



Food and Agriculture
Organization of the
United Nations

YUNGA LEARNING AND ACTION SERIES



Climate Change Challenge Badge

SECOND EDITION



CBD :: FAO :: PLAN INTERNATIONAL :: UNFCCC :: UNU-IAS
WAGGGS :: WOSM :: YOUTH CLIMATE

This booklet is intended as a guide for teachers and youth leaders. These individuals are responsible for the development of programmes and activities that are suitable for their group and should provide the required supervision to ensure all participants are safe and sound.

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The YUNGA Challenge Badges are developed to support the achievement of the Sustainable Development Goals (SDGs). This challenge badge supports achievement of SDGs 12 and 13.

Climate Change Challenge Badge

SECOND EDITION

Developed in collaboration with



Convention on
Biological Diversity



Food and Agriculture
Organization of the
United Nations



United Nations
Framework Convention on
Climate Change



UNITED NATIONS
UNIVERSITY
UNU-IAS
Institute for the Advanced Study
of Sustainability



The World Association of Girl Guides and Girl Scouts (WAGGGS) and the World Organization of the Scout Movement (WOSM) endorse this educational badge framework for use by Guides and Scouts around the world, adapting it as necessary to their local needs and requirements.

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WELCOME

“Climate is hugely important for life and well-being on Earth.”

From being able to enjoy nice weather and spending time outdoors to depending on it for crops and food, we all rely on the planet's climate in a variety of ways. The Earth's natural laws and physical processes regulate climate in a way that makes it habitable and supportive of human, animal and plant life. Thanks to this, we are able to stay healthy, enjoy beautiful landscapes and have wondrous neighbours of animals, plants, insects and other living organisms we can marvel at.

However, our climate is changing, and this is largely because of us. While the Earth's climate has changed naturally over very long time periods, humans are causing the climate to change through our intensive use of polluting energy sources, deforestation and other interventions. We are already seeing the effects of climate change: temperatures are rising, glaciers melting and sea levels are rising. The changes include an increase in extreme weather events such as droughts, cyclones and flooding, putting populations at risk, damaging agriculture and people's livelihoods, and threatening many plant and animal species with extinction. Our ecosystems are complex and interdependent – if one species disappears, many others could be affected. Climate change may cause all sorts of unexpected alterations and disruptions to this delicate balance.

The good news is that there is a lot that can be done to tackle climate change. From changing daily habits to spreading awareness, every one of us has the power to make a difference.

We hope this Challenge Badge will help you better understand why climate change matters and motivate you to take action and become positive drivers of change in your communities and within international arenas.

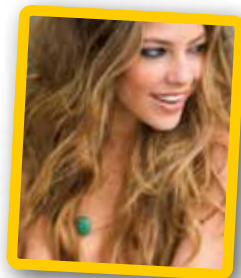
THE ACTIVITIES OF THE YOUTH AND UNITED NATIONS GLOBAL ALLIANCE
ARE SUPPORTED BY THE FOLLOWING AMBASSADORS:



Anggun



Carl Lewis



Debi Nova



Fanny Lu



Lea Salonga



Nadeah



Noa (Achinoam Nini)



Percance



Valentina Vezzali



BE SAFE AND SOUND!

DEAR LEADER OR TEACHER,

YUNGA Challenge Badges are designed to support you in undertaking educational activities. However, as you will be implementing these activities in different contexts and environments, it is up to you to ensure that the activities you choose are appropriate and safe.

Exploring the natural world is a fantastic way to learn about nature; nevertheless, it is important to take some precautions to ensure nobody gets hurt. Please carefully plan and undertake activities with enough adult support to ensure that participants are safe, especially when near water.



SOME GENERAL PRECAUTIONS TO CONSIDER INCLUDE:

LOOK AFTER YOURSELF

- * Wash your hands after every activity that involves being outdoors or using paint, glue or other materials, etc.
- * Don't look directly at the Sun.
- * Always use appropriate clothes and equipment, observe safety instructions and ensure that everything is planned in detail to also cope with unforeseen eventualities.
- * Be careful when using sharp objects and electrical appliances. Young children should be supervised by an adult at all times.
- * Always wear gloves when handling litter or garbage.
- * In some activities, you have the option of uploading pictures or videos to the Internet. Always make sure that everyone in the pictures or video, and/or their parents, have given their permission before you post anything online.

LOOK AFTER THE NATURAL WORLD

- * Treat nature with respect; always think how your activities may be having an impact on nature.
- * Leave nature as you found it, do not disturb natural habitats and make sure you leave things as you found them.
- * Recycle or reuse the materials used in the activities as much as possible.

SUSTAINABLE DEVELOPMENT GOALS

The Youth and United Nations Global Alliance (YUNGA) actively supports the achievement of the Sustainable Development Goals (SDGs) through the development of initiatives, activities and resources such as the United Nations Challenge Badges and by promoting and encouraging young people to be active citizens in their communities. Additional Challenge Badges are being developed to further support the SDGs.

This climate change challenge badge specifically supports goals number 12 and 13.



ENSURE
SUSTAINABLE
CONSUMPTION
AND PRODUCTION
PATTERNS



ACTION
TO COMBAT
CLIMATE CHANGE
AND ITS
IMPACTS

The SDGs succeed the Millennium Development Goals in 2015 and are a set of targets that governments, civil society organizations, United Nations agencies and other entities are working towards achieving by 2030 to ensure a more sustainable future for all.



**SUSTAINABLE
DEVELOPMENT GOALS**

Find out more about the Sustainable Development Goals at:

www.fao.org/yunga/global-citizens/sdgs/en

and

<https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals>

THERE ARE 17 SDGS:



1 – NO POVERTY

End poverty in all its forms everywhere



2 – ZERO HUNGER

End hunger, achieve food security and improved nutrition and promote sustainable agriculture



3 – GOOD HEALTH AND WELL-BEING

Ensure healthy lives and promote well-being for all at all ages



4 – QUALITY EDUCATION

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all



5 – GENDER EQUALITY

Achieve gender equality and empower all women and girls



6 – CLEAN WATER AND SANITATION

Ensure availability and sustainable management of water and sanitation for all



7 – AFFORDABLE AND CLEAN ENERGY

Ensure access to affordable, reliable, sustainable and modern energy for all



8 – DECENT WORK AND ECONOMIC GROWTH

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all



9 – INDUSTRY, INNOVATION AND INFRASTRUCTURE

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation



10 – REDUCED INEQUALITIES

Reduce inequality within and among countries



11 – SUSTAINABLE CITIES AND COMMUNITIES

Make cities and human settlements inclusive, safe, resilient and sustainable



12 – RESPONSIBLE CONSUMPTION AND PRODUCTION

Ensure sustainable consumption and production patterns



13 – CLIMATE ACTION

Take urgent action to combat climate change and its impacts



14 – LIFE BELOW WATER

Conserve and sustainably use the oceans, seas and marine resources for sustainable development



15 – LIFE ON LAND

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss



16 – PEACE, JUSTICE AND STRONG INSTITUTIONS

Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels



17 – PARTNERSHIPS FOR GOALS

Strengthen the means of implementation and revitalize global partnership for sustainable development

THE

CHALLENGE BADGE SERIES

Developed in collaboration with United Nations agencies, civil society and other organizations, the United Nations Challenge Badges are intended to raise awareness, educate and motivate young people to change their behaviour and be active agents of change in their local communities. The Challenge Badge series can be used by teachers in school classes and by youth leaders and especially Guide and Scout groups.

To see existing badges go to www.fao.org/yunga. To receive updates on new releases and other YUNGA news, register for the free YUNGA newsletter by emailing yunga@fao.org.



YUNGA has or is currently developing badges on the following topics:

AGRICULTURE: How can we grow food in a sustainable way?

BIODIVERSITY: Let's make sure no more of the world's glorious animals and plants disappear!

CLIMATE CHANGE: Join the fight against climate change!

ENERGY: The world needs a healthy environment as well as electricity – how can we have both?

FORESTS: Forests provide homes for millions of plant and animal species, help regulate the atmosphere and provide us with essential resources. How can we ensure they have a sustainable future?

GENDER: How can we create an equal and fair world for girls and boys, women and men?

GOVERNANCE: Discover how decision-making can affect your rights and equality among people around the world.

HUNGER: Having enough to eat is a basic human right. What can we do to help the 1 billion people who still go hungry every day?

NUTRITION: What is a healthy diet and how can we make food choices that are environmentally friendly?

THE OCEAN: The ocean is mesmerizing and amazing. It helps regulate temperatures on Earth, provides us with resources and much, much more.

SOILS: Without good soil, nothing grows. How can we take care of the ground under our feet?

WATER: Water is life. What can we do to safeguard this precious resource?



CREATING BEHAVIOUR CHANGE

We work with young people because we want to support them in leading fulfilling lives, help them prepare for their future, and for them to believe that they can make a difference in the world. The best way to make this difference is by encouraging young people to embrace long-term behaviour change. Many current social and environmental problems are caused by unhealthy or unsustainable human behaviour. Most people need to adapt their behaviour, and not just for the duration of a project, such as working on this badge, but for life. Young people know more about these issues than ever before, but many still behave in a detrimental way. It is clear that simply raising awareness is not enough to change behaviour; it requires different values, attitudes and skills.

So what can you do?

There are some proven ways of promoting behaviour change so, to increase the long-term impact of this Challenge Badge, try to do the following:



FOCUS ON SPECIFIC, ACHIEVABLE BEHAVIOURAL CHANGE

Prioritize activities that target very clear and specific behaviour change (e.g. “walk or cycle whenever you can rather than taking the car” rather than “reduce your climate impact”).



ENCOURAGE ACTION PLANNING AND EMPOWERMENT

Put young people in charge: let them choose their own activities and plan how to carry them out.



CHALLENGE CURRENT BEHAVIOUR AND TACKLE BARRIERS TO ACTION

Encourage participants to scrutinize their current behaviour and think about how it could be changed. Everyone has excuses for why they don't behave in a particular way: lack of time, lack of money, not knowing what to do... the list goes on. Encourage young people to voice these excuses and then find ways around them.



PRACTISE ACTION SKILLS You'd like to take public transport more often? Collect and practise reading timetables, plot out routes on a map, take a walk to the bus stop, find out what the fare is, do a trial journey. You'd like to eat more healthily? Try lots of healthy foods to see which you like, experiment with recipes, learn how to read food labels, create meal planners, visit the shops or local markets to find healthy food choices. Keep practising until it becomes a habit.



SPEND TIME OUTDOORS No one is going to look after something they don't care about. Time spent in natural environments – whether that is the local park or a pristine wilderness – encourages an emotional connection with the natural world that is proven to lead to more pro-environmental behaviour. Using public spaces, even those in a city centre, and getting involved with communities are excellent ways of building ownership and a sense of responsibility for the environment and other individuals around us.



GET FAMILIES AND COMMUNITIES INVOLVED Why change the behaviour of just one young person when you could change the behaviour of their entire family, or even the whole community? Spread your message more widely, encourage young people to “pester” their family or friends to join in and showcase what you have been doing for the local community. For an even bigger impact, get political and lobby your local or national government.



MAKE A PUBLIC COMMITMENT People are far more likely to do something if they agree to do it in front of witnesses or in a written statement – why not take advantage of this?



MONITOR CHANGE AND CELEBRATE SUCCESS Behaviour change is hard work! Revisit tasks regularly to monitor achievement and reward continued success in an appropriate way.



LEAD BY EXAMPLE The young people you work with look up to you. They respect you, care about what you think and want to make you proud. If you want them to embrace the behaviour you are advocating, then you must lead by example and make those changes yourself.

TIPS ON UNDERTAKING THE BADGE WITH YOUR GROUP

In addition to the suggestions above encouraging behavioural change, the following ideas are intended to help you develop a programme to undertake the Challenge Badge with your group.

STEP 1

Before and while carrying out the activities included in this booklet, encourage your group/class to learn about the climate. Explain why climate is important for our planet's health and how human activities are leading to climate change. If possible, watch a documentary on climate change (see relevant materials under the resources and additional information section at the back of this booklet) or visit a local science museum to get participants interested in the topic. You could also invite a scientist to talk with your group, explore the great outdoors, or do some research together online (the Web sites listed on page 144 of this badge are a great place to start). Another great way to get people engaged is looking at the inspirational actions of other young people in the climate area (again see the back of this booklet).

Then, discuss with the group how our individual choices and actions can help make a positive difference.

STEP 2

Apart from the compulsory activities, which ensure that participants understand basic concepts and issues related to Earth's climate, participants are encouraged to select the activities that best match their needs, interests and culture. As far as possible, let the participants choose which activities they want to do. Some activities can be done individually, others in small groups. If you have another activity that is relevant or particularly appropriate to your area, you may also include it as an additional option.

STEP 3

Allow enough time for the group to carry out the activities. Support and guide them through the process but make sure they carry out their tasks as independently as possible. Many activities can be conducted in several different ways. Encourage participants to think and act creatively when undertaking their activities.

STEP 4

Have participants present the results of their Challenge Badge activities to the rest of the group. Do you notice any changes in their attitudes and behaviour? Encourage participants to think about how their daily activities both depend upon and affect our climate. Discuss the experience and reflect on how they can continue to apply it in their lives.

STEP 5

Organize a celebration for those who successfully complete the badge curriculum. Invite families, friends, teachers, journalists and community leaders to participate in the celebration. Encourage your group to present the results of their project to the community in a creative way. Award them with certificates and cloth badges (see page 143 for details).

STEP 6 SHARE WITH YUNGA!

Send us your stories, photos, drawings, ideas and suggestions:
yunga@fao.org

Find out more about YUNGA and treating a YUNGA Tribe at:
www.fao.org/yunga

BADGE

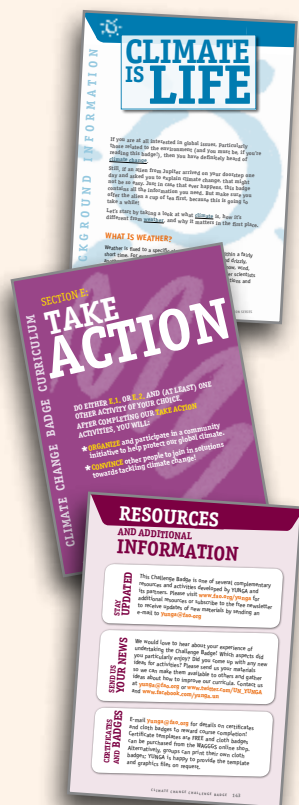
STRUCTURE AND CURRICULUM

The Climate Change Challenge Badge has been developed to help inform children and young people about the crucial role the climate has in influencing and supporting life on Earth. This booklet will help you develop an appropriate, enjoyable and engaging educational programme for your class or group.

The **first part** of the booklet provides **background information** on what climate change is, why it is happening, how it is harming ecosystems as well as human health, settlements and economies. It also explains how we can adapt to climate change and mitigate greenhouse gas emissions. The booklet also includes extensive tips and ideas for how participants can take steps in their daily lives to tackle climate change.

The **second part** of the booklet contains the **badge curriculum**, a range of activities and ideas to stimulate learning and motivate children and young people to help protect our climate.

Additional resources, useful Web sites and a glossary explaining key terms (that are highlighted in the text like this) are provided at the end of the booklet.





Badge structure

For ease of use and to ensure that all the main topics are addressed, both the background information (p. 26) and the activities (p. 100) are divided into five main sections:

- A. CLIMATE IS LIFE:** introduces our climate system and why it is important to life on Earth.
- B. CAUSES OF CLIMATE CHANGE:** explores the natural and human factors that are causing climate change
- C. IMPACTS OF CLIMATE CHANGE:** discusses how climate change is affecting ecosystems as well as human health and safety.
- D. SOLUTIONS TO CLIMATE CHANGE:** looks at how the international community is responding to the threat of climate change.
- E. TAKE ACTION:** suggests ideas for how individuals can live climate-friendlier lives and how your class or group can join in and help out.

Requirements: To earn the badge, participants must complete one of the two compulsory activities presented at the beginning of each section, plus (at least) one additional activity from each section, chosen individually or as a group (see graphic on page 18). Participants can also complete additional activities considered appropriate by the teacher or leader.

Section A: CLIMATE IS LIFE

1 compulsory activity (A.1 or A.2) & at least 1 optional activity (A.3 - A.16)



Section B: CAUSES OF CLIMATE CHANGE

1 compulsory activity (B.1 or B.2) & at least 1 optional activity (B.3 - B.17)



Section C: IMPACTS OF CLIMATE CHANGE

1 compulsory activity (C.1 or C.2) & at least 1 optional activity (C.3 - C.17)



Section D: SOLUTIONS TO CLIMATE CHANGE

1 compulsory activity (D.1 or D.2) & at least 1 optional activity (D.3 - D.17)



Section E: TAKE ACTION

1 compulsory activity (E.1 or E.2) & at least 1 optional activity (E.3 - E.24)



**Climate Change Challenge Badge
COMPLETED!**

Age ranges and appropriate activities

To help you and your group select the most appropriate activities, a coding system is provided to indicate the age group(s) for which each activity is most suitable. Next to each activity, a code (for example “Levels ① and ②”) indicates that the activity should be suitable for five to ten year olds and eleven to fifteen year olds.

However, please note that this coding scheme is only indicative. You may find that an activity listed at one level is suitable for another age group in your particular circumstances. As teachers and youth leaders you should use your judgement and experience to develop an appropriate curriculum for your group or class. This could incorporate additional activities not listed in this booklet, but which would allow you to achieve all the educational requirements.

- LEVEL**
- ①** Five to Ten years old
 - ②** Eleven to Fifteen years old
 - ③** Sixteen plus years old

REMEMBER!

The key objective of this Challenge Badge is to educate, inspire and stimulate interest in Earth’s climate and, above all, motivate individuals to change their behaviour and promote action. Most of all the activities should be **FUN** and participants should enjoy the process of earning the badge and learning about our climate and its importance.

SAMPLE **BADGE** **CURRICULA**

The sample curricula for the different age groups below provide examples of how the badge could be earned and are intended to help you develop your own programme.

LEVEL

1

Five to Ten years old

2

Eleven to Fifteen years old

3

Sixteen plus years old

Each activity has a specific learning objective, but in addition to this, children will also be expected to learn more general skills including:

- ★ **TEAMWORK**
- ★ **IMAGINATION AND CREATIVITY**
- ★ **OBSERVATION SKILLS**
- ★ **CULTURAL AND ENVIRONMENTAL AWARENESS**
- ★ **NUMERICAL AND LITERACY SKILLS**

SECTION	ACTIVITY	LEARNING OBJECTIVE
A Climate is life 	A.1: Creativity for climate (p. 101)	To creatively display what has been learned about climate change.
	A.3: Amazing adapting animal (p. 102)	To invent and draw an animal that has developed features to adapt to its environment and climate.
B Causes of climate change 	B.1: Climate historians (p. 107)	To research the history of the Earth's climate and understand the natural factors that impact it.
	B.7: Climate charades (p. 109)	To play a fun game while learning more about climate change.
C Impacts of climate change 	C.1: Mapping impact (p. 115)	To understand how climate change will impact different ecosystems.
	C.7: Save the animals (p. 117)	To learn which animals are endangered because of climate change.
D Solutions to climate change 	D.1: Useful reuse (p. 123)	To creatively convert items to be thrown away into useful household things.
	D.6: Keeping up with the news (p. 125)	To find climate- and energy-related content in the newspapers.
E Take action 	E.1: Climate action day (p. 131)	To raise awareness of climate change in the local community.
	E.4: Greeting cards (p. 132)	To create and send greeting cards themed around climate change.

