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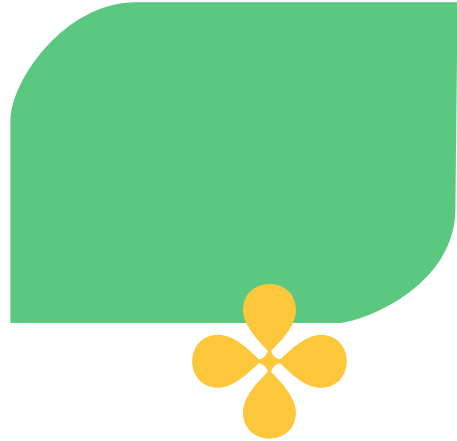
# HOW MUCH WARMER IS ONE DEGREE?



## HANDBOOK

 creative  
commons

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# PROJECT CONSORTIUM

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# HOW TO USE THIS HANDBOOK <sup>1</sup>

Welcome to the project “How much warmer is one degree?” We are glad to see that you are interested in one of the most important issues of our world, which is the climate change and the global warming. One degree more will most certainly make no big difference to you while you are reading this handbook! But one degree more for the temperature of our planet has already led to a series of consequences – and sadly enough, they are all negative! If the global warming continues, future generations will face serious problems.

Our project has developed two outputs which tackle the climate change issue:

1. An interactive e-course with seven modules which you can visit either on a computer or on a mobile app with your cell phone
2. This Handbook which contains more background information to the various modules.

Both outputs are also available as podcasts! Enjoy the reading or listening and become better informed about the challenges of the climate change, and what you as a citizen can do to help our planet Earth!

Rome, summer 2024

The development team of the OneDegree project

# I. HOW CLIMATE WORKS

**Learn about climate, why it is changing, and how scientists are studying it.**



The weather where you live for a long time, like more than 30 years, is called regional climate. It's about what's usually going on with the weather in a place. People talk about the temperatures during different seasons, how windy it gets, and how much rain or snow falls.

Lots of things decide what the climate's like in an area. How much sunlight it gets, how high up it is, the shape of the land, and how close it is to the oceans all play a part. Places near the equator get more sunlight than places near the poles, so their climates are different.

But when we look at the whole planet's climate, that's global climate. It's like taking all the different regional climates and averaging them out. The planet's climate depends on how much sunlight it gets from the Sun and how much of that energy gets stuck in the system.

People who study Earth's climate and how it's changing look at all the things that affect the planet's climate.

## Weather and climate

Weather can change in just a few hours, but climate changes happen over much longer times. Things like El Niño last for several years, smaller changes take decades, and bigger ones take hundreds or even thousands of years. Right now, the climate is changing. The Earth is heating up faster than it has in the past, according to scientists. Even though hot summers might be normal in many places, the whole Earth's average temperature is going up because of global warming.



The amount of sunlight, the air's chemistry, clouds, and all living things affect the Earth's climate.

For more than 100 years, people all around the world have been checking how hot or cold the air is.

They do this every day and use all these numbers to figure out the average temperature for a whole year. Looking at these averages helps us see the big picture instead of just what the weather is like day to day. And what they've noticed over this long time is that the Earth is getting warmer.

They've been using special balloons to gather this info since the 1930s, and since the 1970s, they've also been using satellites. Both of these ways of collecting data show that the Earth's climate is heating up.



## 2. THE WORLD IS GETTING WARMER

**Learn about climate, why it is changing, and how scientists are studying it.**



The world is getting warmer because there are more gases in the air that trap heat. These gases are making our planet hotter.

Sometimes, the amount of carbon dioxide goes up and down in a year because of plants growing. But overall, it's been going up a lot over many years. This is because of things like burning fossil fuels (like in cars and making electricity), cutting down forests, and making cement. All these things let out gases that trap heat in the air.

When we drive cars that use gasoline or make electricity by burning coal and gas, we let out gases like carbon dioxide. Even making cement and dealing with our trash and farm animals releases these gases. Since a long time ago when coal factories started, we've been letting out more and more carbon dioxide every year. This gas stays in the air for a really long time, so even a little bit added each year adds up.

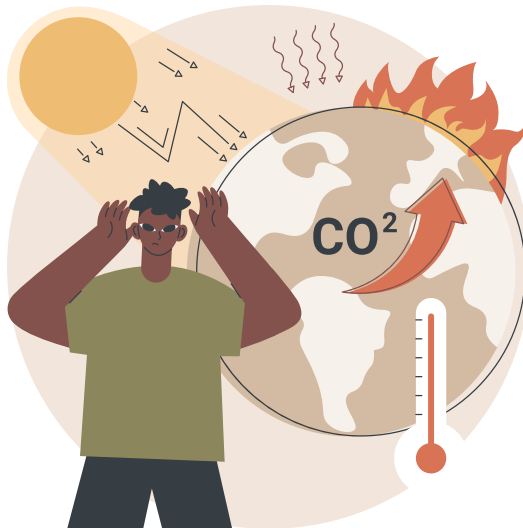


To stop the amount of carbon dioxide from going up, we'd have to release a lot less of it. The gases, like carbon dioxide, act like a blanket around Earth, keeping the heat inside instead of letting it escape into space. This makes our planet warmer.

Even changing how we use land, like cutting down forests or doing agriculture, affects the climate. When forests are cut, there's less help to take carbon dioxide out of the air.

And things like farm animals and factory-made fertilizers let out other strong heat-trapping gases.

If we keep letting out these gases, the world will keep getting warmer.



## Rising temperature

The temperature of the Earth by the end of the century depends on what we do now. If we work hard to stop making more CO<sub>2</sub> after 2050, the planet might warm by 1–1.5°C.

That's the best we can hope for (shown by the blue line in the graph).

But if we keep making more CO<sub>2</sub>, things could get a lot hotter, maybe by 4.5–5°C. That's the worst scenario (shown by the red line).

How much the climate changes depends on how fast we act in this hundred years. If we keep putting out gases that trap heat, the Earth will get much hotter than it did in the last hundred years.

Scientists think it could warm up to 5°C if we keep going like this. But here's the good part: this doesn't have to happen! If we find ways to put out way less of these heat-trapping gases, the planet might only get 1 to 1.5°C warmer in this century.

