

Explaining Climate Change

Green-Schools Travel

Teacher Guidelines:

Strand: Interactive science based role play



Introduction

This activity is designed to raise awareness about the issues surrounding Climate Change and their links to the various green-schools themes i.e. Litter/waste, Energy, Water, Travel, Biodiversity and Global Citizenship.

Climate Change

Climate change refers to the general changes in normal weather patterns including temperature, precipitation, winds and other factors. **Climate** is the term used to describe the weather conditions over a period of years in a given place. **Weather** is what we experience on a day to day basis. The easiest way to relate the two terms is '*Climate is what we expect and weather is what we get*'.

Scientists have warned that the world's climate has changed a lot in recent years, many places that were warmer are getting colder and some places that were colder are getting more cold or warmer. Climate change is caused by increasing global temperatures (**Global Warming**) which is being attributed in part to human activities. The impact of climate change is most commonly highlighted in polar-regions (melting ice-caps) but the impact of climate change extends well beyond this environment. Educational videos on this topic are available from <http://www.educationscotland.gov.uk/weatherandclimatechange/index.asp>

Global Warming

The earth is surrounded by an atmosphere which is naturally comprised of several Green-House Gases. Their role is to trap **some** of the heat from the sun and leave the remainder return to outer space. This process is similar to a greenhouse and is so termed the '**greenhouse effect**'. This process is essential for life, the issue is that excessive amounts of greenhouse gases are being produced by human activities and global warming is happening at an accelerated pace. Excessive green-house gases (such as Carbon Dioxide) is causing the atmosphere to get thicker and thicker. As a result more heat is being be trapped within the earth's atmosphere. This is disrupting earth's natural processes (weather/climate) and so causing a process called 'Climate Change'.

Activity

This activity is designed as an interactive class activity which aims to inform a wider audience of earth processes and the causes of Climate Change. In order to put everything into context this activity requires a **Three Narrators**. The purposes of these is to put the actions on the floor into context and maximise the audiences understanding of the activity.

Narrator 1: This student provides the primary dialogue for the activity and outlines the various processes on display. This role can be completed by a student or the class teacher.

Narrator 2/3: Two students are placed within the visual presentation to question the narrator at various points. This is to further the educational outcome of the activity and ensure the audiences understanding of the concepts being covered. These two narrators will be presented as two *stars from the cosmos – 'Sparkling & Twinkling'*.

Act 1: Introducing the audience to the concept of Global Warming

Context: The earth is surrounded by an atmosphere which is comprised of a variety of Green-House Gases. The atmosphere helps to regulate temperatures on earth by retaining some of the heat generated from the sun. This is also known as the Green-House Effect and provides us with Climate and weather.

Roles

Earth: One Student to represent Planet Earth. Let the student decide how they might represent earth i.e. wear a blue/green t-shirt, carry a Sign to indicate her role.

Sun: One Student is required to represent the Sun. Let the student decide how they might represent earth i.e. wear yellow/paint their face yellow/carry a signs

Atmosphere: The Atmosphere is comprised of a variety of gases, the most common ones being *Carbon Dioxide, Nitrous Oxide, Ozone, Methane, Water Vapour and other gases*. You need six students to represent each of these gases. Again, let the students decide how they want to represent these. I would suggest a white t-shirt or that they simply carry signs

Sun's Rays/Infrared Rays: Invite your students to make four large cardboard arrows, paint them yellow on one side and red on the other. The yellow ones represent the sun's rays and the red ones represent the energy that is reflected back into space. These are designed to be used as follows: **Four** students move from the sun towards earth holding up the yellow arrows. **One** arrow is kept by the earth and the remaining **three** students turn the arrows around to show the audience the red side (infra-red) and move away from the earth (into 'space').

Outline of actions and dialogue

A schematic of what we are trying to represent is detailed in Figure 1

The student representing the **sun** stands elevated at the side of the stage/floor (i.e. on a chair)

The student representing the **earth** stands in the centre of the floor

The narrator introduces that the earth is surrounded by an atmosphere. The atmosphere gives our planet life, climate and weather and makes our world a nice place to live. The atmosphere is full of different types of gases. These are called 'Green-House Gases'

One by one the '**Green-House Gases**' make a close circle around the earth.

The **Narrator** explains that these are important gases that help create climate and weather on our planet and make our world a nice place to live.

