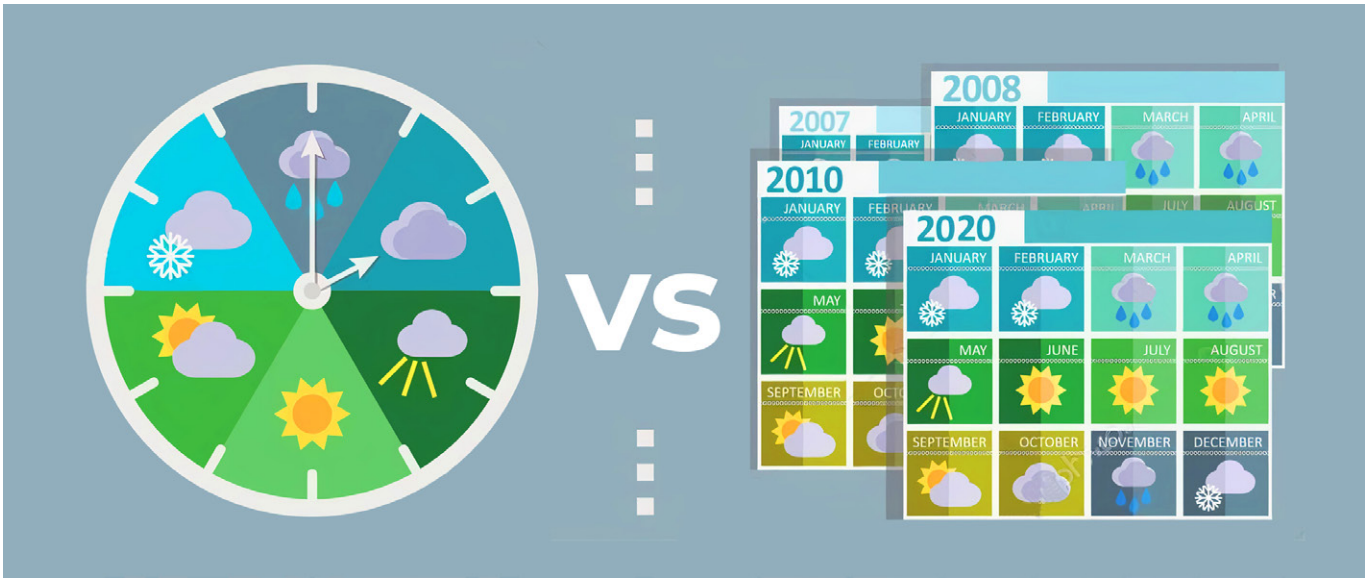
Climate And Climate Change

While the weather might change every hour, day, month or year, the climate is the model of weather conditions over a wide geographic area for a longer period like at least 30 years.

Weather or Climate?

Let's look at the sky today. What do you see? Is it a hot sunny day with no clouds in the sky or a cloudy sky with raindrops falling softly? Maybe the streets are covered with snow or the roofs are scorched by the sun...

The thing you see in the sky when you open the window is actually a scene from that day's weather. Maybe the sun will shine between the clouds a few hours later or the rainwater will flow along the streets on the next day. You are observing the short-term atmospheric events at a certain point like your neighbourhood or city. Factors such as temperature, precipitation, humidity, wind are effective in the formation of this weather condition.



While weather defines short-term events, climate represents the changes over the years.

The climate is a more comprehensive concept than the weather. It is not limited to just a few days or a single city. While the weather might change every hour, day, month or year, the climate is the model of weather conditions over a wide geographic area for a longer period like at least 30 years. For example, rain on November 10 in your city explains the weather for that day while the rainy and stormy period in October-November every year in the Black Sea is the climate of this region.

Five main climate groups are classified on Earth as tropical, dry, temperate, continental and polar.

The climate around the world is classified in various ways. The climate classification by German scientist Wladimir Köppen is the

most widely accepted. Accordingly, five main climate groups are classified on Earth as tropical, dry, temperate, continental and polar. There are also 13 different climate types under these main climate groups. For example, the climate of the landlocked Black Sea can be mainly classified as continental although it is under the influence of the shorelines. That means that there are seasonal temperature variations. The north-western part has a semi-arid (steppe) climate with cold winters and hot, dry summers. The south-eastern part, protected by high mountains, has a humid subtropical climate with abundant precipitation, warm winters and humid summers. Sometimes the winds coming from the Atlantic via Eastern Europe bring rain and storms.

Did You Know?

The climate of the regions is changing due to climate change. The tropical climate around the equatorial region is spreading to the north and south parts of the planet. Or the regions with a Mediterranean climate are beginning to show features of a semi-arid climate.

What is Climate Change?

Although it is not as fast as daily or weekly changes of weather, climates experience changes as well. These changes emerge over many years. For example, the semi-arid climate might be experienced in the Mediterranean climate region over time. In other words, there may be a decrease in the amount of precipitation in the region over the years.

The studies show that our planet has experienced numerous climate changes in the millions of years. Sometimes there was an ice age due to the cold climate and sometimes global drought was experienced due to the hot climate. But all of the changes occurred over a long period that will not be experienced in human life and the factors causing the change emerged naturally.

Our planet has experienced numerous climate changes in the millions of years.

Our planet is experiencing a similar climate change in our time. The global average temperatures are increasing, glaciers are melting, sea levels are rising and heavy precipitation results in devastating floods. The difference is that climate change this time is occurring rapidly as a result of human activities rather than natural factors. The unexpected one-degree increase in global temperature averages over the last 150 years is the most important evidence of this.

Becoming a Paleoclimatologist

The scientists researching the climate of our planet by collecting samples from trees, depths of oceans or glaciers are called “Paleoclimatologists”. The studies by different researchers are compared and considered as correct if these studies match each other. If there is no match, further research is needed to be carried out.

By analysing the air bubbles and water molecules trapped in the ice cores taken from the depths of the glaciers, the climatic conditions of past years can be determined.

Scientists use different methods to learn about past climate changes on our planet. They investigate the tree trunks to learn the climate conditions of a relatively closer past which is a few centuries ago. There are two fundamental methods if they want to go back further to thousands of years ago. First, they can go deeper into the oceans and analyse the sediment samples. Second, they can collect ice cores from kilometers deep in glaciers such as Antarctica which have been frozen for millions of years.