Even though we'll still have to adjust to a warmer world, taking action now can help keep the Earth a good place to live.



### 3. THE GREENHOUSE EFFECT

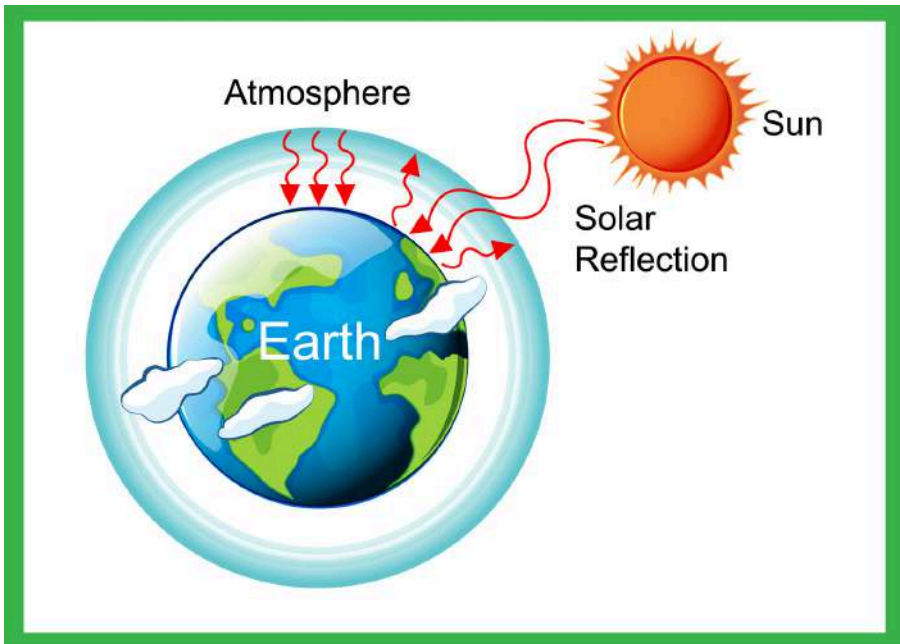
When the Sun's energy comes to Earth, some of it has a hard time going back into space. That's because of something called the greenhouse effect. This effect happens when certain gases in our atmosphere trap some of the Sun's energy, kind of like a blanket, keeping it around Earth.

Normally, without this effect, our planet would be really, really cold—way below freezing! But the greenhouse effect is a natural thing that helps keep our Earth warm. However, when we add more gases that trap heat, like greenhouse gases, it gets stronger. That's what's making our planet warmer.

Here's how it works: The Sun's energy comes down and warms up the Earth. Then, that heat goes back up into the air.

But some special gases, like carbon dioxide, water vapor, methane, and nitrous oxide, they grab onto this heat and keep it close. These gases are made of different atoms that can trap heat. They take in the heat, shake around because of it, and then send the heat back to the Earth's surface or out to space.

Most of the air we breathe is nitrogen and oxygen, and they don't trap heat like these special gases do. But these special gases, the greenhouse gases, they're really good at keeping the heat close to our planet, and that's what's causing the Earth to get warmer.



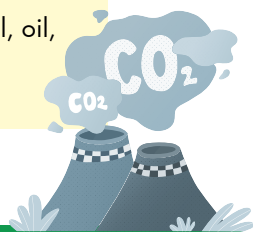
## 4. OVERVIEW OF THE GREENHOUSE GASES

Greenhouse gases are like a special group of gases that trap heat in our atmosphere, making the Earth warmer. Here's a look at the main ones and where they come from:

### Carbon Dioxide CO<sub>2</sub>

This gas is a big deal and makes up about three-quarters of the warming caused by human-made greenhouse gases.

We get a lot of CO<sub>2</sub> from burning things like coal, oil, and gas. Also, cutting down forests adds to it.



### Methane (CH<sub>4</sub>)

This gas is another troublemaker, contributing around 14% to the warming effect of human-made greenhouse gases.

It comes from things like farming (especially from livestock and rice fields), getting fossil fuels, and from rotting stuff in places where we dump our waste.



## Nitrous oxide (N<sub>2</sub>O)

This gas makes up about 8% of the warming caused by human-made greenhouse gases. It's from agriculture (like using certain fertilizers and from animal waste) and from some industries.



## Fluorinated gases ("F gases")

These gases are a small part (around 1%) of the problem but are very powerful in trapping heat. They come from certain industrial processes.

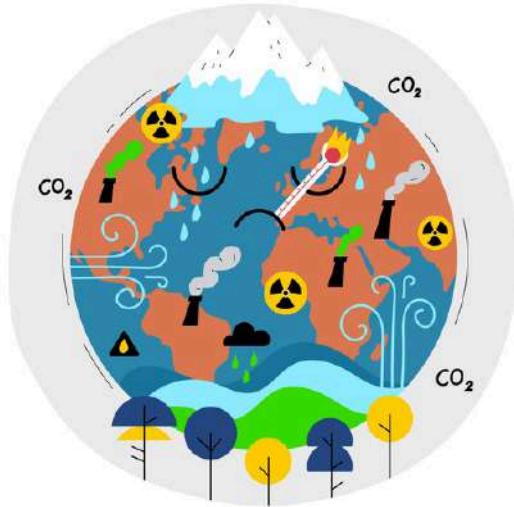


Some other things people do, like leaving trails in the sky from airplanes or creating soot from fires, also make the Earth warmer. But some stuff called aerosols, like tiny particles from some vehicles and industries, actually help by bouncing sunlight away from the Earth, cooling things down a bit.

## How long do greenhouse gases stay in the atmosphere?

These gases can stick around in the air for different amounts of time—from a few years to thousands of years.

Even though they're just a small part of all the gases in our air, they have a huge effect on how warm our planet gets.



## More greenhouse gases mean a warmer earth

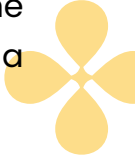
Even though there are only a few special gases in the air that trap heat (greenhouse gases), they have a super big effect on how warm our world gets.