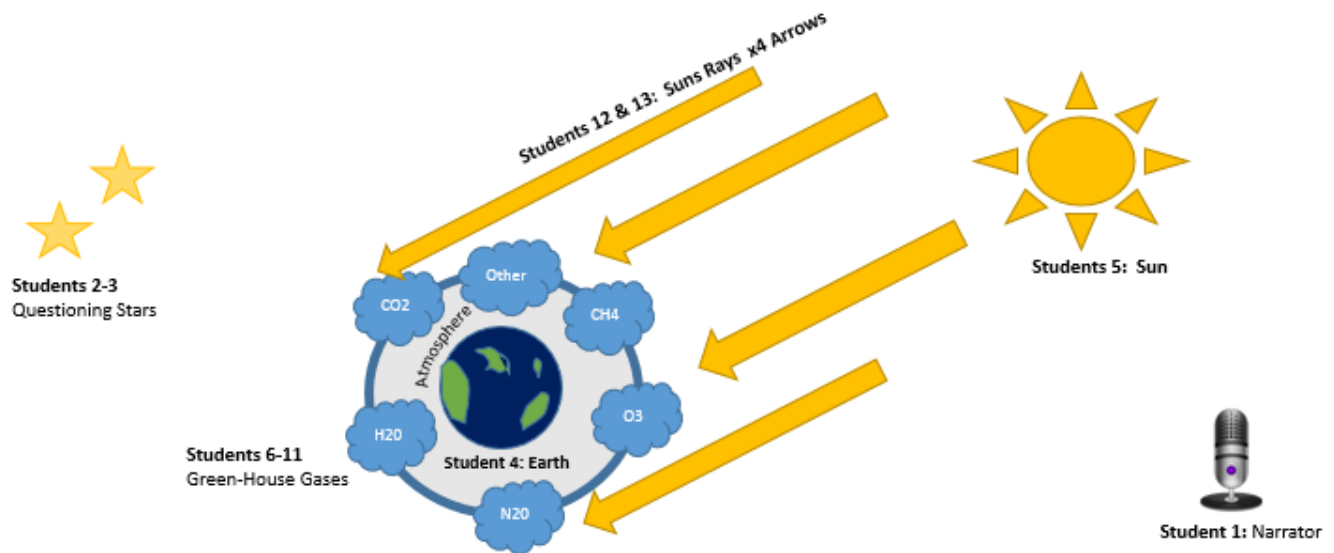


Figure 1: Schematic of what we are trying to represent (Part 1)

Sparkling Star: How does all of this work?

Narrator: The suns energy shines down on earth (students with arrows move forward). Some of the heat is trapped on the earth’s surface and the rest goes back to outer space in the form of infra-red rays. This is called the **Green-House effect**

One arrow is kept by earth and the remaining arrows are turned over to show the audience the red side and then move away from the earth (into space)