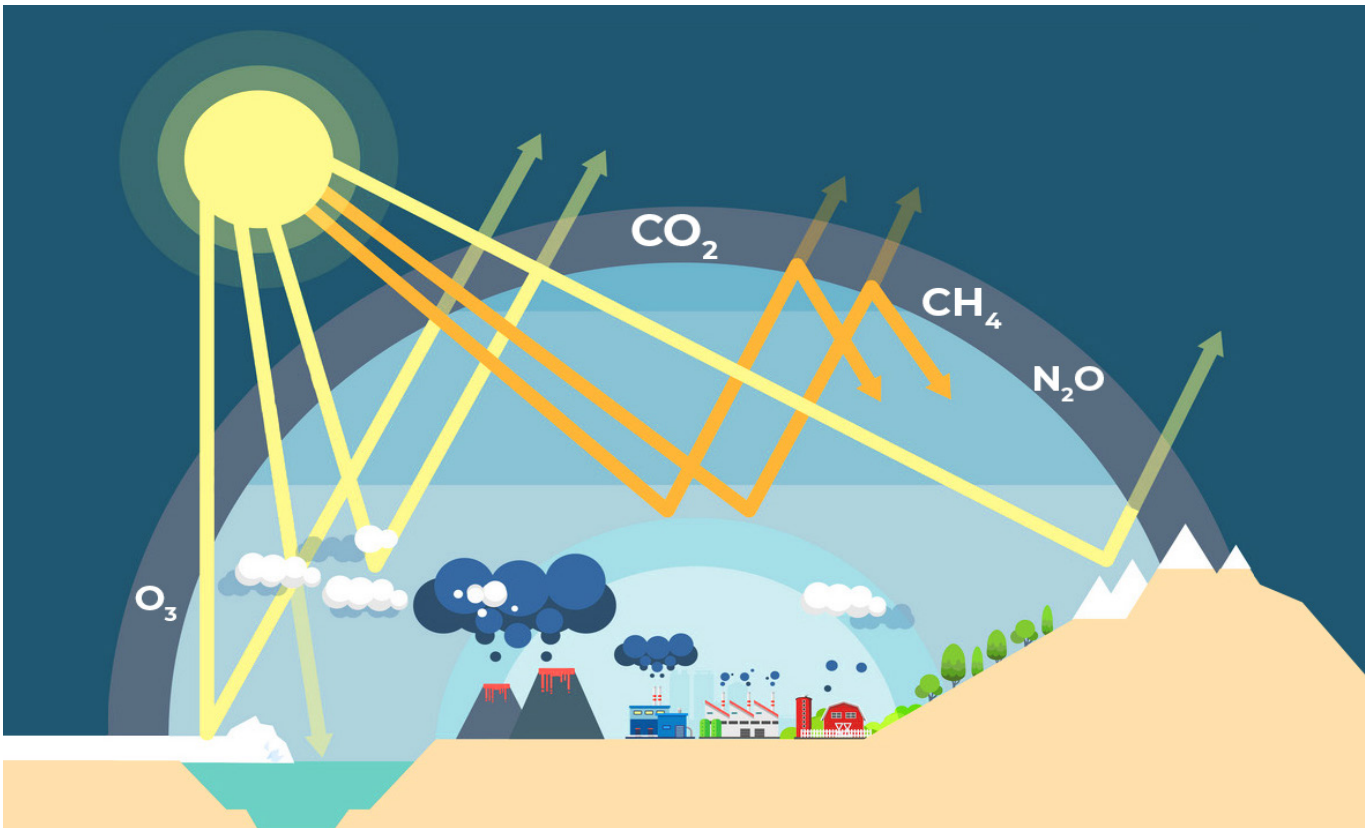
Why Does Climate Change?

The world's climate is determined by various factors such as meteorological phenomena in the atmosphere, temperature and salinity in the seas and oceans, the number of glaciers, vegetation and landforms. The climate changes as these fac-

Our planet is experiencing a similar climate change in our time. The global average temperatures are increasing, glaciers are melting, sea levels are rising and heavy precipitation results in devastating floods.

tors change. Today, scientists state that there is a striking fact that our planet is getting warmer day by day... The main reason for that is the activities of humans, especially in the last 150 years. This is called **anthropogenic climate change** which is human-induced climate change.

The atmosphere is an air layer consisting of a mixture of various gases in a different ratio. This structure consisting of **greenhouse gases** such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), water vapour (H_2O) wraps our planet like a cover. They trap some of the sun's energy reflected by Earth and keeps these solar radiations between the atmosphere and Earth's surface. They prevent all of the solar radiation from being reflected and escaping to space. This situation called, the



The greenhouse gases capture solar radiation and heat our planet.

greenhouse effect, keeps our planet warm enough to sustain life. If there are no greenhouse gases, the average temperature of the planet would be -18°C instead of 15°C.

The greenhouse gases and the greenhouse effects that made our planet habitable at a balanced way especially until the pre-industrial period have changed over time. Over the last century, humanity has industrialised at a tremendous speed, developed vehicles and our consumption habits have changed. All of these changes have led to more energy needs. An airplane without fuel cannot fly or a factory without electricity cannot operate! As a result, a higher amount of fossil fuels is being used uncontrollably than ever before. The greenhouse

Our planet is getting warmer day by day. The main reason for that is the activities of humans, especially in the last 150 years.

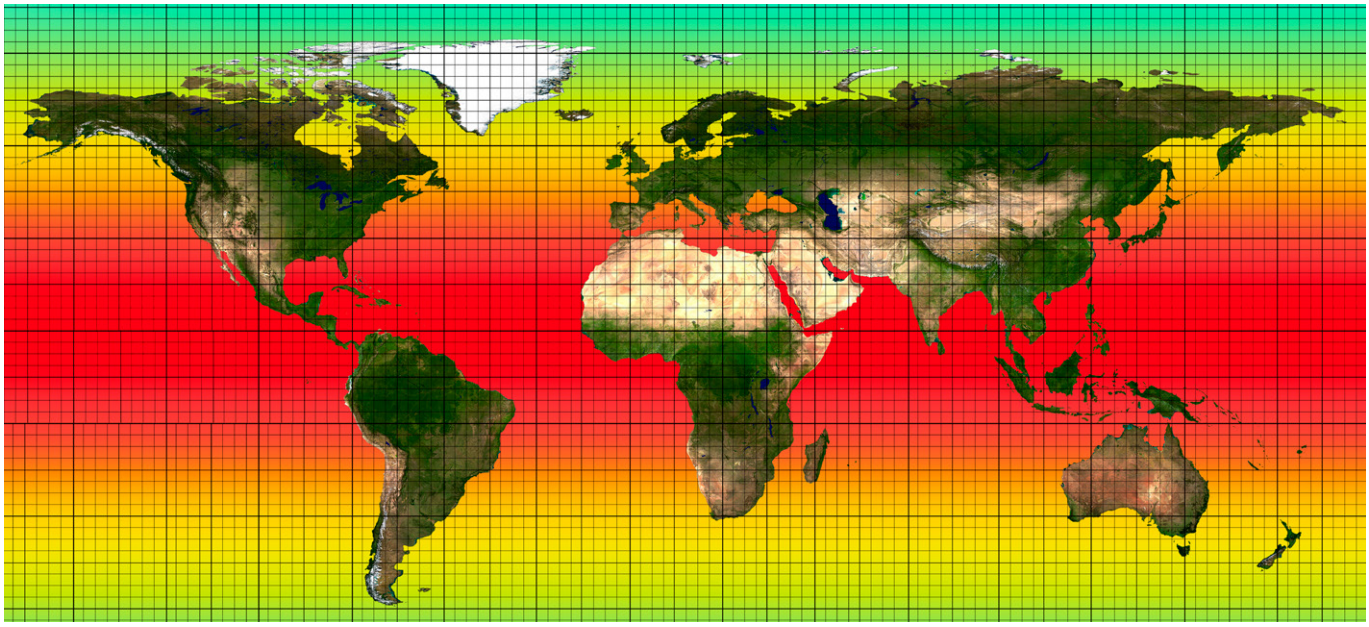
gases released into the atmosphere due to fossil fuel use increased the density of these gases. The balanced structure of the atmosphere has changed. It began to keep more greenhouse gases and more solar radiation as well as heat the surface more.

Substances such as coal, oil and natural gas are called **fossil fuels**. Because these substances are formed when organic materials such as plants and animals decay underground over millions of years. In other words, fossil fuels are the residues of prehistoric forests and dinosaurs! Most of these fossil fuels contain carbon and hydrogen elements. When fossil fuels burn, carbon and hydrogen form compounds with oxygen and are released into the atmosphere as carbon dioxide gas and water vapour.