Here's why:

During this century, the amount of one of these special gases, carbon dioxide, is expected to double. And there are other ones, like methane and nitrous oxide, that are also increasing. All of these gases come from different places, like when we burn fossil fuels (like coal, oil, and gas) or when farm animals digest their food. Even making cement adds to it by releasing carbon dioxide.

When there are more of these special gases in the air, they make it harder for heat to leave our planet. They trap the heat, kind of like wrapping the Earth in a cozy blanket.

Some of the heat goes away from Earth, some gets caught by other special gases, and some comes right back down to warm up the surface of our planet. With more of these gases, more heat stays around, making the Earth warmer.





## 5. HOW DO PEOPLE CONTRIBUTE TO THE GREENHOUSE EFFECT?

Humans play a big part in making this happen. When we burn things like natural gas, coal, and oil (like when we drive cars or make electricity), we make more carbon dioxide. Some ways we farm and change land can make more methane and nitrous oxide too. Factories also make some gases that aren't found naturally, and these add to the problem. And when we cut down forests, we're taking away trees that help keep a good balance of gases in the air.

So, even though the greenhouse effect is good in some ways, when humans make too many of these special gases, it makes the Earth warmer than it should be.



Here we give you some examples which highlight a different ways where human activities contribute to the greenhouse effect and climate change. If you understand the consequences of these activities, it will become easier for you to reduce their impact and help protect the planet.



### **Driving cars**

When we drive cars, especially those that use gasoline or diesel, they burn fuel and release carbon dioxide into the air. It's like when you blow air into a balloon, but instead of air, cars are blowing out a gas that warms our planet.

### **Using electricity**

When we turn on lights or use appliances at home, we're often using electricity made by burning coal or natural gas. This is similar to lighting a big fire that, instead of just giving us light, also adds more heat-trapping gas to the air.

### **Heating home**

In colder places, keeping our homes warm often means burning natural gas, oil, or using electricity that comes from burning fossil fuels. It's like using a big heater outdoors; it warms the air around us but also sends warming gases up into the sky.

## **Air travel**

Flying in airplanes uses a lot of fuel, which releases carbon dioxide. Every time an airplane flies, it's like it's painting the sky with a brush that adds more colour to a picture of a warmer planet.

## **Industrial processing**

Many factories produce things like cement, steel, and plastics. These processes often release carbon dioxide and other gases. Imagine a factory is like a giant machine that, besides making things we use every day, also produces a gas that covers the Earth like a blanket.

## **Agriculture**

Farming activities, especially raising cows and other livestock, produce methane—a gas much more potent than carbon dioxide. It's like the animals are cooking a meal, but instead of smelling food, we're adding a powerful ingredient to the climate-warming recipe.



## **Deforestation**

Cutting down trees for farming or building reduces the number of trees that can absorb carbon dioxide.

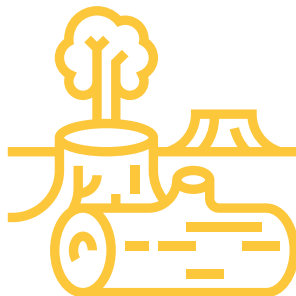
Imagine the Earth wearing a green hat of trees that helps it stay cool. When we cut down trees, it's like removing parts of the Earth's hat, making it easier for the Earth to get warmer.

## **Waste management**

When we throw away organic waste, like food scraps, and it goes to landfills, it breaks down and produces methane. Throwing away garbage without recycling is like burying a box that releases a warming gas as it slowly opens.

## **Fertilizers**

Using synthetic fertilizers in agriculture releases nitrous oxide, a potent greenhouse gas. It's like adding a strong spice to the soil that, besides helping plants grow, also heats up our planet.



## **Energy Production from Coal**

Burning coal for energy is one of the biggest sources of carbon dioxide. It's like lighting a huge barbecue grill with coal, but instead of cooking food, we're cooking our planet.

## **Urban Sprawl**

As cities expand and more land is covered with buildings and roads, it reduces the area that can absorb carbon dioxide. Imagine a green sponge that soaks up water. When we cover the sponge with plastic, it can't soak up water anymore. Similarly, when we cover the land with concrete, it can't absorb the warming gases.

## **Transporting Goods**

Ships, trucks, and trains that move products around the world use fossil fuels, adding to the carbon dioxide in the atmosphere. Every time we ship something, it's like sending a tiny heater along with it that adds to global warming.



## 6. THE CONSEQUENCES

When the climate changes, it messes with the usual weather we're used to.

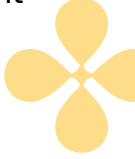


Because the Earth is warming up, the weather in different places is getting a bit crazy. We're seeing more extreme events than before. Here's what's happening:

- **More heat waves:** Lots of places will probably have way more super hot days in a year. And there might be fewer times when it gets super cold.
- **More rain and floods:** With the Earth getting warmer, more water evaporates into the air. That means when there's a storm, it can pour down a lot more rain than usual. This can cause big floods, which can be really bad for the environment and people's health.
- **Worse droughts:** Because it's getting warmer, water evaporates more. That can make some places really dry, causing big droughts that hurt farmers and make it hard to grow enough food.
- **Stronger hurricanes:** The warm water in the oceans can make hurricanes and big storms much stronger. When these storms hit land, they can be really dangerous and cause a lot of damage.



Overall, the weather is becoming more extreme because of these changes in the climate. Heat waves, floods, droughts, and strong storms might become more common in different parts of the world.



## Rising sea levels

As ice sheets and glaciers melt and the ocean gets warmer, the sea level is going up. This means that the water from the ocean is starting to move onto the lower lands, mixing with the freshwater near the coast, and covering up parts of the coast.



This rise in sea level is causing big problems. It can damage homes, buildings, and places near the coast when big storms hit, like during hurricanes.

From 1993 to 2010, because of the greenhouse effect, the sea rose by about 3.2 millimetres each year. And experts think if we keep putting out lots of greenhouse gases, the sea might go up by 52 to 98 centimetres by the year 2100. The reason the sea is going up is because when water gets warmer, it takes up more space.

About 30 to 55% of this rise is because of this. The rest is because huge chunks of ice, like from Greenland and Antarctica, are melting and sliding into the sea. And this melting might just be the start. If all the ice in Greenland and Antarctica melted, the sea could go up by several meters.