LEVEL

1

Five to Ten years old

2

Eleven to Fifteen years old

3

Sixteen plus years old

As in Level 1, each activity in Level 2 has a specific learning aim, but also fosters additional, more general skills including:

- * **TEAMWORK AND INDEPENDENT STUDY SKILLS**
- * **IMAGINATION AND CREATIVITY**
- * **OBSERVATION SKILLS**
- * **CULTURAL AND ENVIRONMENTAL AWARENESS**
- * **RESEARCH SKILLS**
- * **PRESENTATION AND PUBLIC SPEAKING SKILLS**
- * **PRESENTING AN ARGUMENT AND DEBATING SKILLS**

SECTION	ACTIVITY	LEARNING OBJECTIVE
A  Climate is life	A.1: Creativity for climate (p. 101)	To creatively display what has been learned about climate change.
	A.13: Hot soils (p. 104)	To conduct an experiment to learn how different soils and water retain and absorb heat.
B  Causes of climate change	B.2: Film fun (p. 107)	To watch a documentary about climate change and discuss it as a group.
	B.10: Greenhouse jar (p. 110)	To conduct and experiment to understand the greenhouse effect.
C  Impacts of climate change	C.2: Climate change and agriculture (p. 115)	To analyse the effects of climate change on food production and identify ways to ensure food security.
	C.9: Water drama (p. 118)	To script a play about the impact of climate change on water.
D  Solutions to climate change	D.1: Useful reuse (p. 123)	To creatively convert items to be thrown away into useful household things.
	D.9: Young leaders (p. 126)	To explore how youth around the world are involved in climate change campaigns and negotiations and to discuss ways to get involved.
E  Take action	E.2: Climate contest (p. 131)	To engage in a fun group contest to see who can make the most environmentally friendly changes in their daily life.
	E.18: Volunteering (p. 138)	To volunteer for a conservation organization.

LEVEL

1

Five to Ten years old

2

Eleven to Fifteen years old

3

Sixteen plus years old

General skills a Level 3 curriculum seeks to develop include:

- * **TEAMWORK AND INDEPENDENT STUDY**
- * **IMAGINATION AND CREATIVITY**
- * **OBSERVATION SKILLS**
- * **CULTURAL AND ENVIRONMENTAL AWARENESS**
- * **TECHNICAL SKILLS AND THE ABILITY TO RESEARCH COMPLEX ISSUES**
- * **PRESENTATION AND PUBLIC SPEAKING SKILLS**
- * **THE ABILITY TO PRESENT AN ARGUMENT AND DEBATE**

SECTION	ACTIVITY	LEARNING OBJECTIVE
A Climate is life 	A.2: Community climate (p. 101)	To study local climate conditions and related issues.
	A.14: Climate and lifestyles (p. 105)	To create a poster depicting how climate affects quality of life.
B Causes of climate change 	B.1: Climate historians (p. 107)	To research the history of the Earth's climate and understand the natural factors that impact it.
	B.11: The great climate debate (p. 110)	To understand and respond to the views of climate sceptics and hold a debate on the topic.
C Impacts of climate change 	C.2: Climate change and agriculture (p. 115)	To analyse the effects of climate change on food production and identify ways to ensure food security.
	C.15: Climate refugees (p. 120)	To create a documentary on the plight of climate refugees.
D Solutions to climate change 	D.2: Studying natural disasters (p. 123)	To study recent climate-related disasters and discuss recovery efforts.
	D.15: Trading views (p. 129)	To create a presentation about emissions trading.
E Take action 	E.1: Climate action day (p. 131)	To raise awareness of climate change in the local community.
	E.16: Teacher for a day (p. 137)	To teach younger children about climate change and its effects on humans and the natural world.

BACKGROUND INFORMATION

The following section provides an overview of key issues relating to our climate. It aims to help teachers and youth leaders prepare their sessions and group activities without having to search for the information.

Naturally, not all the materials will be required or appropriate for all age groups and activities. Leaders and teachers should therefore select the topics and level of detail most appropriate for their group.

For example, you may wish to skip the more complicated issues with younger groups, but will probably wish to conduct further research with older groups, who could also read the background information for themselves.

A CLIMATE IS LIFE

What is weather?

What is climate?

Why does climate matter?



B CAUSES OF CLIMATE CHANGE

What is climate change and why is it happening?

Natural factors

The human factor



C IMPACTS OF CLIMATE CHANGE

Observed and future changes in climate

Impacts on natural ecosystems and biodiversity

Impacts on human health and economies



D SOLUTIONS TO CLIMATE CHANGE

Adaptation

Mitigation

Mitigation actions

Adaptation

Climate policy and agreements



E TAKE ACTION

Getting started

Be energy smart

Be a star of the three Rs

Shop and eat green

Travel green

Watch your water

Green gardening

Actions to adapt to climate change





CLIMATE IS LIFE

If you are at all interested in global issues, particularly those related to the environment (and you must be, if you're reading this badge!), then you have definitely heard of climate change.

Still, if an alien from Jupiter arrived on your doorstep one day and asked you to explain climate change, that might not be so easy. Just in case that ever happens, this badge contains all the information you need. But make sure you offer the alien a cup of tea first, because this is going to take a while!

Let's start by taking a look at what climate is, how it's different from weather, and why it matters in the first place.

WHAT IS WEATHER?

Weather is fixed to a specific place and takes place within a fairly short time. For example, one day might be overcast and drizzly, another day could be sunny with fluffy clouds. Rain, snow, wind, hurricanes and tornadoes are all weather events. Weather scientists – called meteorologists – use computer models, observations and knowledge to make predictions about the weather.



WHAT IS CLIMATE?

Climate refers to the generally prevailing **weather** conditions of a region throughout the year, averaged over a series of years. It is the big picture of temperatures, rainfall, wind and other conditions over a longer period of time (we're talking 30 years or more). For example, it might be rainy in Phoenix (the capital of Arizona in the United States of America) one week. But this city usually only gets about 18 cm of rain each year. So the **climate** for Phoenix is dry. Much of Egypt also has a dry, desert **climate**. Some regions of Brazil have a tropical **climate**, meaning it's warm and rains a lot. **Climate** can refer to a single city or region or even the whole planet (if we calculate average global temperatures, or the average amount of rainfall globally).

TIP TO REMEMBER!

Climate helps you decide which clothes you need generally for where you live. Looking out of the window and seeing the **weather** helps you decide which of those clothes to wear on that particular day!

WHY DOES CLIMATE MATTER?

Climate is not just about having a nice snowy winter or a good summer to go on holiday. **Climate** is actually extremely important for our planet, in more ways than we may realize. Let's explore how.

Climate and food

A sandwich or a bowl of cereal might seem like a simple meal or snack but, when you think about it, a lot goes into producing



those ingredients. One of those factors is a supportive **climate** to grow crops and raise livestock. For instance, if the **climate** is too dry, certain crops would not get the amount of water they need, and it's impossible to grow them. Farmers around the world earn a living from their crops and livestock. This process is dependent upon their strong understanding of the local climate and natural environment, so any unexpected changes can have serious effects upon their business and livelihoods.



DID YOU KNOW?

Over 80 percent of total agriculture is **rainfed**. In Latin America it is close to 90 percent, while in Africa it is 95 percent. This means that these systems are completely dependent on the rainfall for the crops to grow as they don't have **irrigation** systems. How do you think changes in climate affect these systems?

Climate and health

Our health also depends on the kind of **climate** we live in. Certain diseases, such as malaria and dengue fever, which are transmitted by mosquitoes, spread much more easily in warm, humid and rainy **climates**. People can also suffer from heatstroke and dehydration in very hot **climates**. As we will see in later chapters, **climate change** can have a major effect on people's health – for example climate change can contribute to an increase in extreme **weather** events, such as hurricanes, floods, and droughts that are usually harmful to us and the other organisms that live around us.

Climate and biodiversity

Biodiversity refers to the variety of animals, plants, micro-organisms and ecosystems on Earth. Did you know that many animals and plants have adapted and evolved over time to survive in the **climate** where they live? Camels, for example, can go a week or more without water, and can last for several months without food – a strength that comes in pretty handy in the barren desert. Some lizards have extra thick skin that prevents them drying out in the hot desert sun. At the other temperature extreme, there are certain species (such as frogs) that can partially “freeze” during the winter to survive. They actually turn solid. They then “thaw” back to life in spring. Talk about a cool way to escape the cold!

However, these types of adaptation occurred as climate changed slowly over long periods of time in the history of the Earth. Now, human activities are contributing to more rapid changes in climate change that may not allow species to adapt and may lead to extinctions, especially if they are already weakened by other threats such as habitat destruction and pollution.

Climate and fun

Climate plays a big role in our quality of life. If you live in a cold **climate**, you probably look forward to the winter when you can play in the snow with your friends and family. Changes of season can also have some special meanings or allow for particular activities. Have a think how the climate affects your community and what events or pastimes are linked to the specific climate where you live.

So, as you can see, climate is very important to both humans and the rest of the biodiversity of our planet. However, as we will see, our climate is changing, let's find out why.



CAUSES OF CLIMATE CHANGE

WHAT IS CLIMATE CHANGE AND WHY IS IT HAPPENING?

Climate change refers to a change in the overall state of the Earth's climate (such as temperature and rainfall). We cannot easily observe climate change, because it happens over long periods of time. However, you might have heard your parents or grandparents comment that summers today are hotter than when they were growing up, or that it's rainier or stormier. Scientists have delved into the Earth's past and observed present climate, and have discovered that the planet is warming up fast. So, why is the climate changing?

NATURAL FACTORS

To a certain extent, our climate is always changing. Scientists know this by studying the Earth's climate as far back as hundreds of thousands of years ago! They do this by studying the gases trapped in ice in places like Greenland and Antarctica, or the sediment from the bottom of the ocean or lakes. Tree rings and layers of rock also give them clues about the climate throughout history. These records show us that the Earth's climate varied long before humans prowled the planet. There have been ice ages when the polar ice caps stretched all the way to the Equator. In fact, over the past 400 000 years, the Earth's climate has cycled between cold glacial periods (ice ages) and warmer interglacial periods. We are currently in an interglacial period. So what are the factors that affect the Earth's climate? Let us investigate in the next sections.

WHAT ARE THE POLAR ICE CAPS?

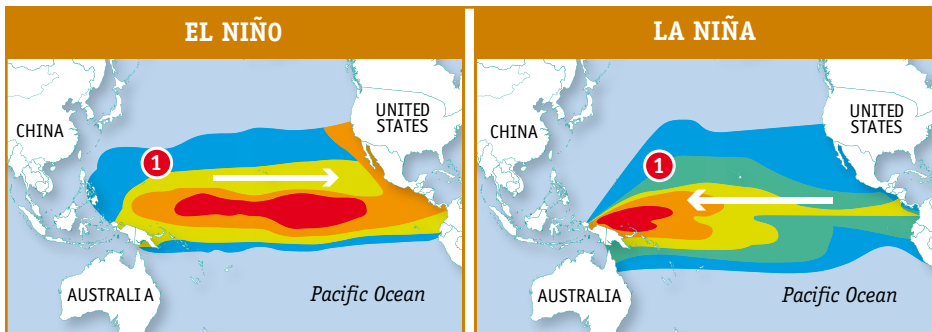
Polar ice caps are huge sheets of ice that lie at both the North and South Poles. The caps can be three to four metres thick at the North Pole and even thicker at the South Pole (Antarctica). Polar ice caps get less sunlight than the rest of the Earth, which is why they remain frozen.

Solar energy

The amount of radiation, or energy, reaching the Earth from the Sun plays a huge role on the Earth's climate and its amount is changing all the time. In fact, scientists study the surface of the Sun to predict how much energy the Earth will get in the future. They mainly do this by monitoring sunspots – cooler spots on the Sun's surface that are associated with higher solar radiation.

The power of El Niño and La Niña

The El Niño-Southern Oscillation (ENSO), known as El Niño, is a natural phenomenon that occurs when the waters in the Pacific near the Equator become unusually warm and change the rain and wind patterns around the world. The opposite condition, called La Niña, is when the waters in the Pacific become colder than usual. Both El Niño and La Niña can cause some unusual weather around the world, and they are a natural part of variations in the climate.

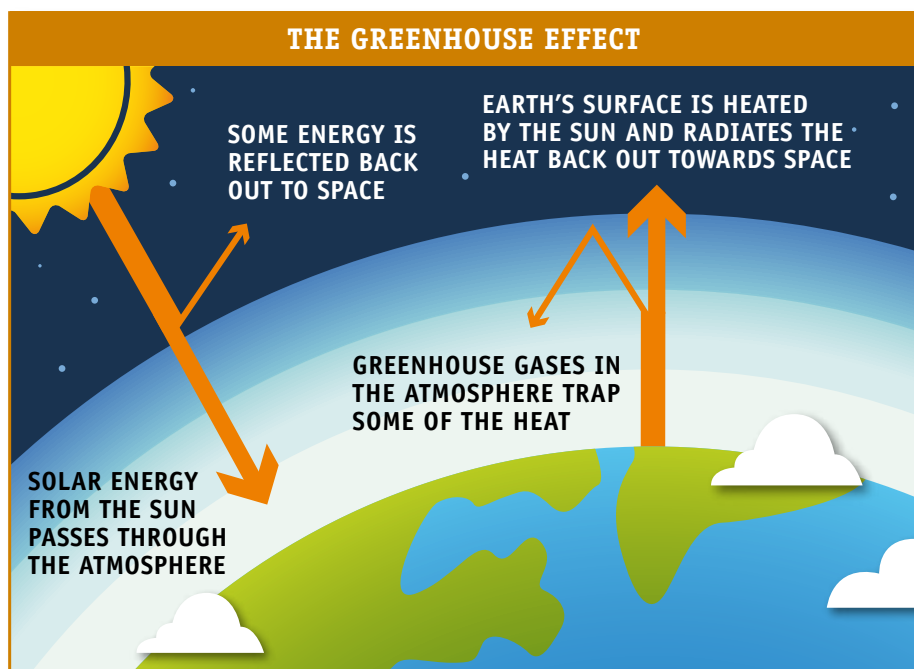




The greenhouse effect

A greenhouse is a house made of glass or plastic that traps heat from the Sun inside, making it warmer than the outside. This allows us to grow plants that prefer warmer conditions (such as tomatoes).

Greenhouse gases such as **carbon dioxide** (abbreviated to **CO₂**) in the Earth's **atmosphere** have a similar effect as a greenhouse; they reflect some of the energy back down to Earth instead of allowing it to escape back into space. This **greenhouse effect** is what keeps our Earth's average temperature at a warm and cosy 15 °Celsius (59 degrees Fahrenheit). Without it, the Earth would have an average temperature of around -19 °C (that's cold!) and would suffer from such extreme temperatures that it could not support life.



WHAT ARE THE MAIN GREENHOUSE GASES?

The main greenhouse gases in the Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide and ozone. Take a look at the table to find out more about each one.

GREENHOUSE GAS	CHEMICAL FORMULA	MOLECULAR STRUCTURE	GLOBAL GREENHOUSE GAS EMISSIONS BY GAS EMITTED BY HUMAN ACTIVITIES IN 2004 (EXCEPT WATER VAPOUR)	GLOBAL WARMING POTENTIAL (GWP)*
Water vapour	H ₂ O	 One oxygen atom bonded with two hydrogen atoms	Experts agree that 99.9 percent of water vapour is of natural origin	Although water vapour is also a powerful greenhouse gas, it is not given a GWP because it is not emitted - its concentration depends mainly on air temperature
Carbon dioxide	CO ₂	 One atom of carbon bonded with two atoms of oxygen	76.6 percent	CO ₂ has a GWP of 1 and serves as a baseline for other GWP values.
Methane	CH ₄	 A single carbon atom bonded to four hydrogen atoms	14.3 percent	23
Nitrous oxide	N ₂ O	 Two nitrogen atoms bonded to one oxygen atom	7.9 percent	296
Ozone	O ₃	 Three oxygen atoms	Hard to measure because low quantities and fast breakdown	25

*The Global Warming Potential (GWP) for a gas is a measure of the total energy that a gas absorbs over a particular period of time (usually 100 years), compared with carbon dioxide. The larger the GWP, the more warming the gas causes. So methane, for example, is 23 times more powerful a greenhouse gas than carbon dioxide.

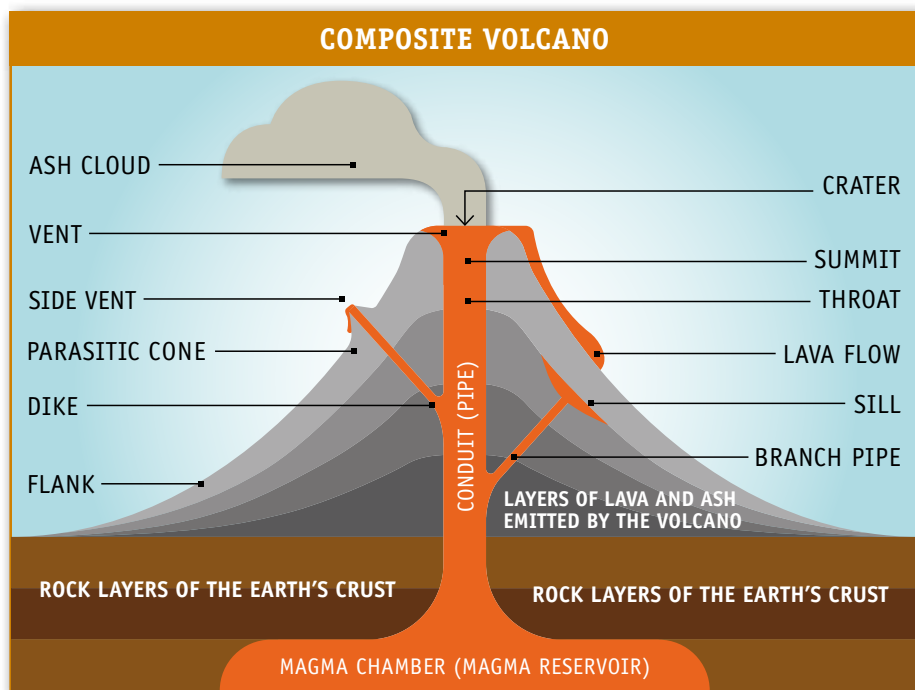


Volcanoes

Volcanoes must be causing a lot of global warming, right?

Nice try. Volcanoes might seem like major culprits, spitting out rivers of lava as hot as 700 to 1 200 °C (1 292 to 2 192 °F), but actually volcanoes also release large amounts of gas and particles into the atmosphere, which can temporarily change the amount of solar radiation reaching Earth's surface and therefore cooling the planet. For example, when Mount Pinatubo in the Philippines erupted on 15 June 1991, it launched about 20 million tonnes of sulphur dioxide high into the atmosphere. The sulphur dioxide created an enormous cloud of particles that circled the globe and remained in the upper atmosphere for two years. It reflected some sunlight back to space, preventing it from reaching the ground. This caused a temporary global cooling.

Find out more at: http://ete.cet.edu/gcc/?/volcanoes_teacherpage



Adapted from: EnchantedLearning.com

DID YOU KNOW?

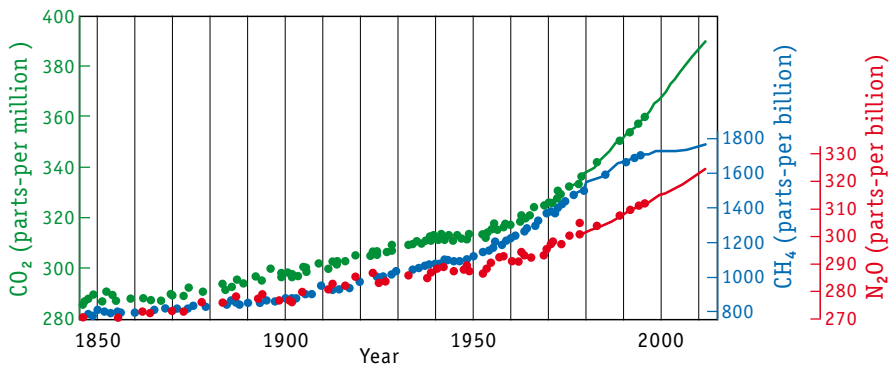
There's more **CO₂** in the **atmosphere** now than at any other time in at least 650 000 years!