Other than using fossil fuels, other human activities also cause carbon dioxide and other greenhouse gases. The burning of coal, natural gas and solid waste, cement production and deforestation increase the amount of carbon dioxide. Methane gas is released during the production and transportation of fossil fuels. Additionally, a high amount of methane gas is released due to animal husbandry, agricultural practices and organic waste decomposition in the urban solid waste landfills. Nitrous oxide production is caused by the burning of fossil fuels and solid waste and fertiliser application to agricultural products. Fluorinated gases are formed due to various industrial processes.

Other than using fossil fuels, other human activities also cause carbon dioxide and other greenhouse gases.

Each gas has a different effect on climate change and these are investigated under three main titles to compare their effects on global warming. The density of the gases, how long they stay in the atmosphere and how much heat they absorb give us some ideas about their effects. To express this situation, the **Global Warming Potential (GWP)** term is used. Each greenhouse gas has a global warming potential and some gases are more effective at making the planet warmer. If the global warming potential of gas is high, it means that gas is absorbing more heat and contributing to the warming of the planet more. For example, while carbon dioxide remains in the atmosphere for thousands of years, methane gas stays in the atmosphere much shorter than carbon dioxide (approximately 10 years) but its warming capacity is 25 times more than carbon dioxide. Nitrous



oxide has approximately 300 times more global warming potential than carbon dioxide and it can stay in the atmosphere for 114 years. Hydrofluorocarbon found in devices adjusting temperature levels such as air-conditioners, refrigerators and freezers can stay in the atmosphere for 270 years and has 14,800 times more global warming potential.

Although greenhouse gases are mostly generated due to the direct use of fossil fuels, they are also released due to our everyday activities. Although we are not aware of it, greenhouse gases are released during almost every activity, from the food we eat, the clothes we wear, taking a shower, to our

Although greenhouse gases are mostly generated due to the direct use of fossil fuels, they are also released due to our everyday activities.

travels. **Carbon footprint** measurement is used for measuring the carbon emissions of an individual from all these activities. These measurements are divided into the primary footprint and secondary footprint. For example, using a motor vehicle or heating the house is the primary footprint. Our secondary footprint includes the carbon emissions by the products we eat, drink or use.

Calculate your carbon footprint!

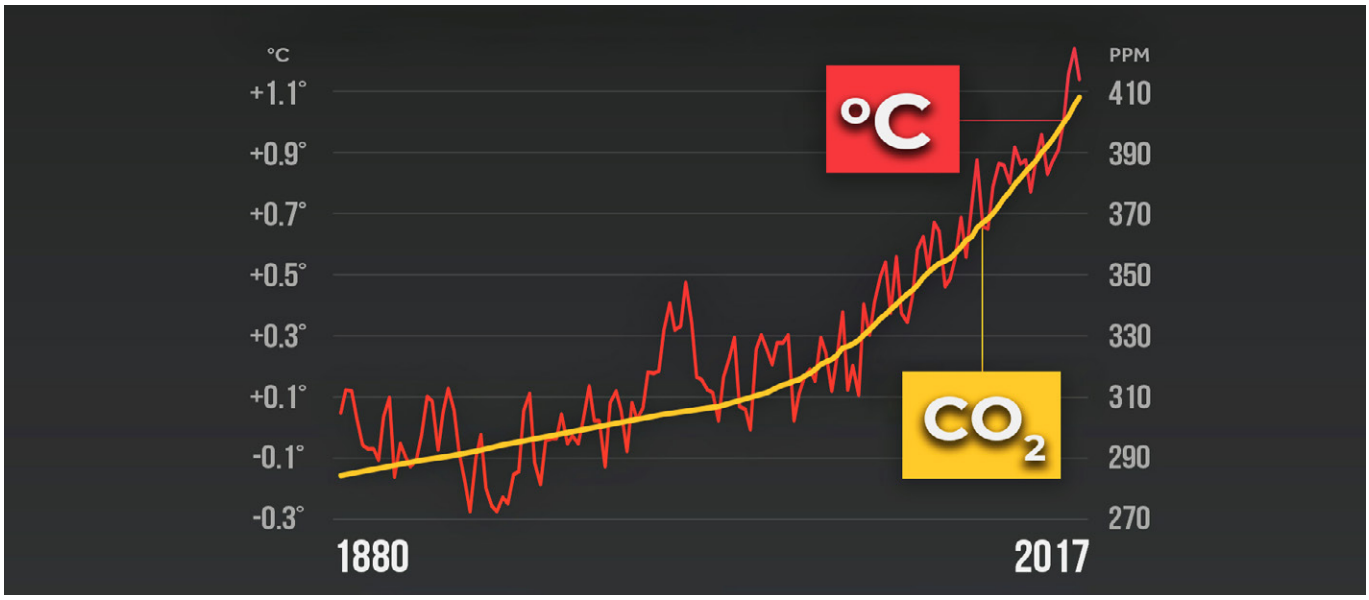
Scan the QR code on your phone and calculate your carbon footprint.

Effects of Climate Change and Measures

Due to human activities, the temperature of the planet has increased by 1 degree compared to the pre-industrial period. The last 5 years have been recorded as the hottest 5 years ever. As we cannot solve this problem and still cannot take permanent steps, climate activists call this situation a **climate crisis**.

In order to combat climate change on a global scale, climate negotiations that started with the Earth Summit regularly are held. Under the umbrella of the United Nations, these summits held with the participation of all member states are aimed to reduce and eliminate the factors that cause climate change, especially carbon emissions. In the process of continuing with

The effects of climate change are visible in different ways. Although the global temperatures are increasing, some regions of the planet are warming very much while others are becoming colder than ever before.



Both carbon dioxide emissions and global temperature averages have been constantly increasing since the industrial revolution. (Source: Climate Central)

Did You Know?

The precipitation pattern changes due to climate change. The precipitation amount for one time can be too much or too little. For example, in recent years, the precipitation on the Black Sea coast in Turkey has happened in a short duration with more than average and caused floods and landslides. As a result, lots of people have experienced serious loss of life and property.