That's a lot of water!





This rising sea is bad news, especially for places near the coast. Big cities like Tokyo, Shanghai, New York, and others are at risk.

In some places, like Bangladesh and Kiribati, lots of people live in areas that are really close to the water. For Kiribati, they might have to leave because their country might be underwater in a few decades. So, this rising sea is a big problem for many people living near the coast.



## **Global warming affects the drinking water supply**

The climate helps decide where we find water all around the world. But because the climate is changing, how much water we have and where we can find it is also changing.

The way rain falls and how hot or cold it gets affects how much water we have for drinking and for growing crops. As things get warmer, the snow in the mountains and the ice in glaciers start melting faster.



This water is important for people to use.

If the temperature goes up by 4 degrees Celsius, the huge glaciers in the Himalayas, which hold a lot of water, would melt. That could affect around a quarter of the people in China and about 300 million people in India. In places like the Mediterranean and southern parts of Africa, the water people drink would become really limited.

Around the world, about two billion people might face problems because of more droughts and not having enough water. So, because of these changes in the climate, having enough water might become a big problem for a lot of people.

## Endangered animals and plants

The ocean water's chemistry is getting mixed up because it's absorbing carbon dioxide from the air. When there's more carbon dioxide in the air, the ocean becomes more acidic. This is a big problem for sea creatures that build shells because the acid makes it hard for them to survive. And they're part of a big food chain in the ocean, so if they struggle, it affects everything else too.



Not just in the ocean, but also on land, the way living things interact with each other is changing because of climate change. Animals, plants, tiny bacteria, and even viruses are moving to new places where the weather suits them better.

This can cause trouble because some diseases might spread to places they didn't use to be, and some animals might take over areas where they weren't before. So, these changes in climate are not just affecting the ocean but also life on land.

## Extreme weather events affect human health

When extreme weather like heat waves, floods, droughts, wildfires, or really strong storms happen, they can hurt or even kill people in those places. And because of climate change, these extreme weather events are happening more often and getting even more powerful. That means more and more people might be affected by these dangers.

For example, heat waves can make the number of deaths go up a lot—sometimes even double or triple in a day! And because climate change is making these hot spells happen more often and last longer, more people might lose their lives because of the heat.



The places where disease-carrying bugs live are also changing because of the changing climate. Ticks that carry Lyme disease, for instance, are now found in countries where they didn't use to live. And where there's more rain because of climate change, mosquitoes carrying diseases like dengue fever are spreading more.

Climate change also affects diseases like malaria, which causes a lot of deaths worldwide. In Africa, most malaria deaths happen because of mosquitoes, and as the climate changes, more people might get affected by this disease. In Asia, dengue fever, spread by mosquitoes, is causing a lot of deaths too, and this might affect even more people as the mosquitoes' homes change because of climate change.

There are also changes in plants and pollen because of the warming climate. More carbon dioxide in the air helps plants grow, which makes more pollen. This can cause more allergies for some people. Plus, the longer warm seasons mean more days with lots of pollen in the air, which can make breathing hard for people with asthma or allergies.

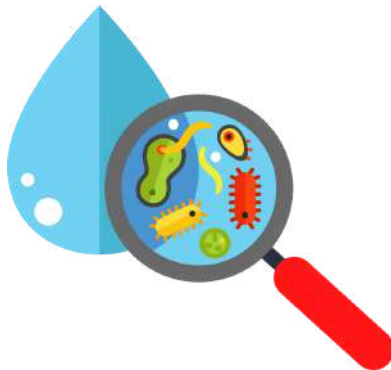
So, because of these changes in the climate, there are more risks for people's health—from extreme weather to the spread of diseases and even more allergies.

## **Lack of clean water causes outbreaks of disease**

When there's really heavy rain, it can lead to water-borne diseases. This happens because places can get flooded, and that water might be dirty, carrying germs that make people sick. So, when drains or sewers get blocked during heavy rain, it can create puddles of dirty water in places where people live, and that's not good for health.

But even when it's dry, it doesn't mean it's safe. During dry times, some diseases that spread through water can still be a problem. For example, in the Amazon when there's not much water flowing, there's a higher chance of cholera outbreaks because the water stays still, letting more germs grow.

In really hot and dry places, people might face more water-related diseases because the water they have could be dirty or not enough for everyone.



## **The combined impacts of extreme weather worsen health risks**

The health problems from climate change can get even worse when different things come together.

For example, when there's a severe or long-lasting drought, it can make it hard for communities to grow food. And when the rain patterns change because of climate change, it can lead to not having enough food, which can make people malnourished.

Also, the air quality might get worse as the world gets warmer. This can happen because of things like urban heat islands (when cities get really hot) or smoke from wildfires. Bad air can cause more breathing problems for people.

So, because of climate change, there are lots of things that can make people sick or have health problems, like floods from heavy rain, diseases from dirty water, not enough food during droughts, and even bad air quality.



## Climate change can affect our health in many ways:

**More heart problems:** When it's super hot or the air quality is bad, more people might get heart disease. Extreme heat and dirty air can be really tough on our hearts.

**Breathing problems:** Bad air from pollution can lead to more people having trouble with their breathing.

**Not enough food:** Changes in how much rain we get can make it hard to grow food. When there's not enough food, it can make it tough for people to have enough to eat.

**Mental health worries:** Because of climate change, people might have a hard time with their jobs, or they might need to leave their homes and move to new places. This can be stressful and make people feel worried or sad.





# 7. DEFORESTATION

Trees are super important for our world. They help fight climate change, support wildlife, and help lots of people. But sadly, we're cutting down trees really quickly, which is causing a lot of problems.

Even though forests still cover about 30% of the land, we're losing them fast. Between 1990 and 2016, we lost an area of forest bigger than South Africa! Since humans started cutting down forests, we've chopped 46% of all trees. In places like the Amazon, nearly 17% of the rainforest has been destroyed in the last 50 years, and the destruction is happening more and more.

We need trees for many reasons. They don't just take in the carbon dioxide we breathe out, but also soak up the gases that make our planet too warm. Trees in tropical areas could help solve almost a quarter of the climate problems we're facing in the next ten years!