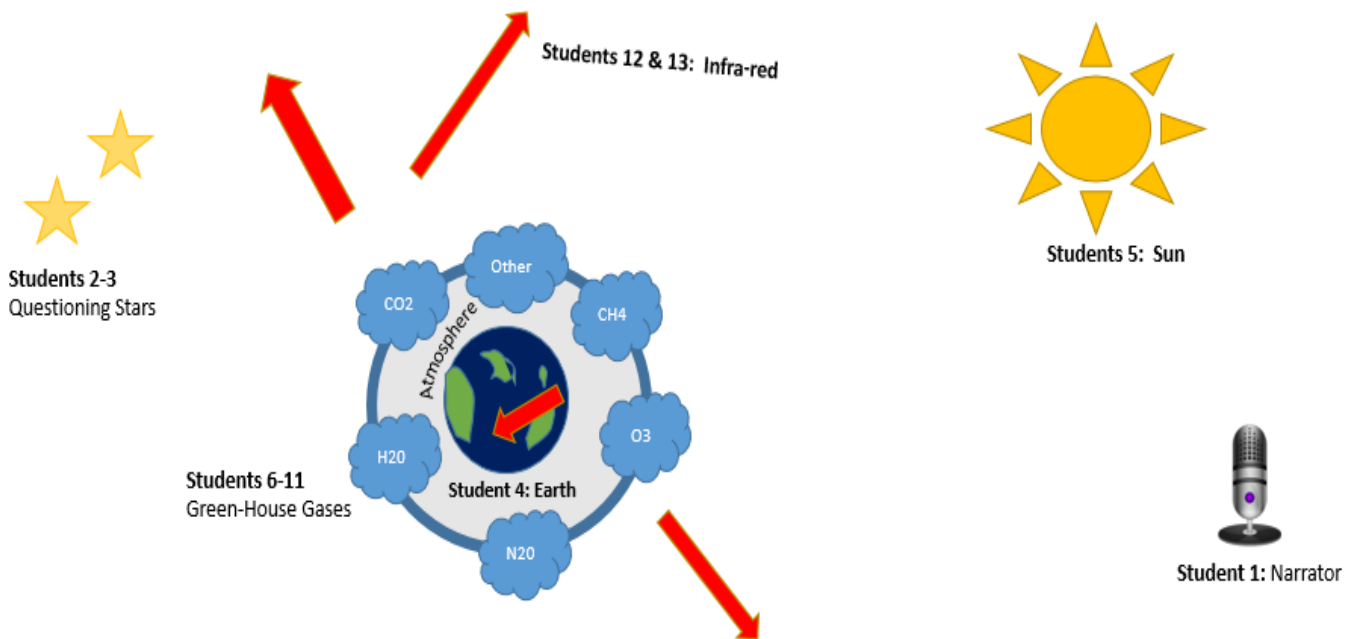


Figure 2: Schematic of what we are trying to represent (Part 2)

Twinkling Star asks the earth ‘are you alright – how do you feel? And the earth replies ‘ *I am great....the atmosphere helps me to support life on earth and provides me with climate and weather.*

Act 2

Earth /Sun/Greenhouse gases remain in place until Act 2

Context: Human activities which generate atmospheric carbon dioxide include

Roles**CO2**

This is open to the number of students you have left to involve in the activity. You need students to represent the various sources of CO2. They could wear a grey t-shirt or carry a sign indicating that they are bad CO2

Sparkling Star *comments– ‘that is ingenious...so that’s how earth can support life....our friend mars is not so lucky, it doesn’t have an atmosphere at all. Without the atmosphere mars gets extremely cold and extremely hot in a very short space of time. Earth is so lucky to have an atmosphere*

The **narrator** breaks in *‘But we have a big problem on earth’*

The First **star** states *‘What...what ...WHAT...I don’t like problems....’,* the second star replies *‘who does!’*

The **Narrator** explains: Well....Humans have made many great discoveries in the last 100 years. The biggest discovery was fossil fuels. Fossil fuels are things like coal, oil and gas which produce energy when they are burned. Humans use them to power their homes, make plastics and power their cars.

Twinkling Star : *Cars are great - I have seen them from up here...they help everyone to get around really quickly and are warm and cosy.*

Sparkling Star: *‘Yeah...I love Cars!! Who needs to walk when you can drive!! Woo hoo! They do use a lot of petrol though☺.*

Twinkling Star: *But I have noticed that people are using them a lot these days...they are so noisy and the smoke that comes out is just urrrrgh!*

Narrator: Yes Twinkling - that is exactly the problem....When we burn fossil fuels to warm our homes or burn petrol & diesel (also a fossil fuel) to drive our cars a great deal of smoke is produced This Smoke is called Carbon dioxide.

Sparkling Star: Carbon Dioxide?

Narrator: *Carbon Dioxide is a green-house gas that is making our atmosphere thicker. Humans make a lot of this and sometimes it is for no reason. Let me explain...*

You need several students to represent the various sources of CO2. These can be placed in the audience or lined up to join in order. Placing them in the audience can make it a fun interactive activity

Actions like

1. Leaving the lights on when there is no one in the room produces CO2
 - **One student joins the outer circle in the main group. This student represents CO2**
2. Leaving electrical appliances on when you don’t need them like the TV or leaving them on standby
 - **Another student joins the outer circle in the main group. This student represents CO2**
3. Driving short distances when you could walk or cycle produces lots of CO2. Cars use petrol and diesel to make them move. These are fossil fuels and the smoke that comes out the exhaust in co2. Humans are doing this a lot
 - **2/3 joins the outer circle in the main group. These students represents CO2**

4. Driving into town when you could easily take the bus produces CO2
 - **One student joins the outer circle in the main group (atmosphere)**