THE HUMAN FACTOR

Industrial revolution

Over history, humans have increased their impacts on their environment and the other inhabitants of the planet. This is especially true once humans started to form settlements and develop cities, leading to major changes in the landscape, such as cutting down forests, building settlements and roads, and using land to grow crops and rear animals. Humans started to have a large impact on the **atmosphere** a few hundred years ago, during the Industrial Revolution (between 1760 and 1850). People started burning a lot of **fossil fuels** (such as **petroleum**, **coal** and **natural gas**) and there were major changes in the way land and agriculture was managed; this released large amounts of **greenhouse gases** into the **atmosphere**. As the world population and economies continue to grow, even more greenhouse gasses are released into the **atmosphere**. Let us see which human activities are having the biggest impacts today.

(c) GLOBALLY AVERAGED GREENHOUSE GAS CONCENTRATIONS



Source: Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change.



WHAT ARE FOSSIL FUELS?

Fossil fuels formed because the remains of plants and animals that existed millions of years ago **decomposed** and eventually turned into these energy-rich resources. The three main forms of **fossil fuels** are **coal**, **petroleum** and **natural gas**. When burned, **fossil fuels** release energy but they also release **greenhouse gases** and other materials into the air.

Electricity production

Approximately 65 percent of all electricity generated in the world is through fossil fuel steam turbines. For example, electricity produced through the burning of fossil fuels accounts for 40 percent of all carbon dioxide emissions in the United States of America. Humans use electricity for many of their everyday activities, so how “clean” our electricity sources are is very important (learn more in section D).

Transport

The use of petrol/gasoline to run cars, trucks and other methods of transportation (such as aeroplanes) is one of the leading causes of global warming. About 20 percent of the energy used throughout the world is used for transport (*Source: US Energy Information Administration 2011*). People are travelling more and more using energy-intensive forms of transportation such as airplanes and cars instead of using less-energy intensive forms of transportation such as trains, buses, ferries and especially bicycles. In addition, as the world becomes ever more globalized, even more products and goods (grains, plastics, textiles and others) are traded and transported throughout the world using trains, trucks and ships.

DID YOU KNOW?

The transport sector is one of the major consumers of fossil fuels and is a big contributor to air pollution. This not only increases the greenhouse gas emissions but also has a direct effect on people's health, causing breathing and heart problems. There are more than 600 million cars on the roads today, and it is predicted that they will become 2 billion by 2050.

Commercial sector

The commercial sector, which includes buildings such as retail stores, restaurants, hotels, hospitals, office buildings, and leisure and recreational facilities, accounts for 12 percent of total world energy consumption (*Source: US Energy Information Administration 2011*). Energy is mainly used for heating and cooling systems, lighting and other equipment. Some non-building energy use is included in the commercial sector, where it contributes to such public services as traffic lights and water and sewer systems.

Industry

Some 51 percent of world energy is used in the industrial sector, which encompasses manufacturing (e.g. factories that produce goods, such as electronics, textiles and other household goods), agriculture, mining and construction (*Source: US Energy Information Administration 2011*). Industries that require a lot of energy include those that work with chemicals, metals (such as iron and aluminium), minerals, paper, food processing as well as the mining of coal, petroleum and natural gas.



Food production

Food production is fundamental industry that ensures that everyone has nutritious food to eat. However, the food sector uses a lot of energy to produce, process (including packaging, refrigeration and storage) and transport food to the consumers. For example, energy is used for tractors (to plant, manage and harvest crops), pumps (for [irrigation](#)), running of buildings and production of chemicals to fertilize the soil and manage weeds and pests. For example, when humans use [fertilizers](#), the greenhouse gas, nitrogen oxide can escape to the atmosphere. Nitrogen oxide is 296 times more capable than [CO₂](#) of trapping energy from escaping back into space. Methane, another greenhouse gas, is also produced when organic matter is broken down by bacteria in conditions where there is no oxygen. Rice paddies, where the soil is covered in water, release methane and herbivorous animals, such as cows, also produce methane (see box). As we will see in the next section, food production is also a major cause of

[deforestation](#), as land is cleared to grow crops and raise livestock.

As you can see, food goes through many stages to become dinner on your table and energy is required at every step. So be sure not to waste your food!



Learn more about this topic through the **NUTRITION CHALLENGE BADGE**

COWS AND CLIMATE CHANGE

To raise livestock can require large amounts of energy, water and feed. However, cows, sheep and goats are guilty of something else, too: producing a lot of gas. These animals are ruminants; they have a special stomach to ferment and better digest their food with the help of bacteria. Unfortunately, this process also produces a lot of methane, and the ruminants' manure also contains large amounts of methane. Overall, methane emissions from livestock are estimated at about 2.2 billion tonnes of CO₂ equivalent, accounting for about 80 percent of agricultural methane and 35 percent of the total human-caused methane emissions (*Source: FAO*). Scientists are learning how to change the diet of ruminants so they produce less methane, and some farmers are finding ways to recycle cow manure to use the methane to power their farms. Remember of course that ultimately your choices of what you eat also affects which animals are reared in the first place (learn more in section D).

Deforestation

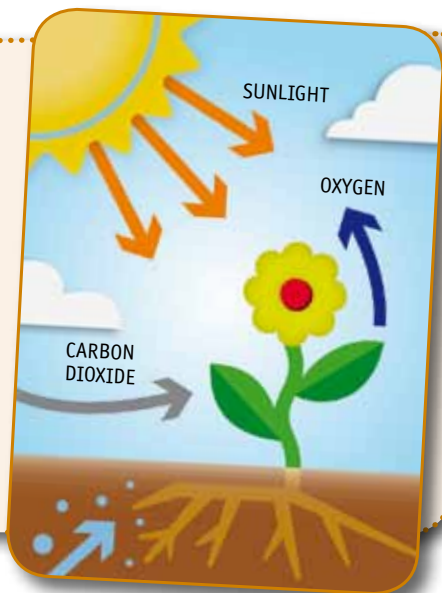
Forests play an important role in fighting climate change because they take up and store vast quantities of carbon (in their trunks, branches, leaves and roots) by absorbing carbon dioxide from the atmosphere in a process called photosynthesis (see box). One healthy tree is said to store up to 30 tonnes of carbon. The Amazon Rainforest or the Congolian forests represent some of the world's largest carbon stores on land.





WHAT IS PHOTOSYNTHESIS?

Trees and plants use the Sun's energy to combine carbon dioxide from the atmosphere and nutrients and water from the soil into food, giving them the energy they need to grow. This process is known as photosynthesis.



Forests also play a huge role in regulating the local climate in which they grow. They absorb water from the soil and then release it back into the atmosphere as water vapour through a process called transpiration. The water then combines with water vapour from other sources in the atmosphere and eventually falls back to the Earth as "precipitation". This helps keep temperatures cooler. Also, the shade from trees cools the surrounding air and ground, which ultimately helps cool the Earth's temperature overall (because heat energy is converted to chemical energy during the process of photosynthesis).

DID YOU KNOW?

An area of forest equivalent to five football pitches disappears every minute!

DID YOU KNOW?

The Great Banyan Tree in the Indian Botanical Garden in Howrah, West Bengal, is almost 250 years old and looks more like a mini-forest than a single tree. It serves its **ecosystem** in many ways, for instance by releasing a large volume of oxygen into the atmosphere and absorbing **carbon dioxide** as well as filtering dust, sulphur dioxide and other pollutants from the air. Its large root system helps to bind and maintain the soil. When a single tree can sustain a broad spectrum of **biodiversity** and ecological security, think of the benefits a whole forest can provide!

Read more here:

www.amusingplanet.com/2011/02/great-banyan-tree.html

However, over centuries, forests have been cut (**deforested**), **degraded** or burnt by humans for a number of reasons, including clearing the land for agriculture and livestock production, roads, cities, large-scale mining, as well as for extracting timber and wood for building materials and firewood. **Deforestation** therefore not only causes loss of biodiversity, habitat and local climate services, it also releases large amounts of carbon **dioxide** and other **greenhouse gases** (GHG) into the **atmosphere**.

Mining

As already mentioned, mining can cause many environmental problems and contribute to climate change through **deforestation**. Mining **petroleum** and **coal** also allows the GHG methane to escape from the Earth. It is estimated that up to 8 percent of methane emissions could be derived from **coal** and **petroleum** mining.



You at home

Think about all of the ways that you use energy in your home. You will probably come up with a long list! Energy consumed by households represents 18 percent of the total world energy use (Source: US Energy Information Administration 2011). People use energy for lighting, cooking, heating, cooling and running a number of appliances (such as televisions, washing machines, water heaters, etc.). The amount of energy used in a home usually depends on its size and the number of appliances you have. However, how well insulated the house is, how energy efficient the appliances are, and how careful you are in using and turning off appliances, can greatly influence how much energy you use. We will learn more on this in Section D. Many communities in the world do not have access to electricity and therefore use wood or other biomass for cooking and heating. What energy sources do you use in your home?

Bigger feet, smaller feet

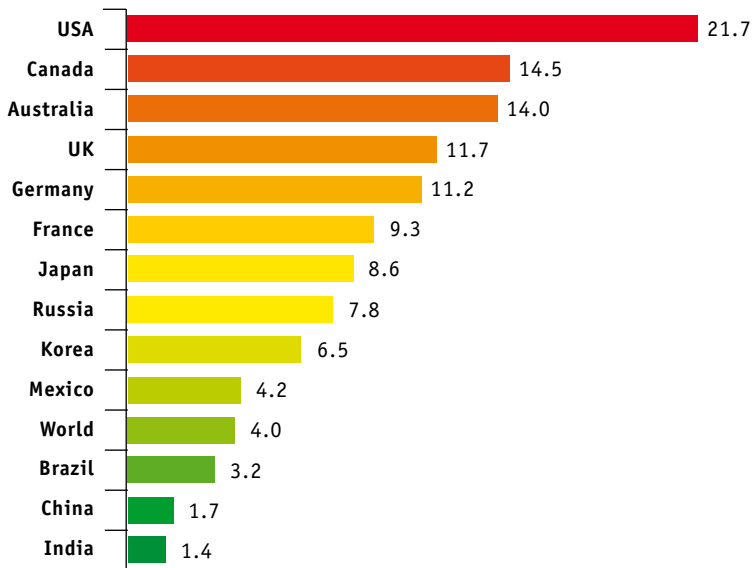
Now that we have discussed many of the ways in which humans contribute to climate change, it is important to note that some areas of the world have a much bigger "carbon footprint" than others. A

carbon footprint is the amount of greenhouse gas emissions a certain entity (like a country, a company or an individual) produces as a result of their activities (like the ones listed above). For example, the world's richest countries make up only one-fifth of global population but account for 45 percent of all meat consumption, 58 percent of total energy use, 84 percent of paper



use and 87 percent of vehicle ownership. At the other end of the spectrum, the poorest fifth of the world's population – more than one billion people – still lack food, shelter, housing, water and sanitation, and access to electricity (*Source: UNDP*). So it is crucial to find solutions for **developed countries** to shrink their **carbon footprints**, while the priority for **developing countries** is to raise the standard of living for their populations, in as climate-friendly a way as possible. We'll go into some of these solutions in Section D.

PERSONAL CARBON FOOTPRINTS: t CO₂e (2001)



Note: The personal carbon footprint represents the combined emissions from personal consumption, including housing, travel, food, product and service emissions. It excludes capital, government and land use emissions.

Sources: Hertwich & Peters 2009



IMPACTS OF CLIMATE CHANGE

"...while the world as a whole can probably adapt to an up to 2 degree Celsius temperature rise (which will still mean sacrificing some species, places and people), if temperatures continue to rise to 4 degrees Celsius (which is where they are headed at the present rate), then all bets are off. In other words, our ability to predict ends."

Saleemul Huq, climate change expert

www.iied.org/ipcc-rings-warning-bell-louder-anyone-listening

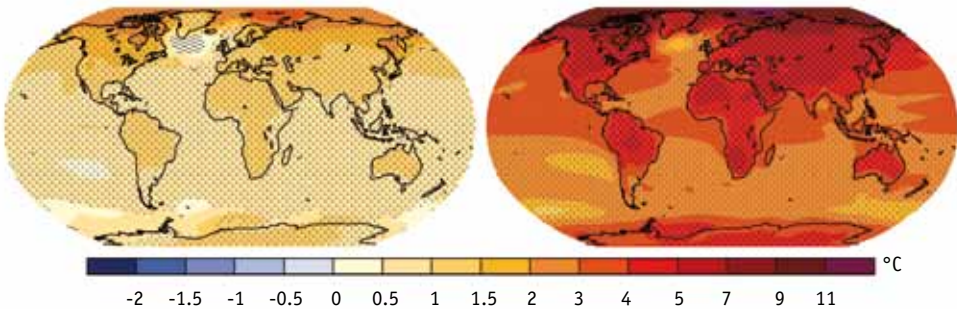
OBSERVED AND FUTURE CHANGES IN CLIMATE

As we have learned in previous sections, the Earth's climate has changed throughout history due to natural causes and the changes in the amount of radiation received from the Sun. However, the current warming is of major concern because the change is occurring more rapidly and is being caused by human emissions of greenhouse gases. In the next section we will investigate what changes have been observed and what impacts these changing are having.

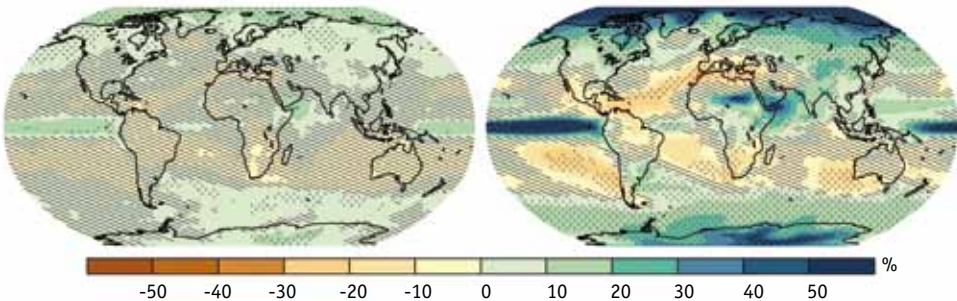
Observed changes in temperature

From 1880 to 2012 the planet has warmed by an average of 0.85 °C. This may not sound much but it actually makes a large difference, especially to already fragile **ecosystems**. Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850, and 2001 to 2010 was the warmest decade ever recorded. 2015 was the hottest year since measurements began and is the first year to breach the key threshold of 1 °C of global warming. As GHG emissions and the overall levels of GHG in the atmosphere continue to increase further warming is foreseen.

A) CHANGE IN AVERAGE SURFACE TEMPERATURE (1986-2005 TO 2081-2100)



B) CHANGE IN AVERAGE PRECIPITATION (1986-2005 TO 2081-2100)



Adapted from "Summary for Policymakers" of the IPCC's Fifth Assessment Report (AR5)
http://ar5-syr.ipcc.ch/topic_summary.php



DID YOU KNOW?

If we don't reduce our **greenhouse gas emissions**, scientists predict that an increase in global temperatures of 5–6 °C is a real possibility for the next century. This would cause enormous consequences to natural habitats and humans. For example it could cause an estimated 5–10 percent loss in global **gross domestic product**.

Source: Stern Review



Changes in the water cycle and precipitation patterns

The water cycle describes the constant movement of water on, above and below the surface of the Earth. **Global warming** is already having a measurable effect on this cycle, altering water vapour concentrations in the **atmosphere**, clouds formation, **precipitation**, and **runoff** and stream flow patterns. Even though higher temperatures will lead to more **precipitation**, it will not be evenly spread around the planet and will vary by season and by region. In fact, many places in the world, such as in many regions of Africa, **precipitation** will decrease from its already low levels. Another expected effect of **climate change** will be an increase in **precipitation** intensity; this means that a larger proportion of rain will fall in a shorter amount of time than it did in the past with could cause flooding or other damage. Furthermore, because of warmer temperatures, more **precipitation** will fall as rain rather than snow, leading to less water availability in summer months (from the melting of the snow). In addition, the earlier arrival of spring-like conditions is leading to snowmelt occurring earlier in the year leading to reduced availability of freshwater in the summer and autumn seasons (*Source: NASA Earth Observatory*). **Climate change** will therefore create droughts in some areas of the world and frequent floods in others.

Changes in timing of seasons and other cycles

The timing of seasons has been changing due to global warming. For instance, studies have shown an earlier arrival of spring, by about 2.3 to 5.2 days per decade, in the last 30 years (*Source: Intergovernmental Panel on Climate Change*). Some examples that the seasons are shifting and affecting habitats and animal behaviour include birds migrating earlier or shifting their range, plants blooming earlier or mountain snows melting earlier.

Increased variability and unpredictability

Over millennium, humans and other forms of life on Earth have been using climate and weather signals to undertake certain process, for example farmers sowing at the start of the rainy season, plants flowering in spring, birds migrating at certain times of year and so on. Climate change is causing annual climate and weather events to be more variable and unpredictable. Merging of seasons, fluctuations in temperature, wet seasons starting later and for shorter periods of time, and longer dry periods followed by short intense rainfall, are just some examples of increased variability and uncertainty.

Extreme weather events

Climate change is expected to increase the number and intensity of extreme weather events in many parts of the world. Extreme weather events happen when a weather event is very different from the usual pattern. This can be over a long period of time, such as a drought, or in a very short space of time, such as a flood, heatwave or a tropical cyclone. These can be devastating, causing destruction, poverty and death. For example, in 2013 Typhoon Haiyan tore through Southeast Asia, leaving 6 340 people dead, and vast destruction and chaos in the wake of its path. These natural disasters can cost billions of dollars in relief and reconstruction efforts – for example in 2013 alone, natural disasters cost the world a total of USD192 billion (*Source: Impact Forecasting*).



SELECTED SIGNIFICANT CLIMATE ANOMALIES AND EVENTS SEPTEMBER 2015

ARCTIC SEA ICE EXTENT

September 2015 sea ice extent was 28.9 percent below the 1981-2010 average—the fourth smallest September sea ice extent since satellite records began in 1979.



ALASKA

Cooler-than-average conditions engulfed much of the state during September. This was the coolest September since 2004.



CONTIGUOUS UNITED STATES

September 2015 was the second warmest September since national records began in 1895, behind 1998.



SOUTH AMERICA

Much of South America experienced above-average conditions during September, with parts of southern Argentina experiencing cooler-than-average conditions. Overall, South America had its warmest September on record.

GLOBAL AVERAGE TEMPERATURE

September 2015 average global land and ocean temperature was the highest for September since records began in 1880.



Map adapted from NOAA's State of the Climate Reports. For more information please visit: <http://www.ncdc.noaa.gov/sotc>



IMPACTS ON NATURAL ECOSYSTEMS AND BIODIVERSITY



FRESHWATER: RIVERS, LAKES AND GLACIERS

Changes in rainfall patterns, distribution, intensity and seasonal timing (like the monsoon) are already altering the water levels in rivers, streams and **freshwater** lakes. Water from snow and glacier melt is also an important source of **freshwater**. As the climate gets warmer there will be less snowfall and earlier thaw, which may lead to the lack of water in certain times of the year. Glaciers are also shrinking and some have already disappeared, further reducing water availability especially in summer dry months. In some coastal areas, sea-level rise is resulting in saltwater intrusion into freshwater aquifers, reducing the availability of **freshwater**, which is essential for all life on land and is important for humans for drinking, growing crops and rearing livestock.