## Causes of deforestation

People cut down trees mostly for farming, raising animals, mining, and drilling for oil. In some places like Malaysia and Indonesia, they cut forests to make space for palm oil used in lots of products we use every day. In the Amazon, it's mostly for farming cattle and growing soy plants.

This cutting down of trees is hurting not just the people and animals living in those places but also the whole world. Millions of people depend on forests for their food and money, and lots of animals and plants live in forests that are in danger. Taking away trees also messes up the weather, making it too hot or too cold for plants and animals.

When we cut down trees, it doesn't just affect the place where they're cut. It reaches far and wide. For instance, in South America, the big rainforest there has a huge role in how water moves around the region.

It helps provide water to cities in Brazil and nearby countries. Even the farmers cutting down trees for soy and beef rely on this rainforest for water. If we lose too many trees, it could mean less clean water and a big impact on the animals and plants living there. It might even affect something as simple as your morning coffee!



Cutting down trees also adds to the problem of climate change. Trees help take in carbon dioxide, but when we cut them, that carbon dioxide gets released back into the air. Tropical deforestation is so big that if it were a country, it would be the third largest in terms of carbon dioxide emissions, just behind China and the U.S.

But there's hope! People are working hard to save forests and plant new trees where they've been destroyed. Some smart folks have even found ways to use old cell phones to listen for chainsaws cutting trees illegally. In places like Tanzania, locals have planted millions of trees to fix the damage.

And in Brazil, the new government supports people who are fighting to protect the forests.



For all of us, it's a good idea to think about what we buy and eat, and try to choose things that don't hurt forests. That way, we can all help make sure there are trees and clean water for everyone!

## 8. IS CLIMATE CHANGE REAL? WHERE'S THE PROOF?

In science, we don't really talk about "proof" like in math. Instead, we look at lots of evidence to figure out how likely something is to happen.

Almost all of the scientists who study climate agree that human activities are a big reason why the Earth's temperatures are changing. A big report from a group of experts said already in 2007 that there's very strong evidence showing that the Earth's air and oceans are getting warmer. They're really sure that most of the warming since 1950 is because of the gases that trap heat that humans are putting into the air.



## **How do we know what is scientifically correct?**

Science is all about checking and testing ideas to make sure they're right. When scientists do experiments or make discoveries, they write it all down in special papers called manuscripts. Then, they send these papers to science journals where other scientists who are experts in the same field check them. These expert scientists read through the papers carefully.

They make sure the experiments were done well and that the conclusions match up with the evidence. Sometimes, they suggest changes if the study needs more proof or if something doesn't quite add up.

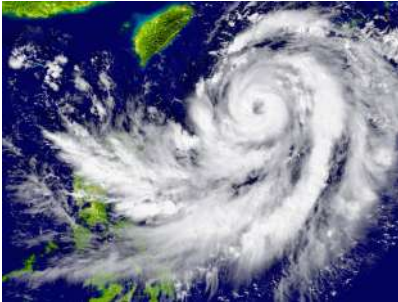
After this checking process, the journal editors decide if the paper should be published, rejected, or if the scientists need to make some changes. When a paper gets published, it means that lots of experts have looked at it and think it's trustworthy.

Even though this process doesn't guarantee that every single published idea is right, it gives us a good amount of trust that the science behind it is solid. And the papers about climate change that have gone through this process agree that human actions play a big role in causing climate change!



## 9. CLIMATE CHANGE DOES NOT AFFECT EACH OF US IN THE SAME WAY

Different places don't all face extreme weather in the same way. From 2010 to 2020, areas that are really at risk had 15 times more deaths from floods, droughts, and storms compared to safer regions. Some places, like parts of Africa, South Asia, Central and South America, islands, and the Arctic, are hit particularly hard by climate change. These areas might not have a lot of resources to handle these big changes.



Imagine this: as the climate keeps changing, the people most likely to get sick or have problems are often those who don't have much help or support.

Some groups are more at risk, like city folks with few resources, older or younger people, traditional communities, farmers who grow food just to survive, and folks living by the coast. But even in rich countries with lots of money, they might not be ready to deal with extreme weather. Having a strong economy doesn't always protect people from getting sick or hurt because of climate change.

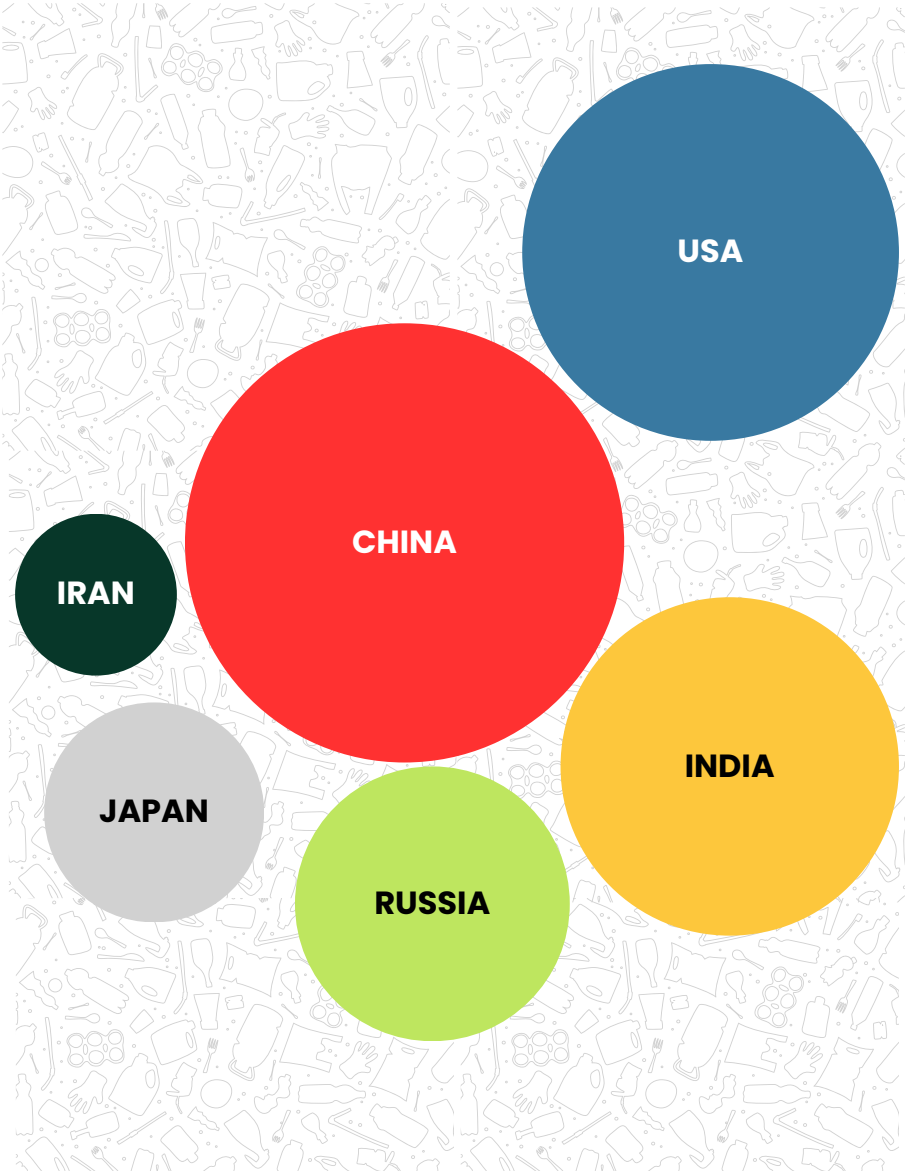
## **Which countries contribute the most to global warming?**