5. Buying items with too much packaging. When there is too much packaging that means that a lot of stuff will enter the recycling stream unnecessarily. This needs energy to be recycled and so produces unnecessary CO2
 - **One student joins the outer circle in the main group (atmosphere)**

6. When humans leave the tap running for too long this means that clean water is going to the wastewater treatment plant. Wastewater treatment plants use a lot of energy to clean water.....so leaving the tap running means that energy is being used to clean 'clean' water
 - **One student joins the outer circle in the main group (atmosphere)**

7. Trees are very important, they use CO2 to make food in a process called Photosynthesis. Humans are cutting down a lot of trees to make roads, build houses and make paper. This is bad because we need trees to gobble up CO2. Cutting down trees means more CO2 is going into the Atmosphere
 - **2 students joins the outer circle in the main group (atmosphere)**

8. Cows produce a lot of Methane – this is also a Green-House Gas. Humans eat meat every day and so there are a lot of cows on earth. This is producing a lot of Green-House Gases too
 - **1 student joins the outer circle in the main group (atmosphere)**

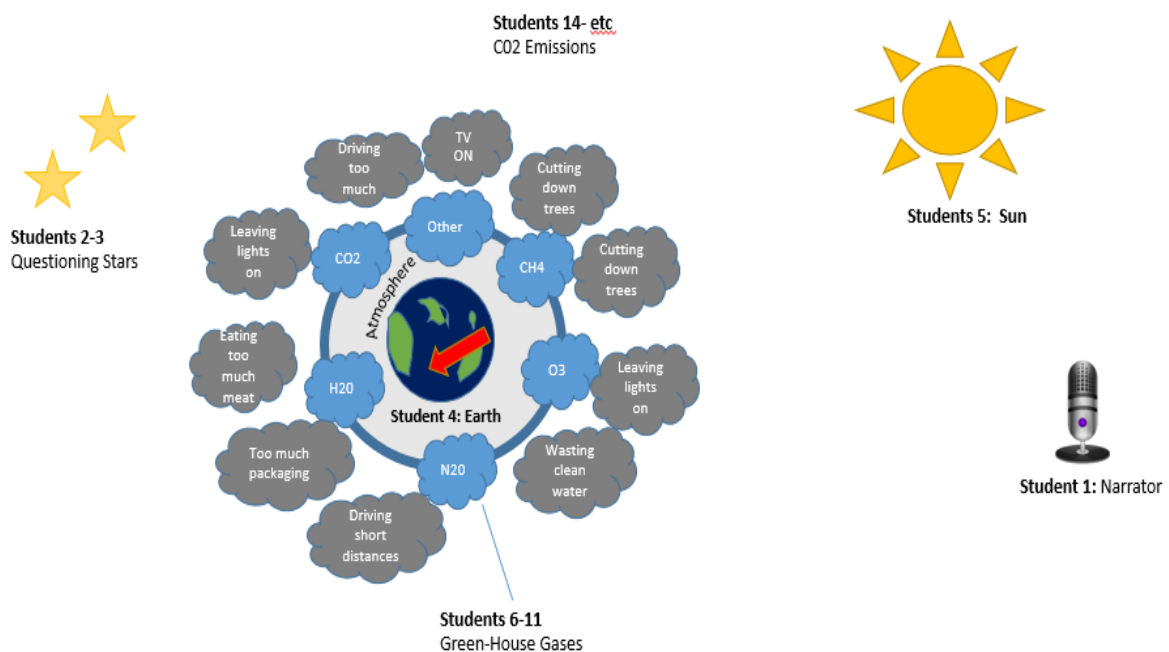


Figure 3: Schematic of what we are trying to achieve

Twinkling Star: Gosh there is a lot of CO2 there isn't there sparkle

Sparkling Star: Sure it's grand...I am sure it is making earth cosier..