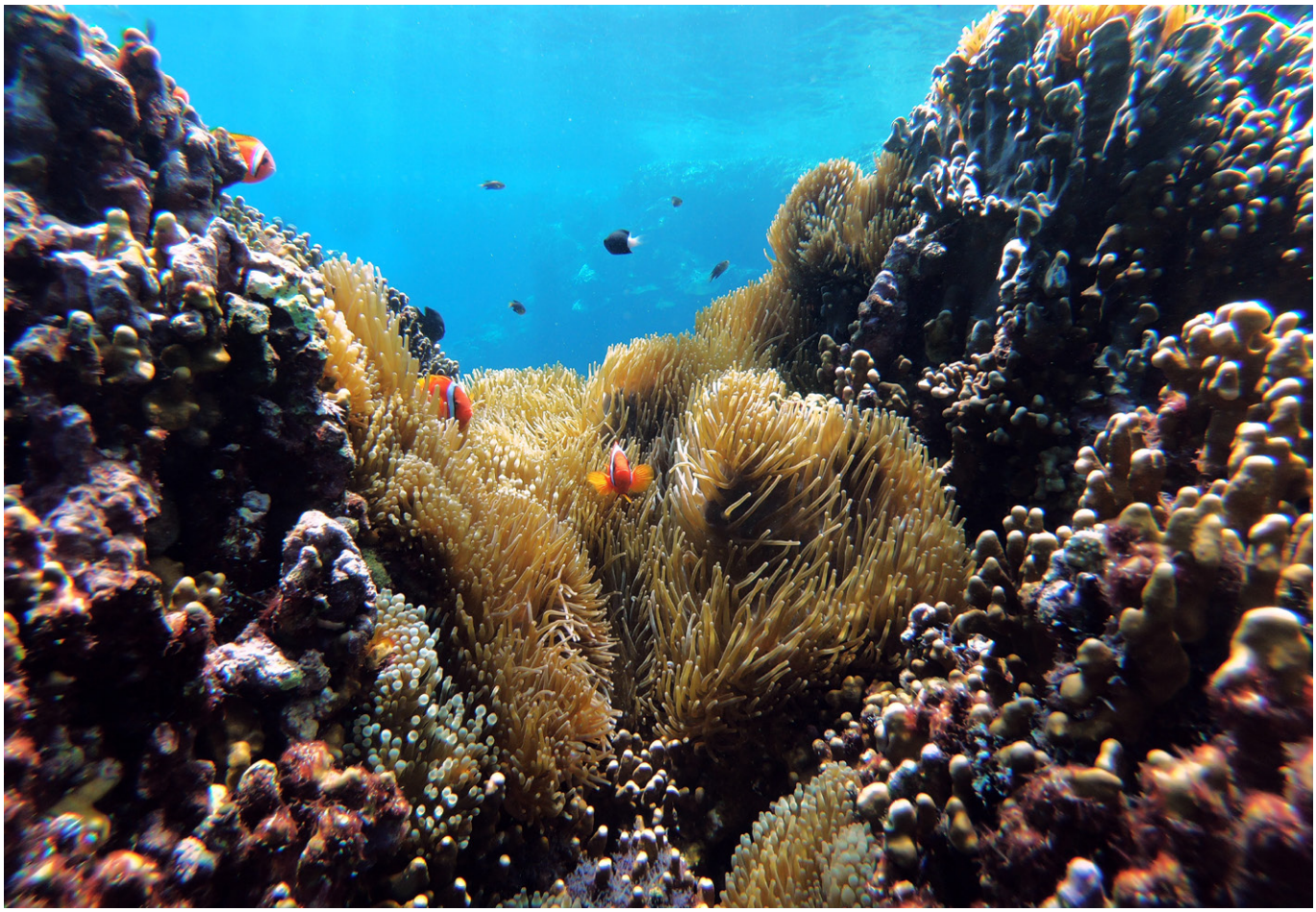
the Kyoto Protocol in 1997 and lastly the signing of the Paris Climate Agreement in 2015, countries must make a joint effort to keep the global temperature increase below 2°C compared to the pre-industrial levels and to limit this increase to 1.5°C.

The effects of climate change are visible in different ways. Although the global temperatures are increasing, some regions of the planet are warming very much while others are becoming colder than ever before. The precipitation frequency and intensity are changing. Glaciers are melting, oceans are warming and the sea level is rising. While there are floods in some regions, others struggle with excessive weather events such as drought and heatwaves. The number of hurricanes, storms and forest fires is increasing. Agricultural production is being damaged.

This change in the global temperature seriously threatens habitats and living beings in these habitats. Various habitats on the planet such as oceans, seas, forests, wetlands and glaciers and numerous plant and animal species dependent on these habitats are directly impacted by climate-related problems. Even small temperature changes can lead to serious impacts on ecosystems. Numerous living beings and habitats are disappearing or experiencing the threat of extinction as a direct result of climate change. For example, due to shifting seasons, some trees leaf out earlier than they should and the caterpillars that feed on them hatch earlier from their eggs. The number of caterpillars is increasing earlier than before but the birds that eat these caterpillars are late for them and they starve. Since birds lay eggs and hatch with an annual rhythm that has been established over many years, the time mismatch can result in popula-

The coral reefs have the highest biodiversity compared to other ecosystems and they are highly sensitive to climate change.

tion declines. Another example is happening in oceans and seas which are the largest oxygen source and carbon dioxide sink. The coral reefs found there have the highest biodiversity compared to other ecosystems and they are highly sensitive to climate change. The coral reefs host more than one-quarter of all marine fish species. A spike of 1-2°C in the ocean temperature can trigger stress in the coral reefs. This causes coral reefs to expel the algae that live in their tissues and that give their colour. As the algae leaves, the corals fade. This is called **coral bleaching**. If the ocean temperatures stay high for long enough, this will result in the death of the corals.



The rich ecosystem of coral reefs is devastatingly affected by climate change.

Did You Know?

Climatic conditions serve as a clock for many creatures, from birds to butterflies, bears to trees. Timing of hibernation, reproduction, migration, blossoming or becoming a butterfly from a caterpillar are all determined by this clock. Studies show that birds might miss their migration times, the plants might bloom early or the caterpillars might turn into butterflies early due to climate change. This wrong timing disturbs the healthy functions of the ecosystem and ends up with the death of numerous living beings.

We have some duties to prevent climate change in addition to governments and large industrial companies. These duties are in fact simple and effective. We need to change our lifestyles to avoid activities that damage our planet and to minimise our carbon footprint. We can choose walking, cycling or using public transport to reduce our carbon footprints in transportation. We can strive to use energy efficiently and we can be careful about saving electricity and water. We can take shorter showers and unplug the electronic devices not in use. We can reduce our wastes. Instead of plastic bags, we can use cloth bags for shopping and instead of single-use products, we can choose durable or recycled products.

We need to change our lifestyles to avoid activities that damage our planet and to minimise our carbon footprint. In this way, we can prevent the acceleration of climate change and minimise the negative effects of climate change on our planet.

We can think about whether we need a product before buying it. We can consume less meat and try to consume local foods and seasonal fruits and vegetables. We can re-use our goods or share them with someone who needs them instead of throwing them away. In this way, we can prevent the acceleration of climate change and minimise the negative effects of climate change on our planet.

Activities

Climate Change

Objective

To draw attention to climate change and concepts related to climate change.

Learning Outcomes

- S/he will distinguish the difference between weather and climate.
- S/he will express what climate change and its effects are.

Target Audience

14+ years old

Materials

Computer with an internet connection, projector, whiteboard, board marker

Duration

20 min.

Method

Video, mind map, question-answer

Application

1. Start the activity by watching the video named "Global Temperature Anomalies from 1880 to 2019" published by NASA. Just watch the changes in the image in this silent video. You can scan the QR code to access the video. Or you can click the following link:

www.youtube.com/watch?v=3sqdyEpklFU

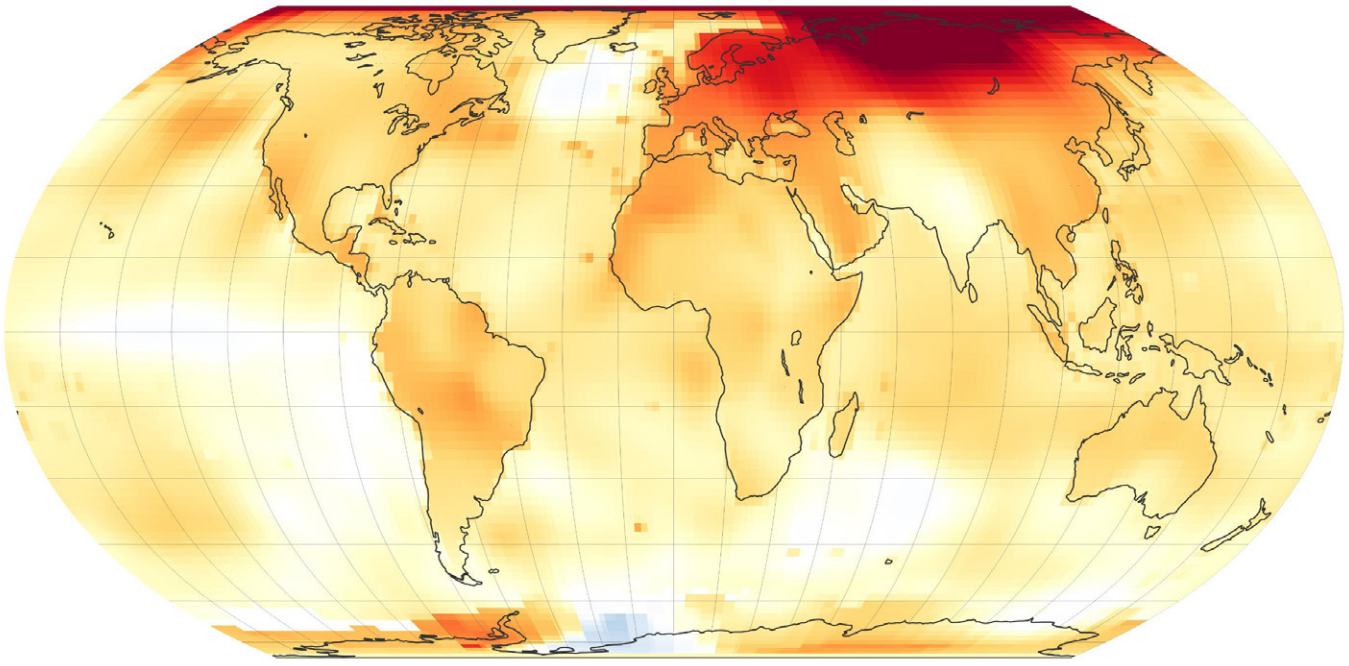
2. Then, ask the participants what the image is and discuss what the change in the average temperature of the Earth over the years means.
3. Talk about the differences between weather and climate. You can use the explanation below.

Weather is the atmospheric conditions at any time and place. Weather includes temperature, precipitation, humidity, air pressure and wind. A rainy, sunny, snowy, foggy day tells us the weather of that day. Hurricanes, snowstorms and drought are extreme weathers.

Climate is the long-term average of the weather in a certain place. While the weather can change in minutes or hours, the changes in climate can take up to decades or centuries. Climate is not only defined by average temperature and precipitation but also by the type, frequency, duration and intensity of meteorological phenomena such as heatwaves, cold periods, storms, floods, droughts. It has a more complex structure than the weather.

We can simply summarise it as follows. What we see when we look outside the window is weather and our prediction about the weather due to season without looking outside is climate. In other words, weather affects which clothes we are going to wear that day, while climate influences our wardrobe.

4. Then, draw the attention of the participants to how much the average temperatures have increased quickly in recent years.



Ask the cause and effect of this increase. Write climate change in the middle of the board and start creating a mind map. Write the answers from the participants by drawing arrows from this word. You can use the following questions when you are creating the mind map.

- Why is the climate changing? (Anthropogenic: fossil fuel use, increase in greenhouse gases, industry, electricity generation, using vehicles, animal husbandry. Natural: volcanic eruptions, ocean flows, the Earth's orbital changes.)
- Who is affected by climate change? (All living beings: humans, animals, plants, fungi, microorganisms...)
- What are the effects of climate change? (Flood, drought, habitat loss, species extinction, crop loss in agriculture, famine, wildfires, melting glaciers, hurricanes...)

5. After getting the answers, you can finish the activity by using the following explanation about climate change and its causes.

Actually, the climates change naturally over many years. Moreover, the planet has experienced various effects of climate changes such as ice age or global drought over millions of years. But all of the changes occurred over a long period that will not be experienced in human life and the factors causing the change emerged naturally. However, we have accelerated this natural change more than ever due to human activities. As you can see in the video, the one-degree increase in global temperature averages over the last 150 years is the most important evidence of this. Because in the last 150 years, humanity has industrialised at a tremendous speed, developed vehicles and changed consumption habits. All of these changes have led to more energy needs and therefore, more fossil fuel use. As a result of fossil fuel use and other activities, the greenhouse gases in the atmosphere are increasing day by day and these gases cause the Earth's surface to warm rapidly. The climate is starting to change. With climate change, the precipitation frequency and intensity are changing. Glaciers are melting, oceans are warming and the sea level is rising. While there

are floods in some regions, others struggle with excessive weather events such as drought and heat-waves. The number of hurricanes, storms and forest fires is increasing. Agricultural production is being damaged. Other than using fossil fuels, other human activities such as consumerism, food waste, solid waste burning, cement production, deforestation, animal husbandry, agricultural practices and fertiliser use in agricultural products impact greenhouse gas formation. In the process of continuing with the Kyoto Protocol in 1997 and lastly the signing of the Paris Climate Agreement in 2015, countries must make a joint effort to keep the global temperature increase below 2°C compared to the pre-industrial levels and to limit this increase to 1.5°C. However, we have some duties to prevent climate change in addition to governments and large industrial companies. These duties are in fact simple and effective. We need to change our lifestyles to avoid activities that damage our planet and to minimise our carbon footprint.

Assessment Questions

You can ask the following questions to the participants during or at the end of the activity.

- Although the climate has been changing naturally over the centuries, why has climate change become an important problem today?
- Which of our choices in our daily lives might be causing climate change?
- What effects do governments and industries have on climate change?

Extensions

- At the end of the activity, you can watch a short video about climate change in accordance with the age level.

Carbon Footprint

Objective
To realise the effects of our daily life choices on climate change.

Materials
Carbon Footprint Test, Problems and Solutions Worksheet, pencil

Learning Outcomes
- S/he will realise the effects of daily life choices on carbon emission.
- S/he will generate solutions to prevent climate change.

Target Audience
14+ years old

Duration
40 min.

Method
Test, question-answer, brainstorming

Application

1. Talk about carbon footprint with the participants. Learn what they know about this topic. You can use the explanation below.

Our choices in our daily lives directly impact our planet... The carbon footprint term is used for determining the harm of our activities causing greenhouse gas emissions which is one of the leading actors for climate change. Although greenhouse gases are mostly generated due to the direct use of fossil fuels, they are also released due to our everyday activities. Each individual causes a different amount of carbon emission depending on the place they live in and their lifestyles. Although we are not aware of it, greenhouse gases are released during almost every activity,

from the food we eat, the clothes we wear, taking a shower, to our travels. Let's calculate our carbon footprint...

2. Then, give sufficient time to participants for the Carbon Footprint Test application.
3. At the end of the test, get everyone's comments about their results. Discuss who has less and who has more footprint and the reasons.
4. Divide the participants into 4 groups. Give each group a title on food, transportation, house and stuff. Ask the participants to write down related problems and solution recommendations about the title on "Problems and Solution Recommendations Worksheet" by brainstorming.
5. After each group presents their work, finish the activity. You can use the explanation below.

Individual efforts are very important to prevent climate change. These efforts are in fact simple and effective. We need to change our lifestyles to avoid activities that damage our planet and to mini-

mise our carbon footprint. We can choose walking, cycling or using public transport to reduce our carbon footprints in transportation. We can strive to use energy efficiently and we can be careful about saving electricity and water. We can take shorter showers and unplug the electronic devices not in use. We can reduce our wastes. Instead of plastic bags, we can use cloth bags for shopping and instead of single-use products, we can choose durable or recycled products. We can think about whether we need a product before buying it. We can consume less meat and try to consume local foods and seasonal fruits and vegetables. We can reuse our goods or share them with someone who needs them instead of throwing them away. In this way, we can prevent the acceleration of climate change and minimize the negative effects of climate change on our planet.

Assessment Questions

You can ask the following questions to the participants during or at the end of the activity.

- Did you know there is a connection between our lifestyles and climate change?
- Is it easy or difficult to change our choices?
- Which behavior will you work on to change based on what you have learned today?