In 2022, China was the largest climate polluter, making up nearly 30% of global emissions. The top 20 global climate polluters – dominated by China, India, the United States and the European Union – were responsible for 83% of emissions in 2022.

It is a terrible irony that the countries which have done the least to cause global warming are likely to be hit the hardest. This mostly refers to low-lying island countries and poor areas of Africa, the Americas, and Asia that are already dealing with extreme temperatures and weather that goes by quickly.

On the other hand, many of the most eco-friendly countries are actually wealthy and developed nations in the west, who have poured significant resources into renewable energies and other sustainable practices. Scandinavian nations perform strongly here, other strong performers include Luxembourg, Switzerland and Austria. It's interesting to note that 20 of the top 25 countries in the Environmental Protection Index are located in Europe.

# Most polluter countries





# 10. REDUCING YOUR CARBON FOOTPRINT

Every action we take or every item we buy creates something called a carbon footprint. This measures how much carbon dioxide is made when we do stuff or make things.

It's like saying how many tons of carbon dioxide, or other gases that cause climate change, are made during an activity or when something is made.

Each of these gases affects the environment differently and sticks around for different lengths of time. So, to keep it simple, they're all converted into a CO<sub>2</sub> equivalent, both in amount and how long they stay in the air.



When we figure out our own carbon footprint, we look at how much we directly and indirectly add to it. Directly means stuff we do that we have control over, like:

- Heating or cooling our homes and workplaces
- Traveling for work, shopping, or vacations
- Using power for lights, heating, cooling, machines, and gadgets

For electricity, we might not always choose how it's made because it depends on where we live and what our electricity company uses. Some places offer options for cleaner energy, so it's worth checking with your local utility company to see what they offer.



We can't always control the impacts our product choices have, but there are ways to lower the CO<sub>2</sub> which we indirectly create:

- **Buy less stuff:** Before getting something, ask if you really need it. Fewer things mean a smaller carbon footprint.
- **Choose local products:** Buying things made nearby cuts down on how much they need to travel, which reduces their impact.
- **Try making things:** It can be fun! Grow your veggies, preserve foods—get creative!

The big thing to remember is to keep our carbon footprints small. The ideal amount of CO<sub>2</sub> per person each year to be eco-friendly is less than 2000 kg (2 tons).

But in 2002, the average American used 20 tons—that's ten times more than what's eco-friendly!



Reducing your carbon footprint means you're being kinder to the Earth. While a carbon footprint technically measures all the carbon dioxide we make using products, the main idea is to lower all the gases that cause trouble for the environment.



Taking care of the Earth means not only using fewer products that release these gases but also doing something helpful, like planting trees, to balance out the bad stuff we've put out there.

If you have access to the Internet, go to [www.footprintcalculator.org](http://www.footprintcalculator.org). There are versions in various languages, also in Italian or German.



## In the following, you can find some examples of how much you can reduce your carbon footprint:



Use a push mower instead of a power mower: 35 kgs



Clean or replace air-conditioning filters as advised: 80 kgs



Run your dishwasher only when it's full and use the energy-saving setting; 90 kgs



Buy products packaged in reusable or recyclable containers: 100 kgs



Install low-flow shower heads in order to use less hot water: 135 kgs



Replace your current washing machine with a low-energy, low-water-use machine: 200 kgs



Keep your water-heater thermostat no higher than 50 degrees: 225 kgs



Don't overheat or overcool rooms. Turn thermostat up when it's hot and down when it's cold: 225 kgs



Replace standard light bulbs with energy-efficient fluorescent bulbs: 225 kgs



Wash laundry in warm or cold water, not hot: 225 kgs



Install a solar thermal system to provide hot water: 320 kgs



Recycle all of your home's waste newsprint, cardboard, glass, and metal: 380 kgs



If your water heater is more than 5 years old, wrap it in an insulating jacket: 450 kgs



Caulk and add weather stripping around doors and windows to plug leaks: 450 kgs



Reduce your garbage by 25%: 450 kgs



Leave your car at home two days a week (walk, bike, take public transit or carpool); 700 kgs



Insulate walls and ceilings: 900 kgs



Get rid of old, energy-inefficient appliances and replace with newer energy-efficient models: 1350 kgs



Plant trees around your home; paint the roof a light color in a hot climate, and a dark color in a cold climate: 2250 kgs



Replace the car you use most often with a fuel-efficient car (less than 7 litres/100 km): 2500 kgs



When replacing windows, install energy-saving models: 4500 kgs

## II. TAKING CHARGE: INDIVIDUAL ACTIONS IN TRANSPORT AND TRAFFIC

Everyone needs to work together to fight climate change. Choosing how we get around is a big deal for the environment. Big changes are important, but even the small things we do matter a lot.