Narrator: It is making it cosy alright! So cosy that more of the sun's energy is being trapped

Action Roles

The Sun extends its arms again

The 2 students representing the four of the Sun's rays go towards the earth again (yellow side towards audience)

3 Arrows are kept by the earth (turn to red side) with one arrow (turned red) moving to outer space

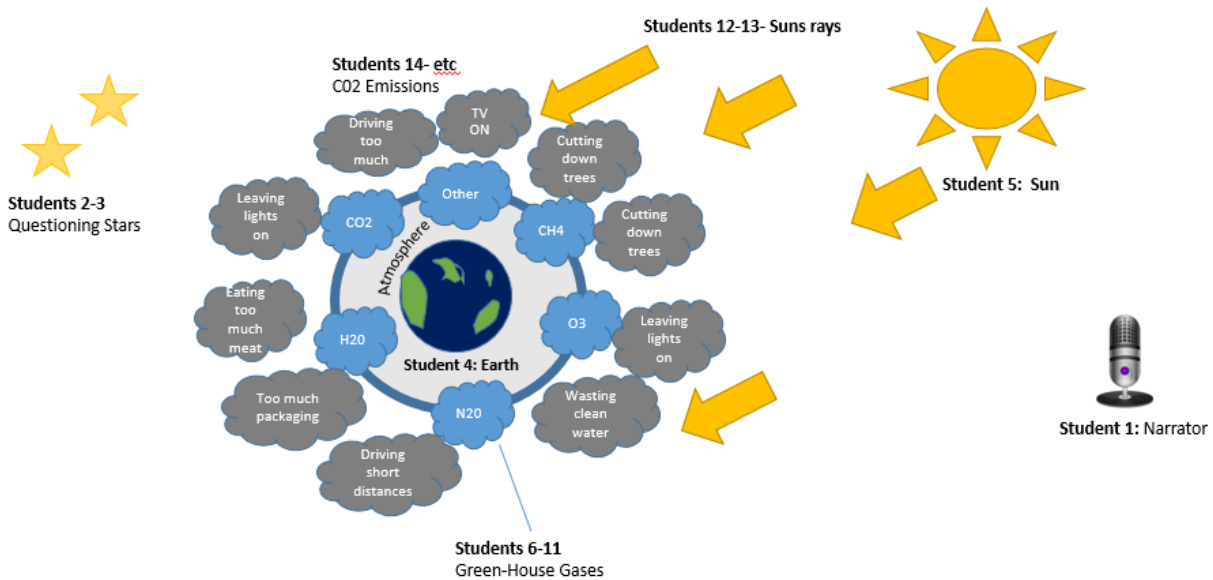


Figure 4: Sun shining down on earth (two students carrying four arrows)

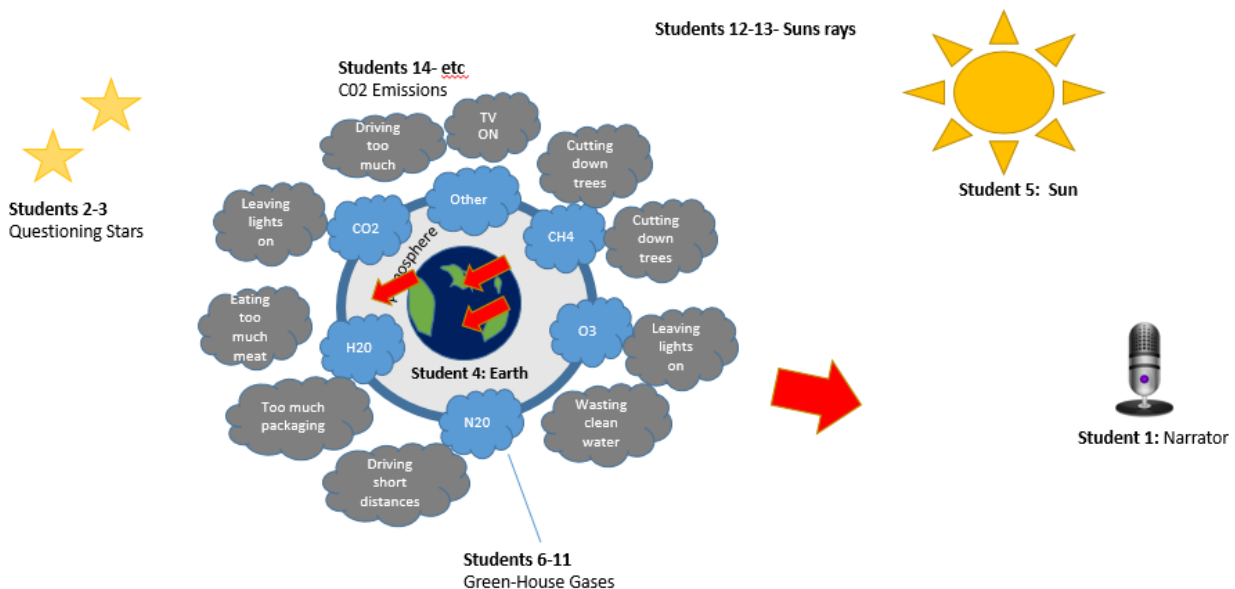


Figure 5: More infra-red energy being trapped on earth

Narrator: This is making our earth warmer and warmer

Twinkling Star (pips in): Earth – Are you ok? How are you feeling?