See the **WATER CHALLENGE BADGE** to learn more!

HOW COOL IS ICE!

Ice and snow are white, and as a consequence reflect a lot of sunlight back out to space, which helps keep the planet from getting too warm. Scientists call this the "Albedo Effect". If there's less ice, the Earth will absorb more energy from the Sun and get even warmer. This is an example of a positive feedback loop, which happens when warming causes changes that lead to even more warming. Can you identify other positive feedback loops related to **climate change** that are mentioned in this badge? Can you think of any possible negative feedback loops?



SOILS

You may not usually give soil much thought, but soils are one of our most precious resources on Earth. Soil supports virtually all land-based plant and animal life! Unfortunately, it is painfully slow to form but can be destroyed terrifyingly fast. Just a single inch of soil can take centuries to build up but, if mistreated, it can be blown and washed away in a few seasons. Changes in climate can cause more frequent and heavy storms that can cause soil **erosion**, while higher temperatures and droughts can cause losses of organic matter and water content.

HARD TIMES IN DRY CLIMATES

Soil is especially fragile in the **drylands**, where there is low rainfall and little vegetation. These parts of the world are home to more than 2 billion people – a third of the world's population – who, due to lack of resources, undertake unsustainable activities such as overcultivation, overgrazing, **deforestation** and poor **irrigation** practices. Due to **climate change**, higher temperatures and extreme events such as droughts are causing **drylands** to be further at risk of **desertification**, the process by which land turns into desert.



See the **SOILS CHALLENGE BADGE** to find out more!



SPECIES AT RISK

Changes in temperatures and water availability are forcing many animal and plant species to move from their homes or change their behaviour. For example, some sea dwellers are being forced to move to deeper waters. Other animals are escaping warmer



climates and heading to cooler areas. The pattern of migrating birds is changing, too, with birds arriving at breeding grounds and laying eggs earlier. Some species may disappear completely because they are unable to keep up with the changes, are unable to move or the specific conditions on which they depend (such as specific food or habitat) no longer exist. For example, polar bears depend on sea ice for their survival but, as you know, sea ice is melting. Koala bears are losing their eucalyptus forest habitats due to increasing droughts and bushfires. Many frog, toad and newt species can no longer breed because higher temperatures and less rainfall cause their breeding pools to dry. The list goes on.

DID YOU KNOW?

A species is said to be extinct when it has not been seen for over 50 years. If the Earth keeps getting warmer, many plants and animals could become extinct! Learn more about different endangered species at: www.iucnredlist.org



DID YOU KNOW?

The Golden Toad (*Bufo periglenes*) has disappeared. The last sighting of a Golden Toad was in 1989. It is thought to be the first species to go extinct because of climate change, which caused breeding ponds to dry up before tadpoles could mature and caused the spread of a fungus parasitic to the toad.

Source: www.froglife.org/2013/11/18/croaking-science-the-golden-toad



INVASIVE ALIEN SPECIES AND OTHER UNWELCOME GUESTS

As we have mentioned in previous sections, changes in climate will cause changes in the distribution of different species. Non-native species (also called “exotic” or “alien” species) can sometimes out-compete native organisms for food and other resources or harm the new ecosystems that they are part of. When this happens, they are called invasive species (Source: CBD). Pests (insects or animals that attack crops, food and livestock) are also increasing in numbers because of climate change. This is because insects as well as other disease-carrying organisms, such as viruses and bacteria, usually prefer hotter and more humid conditions.

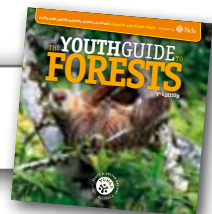


FORESTS

Forests are incredibly helpful to humans and animals. They provide food, medicinal herbs and wood that can be used for shelter, furniture and fuel. And, as you learned earlier, they play a huge role in maintaining the planet’s environmental health. That’s why it’s scary to know that climate change is not sparing our forests, either. For example, higher temperatures and more extreme weather events, such as storms, heavy rainfall and drought, damages trees and the soil they grow on. Hotter and dryer climate conditions cause forest fires to become more frequent. Sea-level rise is causing erosion and the loss of mangrove forests, and changes in climate are causing changes in the frequency and intensity of pest and diseases, including the introduction of new invasive species.



Find out more about the challenges forests face and possible solutions in our **FORESTS CHALLENGE BADGE** and our **YOUTH GUIDE TO FORESTS**





MANGROVES AND CLIMATE CHANGE



Mangrove forests grow in coastal areas, where they help prevent **erosion** and protect the coast from storms and hurricanes by acting as a barrier between the sea and the land. Sadly it is estimated that over half of the world's mangroves have been cleared in recent times for agriculture, salt ponds or aquaculture.

Source: <ftp://ftp.fao.org/docrep/fao/011/i0196e/i0196e14.pdf>



THE OCEAN

Vast and awe-inspiring, the ocean covers 70 percent of the Earth's surface. But here's a less-known fact: the ocean is essential for life on our planet – even for those of us who live nowhere near the sea! To name just a few of its benefits, the ocean provides us all with food and other materials that we need, regulates our **climate** and provides half of the oxygen we breathe. But powerful as it is, the ocean, too, is vulnerable to **climate change**, in the following ways:

- ★ **OCEAN ACIDIFICATION:** Did you know that around a quarter of human-produced **CO₂** is absorbed by the ocean? As the **CO₂** dissolves in seawater it makes the ocean more acidic. This can harm marine life and also threatens people's incomes through reduced fishing and tourism.
- ★ **MARINE MIGRATION:** As the ocean's waters warm, species at the bottom of the **food chain** will drift towards the poles in order to breed and survive. Species that eat them are forced to follow, causing mass movements in marine populations. Species that can't follow quickly enough will have to change their diet. If they don't manage, they are likely to become extinct.
- ★ **CHANGES IN CLIMATE:** Warmer ocean waters will also affect phenomena such as El Niño and La Niña, and this in turn has great

CORAL BLEACHING

Coral reefs form in shallow tropical waters by millions of tiny animals called corals. Each coral makes an external skeleton for itself and, over time, these skeletons build up to create coral reefs, which provide habitat for lots of fish and other ocean creatures. As the ocean warms up, corals lose the little algae that grow in them (and which they need to survive). This makes the coral turn white, as their beautiful colours actually come from these tiny algae. Not only do bleached corals eventually die because they no longer get essential nutrients from the algae, warmer ocean water actually dissolves more **carbon dioxide** and becomes more acidic, making it harder for corals to form their hard skeletons. In short: climate change badly threatens corals in several ways at once.

Source: www.epa.gov/climatestudents/impacts/effects/ecosystems.html



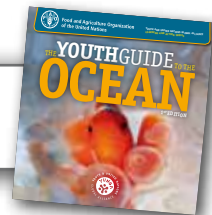
effects on overall global **weather** patterns, causing changes in temperature and precipitation and increasing the frequency of more powerful storms and extreme events.

★ **SEA-LEVEL RISE:** A warming ocean is also one of the main causes of rising sea level. This is because warm water takes up more space than cold water, and also because warmer overall temperatures are making glaciers and ice sheets melt, meaning there is more water flowing into the ocean. This will increase the danger of flooding, especially in low areas near the coast.

★ **REDUCED FISH:** **Climate change** is expected to reduce the availability and quality of many fish species. This will threaten people's food supply and livelihoods



Learn more from the **OCEAN CHALLENGE BADGE** and the **YOUTH GUIDE TO THE OCEAN**





IMPACTS ON HUMAN HEALTH AND ECONOMIES



WHO IS AFFECTED MOST?

Often the people that contributed the least to greenhouse gas emissions are the ones that are the most affected populations. This is because they often have the least resources to respond or adapt and because they are living where climate change will have the most negative impacts. Rural people engaged in small-scale farming in developing countries are the most vulnerable as their livelihoods are closely linked to climate and natural resources.

SMALL ISLAND STATES

Sea levels rise means big trouble for small island states, as they are at risk on being submerged. The Carteret Islands – 6 low-lying islands located in the region of Papua New Guinea – are already suffering from the disastrous effects of rising sea levels. The islands are literally being submerged!!

Since the 1980s the Carteret Island people have been relocated to nearby islands. The people of the Carteret are being called the world's first environmental refugees.

Rising temperatures are causing polar ice and glaciers to melt and together with thermal expansion (water expands as it absorbs heat from the atmosphere) the level of the oceans could increase by 1.4 metres (4ft 6in) by 2100 (Scientific Committee on Antarctic Research). Such a rise would result in more islands, like the Carteret islands, disappearing, causing many more people and animals and plants to lose their homes.



WOMEN

Women often have the responsibility to secure water, food and energy for cooking and heating; in many regions of the world women spend up to five hours per day collecting fuel wood and water. The effects of **climate change**, such as drought and uncertain rainfall, make it harder to secure these resources. Moreover, on a global scale, women produce more than half of the food that is grown but often have less access to resources such as land and credit, which puts women and their families at even greater risks than men.



EDUCATION

Climate change affects both girls' and boys' access to education, especially in poor rural regions. All over the world, different extreme **weather** events, such as sandstorms, intense heat or floods, may prevent students from attending or reaching school or cause the school to be closed or relocated. Furthermore, climate-related shocks result in far more girls being taken out of school than boys, as girls and women are often responsible for gathering food, fuel and water, which due to climate shocks may take longer to gather.



AGRICULTURE AND FOOD SECURITY

There are already 7 billion people on our planet and this is expected to grow to 9 billion by 2050. Of the current population, around 800 million already do not have enough to eat. Humans are completely dependent on the Earth's natural resources to gather or grow their food. However, **climate change** will add new challenges at a time when we are already struggling to feed our growing population. Changing and unpredictable rainfall patterns, droughts, higher temperatures, the increase and intensity of extreme **weather**, and outbreaks of pests and diseases will



cause an increase in crop failures and loss of livestock. Of course as a consumer, the choices of the food you buy can also greatly affect our environment; this is why you need to adopt a sustainable diet.



See the **ENDING HUNGER CHALLENGE BADGE** to learn more of the battle against hunger.



See the **NUTRITION CHALLENGE BADGE** to learn more about sustainable diets.



HEALTH

Climate change is expected to increase the number of health and disease risks. This includes: health-related issues linked to higher levels of smog; decreased quality of drinking water; food shortages; increase in injuries due to flooding and storms; and mental health problems due to shocks experienced. For example, in 2003 Europe experienced one of the hottest summers on record, which caused loss of life due to heat exhaustion. Higher temperatures are also allowing mosquitoes to spread to new areas, increasing the risk of mosquito-borne diseases (malaria, dengue fever, yellow fever, etc.). In 2010 the first ever cases of locally acquired dengue fever were reported in southern France, showing that the mosquitoes that transmit the disease are now established in the region.



HUMAN SETTLEMENT

Climate change related events such as floods, cyclones and storms also cause damage to human settlement. Sea-level rise, drought, saltwater intrusion, and river and coastal erosion are forcing large numbers of people, mainly in Africa and Asia, to migrate. These unemployed people move to cities in search of work, which means that urban populations around the world are increasing rapidly putting pressure on food and housing systems and leaving many people with very difficult situations.



DID YOU KNOW?

Over 100 years ago, only every fifth person lived in an urban area. In 1990, this number had almost doubled and by 2010 *more than half of the world's population* was living in urban areas! It is estimated that by 2050, this proportion will increase to 70 percent (*Source: World Health Organization*). All these people need schools, jobs and housing. Cities are facing overcrowding, pollution and strains on healthcare and school systems, to name just a few problems. Unfortunately, many people coming from climate-stressed areas often cannot afford housing. As a result, many end up taking shelter in slums or even in the floodplains. This situation of very poor housing and sanitation causes diseases to spread.





A TALE OF ONE CITY...

When the floods ruined his crops in 2008, Omar Faruk left the town of Sherpur, Bangladesh, with his family, and moved to the Kakrail slum in Dhaka city to earn a living. There is no running water supply or sanitation service in the slum where he and his family live. They live in a single room and share a flimsy wooden plank toilet with about 35 other families in the slum.

Source: Freidman, 2009



TRANSPORTATION

Climate change can have a huge impact on the way we travel. Heatwaves can cause roads to crack, shift and break, causing huge delays in traffic. Railways and airport runways may deteriorate due to intense freeze-thaw cycles caused by sharper temperature extremes, and heavy rainfall can flood or destroy roads. This can lead to travel times becoming extremely long and dangerous, and may prevent farmers from getting their produce to market, or remote communities accessing health and other services.



ELECTRICITY

Many systems used to generate electricity, including power stations and hydropower, need water to function. As the frequency of droughts increases and precipitation patterns become more unpredictable, less electricity can be produced by these methods. In addition, electricity production from photovoltaics is also affected because although solar panels require sunlight they actually get less efficient as temperatures get higher.



TOURISM

Travel and tourism contribute USD2.2 trillion to the world economy. Many countries around the world rely on tourism as a main source of income, but **climate change** may significantly alter geological features, breath-taking monuments or interesting cultures that tourists come to see. For instance, some places have been put on the World Heritage in Danger List (take a look: whc.unesco.org/en/danger). This means that the site faces threats that will reduce its value. The Chinguetti mosque is an example of a site at risk. It is located on the edge of the Sahara desert in Mauritania, where it holds a remarkable collection of Islamic manuscripts, but the encroaching desert and seasonal floods are constant threats. This is damaging the mosque's income as a tourist attraction and the lower revenues are limiting the capacity of the keepers of the mosque to take action to adapt to the changing **climate**.





SOLUTIONS TO CLIMATE CHANGE



In the previous section we learned that our climate is already changing and is already having devastating effects on humans, other species and the environment we depend on. As we have seen, human activities are mainly to blame as each year we are releasing billions of tonnes of carbon dioxide and other heat-trapping gases into the atmosphere. The more greenhouse gases we emit, the larger future climate changes will be. Therefore,

limiting climate change, and eventually reversing global warming, will require sustained reductions of greenhouse gas emissions. This is what we call climate change mitigation. In addition, as changes in climate are already inevitable, populations and the ecosystems on which we depend need to prepare and act in order to cope. This is known as adaptation. Let us look at some examples on how mitigation and adaption measures can be undertaken.

MITIGATION

Climate change mitigation refers to the action of reducing or preventing further greenhouse gases being released into the atmosphere. Examples of mitigation could include switching to renewable sources of energy, making equipment more energy efficient, recycling, making more cycle paths and walkways, improving forest management practices, or changing consumer behaviour. It can be as complex as a plan for a new city or as simple as turning/unplugging electronics. The actions can be undertaken from local to international level, such as creating treaties and agreements to reducing greenhouse gas emissions.

However, generally, individuals, communities and even nations prefer others to do the work of mitigation, so long as we can still enjoy the benefits of their efforts. The problem is that if *everyone* wants a "free ride", no-one will do the work, and we won't be able to stop or reverse climate change! This is what is known as a collective action problem, and climate change is a prime example. Climate change affects the whole planet and, as we have seen, many of the worst affected are the ones that contributed the least to climate change, so let us work together to solve the problems.

**EVERY INDIVIDUAL MUST PLAY THEIR PART IN
REDUCING GREENHOUSE GASES TO SAFE LEVELS.**



DANGEROUS TIPPING POINTS

(Source: 350.org)

The most dangerous aspect of future climate change is that human activities and emissions will push parts of the climate system past its tipping points. A tipping point is when systems reach a point where it is difficult or impossible to reverse once it starts. For example, imagine a glass of water slowly tipping over: at first, as it starts tipping, nothing happens. But once it passes its tipping point, the glass suddenly falls over and all the water spills out. Once that happens, there's no way to get the water back in the glass. Climate tipping points are major events. For example, in the summer of 2012 almost half of the sea ice in the Arctic melted, an event that shocked climate scientists. Just a few years ago, scientists estimated it would take 80 years before the Arctic Sea ice would melt completely – now they say it could happen this year.

For most of Earth's history, our atmosphere has had an average of 275 parts per million (ppm) of carbon dioxide (CO₂). Due to human activities we are now over 400 ppm and rising by about 2 ppm every year. Scientists believe 350 ppm is the safety limit for life on Earth.

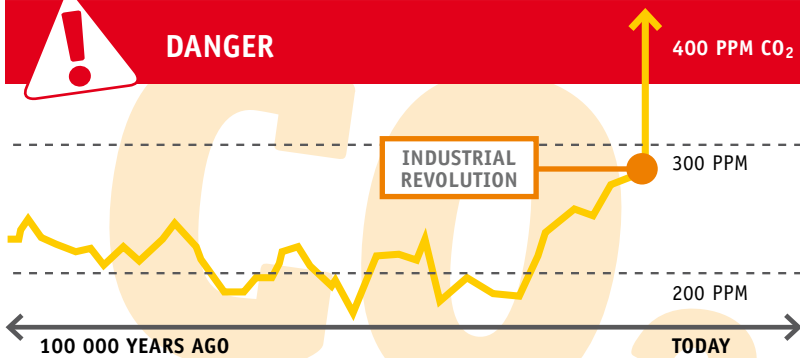
Over 350, we risk hitting dangerous "tipping points". At 400 ppm and rising we're far beyond anything human civilization has ever seen before.



WE MUST THEREFORE ALL
TAKE IMMEDIATE ACTION !
IT IS TIME FOR
MITIGATION !



DANGER



Since the industrial revolution CO₂ in the atmosphere has been rapidly increasing and reached 398.55 parts per million (ppm) in 2014 and is currently increasing at about 2.1 ppm per year.

Graphic modified from 350.Org

WHAT IS SUSTAINABILITY?

You probably hear a lot about sustainability, particularly when environmental topics come up. So, what exactly does it mean? Well sustainability for example refers to the way in which we humans use the natural environment: doing so sustainably means meeting our needs without damaging the environment so future generations will also be able to live well, too.



**SUSTAINABLE
DEVELOPMENT GOALS**



MITIGATION ACTIONS

So, we know what and why we need to mitigate climate change, but what actions can we undertake? Let see some examples in the next sections.

Energy efficiency

Energy efficiency refers to the practices of using less energy to provide the same or more services. Energy efficiency practices are available in all sectors including in industry, transport and our homes. For example, you may have seen electrical **appliances** such as computer monitors or washing machines labelled Energy Star or with other energy efficient labels (such as A+++). This means that the appliance has been made in a way to consume less energy. Cars and other forms of transport can also have differences in the efficiency of engines and the fuel they use (petrol, electric, hybrid, etc.). In addition, the production of food and other manufacturing can be undertaken using less energy and using more sustainable practices (see box on previous page). Another innovation is the design of “zero energy” buildings that do not require any external energy sources. These initiatives are just some examples of reducing our energy needs.

DID YOU KNOW?

Simple actions such as switching to energy efficient lighting can help save electricity. The following table gives you examples of how lighting has evolved and become more energy efficient.