Extensions

- You can ask participants to create a campaign to attract attention to climate change and to move people. Accordingly, you can help them to find slogans and prepare posters.

CARBON FOOTPRINT TEST

FOOD	TRANSPORTATION
1. Which best defines your diet? **a.** I eat meat in every meal (**20**) **b.** I eat meat in some meals (**10**) **c.** I rarely eat meat (**5**) **d.** I don't eat meat (**0**) 2. How often do you eat outside (restaurant/ cafe/online food order)? **a.** Every day (**20**) **b.** Few times a week (**10**) **c.** Once a month (**5**) **d.** None (**0**) 3. How much of your food do you waste? **a.** More than half (**20**) **b.** A quarter (**10**) **c.** One tenth (**5**) **d.** None (**0**) 4. How much of the food that you eat is locally grown? **a.** I don't know (**20**) **b.** Some (**10**) **c.** Most (**5**) **d.** All (**0**)	1. How do you travel most? **a.** By car (**20**) **b.** By motorcycle (**10**) **c.** With public transport (**5**) **d.** None - I walk or ride a bicycle (**0**) 2. How many hours do you spend in your car or motorcycle? **a.** More than 1 hour (**20**) **b.** Half - 1 hour (**10**) **c.** Less than half an hour (**5**) **d.** Never (**0**) 3. How many hours do you spend on public transport? **a.** More than 1 hour (**20**) **b.** Half - 1 hour (**10**) **c.** Less than half an hour (**5**) **d.** Never (**0**) 4. How many times do you fly each year? **a.** 4 or more times (**20**) **b.** 2-3 times (**10**) **c.** 1-2 times (**5**) **d.** None (**0**)
Total Points:	**Total Points:**
HOUSE	**STUFF**
1. What kind of house do you live in? **a.** 2-3 storey detached house (**20**) **b.** 1 storey detached house (**10**) **c.** Apartment / Flat (**5**) 2. How many rooms per person do you have? **a.** 4 or more (**30**) **b.** 3 (**20**) **c.** 2 (**10**) **d.** 1 (**5**) 3. Which temperature range do you keep in your house in winter? **a.** Above 21°C (hot) (**20**) **b.** 18-21°C (warm) (**10**) **c.** 14-17°C (cool) (**5**) **d.** Below 14°C (cold) (**0**) 4. Do you turn off the lights and electronic devices when not in use? **a.** No (**10**) **b.** Yes (**0**)	1. How many electronic devices do you have in your house? **a.** 10 or more (**20**) **b.** 5-10 (**10**) **c.** 1-5 (**5**) **d.** 0 (**0**) 2. How many clothes do you buy in a year? **a.** More than 8 pieces (**30**) **b.** 5-7 pieces (**20**) **c.** 2-4 pieces (**10**) **d.** 1 piece (**5**) 3. How much trash do you generate in a day? **a.** More than 1L jar (**20**) **b.** 1L jar (**10**) **c.** 0.5L jar (**5**) **d.** None (**0**) 4. Do you throw products such as glass, metal, and paper into recycling bins? **a.** No (**20**) **b.** Yes (**5**)
Total Points:	**Total Points:**
Grand Total Points:	

Sum the scores from all categories. Learn your carbon footprint according to the result.

Less than 70 points Great! Your carbon footprint is low. Share your environmentally friendly choices in your daily life and inspire people.

70-160 Points You are trying to be careful about your lifestyle. But your lifestyle still has an impact on the planet. You can search for what you can do to lessen your impacts on nature.

More than 160 points Watch out! Your carbon footprint is high! Let's take a step before it is too late for our planet and start reducing your carbon footprint.

PROBLEMS AND SOLUTIONS WORKSHEET

PROBLEMS	SOLUTIONS

The Greenhouse Effect Game

Objective
To perceive the greenhouse effect and its relationship with climate change.

Learning Outcomes
- S/he will learn the greenhouse effect.
- S/he will connect human activities with climate change.
- S/he will distinguish environmentally friendly and environmentally unfriendly activities.

Target Audience
14+ years old

Duration
40 min.

Method
Game, question-answer

Materials
Sunlight and Greenhouse Gas Cards, Human Activities Cards, bag or container, chalk or ball of wool

Preparation
- First, determine a large area for the game. Draw a circle on the ground representing the Earth. You can use chalk or a ball of wool for this purpose. Draw a larger circle representing the atmosphere by putting the "Earth circle" at centre.
- Determine the number of Sunlight and Greenhouse Gas Cards depending on the number of participants.
- Cut the Sunlight and Greenhouse Gas Cards and Human Activity Cards before the activity. Put the Sunlight and Greenhouse Gas Cards in a bag or a small container.

Application

1. Go to the area you have prepared before the activity with the participants and talk about climate change, the causes of climate change, human activities and greenhouse gases. Give the following information about greenhouse gases.

The atmosphere is a layer wrapping our planet and consisting of a mixture of various gases in a different ratio. It consists of ***greenhouse gases*** *such as carbon dioxide*

(CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3) and water vapour (H_2O). These gases trap some of the sunlight and keep our planet warm enough to sustain life. This is called the ***greenhouse effect****.*

2. Then, tell the participants that you are going to play a game that represents how the greenhouse gases warm the Earth.
3. Explain that the small circle in the middle of the game field represents the Earth, the big circle represents the atmosphere and the outside of the atmosphere represents the space.
4. Ask each participant to draw one of the Sunlight and Greenhouse Gas Cards that you have prepared before the activity. Tell them that those with yellow cards represent the sunlight and those with the red cards represent the greenhouse gas.
5. Place two or three children representing the greenhouse gases in the atmosphere and tell them that these are the greenhouse gases formed as a result of natural processes on Earth. Tell them to stay put, not to move and they can only touch the sunlight passing next to them with their hands. Tell them that the sunlight they touch cannot go back to space and they will continue to stay in the atmosphere since they are held by the greenhouse gases.