Let's talk about how we travel.

### **Good ways to travel:**

1. Use public transportation! Taking buses, trains, or subways is a great way to help. Lots of people can travel together using less energy.
2. Share rides! When you carpool or share rides with others, there are fewer cars on the road. That means fewer emissions going into the air.
3. Walk or bike! Walking or biking, especially for short trips, doesn't make any pollution and is healthy for us, too.





## **Change to cleaner cars!**

1. **Electric Vehicles (EVs):** You might want to buy an electric or hybrid car. EVs make fewer pollutants and are getting easier to get and cheaper to buy.
2. **Fuel Efficiency:** Choose cars with engines that use less petrol or emissions. Regular repair and making sure the tyres are properly inflated also help the car use less gas.
3. **Alternative Fuels:** If EVs aren't yet a good option, look into biofuels or hydrogen-powered cars.

## **Drive in ways that are good for the environment!**

1. **Smooth driving:** Don't speed up or slow down quickly, as this uses more gas. Keeping the speed steady saves energy and cuts down on pollution.
2. **Don't idle:** If you don't need to use gas or put out pollution, turn off the engine when you're not using it.
3. **Plan efficient routes:** Use guidance apps to find the quickest and greenest ways to get where you need to go.

## **Support infrastructure that lasts!**

1. Support policies and programmes that make transport in your town or workplace cleaner and more environmentally friendly.
2. Green Choices: Ask companies and the government to spend money on environmentally friendly ways to get around, like bike lanes, walking paths, and charging stations.
3. Pick eco-friendly businesses: Buy from businesses that care about sustainable transportation and do things that are good for the earth.

## **Take steps to live a greener life!**

1. Travel Less: Combine chores, carpool, or plan your trips well to cut down on the number of times and distance you travel.
2. Telecommute: If you can, work from home to avoid having to drive to work every day.
3. Teach and Advocate: Make people aware of how transportation affects the environment and push for environmentally friendly options in your neighbourhood.



## 12. TAKING CHARGE: INDIVIDUAL ACTIONS IN YOUR HOUSEHOLD

The amount of energy that homes use is a major cause of global warming. Here are some suggestions of what we can all do to lessen its effects:

### **Adopt habits that save energy!**

1. Get new machines that use less energy. When you replace old ones, look for ones with the ENERGY STAR label. These gadgets use less electricity and can help you leave behind a lot less pollution.
2. Use LED lighting: Use LED lights instead of regular candles. They use less energy and last longer, so you won't have to change them as often.
3. Unplug electronics: Electronics that are in sleep mode use energy even when they are not being used. Unplug chargers, TVs, and other electronics when they're not being used.
4. Install programmable or smart heaters to control the temperature inside your home. This helps you get the most out of your energy use based on your needs.

## **Make the most of natural resources!**

1. Natural Ventilation: When it's not too hot outside, open the windows to let in fresh air and cut down on the need for air conditioning.
2. Use of sunlight: To cut down on the use of electric lighting, make the most of natural light during the day.
3. Solar panels: If you want to use clean energy in your home, you might want to think about putting solar panels. Many places will give you money or tax breaks to make this environmentally friendly purchase.



## **Change the ways you use energy!**

1. Don't use too much heating or cooling. Set thermostats to moderate levels during the day and dress appropriately inside instead of depending too much on heating or cooling systems.
2. Modes that save energy: When you're not using a computer or other device, put it into a mode that saves energy or a sleep mode.
3. Make the best use of water: To save water, install showerheads and taps with low flows. Less hot water use means less energy is needed to heat water.

## **Practice Efficient Home Management!**

1. Insulate your house: Doors, windows, and walls should be properly insulated to keep heat in during the winter and keep it out during the summer. This means that you don't have to heat or cool as much.
2. Regular maintenance: To keep systems and tools working well, make sure they get regular maintenance. To make sure everything works perfectly, clean the filters, repair the HVAC systems, and take care of the equipment.

3. Reduce, reuse, and recycle: Stick to the three Rs. Choose goods with little packaging, reuse things as much as you can, and recycle things like metal, glass, paper, and plastic.

### **Spend money on energy audits and choices that are good for the environment.**

1. Energy Audits: To find ways to make your house more energy efficient, you might want to get a professional energy audit. This is a service that many utility companies give.

2. Green Energy Plans: Talk to your utility company about the different ways you can buy green energy. There are a lot of plans that get their power from winds or the sun.



# 13. TAKING CHARGE: GREEN HOUSING

Building and designing family homes in a way that reduces the effects of global warming is very important. Here are suggestions with things we can all do through building and development to help lessen these effects:

## **Choose materials that will last.**

1. Recycled and renewable materials: Pick materials that are better for the earth, like bamboo, cork, recycled steel, or reclaimed wood. They lower the need for new resources and the amount of carbon dioxide that is released during production.

2. Insulation saves energy: Buy good insulation to keep the temperature inside stable without using your heating or cooling systems too much.

3. Use low energy concrete and bricks: Look for options like autoclaved aerated concrete or recycled bricks that use less energy to make.

## **Accept designs that use less energy!**

1. Passive Solar Design: Use passive solar design elements that let in the most natural light and heat in



the winter and keep heat out as much as possible in the summer.

2. **Windows That Save Energy:** To improve insulation and lower heat loss, install windows that save energy and have double or triple glass.

3. **Solar Panels and Renewable Energy:** To power your home, you might want to place solar panels or use other renewable energy sources, such as geothermal systems.

### **Pay attention to saving water!**

1. **Fixtures that use less water:** To save water, install low-flow taps, toilets, and showerheads. Save rainwater for uses other than drinking, like watering.

2. **Greywater Systems:** Use water from sinks, bathrooms, and washing machines for watering plants by installing greywater systems.

3. **Native landscaping:** Use native plants in your yard because they need less water, so you won't have to water them as much. They are also a better habitat for local insects.