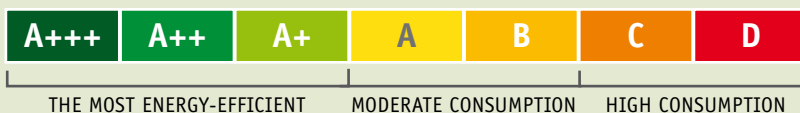


	2800° K 3200° K 4500° K Up to 7000° K			
LIGHT TEMPERATURE				
THE EVOLUTION OF LIGHTING	 INCANDESCENT	 HALOGEN	 COMPACT FLUORESCENT (CFL)	 LIGHT EMITTING DIODE (LED)
Year developed	1879	1959	1976	1994
Energy efficiency	Very low	Low	High	Very high
Watts (energy) needed for 800-1000 lumens (light)	60W	41-43W	13W-16W	7W
Watts (energy) needed for 250+ lumens (light)	25W	18W	6W	4W
Luminous efficacy: lumens (light output) per watt (energy input)	10-17 lumens/watt	12-22 lumens/watt	40-70 lumens/watt	40-100 lumens/watt
Energy lost to heat	90 percent	80 percent	50 percent	10 percent
Carbon dioxide emissions (lbs./year)	6 000	4 500	1 500	1 000
Life span	1 year	3 years	8 years	23 years
Annual energy cost to run	Approx. US\$6.18	Approx. US\$4.43	Approx. US\$1.54	Approx. US\$0.98
Cost 25000h electricity and bulb replacement	Approx. US\$260	Approx. US\$180	Approx. US\$50	Approx. US\$30



ENERGY EFFICIENT APPLIANCES

Some electrical appliances (such as washing machines, stoves, ovens and fridges) use a lot of electricity and, therefore, contribute to **greenhouse gas emissions**. But, by choosing more energy-efficient electrical appliances you can help tackle **climate change** and also save on your electricity bill. Labels such as the European Union energy label give information that allows you to determine quickly and easily the energy efficiency of a product. It is based on a rating scale using letters and colours, which go from A and green for more efficient appliances to D and red for less efficient appliances. The label also shows total energy consumption and provides other information relevant to that product, for example, water consumption for washing machines. Energy efficiency is measured using the following scale:



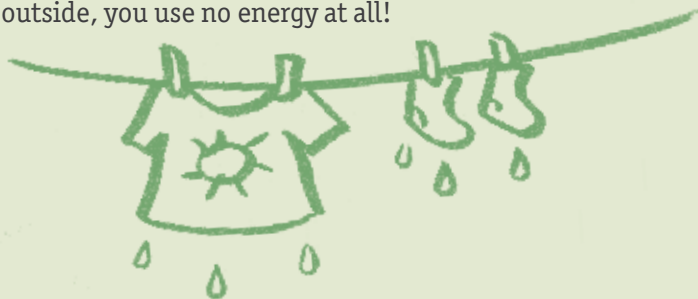
ENERGY EFFICIENCY IN TRANSPORT

Experts believe that technical and behavioural mitigation measures for all transport modes, plus new infrastructure and urban redevelopment investments, could reduce final energy demand in 2050 by around 40 percent (*Source: Intergovernmental Panel on Climate Change*). There are already a number of energy efficient measures such as improving engine and vehicle designs or using alternative fuels (such as **biofuels**) as well as hybrid and electric vehicles.

ENERGY EFFICIENCY IN HOUSES

A large amount of energy is used in our homes. For example, in the UK, more than a quarter of energy use and carbon dioxide emissions come from energy used in our homes. A lot can be done to reduce these consumptions and governments are also making stronger building regulations so ensure that new homes (and even cities) are more energy efficient and environmentally friendly. However, you can also think of how you can improve the energy efficiency of the house that you live in. For example:

- * Improve insulation and stop drafts. Much of energy for heating and cooling houses go straight out of the window. Insulate roofs and make sure window and doors are draft free.
- * Switch off the lights. Lighting accounts for up to 15% percent of your electricity bill.
- * Turn your TVs, DVD players, stereos and computers off when they are not in use, – when they are on stand-by they still use 10-60% percent of power.
- * Turn the heating down in the winter. Set the temperature on your heating system a little lower to save energy. Turning your thermostat down by 1°C can save you as much as £GBP60 per year.
- * Wash at colder temperatures. 90% percent of a washing machine's energy expenditure is spent on heating the water, so if you wash your clothes at 30-40 °C you can save more energy.
- * Hang your clothes out to dry. Traditional clothes dryers are energy intensive. If you dry your clothes on a clothes line, either inside or outside, you use no energy at all!





Green energy

As we have seen in the previous section, many of our societies depend on **fossil fuels** for energy to undertake many of our everyday activities. As we have learned, we need to be more efficient, waste less and use less energy in our everyday activities and choices. However, we should also consider if we can switch to **renewable energy resources**, which are far better for the **environment**, will not run out and do not contribute to **GHG emissions**. In fact, ensuring that everyone has access to cleaner and more efficient energy has become one of our world's most important priorities. It is for this reason that the United Nations has declared 2014–2024 as the Decade of Sustainable Energy for All (see: www.se4all.org) and energy is one of the new sustainable development goals (SDGs). Let us look at some examples of **renewable energy** sources.

- ★ **SOLAR ENERGY** – energy from the Sun's rays is unlimited and can be converted to electricity using photovoltaic panels or other technologies. The sun can also be used to heat water for heating homes and hot water taps. The main benefit of solar energy systems is that they do not produce pollutants or **carbon dioxide**.
- ★ **GEOTHERMAL ENERGY** – heat energy from deep inside the Earth reaches the surface through volcanoes, hot springs and geysers. We can recover it as steam or as hot water and it can be used in many ways, from large and complex power stations that produce electricity to small and simple pumping systems that can heat our homes.
- ★ **WIND ENERGY** – you guessed it! – the energy from the moving air is captured and converted into electricity. This is normally achieved using blades that as they are rotated by the wind drive an electric generator, which produces electricity. Locations where winds are stronger and more constant, such as near the

coast, are the preferred locations for wind turbines. Can you think of other ways that wind energy was used in the past?

- ★ **HYDROPOWER** – hydroelectric power plants use moving water to drive a turbine to generate electricity, a bit like an old water mill.
- ★ **ENERGY FROM BIOMASS AND BIOFUELS** – **Biomass** refers to energy contained in organic matter such as wood, cow manure and food scraps. This energy is released when the organic matter is burned, like when we burn wood in a fireplace. Humans can also produce specific biofuels, such as ethanol (produced from sugar cane) and biodiesel (produced from soybeans and palm-oil trees). The sustainability of biofuels very much depends on how they are produced and if they are coming from sustainable practices.



*You can find out more about how we can generate energy from these renewable sources in our **ENERGY CHALLENGE BADGE**.*





Reducing waste and unsustainable production and consumption patterns

Currently, the way we produce, use and dispose of goods is rapidly depleting the natural resources of our planet. The products we buy and use every day have a significant impact on the environment, from the materials used in their production to the energy needed to produce and transport them. Promoting **sustainable** patterns of production and consumption is essential if we want to stop environmental degradation. What is needed is the phasing out of products that use too much energy or water resources or that contain hazardous materials and introducing better more efficient products and production methods.

Consumers (i.e. YOU) have an important role to play as the choices you make ultimately govern what manufactures and farmers produce. Therefore, consumers need to become better informed and more capable of making environmentally sound choices, such as choosing products with eco-labels or even rethinking if you really need that new pair of shoes or mobile phone. Read Section E to learn about all the things you can do to reduce your **greenhouse gas emissions!**

SAVING BIG AT THE SONGHAI CENTRE

The Songhai Centre in Benin is an example of a project where waste-to-wealth is being done in a big way. The Songhai Centre is a farm that trains young people in agriculture, **sustainability** and waste management. Using a system known as circular agriculture, the Centre reuses all waste by turning it into **fertilizer**, fuel and other important products for managing the farm.

Check out the Centre in this video:

www.youtube.com/watch?v=Z4K68WYtqXg



Recycling

Recycling is about making sure that items such as papers, bottles and cans are not thrown away, but collected so that they can be made into new products. Large-scale recycling, in business, industry and agriculture, is also important in reducing emissions. These days there are many waste-to-wealth programmes popping up, which turn waste items into useful fuels, flavours and fragrances, plastics, paint or medicines. For example, new technology is using a microbe to convert waste gases from steel mills into jet fuel, which will emit 60 percent less carbon than the fossil fuel it replaces. So waste, usually seen as useless, can also contribute to economies in an environmentally friendly way. (Source: <http://bit.ly/1irCyTW>).

DID YOU KNOW?

In nature nothing is wasted. Predator animals in the forests kill only when they are hungry. When an animal is killed by a lion or a tiger, a host of other creatures and organisms benefit from the kill. Once the predator has eaten its share, scavengers like the hyena feed on the remains. What is left of the bones attracts insects such as flies. The leftovers are broken up by micro-organisms such as bacteria and fungi. This is a perfect example of “waste not, want not”. How do humans compare with regard to waste?



Protect carbon-rich landscapes

A large quantity of **GHG** emissions occur when humans disrupt or change habitats or landscapes. For example, when forests are cut down or burnt to clear the land large amounts of GHG emissions occur, as well as the loss of habitat for many species. Peatlands and other organic soils are also carbon rich (see box). Preserving such habitats and even replanting forests is a good way to remove GHG from the atmosphere and store them in solid form. This process is called sequestration (see box). Find out more in section E.

WHAT IS CARBON SEQUESTRATION?

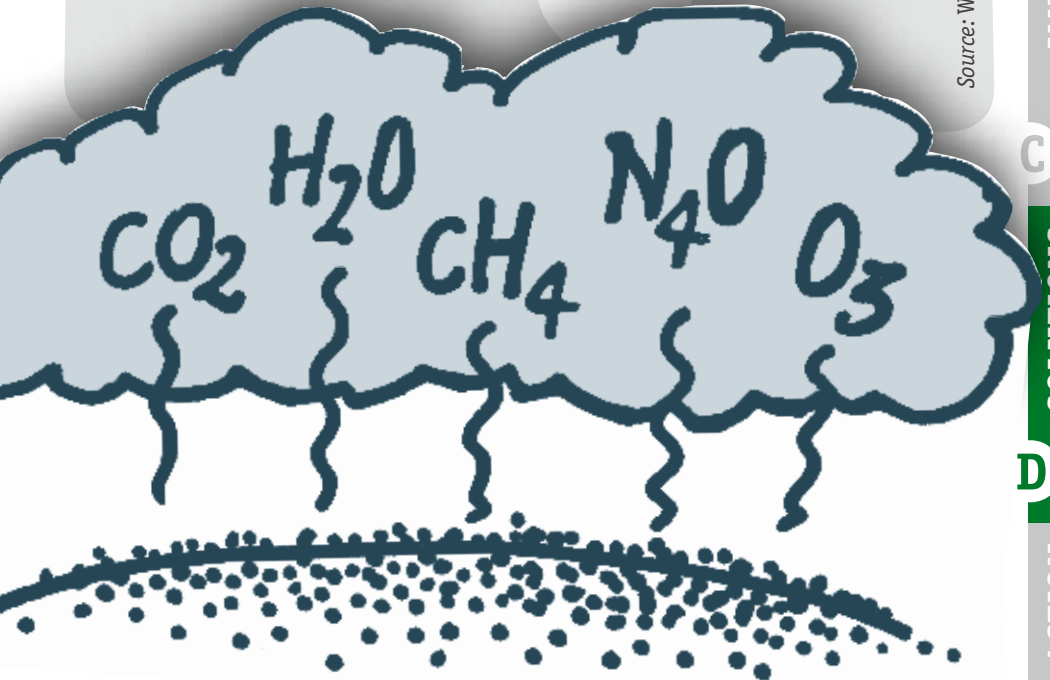
Concentrations of **carbon dioxide** in the **atmosphere** can be lowered either by reducing emissions or by taking **carbon dioxide** out of the **atmosphere** and storing in terrestrial, oceanic, or freshwater ecosystems. Carbon sinks are natural systems that absorb and store **carbon dioxide** from the **atmosphere**. So, the process by which carbon sinks remove carbon dioxide is known as carbon sequestration. Forests, soils and the ocean are important stores of carbon. Protecting natural **carbon sinks** is also important for **mitigation**. The long-term conversion of grassland and forestland to cropland (and grazing lands) results in the release of the stored carbon, but there is a major potential for increasing carbon sequestration through restoration of degraded soils, better silviculture (the process of looking after or re-growing forests) practices, and adoption of green agriculture.



DID YOU KNOW?

Peatlands are wetlands with a thick waterlogged organic soil layer (peat) made up of dead and decaying plant material. Peatlands represent half of the Earth's wetlands and cover 3 percent of the global total land area. They are found in almost every country in the world. Peatlands are carbon-rich and contain twice as much carbon stock as the entire forest biomass of the world. The majority of the carbon stored in peatlands is in the saturated peat soil that has been sequestered over millennia. When disturbed, peatlands can become significant sources of greenhouse gas emissions.

Source: Wetlands International





ADAPTATION

Climate change is already happening, and many negative effects and changes will continue to occur. Therefore, we have to be prepared for the changes and take action to minimise the damage and disruption they may cause. This is known as adaptation to climate change. Adaptation seeks to moderate or avoid harm of changes in climate and find new solutions for people to live and prosper under their new climatic conditions. In this section we explore what adaptation means to different groups in different countries, and the different types of adaptations that exist.

Types of Adaptation

There are four main types of adaptation:

- ★ **ANTICIPATORY ADAPTATION** – changes are made before the impacts of climate change happen (prevention). An example of anticipatory adaptation could be if a farmer decides to change to growing crops which need less water, knowing that their climate is likely to get drier in the future.
- ★ **REACTIVE ADAPTATION** – actions are taken once something has already happened (like a cure), e.g. a farmer buys new irrigation technologies because he is no longer able to sustainably grow his crops due to drought.
- ★ **SPONTANEOUS (AUTONOMOUS) ADAPTATION** – it just happens in response to the changes in the environment (natural systems) or market or welfare (human systems), such as a farmer changing the timing of planting, because the seasons appear to be changing.
- ★ **PLANNED ADAPTATION** – based on awareness that changes have or are likely to occur, a decision is made on what action is going to be taken to return to, maintain, or achieve a desired situation. A planned adaptation might be a change in building regulations to make sure that new buildings will be suitable to a hotter climate.

Who/What adapts?

Countries?

It is important to understand what **adaptation** means to different people and societies around the world. In developed countries, **adaptation** generally means maintaining current standards of living and lifestyles. In developing countries however, **adaptation** may mean an improvement from current conditions which may be extreme poverty, into a more desirable and sustainable state.

In some countries adaptation may mean people abandoning their homes and relocating to another country as a result of rising sea-levels. Tuvalu, in the western Pacific, has discussed moving its people to New Zealand if sea-levels continue to rise. The economic and cultural implications of migrations like this are likely to be significant, with global consequences.

Individuals?

Different people within the same societies may have different expectations and goals of **adaptation**. For example, houses in parts of the eastern coastline of the United Kingdom are threatened by coastal erosion, storm surges and sea-level rise. For the people who live in those houses, protecting the coastline is a vital adaptation. However, for policy-makers and planners with limited resources, the protection of a relatively small number of properties is not a major priority and their approach is more likely to focus on relocation.

Adaptation is already occurring, but not fast enough

Human beings are constantly adapting to changing conditions. Agricultural producers are an excellent example, as they continually adapt to changing weather, political, economic and social conditions. Many traditional societies have strategies for coping with **climate** variability. However, **climate change** may happen much faster than they are able to cope with, or may lead to changes they have not experienced in the past.



DID YOU KNOW?

Living in fine tune with nature, **indigenous** communities are able to observe subtle changes in the plant and animal world around them that convey useful information about the **climate**, and they can take adaptive measures accordingly. For example, in Swaziland, floods can be predicted from the height of birds' nests near rivers. Moth numbers on the other hand can predict drought. The position of the Sun and the cry of a specific bird on trees near rivers may predict the onset of the rainy season for farming. The presence of certain plant species (for example, *Ascolepis capensis*) indicates a low water table.

Source: GRIDA and ICSU

Adaptive capacity: the ability to change

The way in which individuals, communities, countries and regions will be able to adapt to **climate change** depends largely on what is known as 'adaptive capacity'. Adaptive capacity is the ability of a system to adjust to **climate change**: to minimise damage, take advantage of opportunities, or to cope with the consequences (IPCC 2007). Adaptive capacity is shaped by available economic and natural resources, institutions, skills and knowledge.

In agriculture, different regions will face different challenges. A few regions of the world, mostly in northern Europe, may benefit from **climate change**, but many regions will be pushed to their limits. In the Sudano-Sahel region of Africa, persistent droughts in recent years have reduced the quality of the land, causing loss of earnings, food insecurity, displacement of people and civil strife.

There is very little scope for this region to adapt to any further changes. In the Mediterranean region and Central Asia, water resources are likely to become a limiting factor for certain crops.

While gradual changes in temperature may not cause too many problems in the next few decades, extreme weather events such as droughts, heat waves and floods, are likely to cause the most damage in all parts of the world and have severe consequences for food production.

Who is responsible for adaptation?

Adaptation generally delivers local, and often private, benefits. This might mean that individuals should be the ones to adapt. However, in some cases it is more appropriate for governments to take action to ensure that effective adaptation occurs. An example is where individual adaptations may have effects in other areas. This could occur where a farmer needs more irrigation water for crops during a drought, but taking more water from the river might mean that people downstream do not have enough water. The government or local authority needs to regulate who can have access to water, and how much. Other examples where the government might adapt are in protecting critical infrastructure, like roads and hospitals or important cultural or historic sites. Governments might also decide that they need to become involved in adaptation in agriculture in order to ensure food security.



Examples of adaptation measures

Adaptation measures to manage the risks of **climate change** can consist of a wide variety of actions. These measures should be considered overlapping rather than separate, and they are often pursued simultaneously. **Adaptation** can contribute to the well-being of populations, the security of assets and the maintenance of **ecosystem** goods and services now and in the future. Continue reading to find some examples in different sectors:



AGRICULTURE

- ✱ Farmers can adapt to dryer and hotter temperatures by improved water management, for example, through rainwater harvesting and drip irrigation systems.
- ✱ They can also practice inter-cropping, which means growing different plants and crops together as this will help protect and maintain the soil. For example, farmers could mix their crops with legume crops or plant shrubs and trees around their fields.
- ✱ Another approach is to use new crop varieties that are more tolerant of heat, drought and waterlogging from heavy rainfall or flooding.



COASTAL AREAS

- ✱ One option for protection is to build hard structures, such as sea walls which act as defence walls to prevent upland erosion and storm surge flooding.
- ✱ Local governments can also establish set-back zones requiring developments/settlements to be at a specified distance from the water's edge.
- ✱ Another measure is mangrove conservation and restoration as the dense root systems of these forests help protect the coast from sea level rise and prevents erosion from waves and storms.



INFRASTRUCTURE

- ★ Government and private institutions can protect energy production facilities to withstand increased flood, high winds, lightning, and other storm-related stresses.
- ★ City planners can limit construction on flood plains or potential mud-slide zones in order to avoid future risks.
- ★ Another clever idea that scientists are developing is using street surfaces that absorb water to deal with the extreme storms, water will infiltrate at the point of contact, as opposed to the runoff that usually overtaxes cities' sewers.



WATER

- ★ Farmers can establishing conservation buffers (areas or strips with permanent vegetation -often with native grasses, shrubs and trees) in agricultural lands to avoid water contamination as they intercept pollutants and trap sediments.
- ★ Governments can also help individuals improve their access to water by providing loans that allow the purchase of water storage tanks.
- ★ Additionally, maintaining and restoring wetlands is a key aspect as these ecosystems filter, clean and store water. In other words, they act like kidneys for other ecosystems, and they collect and hold flood waters.



HUMAN HEALTH AND WELLBEING

- ★ Early warning systems for extreme weather events can help local people prepare for and respond to disasters; for example, timely flood warnings can prompt communities to protect crops, livestock and housing.
- ★ Warmer climates can create conditions for the spread of diseases like malaria or dengue, therefore governments can establish vaccination plans to avoid people from getting sick or distribute insecticide impregnated bednets that repel mosquitos.
- ★ Communities and individuals can also plant trees and expand green spaces in urban settings to provide shade and minimize heat building up in cities or towns and manage storm water.