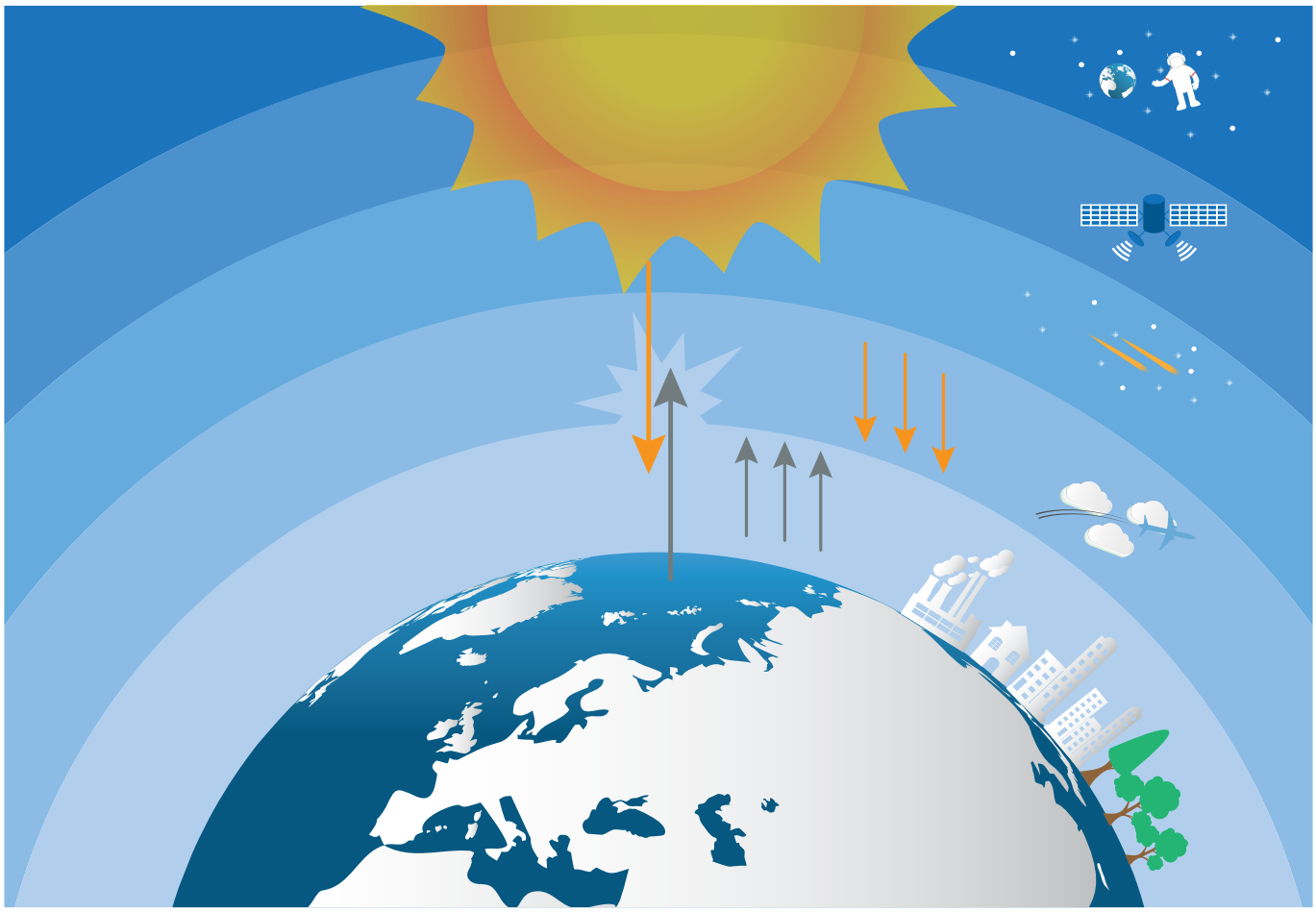
6. Ask all the children representing sunlight to run from space to Earth and go back to space. Tell them that if a greenhouse gas touches the sunlight, they cannot go back to space and they need to stay in the atmosphere.
7. Tell the sunlight in the space to stay outside of the circle for the next tour and do the following assessment:

How much sunlight has been trapped by the greenhouse gases in the atmosphere? This is what we call the greenhouse effect. It represents the amount of heat energy from the Sun. The sunlight coming from space has been trapped in the atmosphere by greenhouse gases such as carbon dioxide, methane, water vapour and nitrous oxide without going back to space. How do you think this affects the temperature of Earth? A certain amount of greenhouse gases is necessary to keep the planet at a habitable temperature. If there were no greenhouse gases, the average temperature of the planet would be -18°C instead of 15°C.

8. In this tour, increase the greenhouse gases in the atmosphere with human activities. To do that,

randomly select a card from Human Activities Cards that increase the greenhouse gases (you can make the participants draw the cards) and start reading it. Place as many participants as the number of greenhouse gases written on the card in the atmosphere. After the guidance by the cards, ask the sunlight to go to Earth and escape back into space. Tell them the sunlight caught by the greenhouse gases will stay in the atmosphere. Repeat the game until the greenhouse gases are increasing in the atmosphere and do the following assessment.

With the rise of greenhouse gases, more of the sunlight can no longer go back to space and this increases the temperature of the Earth's surface. Greenhouse gases have been formed on our planet as a result of natural processes for millions of years, but today, due to increasing industrialisation and vehicles, human-induced greenhouse gases are emitted intensely. Therefore, the balanced structure of the



atmosphere has changed. It began to keep more greenhouse gases and more solar radiation as well as heat the surface more. The climate started to change.

9. Now, randomly choose a card from Human Activities Cards. Read the information on the card and either send or remove the number of participants representing the greenhouse gases depending on the number on the card and make the following explanations:

As a result of our activities, we can increase or decrease the greenhouse gases in the atmosphere. Our choices in our daily lives highly affect the amount of greenhouse gases. Consuming fossil fuel, buying too much, consuming more meat and travelling are the activities that significantly increase the amount of greenhouse gases and cause the world to warm up. However, we can reduce the greenhouse effect by using vehicles that reduce fossil fuel use such as walking, cycling or public transport, planting trees, consuming less and recycling.

10. Get participants' comments about the game and finish the game.

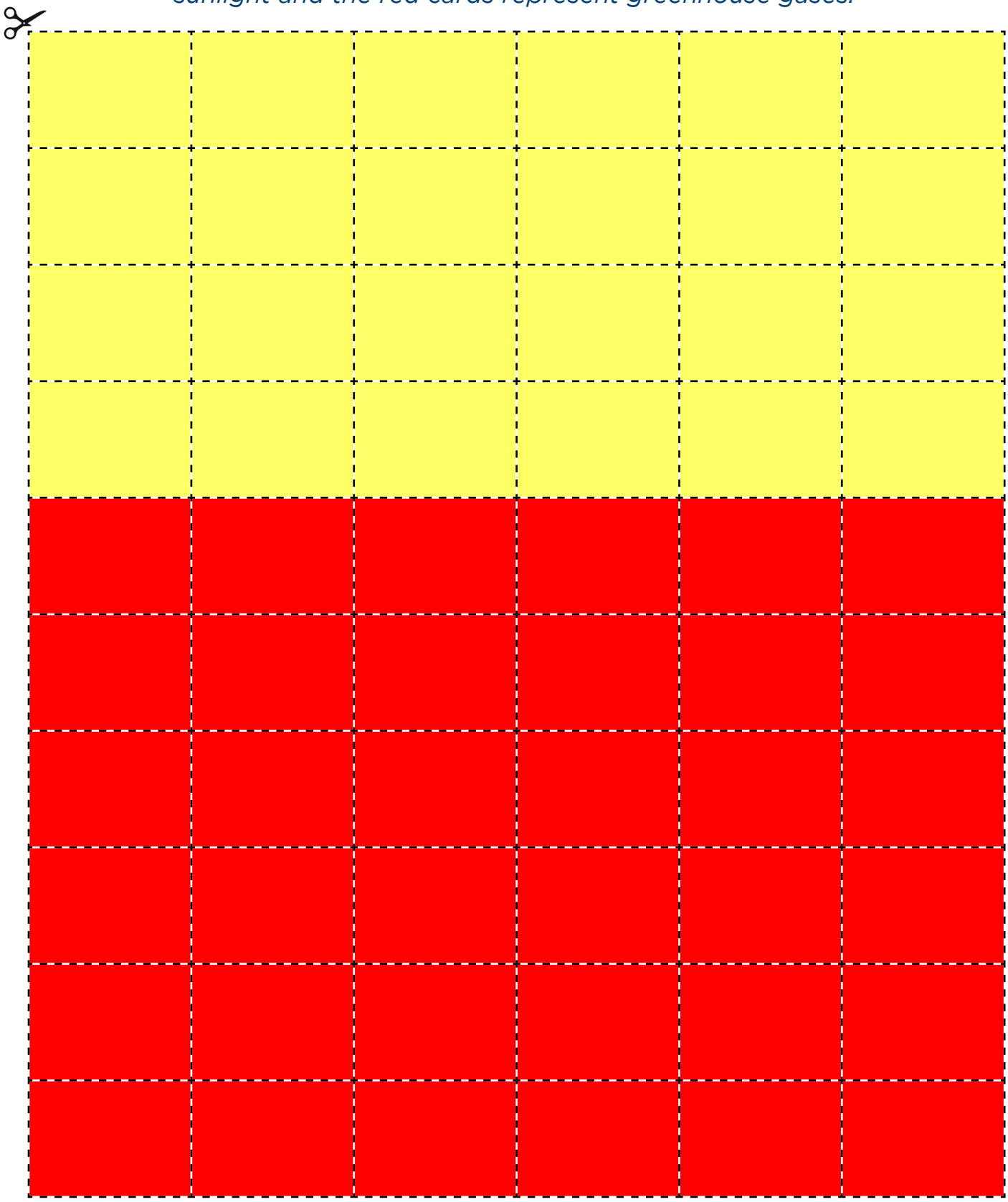
Assessment Questions

You can ask the following questions to the participants during or at the end of the activity.