## **Optimize Building Techniques!**

1. **Energy-Efficient Appliances:** Put in appliances that use less water and electricity, which will help lower your power bills and cut down on your energy use.
2. **Good Ventilation and Air Quality:** Use good ventilation systems to keep the air quality inside your home high without using air conditioning too much.
3. **Green Roofs and Living Walls:** Green roofs and living walls can help with ventilation, lower energy use, and lessen the effects of urban heat islands.

## **Pay attention to longevity and durability!**

1. **Durable building:** Spend money on high-quality building that will make your home last a long time and keep it from needing repairs or renovations all the time.
2. **Modular and Prefabricated Homes:** You might want to think about modular or prefabricated homes, which can be made to use less energy and produce less waste during building.
3. **Sustainable Demolition:** When remodelling or tearing down, try to reuse and recycle as much as possible to keep trash out of landfills.





## 14. TAKING CHARGE: FOOD AND WASTE

One strong way to lower our carbon footprint is to change the way we eat, cook, and deal with trash in ways that lessen the effects of global warming. Here are some suggestions what each of us can do to help.

### **Look for sustainable food!**

1. **Plant-Based Diet:** Eating more plant-based meals lowers the damage that raising animals for food does to the earth. Greenhouse gas emissions go down a lot when people eat less meat, especially beef and lamb.
2. **Choose fruits and veggies that are grown in your area and at the right time of year to support local farmers and lower your food's carbon footprint.** Most of the time, these things don't need to be transported and don't need refrigeration.
3. **Avoid food waste:** To avoid loss, plan meals, store food properly, and find creative ways to use scraps. Composting organic garbage lowers emissions from landfills even more.

## **Cook in an eco-friendly way!**

1. Use tools that need less energy: Instead of regular stovetops, use cooking tools that use less energy, like induction stoves or pressure cookers.
2. Right-Sized Cookware: To save energy and cook faster, use pots and pans that are the right size for the job.
3. Cover pots while they're cooking: Covering pots and pans keeps the heat in and cuts down on cooking time, which saves energy and lowers emissions.

## **Cut down on plastics and packaging!**

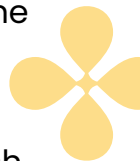
- Used Containers and Bags: Instead of single-use plastics, store food and leftovers in used containers, bags, and wraps.
2. Stations for Bulk Buying and Refilling: Buy things in bulk to cut down on packaging. To cut down on plastic trash, use refill stations for things like oils, detergents, and spices.
  3. Disposables that are good for the environment: If you have to use disposables, pick ones that are recyclable or compostable and are made from long-lasting materials.

## **Take care of waste!**

1. **Composting:** Put away things like fruit peels, veggie scraps, and coffee grounds in a pile for composting. The soil is improved by compost, and methane pollution from landfills is cut down.
2. **Recycling and upcycling:** To cut down on trash, recycle metal, glass, paper, and plastic items. Instead of throwing things away, find clever ways to use them again.
3. **Mindful Purchasing:** Before you buy something, think about how it will be used over time. Pick things that come in little packaging or are made from recycled or biodegradable materials.

## **Community and Speaking Out**

1. **Back local projects:** Get involved with community programmes in your area that support zero-waste farming, food rescue, and healthy agriculture.
2. **Educate and Advocate:** Teach your friends and family about ways to eat in a way that is good for the environment. Get restaurants and bars in your area to do things that are better for the climate and for the Earth.



3. Get involved with policymaking. Push for rules that support long-term food systems and waste control in your area.



## 15. TAKING CHARGE: SUSTAINABLE SHOPPING

What people buy has a huge effect on the world. Our combined carbon footprint is affected by everything we do, from the things we buy to the businesses we support. If you want to be a conscious consumer, you need to make decisions that are sustainable and cause less harm to the environment.

Here's a list of things that each of us can do as customers to help slow down the effects of global warming:

### **Buying things with knowledge**

1. Learn about and pick eco-friendly brands: Help companies that care about the environment, doing business in an honest way, and making things that last. Find labels that say things are Fair Trade, Organic, or Energy Star.
2. Reduce Single-Use Plastics: Use reusable items like water bottles, shopping bags, and coffee cups instead of single-use plastics as much as possible.



3. Buy products that last a long time. High-quality items that last a long time are better than throwaway or short-lived items. In turn, this cuts down on trash and the need for replacements more often.

### **Buy appliances and electronics that use less energy!**

1. Look for appliances and gadgets with Energy Star ratings, which show how energy-efficient they are. They consume less electricity, reducing overall energy consumption.

2. Unplug and Save: Devices that are not in use still need electricity, so unplug chargers and turn off gadgets when they are not in use to stop “vampire power”.

### **Moving things and travelling**

1. Public Transportation and Carpooling: To cut down on carbon emissions from daily travels, take the bus, carpool, ride a bike, or walk whenever you can.

2. Driving Efficiently: To save gas and cut down on pollution, combine tasks, keep tyre pressure at the right level, and drive at steady speeds.





## **Eco-friendly food options**

1. Adding more plant-based food to your diet will lower the carbon footprint of meat production.
2. Local and seasonal produce: To help local farmers and cut down on pollution from transportation, choose produce that is grown nearby and in season.

## **Cut down on waste and recycling!**

1. Choose products with minimal packaging, re-use things in creative ways, and recycle materials whenever you can to cut down on waste.
2. Starting a compost bin for your organic waste will keep it out of landfills and turn it into a nutrient-rich soil.

## **Advocate for change!**

1. Support environmental projects: Join local environmental groups, back green projects, and push for laws that encourage long-term living.
2. Spread the word: Tell your family and friends how important it is to live in a way that doesn't harm the environment and push them to do the same.

## **Ethical Investing and Finance**

1. Invest in sustainable companies: Think about investing in companies that do things in an ethical way and that care about the earth.
2. Sustainable Banking: Back banks and other financial institutions that have moral standards and invest in projects that are good for the environment.

## **Engage in the Community!**

1. Get involved locally: To encourage people to care for the environment, take part in community clean-ups, tree planting, and other local conservation activities.
2. Vote for Change: At the polls, use your vote to back candidates and policies that put protecting the environment and tackling climate change first.



**THANK YOU!**





More info: [www.howmuchwarmerisonedegree.com](http://www.howmuchwarmerisonedegree.com)