CLIMATE POLICY AND AGREEMENTS

Climate change is an incredibly complex problem. Every person contributes to climate change and everyone will suffer from its effects. This is because we all share one atmosphere and our individual emissions have a global impact. However, some populations/individuals are more responsible for emissions than others, and in many cases the people that will be the most affected by climate change are the ones that have contributed the least. Agreements therefore need to be made on how to best and fairly tackle climate change with each country, organization and individual doing their fair share. Governments develop policy, rules, guidelines, taxation or incentives to facilitate cooperation and ensure that everyone fairly contributes to the overall climate objectives. Let us look at some examples of how this is being done.

International

International agreements set global goals for tackling climate change and establish ways to help countries meet them efficiently. So, how did the climate change negotiation process start in the first place? In 1990, at the UN General Assembly, the international community finally decided to create a formal body for addressing climate change. After still more planning and negotiation, the body came into being at the famous Earth Summit in Rio, Brazil, in 1992. It is called – take a deep breath, it’s a bit of a mouthful – the **United Nations Framework Convention on Climate Change (UNFCCC)**. In 1997, the UNFCCC adopted the Kyoto Protocol, an agreement in which countries agreed to reduce their greenhouse gas emissions. Recognizing that developed countries are mainly responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations, and only these countries actually have specific targets for reducing their GHG emissions.

Since the UNFCCC was born, its member countries (known as “Parties”) have been meeting annually in the Conference of the Parties (COP) to assess progress in dealing with climate change. COP is the highest decision-making event in the world of climate change. The 2014 COP in Lima, Peru, is commonly called COP20, since it was the twentieth Conference of Parties. COP 21 will take place in Paris, France, in 2015, and it will be an important event because Parties are negotiating a new universal agreement in which all countries – not just developed countries – will have some responsibility and specific targets for reducing their greenhouse gas emissions.



United Nations
Framework Convention on
Climate Change



PARIS2015
on Climate Change
COP21-CMP11

YOUTH AND CLIMATE CHANGE

Youth has a long history of participating in the annual UN climate meetings, where they challenge governments to create stronger policies to reduce and to respond to climate change. Youth participation includes ongoing engagement with negotiators and creative action to raise awareness of issues that youth feel strongly about. For example, **YOUNGO** – a group of youth representatives of non-governmental organizations – has gained official recognition with Constituency status at the UNFCCC, which allows for exchange of official information between young people and the Secretariat and gives young people more opportunities to share their views in the negotiation process.



National

Countries set national climate change targets in line with international agreements and regulate greenhouse gas emissions by creating standards for industry, transport, etc. They can also implement new initiatives such as emission trading systems (in which quotas for greenhouse gas emissions are sold and bought), carbon taxes (placing taxes on emissions) or renewable energy quotas. Youth in many countries have organized national coalitions to present a clear and unified voice on the climate front.

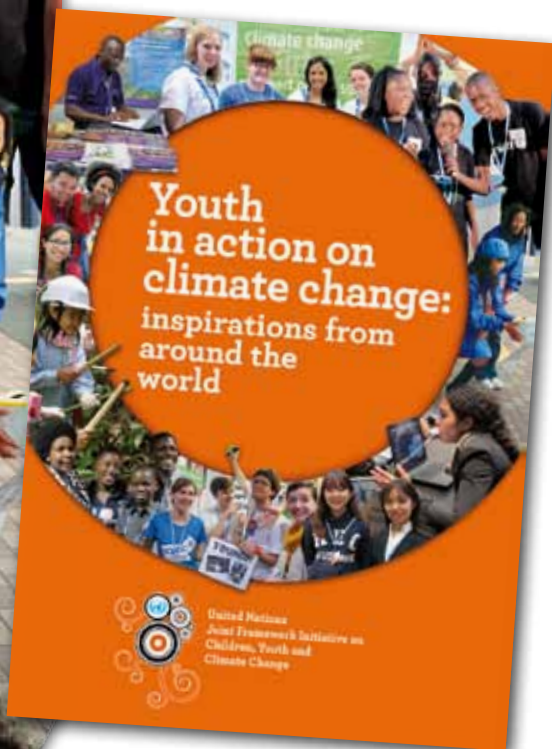
Regional (provinces, states)

Within countries, local authorities often set their own goals and mechanisms for tackling climate change. They implement these initiatives and regulations in partnership with the national government. Youth have been very effective at encouraging their provinces/states to show leadership on climate change, often going beyond policies at the national level.



Municipal (towns and cities)

Mayors can introduce new by-laws, for example by supporting green alternatives to driving, such as transit and new bike lanes, promoting energy efficiency, improving city planning and much more. Being the most exciting and important asset of any city, youth have long engaged in local politics, worked with mayors and councillors and challenged them to make their cities and futures cleaner and greener.



Check out
**UNFCCC'S
YOUTH PORTAL**
and get inspired
by stories of
youth taking action
on
climate change
around the world:

http://unfccc.int/cc_inet/files/cc_inet/information_pool/application/pdf/youth_pub_2013_en_m.pdf



TAKE ACTION

GETTING STARTED

Can one person help fight global climate change? Yes! Especially when the simple steps you, your friends and your family take are multiplied by millions of people all over the world. In the following sections are some examples of ways you can make a difference.

However, before you get started think about the following:

- ★ **Assess your carbon footprint:** Your carbon footprint is the amount of greenhouse gas emissions produced from your activities (e.g. transportation, electricity, heating and cooling, and cooking and consumption of goods). Find out how big your own carbon footprint is, and explore ways you can reduce it. Try WWF's Footprint Calculator: <http://footprint.wwf.org.uk>
- ★ **Build a strategy:** Having goodwill is fine but actually changing behaviour is extremely difficult. Look carefully at your carbon footprint and decide how it can be reduced, what are your everyday actions?
- ★ **Spread the word and create participation:** Talk or give a presentation to your family, school or community group that explains how their actions can cause or reduce climate change or prepare and adapt to climate change. Get creative, and think of more ways to help others make a difference!
- ★ **Show success:** Make sure you show your school and the rest of the community what has been achieved so you convert others to take part.

BE ENERGY SMART

Being energy smart involves two types of actions:



Using less energy

Most of the energy you use at home and at school comes from heating, air-conditioning and using electrical appliances. Most of this energy comes from burning fossil fuels so using less energy means putting less carbon dioxide into the atmosphere. Here are some ideas on saving energy:

- ★ **POWER DOWN:** Did you know that some appliances and electronics plugged into an outlet still use power, even when they're turned off? Unplug energy vampires like video game consoles, cell phone chargers and MP3 players whenever you can. Or consider buying a "smart" power strip, which automatically cuts off power when you turn off an appliance. Visit the ENERGY STAR Web site for kids to learn more: www.energystar.gov/index.cfm?c=kids.kids_index.

- ★ **LOOK FOR THE LABEL:** Energy-efficient appliances and electronics typically use between 10 and 50 percent less energy than regular models. If you're shopping for a TV, computer, DVD player or other electronic device or appliance, look for products that display the STAR label.



- ★ **TAKE SMART STEPS:** Making a few basic changes around your house can go a long way towards reducing your carbon footprint. For example:
 - ★ **Clean or replace filters** regularly on your furnace and air conditioner, so that they work more efficiently.
 - ★ **Check** your thermostat; if it is set too high in winter or too low in summer, you are wasting energy.

- ✱ **Keep vents clear.** It takes less energy to pump air into your room when the vents aren't blocked.
- ✱ **Use ceiling or house fans** instead of air conditioning, unless you live in a very humid climate. Don't forget to turn them off when you leave the room. If you do need air conditioning, keep doors and windows closed when it's on.
- ✱ **Use shades and drapes** to keep the hot sun out.
- ✱ **Ask your parents** to replace any single-glazed windows with double-glazing.
- ✱ **Use the washing machine or dishwasher** only when full. If you need to use them when only half full, use the half-load or economy setting. There is also no need to set the temperatures high. Most detergents are so efficient that they get your clothes and dishes clean at low temperatures.
- ✱ **Replace any regular incandescent light bulbs** in your home with LED lighting, which use 60 percent less energy. Also, dust your light bulbs regularly. Clean bulbs give off 50 percent more light than dirty ones.
- ✱ **Use daylight as much as possible.** Natural lighting is more efficient than artificial and it's free, too.
- ✱ **Paint the walls in light colours.** Dark colours absorb light. Light colours reflect light. The lighter the colours used, the less artificial lighting is required to illuminate the area.
- ✱ **DO THE MATHS:** An energy audit can help you calculate how much energy your family uses at home and identify ways to reduce your energy use. Here is an example: http://energyquest.ca.gov/library/documents/2007_HOME_ENERGY_SURVEY.PDF

Switching to clean energy

So now that we have reduced the energy we use we should also think about using cleaner energy sources. When we get electricity from renewable energy sources like **wind** and **solar power**, we avoid the **carbon dioxide** emissions that come from burning **fossil fuels** like **coal**, **petroleum** or **natural gas**.

- ★ **CHOOSE GREEN POWER:** Talk with your family and school about switching to renewable energy suppliers.
- ★ **GENERATE YOUR OWN POWER:** Can your school or home generate its own **renewable energy**? Talk with your family and school about the possibility of installing solar panels, a solar water heater or even a wind turbine (see Action4Climate video at: <http://youtu.be/2F2psC9Ipc4>).



BE A STAR OF THE THREE Rs

Most people don't realize that reducing, reusing and recycling can help slow **climate change**.

How? Well, every product we buy needs energy and resources to produce, transport, sell and eventually be disposed of. Reducing, reusing and recycling means you buy and throw away less, and that helps reduce the amount of **greenhouse gases** we're adding to the **atmosphere**.

- ★ **REDUCE:** Think about how many items in your house that you never use – what things can you think off that were not worth buying? Do you really need that new mobile phone? What is going into your bin? Are you wasting food? Why is that? You can greatly reduce the amount of things you buy, Reduce the amount of new you buy. Can you buy the same products with less or no packaging? Can the packaging be easily recycled? When possible, try to borrow or rent things you'll only need for a short amount of time.



- ★ **REUSE:** Reuse the things you already have. When you have things you no longer need, give them to others who can use them. Re-use bags, glass jars and other materials rather than throwing away and buying containers.
- ★ **RECYCLE:** Remember to recycle whatever materials you can, like bottles, cans and paper, so they can be collected and remade into new products. At home, separate all the materials into separate bins so they can be recycled and disposed of separately. Also **BUY RECYCLED** – choose products made from recycled materials whenever you can.

TEACH YOUR SCHOOL THE THREE Rs! Schools can save energy, preserve natural resources and prevent greenhouse gas emissions by reducing, reusing and recycling.

SHOP AND EAT GREEN

- ★ Ask your parents and friends to change their shopping habits to become more environmentally friendly. There are several certification schemes that guarantee certain environmental principles are followed in producing the product; look out for them when buying such products: for example, the national or international organic labels and the Forest Stewardship Council (<https://ic.fsc.org>).
- ★ Eat less meat. Explore recipes that do not contain meat but still allow you to have a balanced nutritious diet. For example, see if you can find alternative meals once a week that instead of meat contain legumes and pulses (which also contain protein).
- ★ Reuse your shopping bag instead of accepting a disposable one in each shop. Doing so saves energy and reduces waste.
- ★ Avoid heavily packaged products. You can save as much as 500 kg of carbon dioxide if you cut down your garbage by 10 percent.



- ✱ Buy locally grown and produced foods. This can save fuel and keep money in your community. For example, farmers' markets can be excellent for buying food with no packaging and low carbon footprints. Can you think of other places?
- ✱ Buy food that has not undergone heavy processing; buy raw ingredients and cook them yourself.
- ✱ Buy fresh foods instead of frozen. Frozen food uses ten times more energy to produce.
- ✱ Avoid buying a product if it's only a luxury and not a necessity. Don't let advertising influence you into buying things you don't need.
- ✱ Buy products in refillable containers.



Check out the sustainable diets section of the **NUTRITION CHALLENGE BADGE** to learn more

DID YOU KNOW?

The average meal in the United States of America travels 2 400 kilometres from farm to plate!

Source: <http://www.worldwatch.org/node/6064>

DID YOU KNOW?

The livestock sector generates more **greenhouse gas emissions** than transport! (Source: FAO). It also uses huge amounts of land, water and energy. In addition, millions of hectares of rainforest are cut down in order to turn the land into grass pastures for cows – so also ensuring that your food is coming from sustainable sources is also important.

TRAVEL GREEN

Cars, trucks, airplanes and other kinds of vehicles are responsible for about one-third of [greenhouse gas emissions](#). Smart transportation choices can make a big impact on reducing emissions.



- * WALK, BIKE, SCOOTER, SKATEBOARD, ROLLERBLADE OR TAKE A BUS TO SCHOOL:** Just make sure to stay safe. Ask your school to get involved in the Safe Routes to School programme. This programme has lots of tips for students and their families, like forming “walking school buses” led by one or two adults.
- * GIVE THE CAR A BREAK:** Encourage your family to make one big trip to run all their errands at once, instead of making lots of small trips. Consider sharing rides with others, and use public transportation like buses or trains whenever you can.
- * USE YOUR BUYING POWER:** When it’s time to buy a new car, help your family choose one that’s fuel-efficient or electric. You’ll use less gas, reduce emissions and save money.
- * DRIVE SMARTER, OR GET YOUR PARENTS TO:** Many factors affect the fuel economy of your car, such as tyre pressure, going easy on the brakes and gas pedal, avoiding hard acceleration and unloading unnecessary items from the trunk. Keeping the car well maintained also goes a long way towards saving on [greenhouse gas emissions](#).
- * OFFSETS:** When you have to travel by plane, or other modes of transport, see if the company has carbon offset schemes – for example they plant trees to counter the carbon that was emitted for your travel. Check out the details to ensure the scheme is credible.



WATCH YOUR WATER

It takes a lot of energy, and therefore **greenhouse gas emissions**, to treat the water you use every day to make it safe to drink and to deliver it to your house. It takes even more energy to turn it into hot water. In other words, saving water saves energy!

- ★ **BE WATER-WISE:** Turn the water off while brushing your teeth, try taking shorter showers and avoid baths.
- ★ **FIX THOSE LEAKS:** A tap that leaks at a rate of one drip per second can waste more than 11 360 litres of water in a year. If your toilet has a leak, you could be wasting around 760 litres of water a day. Try putting a drop of food colouring in the toilet tank. If the colour shows up in the bowl without flushing, you have a leak!
- ★ **KEEP IT COOL:** Wash only full loads of laundry, and see if you can use a lower temperature. About 90 percent of the energy used for washing clothes is for heating the water.
- ★ **GO LOW-FLOW:** Talk with your family about installing water-efficient appliances and plumbing fixtures like low-flow showerheads and taps, which could reduce water use by up to 50 percent.

Check out our Water Challenge Badge for more information, and find even more water saving ideas here:

<http://wateruseitwisely.com/100-ways-to-conserve>

DID YOU KNOW?

Running the warm water for five minutes uses about as much energy as leaving a 60-watt light bulb on for 14 hours.

Source: US Environmental Protection Agency



GREEN GARDENING

- * **USE A PUSH MOWER**, which, unlike a gas or electric mower, consumes no fossil fuels and emits no greenhouse gases. It will keep you fit as well !
- * **COMPOST YOUR FOOD AND YARD WASTE** to reduce the amount of garbage sent to landfills and to keep your garden healthy.
- * **PLAN YOUR GARDEN WISELY:** Choose plants that are low-maintenance and require less water and external inputs.
- * **USE MULCH:** Mulch is material such as decaying leaves or tree bark that you can spread around or over a plant to enrich or protect the soil. Using it will help moderate soil temperature and retain moisture during dry weather, reducing the need for watering.
- * **REDUCE THE SIZE OF YOUR LAWN:** Lawns use 2–3 times as much water as other plants and can result in 50 percent more water waste from evaporation, runoff, overspray and overwatering.
- * **CREATE A VEGETABLE PATCH:**
Grow your own organic fruit and vegetables – not only are they delicious and fresh but they also have a low carbon footprint.
- * **PLANT AND LOOK AFTER A TREE:** Trees help to slow climate change because they absorb carbon dioxide during photosynthesis. Trees also provide shade, which helps keep streets and houses cooler in the summertime and reduces the need for air conditioning. If you get a fruit tree you get food from it as well.





ACTIONS TO ADAPT TO CLIMATE CHANGE

Communities and people around the world are already preparing for the impacts of climate change through adaptation, which, as you know, is planning for the changes that are expected to occur. Although children and young people are among the most vulnerable to climate change-related disasters, they have the potential to effectively communicate risks and act as agents of change. So keep reading to learn about the things YOU can do:

BE PREPARED Have a look into how climate change is affecting where you live, and see if this makes you more likely to experience an extreme weather event, such as flooding, drought or severe storms. If it does, make a plan for how to act if it were to happen, and get everyone involved! Have a look at the Red Cross's Masters of Disaster for some fun inspiration: <http://www.redcross.org/prepare/location/school/preparedness-education/masters-of-diaster>

ACT FOR WATER AND FOOD SECURITY Increase your understanding about what climate change means for your community and how it will affect water and food sources. Learn about the actions local authorities are taking to prevent water scarcity and to combat the risk of food insecurity. Can you participate in these efforts?

PROTECT YOUR HEALTH As the climate changes, extreme weather events, such as heatwaves, might affect people's health. Learn about the impacts these events might have on your community, about the people that will be most affected and about the things you can do. For example, you can identify the location of hazards, safety spots and medical facilities.



ASSESS WHAT INTERVENTIONS ARE REQUIRED

Investigate how houses, buildings or public spaces might be affected by [climate change](#). Learn about simple measures you can take to minimize vulnerability. For example: check if your house is at risk of a hazard. Is it well insulated or does it get very hot? Do you have a yard, garden or land? How can it be landscaped to be more resilient to changes in climate or extreme weather events?

ACT FOR ECOSYSTEMS Changes in climate will affect the way [ecosystems](#) function, and changes in [ecosystems](#) will affect people. This is because [ecosystems](#) provide us with many services like clean air and water, food and medicines. Learn how you can support the protection of natural habitats around where you live, how they will be affected by climate change and what can be done to protect them.

STAY UPDATED Continuously assessing future hazards brought on by climatic changes will allow you to act on time in order to safeguard your well-being and that of the people who surround you.

ADVOCATE FOR EDUCATION If you are reading this, you are lucky enough to be able to access information about [climate change](#) and its effects. But there are other young people and communities that might not know about this issue yet. So, another way to help is to encourage schools, youth groups or community centres to integrate knowledge of [climate change](#) and its related impacts into their education programmes. Can you help them create a [climate change mitigation](#) and [adaptation](#) curriculum?

PARTICIPATE IN DECISION-MAKING PROCESSES

Identify opportunities for advocacy and action; decisions made at local, regional or national level will ultimately affect you, your family and your community. Raise your voice to encourage governments to adopt climate change adaptation measures in order to help society prepare for the changes to come.

ACTIVE ENGAGEMENT OF LOCAL GOVERNMENT

How about talking to your local government about the measures they can implement (or maybe find out about the things they are already doing) to help tackle the effects of a changing climate? For example, you can talk to them about preserving natural barriers, like sand dunes, that provide protection against storms; or about using water barrels that capture excess rainfall to minimize flooding and maintain a constant supply of water through dry spells.

So now you have learned about climate change, it is time to put your knowledge into action. What are you waiting for?



**IT'S TIME
TO MAKE A CHANGE**

**START YOUR
CLIMATE CHANGE
CHALLENGE BADGE
TODAY!**

SECTION A:

CLIMATE IS LIFE

DO EITHER **A.1.** OR **A.2.** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE.