- Which activities increased the greenhouse gases the most?
- Which activities decreased the greenhouse gases the most?
- Which activities do you do in your daily life that increase or decrease greenhouse gases?

SUNLIGHT AND GREENHOUSE GAS CARDS

Prepare the cards by cutting out the dashed lines. The yellow cards represent sunlight and the red cards represent greenhouse gases.



HUMAN ACTIVITIES CARDS

Human Activities Increasing Greenhouse Gases

Fossil Fuel Consumption
As a result of using fuels like coal, petroleum, natural gas carbon dioxide and nitrous oxide are released into the atmosphere. Greenhouse gases are formed by using fossil fuel-consuming vehicles like cars, planes, buses and using fossil fuels to generate electricity and heat.

Release 2 greenhouse gases into the atmosphere.

Deforestation
The trees absorb the carbon dioxide in the atmosphere and help to regulate the climate. When the trees are cut, this beneficial effect disappears and the carbon dioxide stored in the trees is released into the atmosphere. Forests are destroyed to open agricultural lands and to build houses.

Release 2 greenhouse gases into the atmosphere.

Animal Husbandry
Cows and sheep produce a large amount of methane when they digest their food. Also, forests are destroyed for animal feed production. Greenhouse gases are released during the transportation of meat.

Release 2 greenhouse gases into the atmosphere.

Nitrogen Fertilizers Used in Agriculture
Nitrogen-containing fertilizers release nitrous oxide into the atmosphere.

Release 2 greenhouse gases into the atmosphere.

Use of Fluorinated Gases
The chlorofluorocarbon gases with high global warming potential are released into the atmosphere due to the use of cooling devices such as air conditioners, refrigerators and freezers.

Release 2 greenhouse gases into the atmosphere.

Overconsumption
Living in houses that are larger than we need generates more greenhouse gases to meet both heating and electrical energy. Buying more clothes or items than we need causes greenhouse gases during production and transportation.

Release 2 greenhouse gases into the atmosphere.

Human Activities Preventing Greenhouse Gases

Tree planting The trees absorb the carbon dioxide in the atmosphere and help to regulate the climate. The more trees there are, the less carbon dioxide in the atmosphere. *Remove 2 greenhouse gases from the atmosphere.*	**Keeping the Seas Clean** Seas and oceans absorb a huge amount of carbon dioxide in the atmosphere and at the same time use carbon dioxide to produce oxygen. When the seas are healthy, it is easier to deal with greenhouse gases. *Remove 2 greenhouse gases from the atmosphere.*
Renewable Energy It is possible to generate energy without greenhouse gas emissions by using renewable alternative energy such as solar panels and wind turbines instead of fossil fuels. *Remove 2 greenhouse gases from the atmosphere.*	**Recycling** Recycling saves energy to be used to produce a new product. This means less fossil fuel needs. In this way, less greenhouse gases are generated. Using recycled paper prevents trees from being cut down. *Remove 2 greenhouse gases from the atmosphere.*
Eco-Friendly Vehicle Use Choosing public transportation allows us to emit less greenhouse gases. We can choose electric vehicles instead of vehicles that consume fossil fuel. A bicycle is a nature-friendly vehicle. *Remove 2 greenhouse gases from the atmosphere.*	**Sustainable Living Choices** Consuming less, choosing recycled products, buying local foods, living in smaller houses, choosing energy-efficient products are activities that cause less greenhouse gas formation. *Remove 2 greenhouse gases from the atmosphere.*

Notes

References

A Science & News Organization. (n.d.). Climate Central. https://www.climatecentral.org/

Black Sea - Climate. (n.d.). Encyclopedia Britannica. https://www.britannica.com/place/Black-Sea/Climate

C2ES. (2020, January 9). Main Greenhouse Gases. Center for Climate and Energy Solutions. https://www.c2es.org/content/main-greenhouse-gases/

Climate Types for Kids. (n.d.). Climatetypesforkids. https://www.climatetypesforkids.com/

ClimateScience. (n.d.). ClimateScience. https://climate-science.com/

Coral reefs and climate change. (2018, August 31). IUCN. https://www.iucn.org/resources/issues-briefs/coral-reefs-and-climate-change#:%7E:text=When%20conditions%20such%20as%20the,prolonged%20periods%2C%20they%20eventually%20die.

Greenhouse Gas Protocol. (2014). Global Warming Potential Values. https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf

HCTF Education. (2003). Greenhouse Gas Game. http://hctfeducation.ca/wp-content/uploads/2014/09/GreenhouseGasGame_Lesson.pdf

NASA. (n.d.). Climate Kids. NASA Climate Kids. https://climatekids.nasa.gov/

National Geographic Society. (2017, September 26). All About Climate. https://www.nationalgeographic.org/article/all-about-climate/

Overview of Greenhouse Gases. (2020, September 8). US EPA. https://www.epa.gov/ghgemissions/overview-greenhouse-gases#:%7E:text=For%20each%20greenhouse%20gas%2C%20a,contribute%20more%20to%20warming%20Earth.

Red Cross Red Crescent Climate Centre. (2017, September). Greenhouse Gas Game. https://www.climatecentre.org/downloads/modules/games/Greenhouse%20Gas%20Game.pdf

The Greenhouse Effect Game | The Saiga Resource Centre. (n.d.). Saiga Resource Centre. https://www.saigaresourcecentre.com/activity/greenhouse-effect-game

UCAR Center for Science Education. (2018). The Greenhouse Game. https://scied.ucar.edu/sites/default/files/files/activity_files/the_greenhouse_game_1.pdf

Understanding Global Warming Potentials. (2020, September 9). US EPA. https://www.epa.gov/ghgemissions/understanding-global-warming-potentials#:%7E:text=The%20Global%20Warming%20Potential%20

WWF Footprint Calculator. (n.d.). WWF. https://footprint.wwf.org.uk/#/questionnaire

The Editor of the Material
District Government of Enez
Address: Gaziömerbey Mahallesi, Cumhuriyet Meydanı
Hükümet Konağı 22700 Enez / Edirne
Phone: +90 284 811 60 06
E-Mail: enezkaymakamligi@gmail.com
Website: www.enez.gov.tr

The Title of the Programme
Joint Operational Programme Black Sea Basin 2014-2020

The Editor of the Material
District Government of Enez

Joint Operational Programme Black Sea Basin 2014-2020 is co-financed by the European Union through the European Neighbourhood Instrument and by the participating countries: Armenia, Bulgaria, Georgia, Greece, Republic of Moldova, Romania, Turkey and Ukraine.

This publication was produced with the financial support of the European Union. Its contents are the sole responsibility of Enez District Governorship and do not necessarily reflect the views of the European Union.