Earth replies: Not so good Twinkling. I am ROASTING! My climate is going crazy...they are getting Typhoons in the Philippines. Freezing winters in France. Australia has gotten so warm there is less water available. Africa is doing very badly. It is just too warm! There is too many **Green-House Gases**

Act 3

The earth should be surrounded by an atmosphere and all of the students representing CO₂

Context: What can we do to slow down Climate Change (Reduce our Green-House Gases)

Sparkling Star: What can we do....Twinkle we have to do something....

Twinkling Star (Asks the audience): What can we do to reduce our CO₂!!!!!!!!!!!!!! We need to do something

(Theoretically the audience will tell you what to do i.e. walk to school etc)

Sparkling Star pips in: We could make sure that all the lights are off in the classroom when we go on break.....

- **One CO₂ student moves away from the outer circle and sits down**

Sparkling Star pips in: What else could we do? How about making sure everything is turned off when we don't need them....this would produce less CO₂

Students representing this CO₂ move away from the group

Twinkling Star: If humans ate fish once a week that would help a lot to reduce the green-house gases from COWs

Sparkling Star: Yes...that reminds me of what God was saying in the bible that we should eat fish on Fridays....he was right!

And so forth until there is no CO₂ left (refer to list above)

Twinkling Star (pips in): Earth – Are you ok? How are you feeling now?

Earth: Much better....being a green-school is really helping me out. Thank you Salesian Primary!

Teacher Notes**Litter/Waste (Indirectly Linked)**

Litter & Waste is the first theme in the Green-Schools programme where schools actively work to reduce the amount of litter/waste generated by the school. This is done through awareness raising activities based on the principle of Reduce, Reuse and Recycle (in that order). This theme has several links to climate change for instance

- Cutting down trees to make packaging and paper products reduces the planets capacity to absorb carbon emissions i.e. trees naturally absorb carbon dioxide (CO₂) and release Oxygen (O₂) as a part of **photosynthesis**. The less trees we have the more CO₂ is released into the **Atmosphere**
- Once a product is consumed the packaging/paper enters the waste stream. This then has to be recycled which requires energy. The energy used to recycle items **generates carbon emissions (CO₂)**. Reducing the amount of packaging we use reduces the amount of energy required to recycle them.
- Re-using items also helps reduce carbon emissions as you are reducing the amount entering waste and recycling streams.
- Plastic is a major issue because plastic is made from fossil fuels and it takes years to decompose in landfills. Reducing the amount of plastic we use, recycling what we must use will cause less pressure on this natural resource.

Energy (directly linked)

Energy is the second theme in the Green-Schools programme which focusses on natural resources and energy use in the school (electricity/heating etc). Fossil fuels are mostly used to generate energy. Burning Fossil Fuels generates Carbon Emissions (CO₂). Reducing unnecessary use of energy can reduce carbon emissions (CO₂)

Water (Indirectly)

Once water is used it is cleaned in waste – water treatment plants before entering natural water systems. Energy is required to power these plants so if you leave the tap running then clean water is being processed unnecessarily (i.e. energy used to clean the water generates unnecessary carbon emissions)

Climate change can alter the Water Cycle. In some parts of the world the climate is getting warmer and warmer because of global warming. This increases the amount of evaporation, condensation and subsequent rainfall in other areas

Travel (Directly Linked)

Travel is the fourth theme which concerns how we travel to school. Petrol and diesel are fossil fuels which are used to power our vehicles. When you burn fossil fuels, carbon emissions are emitted (in this case from the exhaust). Reducing unnecessary use of fossil fuels for short journeys preserves natural resources and reduces carbon emissions.

Roads are built to accommodate cars, this is often at the cost of natural habitats. The loss of natural habitats not only impacts biodiversity but also reduces our planets ability to absorb CO₂ through photosynthesis.