AFTER COMPLETING OUR **CLIMATE IS LIFE** ACTIVITIES, YOU WILL:

- * **UNDERSTAND** what climate is.
- * Be able to **IDENTIFY** the different ways in which climate is important for life on Earth.

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

A.01 CREATIVITY FOR CLIMATE. As a group, spend a day

LEVEL 3 creating your own learning materials on climate change.

LEVEL 2 These can be posters, leaflets, articles and even drawings

LEVEL 1 and poems. Explain what climate change is, why it matters and why it's happening. Then distribute the materials through local schools or libraries, or if possible upload your materials on your youth group or school Web site.

A.02 COMMUNITY CLIMATE. Do a climate research project

LEVEL 3 for where you live. What kind of area do you live in? Is it a

LEVEL 2 big city or small village? What is the main income of your

LEVEL 1 community? What source of energy does your city or village use? What is the climate generally like? Talk to various community members, such as farmers, shopkeepers and construction workers, and ask them how they think climate change might affect the area, and how this will affect them. Share your findings with your group.





CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

A.03 AMAZING ADAPTING ANIMAL. Different animals have evolved over generations to be suited to the environment in which they live. Invent your own animal and describe how it has adapted over the years to survive its environment. Does it live in a cold or hot place? Rainy or dusty? What particular features has it developed? Draw a picture and decorate your classroom with your invented creature.

LEVEL
●
●
①

A.04 CLIMATE VS WEATHER. Are you ready to test your knowledge about the difference between climate and weather? With your teacher or leader, prepare some flash cards containing different phrases related to climate and weather, for example, "It's hot in Florida" or "1 December was minus 2 degrees". Your teacher or leader must then read a flash card and all the participants must run to one side of the room if it refers to climate and run to the other side of the room if it refers to weather. You can stay in the middle if you are not sure. Continue playing until everyone has a clear understanding about climate and weather.

LEVEL
●
●
①

A.05 THINKING ALOUD. How do you feel about climate change? Are you worried about it, excited about how you can make a difference, or just not interested? Write a short essay, story, comic strip or poem about your thoughts and feelings on climate change and explain why you feel the way you do. Share your ideas and feelings with your friends, family, community and even your government.

LEVEL
●
②
①

A.06 BUDDING SCIENTISTS. Imagine you're a grown-up, studying climate change. What would you like to be doing?

LEVEL 2 Would you like to be a meteorologist, predicting the weather,

LEVEL 1 or would you like to be studying ice cores and digging deep below lakes to understand how the Earth's climate has changed over the years? Perhaps you would prefer to study certain plants or animals, to see how they are affected by climate change? Learn more about what different climate scientists do and decide what type of scientist you'd like to be. Then put together a list of points explaining why.

A.07 TRAVEL TALES. What part of the world would you love to visit? Look it up and learn about it. How do the people over there live? Is climate change a problem there? Do the people use more or less or a different kind of energy than people in your area? Create a travel guide with information and drawings and present your findings to each other in your group.

A.08 LIFE-GIVING CLIMATE. You already know that climate is a key factor in maintaining life on Earth. The Earth's climate helps us to produce crops, it contributes with the water cycle, and it allows people to obtain the resources they need to build their homes. Hold an interview with a family member, a friend or a community member about how they think the Earth's climate contributes to the health and well-being of all live forms. You can prepare some facts about the topic to share with them! Share your interviews with your class or group. Did people really know about the importance of climate for our life?

A.09 WEATHER TALK. Talk to an older person you know, such as a grandparent or neighbour. Did they grow up in your area? Have they seen any changes in climate in the area since they were young? If yes, what kinds of changes have they seen, and how has this affected their lives? Share your findings with your group.



A.10 LOCAL FOOD. What kinds of crops are grown in your country? How does your country's climate affect the crops?

LEVEL 3 Visit your local library, look online and, if possible, talk to local farmers to get as much information as you can. Prepare a report, including photos or drawings and details about the kinds of crops your country produces and the role the climate plays in this. If your country's climate is not suitable for growing crops, explain why, and find out where your food comes from instead. How is the climate better suited to growing crops over there?

LEVEL 2

LEVEL 1

A.11 CLIMATE AND HEALTH. Study a health problem or disease that occurs or spreads more easily in certain climates, such as malaria, dengue fever, heatstroke, respiratory problems, food poisoning or allergies. What is the connection between climate and the problem? How many people does it affect around the world, and how can it be prevented? Prepare a slideshow and present to your class or group.

LEVEL 3

LEVEL 2

LEVEL 1

A.12 MEASURING CLIMATE. Find out how climate is measured and what instruments are used. How does the data then get used to predict changes in climate? Set up a weather station, find out if you can support the local and national measurements. Many countries don't have the funds, technical staff or other resources to make these measurements. How do you think this affects different people and communities? How does this make them more vulnerable to the impacts of extreme weather events?

LEVEL 3

LEVEL 2

LEVEL 1

A.13 HOT SOILS. Some parts of the Earth heat faster than others, due to different types of surfaces, colours and other factors. Have you ever noticed different air temperatures in sunny areas versus shady areas? Do you think that water or land absorbs more heat? How do you think that the colour of land surfaces

LEVEL 3

LEVEL 2

LEVEL 1

influences how much heat is absorbed (e.g. ice, sand and dark soil)? Find out through an experiment to see how different coloured soils and water absorb and retain heat. You will need a sunny area or a strong lamp, three pie pans (or plates), dark soil, light-coloured sand, water, three thermometers and a watch. Fill the pans to the same level: one with soil, one with sand and one with water. Put one thermometer into each. Place the pans or plates under a strong lamp or in the Sun, and record the temperature once each minute for ten minutes. Then put the pans into a shady area and record the temperatures each minute for another ten minutes. You can also experiment with wet soil, dry soil, grass clippings or other types of coverings. Which surfaces in your area absorb the most amount of heat from the Sun? Read more about this experiment here: www.ucar.edu/learn/1_1_2_5t.htm.

A.14 CLIMATE AND LIFESTYLES. Look into all the ways **LEVEL 3** climate affects our quality of life, whether related to travel, recreation or general well-being. Do you think certain places have a better quality of life because of their climate? Why is this the case? Prepare a poster showing the findings of your research and then re-group. Take a look at each other's posters and discuss. Do you agree or disagree with each other's findings? Are you surprised by what you've discovered?

A.15 EVOLUTIONARY STUDY. Pick a plant or animal species **LEVEL 3** and research how it has evolved over generations to adapt to climatic conditions. What specific traits did it develop to survive? Gather as much detail as you can and prepare a report or give a sketch/presentation on the species of your choice.

A.16 Do any other activity approved by your teacher or leader.
LEVEL 1 2 3

SECTION B:

CAUSES OF CLIMATE CHANGE

DO EITHER **B.1.** OR **B.2.** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE.

AFTER COMPLETING OUR **CAUSES OF CLIMATE CHANGE** ACTIVITIES, YOU WILL:

- * **UNDERSTAND** the causes – both natural and human – of climate change.
- * **RECOGNIZE** the impact that daily human activities have on our climate.

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

B.01 CLIMATE HISTORIANS. Study the history of the Earth's

LEVEL 3 **climate**, looking up events like the ice ages and warmer

LEVEL 2 **(interglacial)** periods. What were things like on the planet

LEVEL 1 during these periods? Look up past volcanoes and the effect they may have had on the Earth's **climate**. Did you learn anything new? What did you find interesting or surprising? Make notes or draw pictures to illustrate your findings and place these in your classroom, around your school or your group meeting place.

B.02 FILM FUN. As a group, watch a documentary about

LEVEL 3 **climate change** such as *An inconvenient truth* or *Chasing ice*. Then discuss your impressions of the documentary. Do

LEVEL 2 *ice*. Then discuss your impressions of the documentary. Do

LEVEL 1 you agree or disagree with the information in it, and why? Whose points of view are represented in the film? Whose are not represented? What are the most important messages? What actions are recommended? And most importantly: what will your group do to follow up its recommendations? Make an action plan and then carry it out.





CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

B.03 FUTURISTIC ART. How do you imagine your city or hometown will look in 100 years? How do you think climate change might affect it? What solutions will people come up with to deal with the effects of climate change? Let your imagination run wild and paint a picture of how you think things might turn out.

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B.04 ELECTRICITY ALL AROUND. Have you thought about how many light switches and electrical sockets you have at home? Well, you will be surprised! Count all the light switches and electrical sockets you find in your house and then write or draw pictures for how electricity is used in your home, your school and in hospitals. Discuss with your group. Did you think this much electricity was used every day? Now, to encourage everyone at home to save electricity, make some cool light switch covers and put them all around your house!

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B.05 FOOD JOURNAL. Have you noticed which types of food you eat every day? Well, it is time for you and your group to keep a food journal! All of you will have to write down what you eat during a week. Then, add up all the meat you eat. Which types of meat are consumed the most? Research and explain how raising and eating livestock is contributing to climate change. Finally, with your teacher or leader, come up with a low emissions meal. How does eating wisely help reduce global warming?

LEVEL
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B.06 INVISIBLE WATER.

- LEVEL 1 ● to wash our teeth or to prepare a soup. But, how much water
- LEVEL 2 ● have you used today that you can't see? Prepare a poster
- LEVEL 1 ① board where you include the names of everyone in your group or class. For each litre of water used by each person that day, give each one a small sticker to put on the poster board. For example, you could ask "who's wearing a t-shirt?: you need water to grow the cotton, drinking water for the person who picked the cotton, water for the truck that brought it to the factory, water at the factory to produce the t-shirt, and then water for the truck that takes the t-shirt to the store. And, whose shirt isn't brand new? You need an extra sticker for washing it." With your teacher or leader, think about other examples where children have used 'invisible water'. How does the poster board look at the end of the activity? Research some facts about how much water is needed to produce different items, such as a car, a book or a hamburger, and share the information with your group. You will all be surprised!

B.07 CLIMATE CHARADES.

- LEVEL 1 ● cards, each labelled with a climate-related word, such as
- LEVEL 2 ② "greenhouse gas", "global warming" and "drought". Be as
- LEVEL 1 ① creative as possible! Then mix all the cards up and split up into teams. Play a game of charades, where each person has to act out the word on their card, while their team has to guess what they are.

B.08 WHAT A GAS!

- LEVEL 1 ● greenhouse gas, with its properties on the other side of the
- LEVEL 2 ② card. For example, the card for carbon dioxide could list the
- LEVEL 1 ① properties: *a colourless gas that makes up about 0.3 percent of the air; plants make their food from it.* Quiz each other in your group by having one person list the properties and the rest trying to guess which gas is being described.



B.09 PRESENTING FOSSIL FUELS. Split into groups and

LEVEL 3 pick one fossil fuel source per group, e.g. coal, natural
2 gas, etc. In your group, prepare as thorough a presentation
1 as possible about your topic. You can make a slideshow, or
a poster, or even a papier-mâché model of it. Try to make
it as colourful and interesting as possible. What are the
advantages of this fossil fuel? What are the disadvantages?
How widely is it used in the world? In your next meeting,
each group will present their work.

B.10 GREENHOUSE JAR. Are you curious about how the

LEVEL 3 greenhouse effect really works? You can do a simple
2 experiment to see the effects of a greenhouse. For this
1 experiment, you will need two small thermometers, a jar or
other see-through container, a clock or watch, and a sunlamp
or a sunny place for the experiment. Place both thermometers
in a sunny area. Cover one of the thermometers with an
upside-down jar. Every minute for ten minutes, record the
temperature on both thermometers. Was there a difference in
the temperatures inside the jar and outside of the jar?
How is this similar to the greenhouse effect?
Find out more about this experiment here:
<http://sln.fi.edu/tfi/activity/Earth/Earth-5.html>.

B.11 THE GREAT CLIMATE DEBATE. Some people argue

LEVEL 3 that climate change is a natural process and is not
2 anthropogenic, i.e. it is not being caused by humans. Split
1 into teams and pick a side on the climate debate to research
the various arguments. Then come together as a group and
hold a debate on the topic. Have an objective panel of
judges, perhaps with your parents, teachers and leaders, who
will decide which team was more convincing.

B.12 ENERGETIC EDIBLES. Did you know that different foods take different amounts of energy to produce? For example, it takes around 25 times more energy to produce one calorie of beef than to produce one calorie of corn for human consumption. Pick your favourite food and do some research to find out how much energy is used in its production. What type of energy is typically used in its production? Compare notes with the rest of the group. Whose favourite food is the most “energy-hungry”? Prepare a list of all the foods in increasing order of their energy consumption. Do your findings make you want to change some eating habits? Plan a meal that does not require very much energy, such as cooking local vegetarian food with as few packaged and processed products as possible. Cook your meal together with your group or on your own. Challenge yourself to try a new recipe or even make up your own recipe. Do you like the food that you prepared?

LEVEL
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1





B.13 URBAN INVESTIGATIONS. In which cities of the world
LEVEL 3 are the highest atmospheric **CO₂** levels to be found? Do
LEVEL 2 some research to find the answer. What is causing these high
LEVEL 1 **CO₂** levels and are these cities doing anything to address
the issue? Prepare a slideshow presentation or a mini-
documentary of your findings and share with your teachers
and group.

B.14 CARBON GRADING. Look up **CO₂** equivalent emissions
LEVEL 3 by country total, and per capita. Where does your country
LEVEL 2 stand? What do you think are the reasons for its position
LEVEL 1 compared with other countries of the world? Produce a poster
to display your findings; try to be as creative as possible
– you could even draw a map! Find out **CO₂** emissions by
country here: [www.guardian.co.uk/news/datablog/2011/
jan/31/world-carbon-dioxide-emissions-country-data-co2](http://www.guardian.co.uk/news/datablog/2011/jan/31/world-carbon-dioxide-emissions-country-data-co2)

B.15 STORMY SEARCHES. **El Niño** and **La Niña** are natural
LEVEL 3 phenomena that occur when the waters of the Pacific either
LEVEL 2 become unusually warmer or colder. Conduct an investigation
LEVEL 1 of the two events. When did they last occur? What kinds of
weather events are people linking to them? How did this
affect people around the world? Create a poster illustrating
your findings.

B.16 ASTRONOMICAL OBSERVATIONS. Did you know that variations in the Earth's orbit and its tilt on its axis can also cause variations in climate? These variations do not occur on any forecastable timescale – the tilt of the Earth's axis changes between 22 °C and 25 °C on a cycle of about 41 000 years! Dig deep to learn more about the Earth's position in space and how, over tens of thousands of years, this affects the Earth's climate. Create a model of Earth rotating about the Sun, in which you can alter Earth's orbit and tilt to see how this affects our proximity to the Sun.

B.17 Do any other activity approved by your teacher or leader.

LEVEL 1 2 3



SECTION C:

IMPACTS OF CLIMATE CHANGE

DO EITHER **C.1.** OR **C.2.** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE.

AFTER COMPLETING OUR **IMPACTS OF CLIMATE CHANGE** ACTIVITIES, YOU WILL:

- * **REALIZE** the main ways that climate change will affect natural ecosystems.
- * **UNDERSTAND** how climate change will affect human health, safety and economies.

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

C.01 MAPPING IMPACT. With your class or group, draw a
 LEVEL 3 geographical map of the Earth, showing the ocean, seas,
 LEVEL 2 mountains, deserts, forests, ice caps, etc. Label each area
 LEVEL 1 with a list of the ways climate change will impact it. For
 example, Arctic ice will melt, and acid levels in the ocean
 will increase. Place the map in a prominent place in your
 school. Get inspired by these Connect4Climate maps:
<http://www.connect4climate.org/blog/visualising-a-warming-world>

C.02 CLIMATE CHANGE AND AGRICULTURE. Agriculture,
 LEVEL 3 fisheries and forestry are fundamental to provide us with
 LEVEL 2 food and other resources. In addition, they are important
 LEVEL 1 sectors for the world economy, providing income for over
 1 billion people around the world (Source: FAO). Discuss
 with your group how climate change could affect food
 production in your country and region. What options are
 there to ensure food security and rural employment?





CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

C.03 HUNTING TAG. This game will be similar to a traditional tag. Choose some participants to be polar bears and everyone else will be a seal. Start with no safe zones for seals to escape. The more seals a polar bear tags the faster he/she can go home as he/she has already eaten enough. The next round, introduce hula-hoops on the ground that will be safe zones for seals. The next round put even more hula-hoops on the ground and tell the polar bears that are not able to catch any seal to move slower as they are tired and hungry. Once a polar bear goes three rounds with no food he/she is out of the game as he/she will starve! With your teacher or leader, research and explain that this is what [climate change](#) is doing to some animals. Why is this happening?

C.04 STORYTELLING. On p. 62 of this badge, you learned about Omar Faruk, a poor man in Bangladesh who had to leave his home and move to the city because floods ruined his crops. Make up your own story about a person or family affected by an extreme situation that could have been caused by [climate change](#). What happened to them and how did they deal with it? Illustrate your story with drawings and share it with your parents and other family members!

C.05 OCEAN PEEKING. It is time to create some amazing ocean “peek boxes”. Ask all the participants to bring in a box to reuse (cereal, shoe box or whatever box they have that can be recycled). Prepare all sorts of cool crafting materials to create an underwater sea image – stickers, tissue paper, markers, magazine cut-outs, etc. Once everyone has finished their box, with the help of your teacher or leader, secretly

cover everyone's image with a black paper or cardboard. Now, ask all participants to peek inside each other's boxes. How did they feel when they saw "nothing"? How is this similar to what is happening with marine **ecosystems** and animals because of **climate change**? Discuss this with your group. What can you do to avoid losing our precious marine resources and animals?

C.06 FAVOURITE PLACES. What type of landscape is your favourite: beaches, mountains, deserts or forests? Do some research about it. Is it already being affected by **climate change** and, if so, how? What about the plants and animals that live there? If you live in or near the type of landscape you've chosen, then visit it and take some pictures or make a drawing. Put your notes and pictures together and present to your group or class.

C.07 SAVE THE ANIMALS. Find out which animals are being affected by **climate change**. You can learn about them on this Web site: http://wwf.panda.org/about_our_Earth/aboutcc/problems/impacts/species. Which of these animals is your favourite and why? Where does it live? How is **climate change** threatening it and what can be done to help it? Make a drawing of your chosen animal and on the side explain what you learned about it.

C.08 FOOD FOR THOUGHT. In this badge, you learned about foods that may no longer be available to you due to **climate change**. Which of those foods would you miss the most? Look it up and find out how **climate change** might hurt it and whether it can still be saved. Prepare a poster about it and place it in your school or local library or share it online on your group or school's Web site. You might just help save it!



C.09 WATER DRAMA. Split into small groups and script a short play about a community whose members rely heavily on water for their livelihoods. Perhaps some of you raise poultry, while others grow vegetables. Lately, your village has been facing a water shortage because of climate change. How is it affecting your lives? What are some solutions? Let your imaginations run wild and then invite your family and friends to a performance of each group's play.

C.10 PLACES AT RISK. Find out which UNESCO World Heritage Sites are being threatened by climate change and how. Choose a few that interest you and create a collage, story or presentation with pictures and information about them. Where are they located, what is their history and how are they at risk? Display your work in a prominent place in your school or community.

C.11 WATER FOOTPRINT. Clean water is vital for our health; we rely on water for many, if not all, of our everyday activities. Changing climate patterns are already threatening our lakes and rivers and, thus, our water supply. Use a water calculator to help you find out how much water you and your family use at home. Here is an example: www.swfwmd.state.fl.us/conservation/thepowerof10. Do you think you are wasting too much water? What can you do to lower your water consumption? Share with your family the advantages of saving water!

C.12 FISHING FOR FACTS. Healthy, renewable food from fisheries will become more important as agriculture suffers from drought and other impacts of climate change (Source: Marine Stewardship Council). But many fish species are being caught faster than they can reproduce, putting them in danger of disappearing altogether. We can help by only buying and consuming fish and seafood that are not in danger of going extinct, and that are being farmed with sustainable practices. Find out which species these are and prepare a brochure with pictures and descriptions of these fish advising your readers to opt for them, as opposed to endangered fish, when planning dinner. Distribute the brochures in your local community.

C.13 CHANGING WITH THE CLIMATE. Climate change both affects and is affected by forests. The functioning and composition of forests can change with temperature changes as little as 1 °C! Compare how three different types of forests (such as mangrove, mountain and boreal forests) will be affected by climate change. How can each of them influence climate change? Create a card game that informs players about the importance of forests and their linkages with climate.





- C.14 Q&A.** Split into pairs, with one member of each pair playing the role of farmer and the other of interviewer/reporter. Pick a country for each pair. Each farmer should then spend some time researching climate-related issues in their country, while each interviewer prepares their questions. Then get together in your pairs and conduct an interview, with each reporter asking questions and each farmer responding to explain how climate change is affecting their crops, why any problems are arising and how this is affecting the overall agricultural ecosystem.

LEVEL 3
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Extension: Make brief notes on the answers or record the interview and then use it to write an article about climate change in your chosen country. Maybe you can make a newspaper with all your articles!

- C.15 CLIMATE REFUGEES.** Scientists predict that by the year 2050, 50 million people could be forced to leave their homes and communities because of the effects of climate change. Where will most of these refugees be from and where will they go? What kinds of weather events will force them to leave home? Learn more about climate refugees over here: http://education.nationalgeographic.co.uk/education/encyclopedia/climate-refugee/?ar_a=1

LEVEL 3
2
1

Prepare a short documentary about the issue and screen it at your school. See some ideas at:

<http://youtu.be/B7Dc-Nb-y9M>

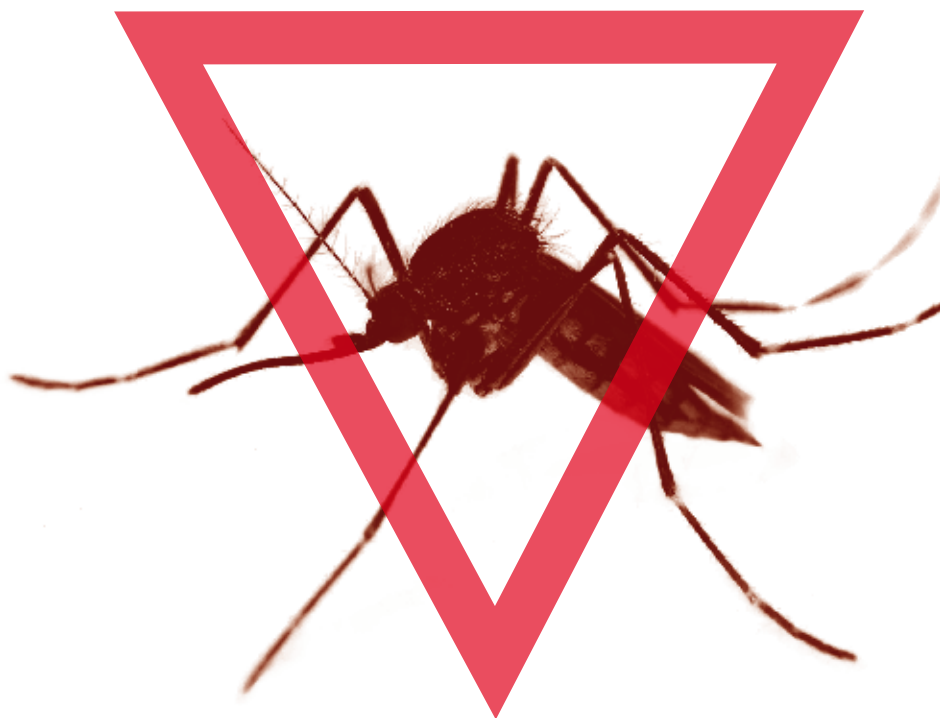
and

<http://youtu.be/dW51esWhr04>

C.16 HEALTHY DISCUSSIONS. Climate change is expected
LEVEL 3 to increase the spread of several diseases, including malaria,
LEVEL 2 diarrhoea and dengue fever. Read up on which diseases may
LEVEL 1 spread because of climate change and why. What happens
in these diseases, how do they spread and who is affected
most? In which areas are they most prevalent? Are these
diseases already on the rise in some places because of
climate change? How can the issue be tackled? Invite your
friends, family and schoolmates for a Q&A night, where you
and your group form a panel and answer questions about
climate change and health.

C.17 Do any other activity approved by your teacher or leader.

LEVEL 1 2 3



SECTION D:

SOLUTIONS TO CLIMATE CHANGE

DO EITHER **D.1.** OR **D.2.** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE.

AFTER COMPLETING OUR **SOLUTIONS TO CLIMATE CHANGE** ACTIVITIES, YOU WILL:

- * Be able to **EXPLAIN** the main solutions we have found to tackle climate change.
- * **KNOW** what the international community is doing as a whole.

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

D.01 USEFUL REUSE. There are lots of ways to convert seemingly useless items into useful things. For example, you can use an empty toilet paper role to arrange bracelets or you could use an empty pasta sauce bottle to store pens and pencils. Find more ideas here: twistedsifter.com/2012/06/creative-ways-to-repurpose-reuse-and-upcycle-old-things. Make a list of all your ideas and come together as a group to share them. Do a project together where you convert things from useless to useful and decorate them to make them look nice. Organize an exhibit or even a sale in your community with your creations as a way to get everyone to think creatively about helping the environment! If you do a sale, you could donate the proceeds to a climate change-related project.

D.02 STUDYING NATURAL DISASTERS. Split into groups to study different recent climate-related disasters, e.g. flooding or a hurricane. Perhaps you were even there when it happened, and can remember the experience. What damage did the disaster cause, and how did people get together to recover and rebuild after the event? Are steps being taken to prevent or prepare for future such disasters? What are your ideas for how to prepare for next time? Discuss your findings and ideas as a group. Is there anything in common between the different disasters? Were the recovery efforts different in different places? Why do you think this is the case?



CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

D.03 DRAW IT. Imagine that climate change will greatly affect

LEVEL 1



LEVEL 2



LEVEL 3



the place where you live in the future, e.g. there will be many more storms or the weather will become much hotter. Try to find out what climate change impacts scientists have projected for your country/region. What are your ideas for how you can adapt and prepare for these changes? For example, in some parts of the world, people are building houses on stilts (tall sticks) to protect them from getting flooded. Draw a cartoon sharing *your* ideas.

D.04 WONDERFUL VEHICLES. As you probably know, today

LEVEL 1



LEVEL 2



LEVEL 3



we have cars that run on electricity, which are much better for our environment. Dream up your own machine that does not hurt or protects the environment. What kind of fuel does it run on? Where do you get that fuel? What other special features does it have? Draw a picture of it and share your ideas in your class or group.

D.05 CLIMATE GAMES. Use the glossary at the end of this

LEVEL 1



LEVEL 2



LEVEL 3



badge to play a game of “Climate Change Pictionary.” Create two or more teams and split the words up among the teams. If you don’t know the rules, you can find them at this Web site: www.group-games.com/ice-breakers/homemade-pictionary-game.html.

D.06 KEEPING UP WITH THE NEWS. Check out the science and technology section of your local newspaper for the next few weeks. Is there any news about climate, energy-saving products, **renewable energy** or **energy efficiency** in general? If the article is difficult, ask a parent or teacher to explain it to you. Write your own summary of the report and share it with your group or class. Maybe the story will inspire you and your friends to come up with your own ideas and inventions to save energy, like this bike, with which people can pedal power an MP3 player and a light bulb:
<http://blackstonestudios.net/post-8>.

D.07 INTERNATIONAL IDEAS. Do you have friends from other countries? Talk to them about environmental habits where they come from. What is “greener” about their lifestyle? What is “greener” about yours? For example, in Pakistan some people go from house to house buying people’s old newspapers, which they then sell to shopkeepers who make paper bags out of them – a recycling scheme where everyone wins. What green practices are followed in your friends’ countries? What can you learn from each other?

D.08 KEEPING COOL AND WARM IN THE PAST. Study how people around the world used to keep themselves and their homes cool or warm before we started using energy-hungry methods. If you look, there are some really clever ways! You can even conduct an interview with an elder family member or friend to learn about how they kept warm or cool in their houses. What can we do in our homes to replicate what was done in the past? What do you think governments should do to make sure our houses and other buildings are more energy efficient?



D.09 YOUNG LEADERS. Find out how children and youth are getting their voices heard in climate change negotiations.

LEVEL
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Here are a few Web sites to get you started:

* http://unfccc.int/cc_inet/cc_inet/youth_portal/items/6578.php

* <http://youthclimate.org>

* <http://unyouth.com>

* <http://adoptanegotiator.org>

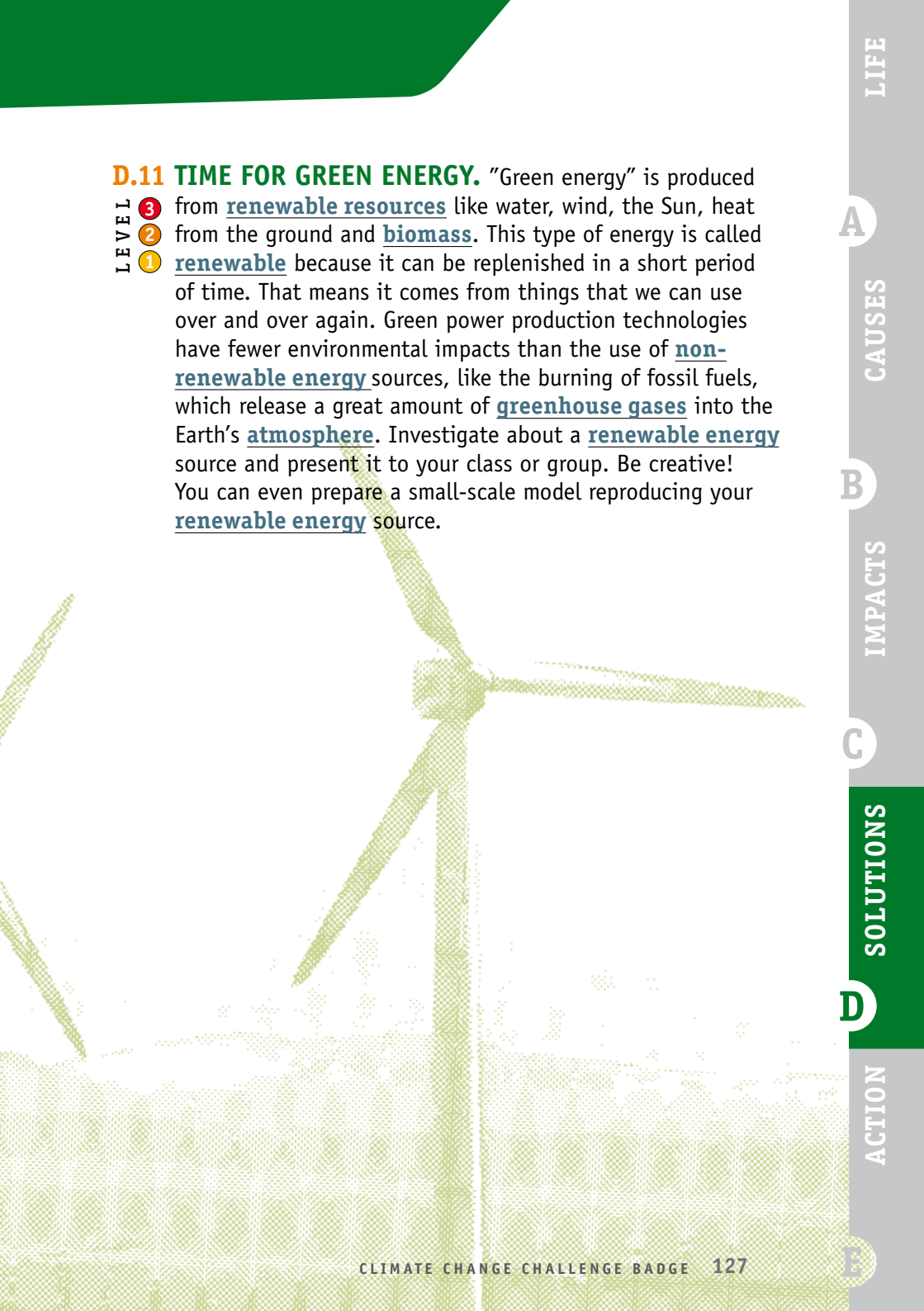
Does their work inspire you to join in and make your voice heard? As a group, form a plan of action for how you can join forces with other youth groups to be part of the solution to tackle climate change.

D.10 INSIDE INFORMATION. Set up a meeting with a local official in your country's environmental ministry or agency.

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Ask them about your country's role in the UN climate negotiations. What are the reasons behind your country's position, and which other countries agree with it? What else can they tell you about the negotiation process? Are they considering how young people feel about and will be affected by climate change? If not, you could help them by researching and sharing the perspectives of youth with them. (Make sure you have asked as many different young people as possible though as not everyone will think exactly the same as you.) Use your imagination to try to come up with solutions too – there are lots of things that young people could help with/ teach adults how to do.

D.11 TIME FOR GREEN ENERGY. “Green energy” is produced from renewable resources like water, wind, the Sun, heat from the ground and biomass. This type of energy is called renewable because it can be replenished in a short period of time. That means it comes from things that we can use over and over again. Green power production technologies have fewer environmental impacts than the use of non-renewable energy sources, like the burning of fossil fuels, which release a great amount of greenhouse gases into the Earth’s atmosphere. Investigate about a renewable energy source and present it to your class or group. Be creative! You can even prepare a small-scale model reproducing your renewable energy source.

LEVEL
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D.12 BRIGHT IDEAS. There are loads of great ideas and projects for energy efficiency out there. For example, solar-powered drip irrigation is helping farmers in Benin and there is a small-scale hydro plant to bring electricity to homes and schools in Tajikistan. Learn more here: sustainablebusinessforum.com/kaityfl/55614/2012-year-dragon-and-year-sustainability. Choose one of the projects and prepare a presentation about it for the group as a whole. Could it be implemented in your own area?

D.13 NEWS REPORT. Interview an indigenous person about how his or her community is adapting to climate change. Write a newspaper report or make up a radio show based on your interview. Remember to ask for the person's permission to share the information they give you. It is also a good idea to have the person preview your report before you show it to your family and friends. If you have permission from the person you interviewed, you may even want to share your report or radio show with the local newspaper or radio station!

D.14 KNOW YOUR ELECTRICITY CONSUMPTION. Compare and make a graphic representation of the usage of electricity from maximum to minimum in your daily routine. Discuss the various ways to reduce energy (LPG, electricity) consumption. How could simple actions, such as installing energy-efficient home lighting systems or understanding and following energy labelling, help home appliances work more efficiently and eventually even reduce your bills?

D.15 TRADING VIEWS. How does emissions trading work? Do

- LEVEL 3 some research and prepare a slide presentation on the topic.
- Do you think it offers a plausible solution towards climate change mitigation? Why or why not? Share your presentations as a group. Are you surprised by each other's views?

D.16 CLIMATE NEGOTIATION. Have everyone in your group

- LEVEL 3 represent a country, making sure to have a broad mix of
- developing countries, rich countries, least developed countries, small island developing states, etc. Everyone should research their country for the particular issues it might be facing because of climate change. Regroup and carry out your own "UN negotiation" where each country argues for a particular action based on its needs. Are some of you on opposite sides? How can you reach an agreement?

D.17 Do any other activity approved by your teacher or leader.

LEVEL 1 2 3



SECTION E:

TAKE ACTION

DO EITHER **E.1.** OR **E.2.** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE.

AFTER COMPLETING OUR **TAKE ACTION** ACTIVITIES, YOU WILL:

- * **ORGANIZE** and participate in a community initiative to help protect our global climate.
- * **CONVINCE** other people to join in solutions towards tackling climate change!

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

E.01 CLIMATE ACTION DAY. Hold a Climate Action Day in your community. Get permission to use space in a public park or square for the event. Put up posters illustrating various climate-related facts and figures, as well as tangible actions people can take to play their part in reducing climate change. Have a “pledge” wall, where people can use sticky notes to write down one (or more!) action they will take to help fight climate change. Hold a climate quiz and have a prize for the most climate-savvy participant. Perhaps you can even include a tree planting ceremony! Take lots of pictures, make videos and have a space in your school or library where you can share with others what you did on the Climate Action Day. Make sure to e-mail us at yunga@fao.org too!

E.02 CLIMATE CONTEST. Within your group, have a contest to see who can make the most changes in their everyday lives to be greener and more energy-efficient. See the Take Action section (p. 88) of this badge for some ideas of steps you can take. Keep a checklist and compare notes at the end of a month to see who the winner is. Make sure the winner gets a prize!





CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

E.03 PLANETARY POETRY. Write a poem from the Earth's point of view. Is the Earth worried about its future? Is it optimistic that everything will be ok? Does it think humans need to change their lifestyles and, if so, how? Share your poems with each other and your teachers, leaders and parents.

LEVEL
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E.04 GREETING CARDS. There are lots of occasions to send greeting cards to your friends and family – birthdays, festivities, the new year, or just to say “hi”. This year, make your own greeting cards instead of buying them. Use recycled paper and explain at the back of the card that you used recycled paper and why this is important for [climate change](#).

LEVEL
●
②
①

E.05 PLAN IT ORGANIC. [Organic](#) farming helps our soil stay healthy and retain its ability to store [carbon](#), which helps reduce [climate change](#). Look out for [organic](#) and fair-trade products available in your local supermarkets or farmers' markets. Where did the products come from? Were they locally grown or imported from farmers at the other end of the world? What are the pros and cons of each situation? Also, how might the production of these [organic](#) and fair-trade goods help the environment? Is there a significant price difference between these and other products? Why is this the case? Put your findings together in the form of photos and graphics, and then present them to your peers, parents or other adults. Encourage them to buy more [organic](#) and fairly-traded goods, whenever possible.

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E.06 SMART SHOPPING. Next time your parents are going to

- LEVEL 3** the market, join them.
- LEVEL 2** a. Observe the following:
- LEVEL 1**
- i. whether they are carrying cloth/jute bags;
 - ii. what they are buying.
- b. Make a list of products:
- i. that they could have bought in refillable containers;
 - ii. that have unnecessary packaging;
 - iii. that could have been avoided.
- c. Explain to them how they can help the environment when they buy products in refillable containers and avoid unnecessary packaging.

E.07 AD WATCH. When you're watching your favourite TV

- LEVEL 3** show for kids, pay attention to the commercials. Choose a
- LEVEL 2** particular commercial that is influencing you to purchase the
- LEVEL 1** product although you feel it is unnecessary and you could do well without. Note the following:
- a. How many times the commercial was aired during the programme.
 - b. Could you understand it?
 - c. Did you feel the commercial is unbiased, truthful and accurate?
 - d. Are you going to purchase the product because the advertisement says it is good or because you believe it is good?
 - e. Are your parents against buying the product? Why?
 - f. Compare notes with your friends. Overall, do you think commercials should be banned from children's programmes?



E.08 RECYCLE YOUR OWN PAPER.

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3 For this activity, you will need:

- 2** 1. *Waste paper from old notebooks/old newspaper/old magazines*
- 1** 2. *A little starch*
3. *A bucket or an old basin*
4. *A mortar and pestle or any other device to pound the paper*
5. *A wire mesh sieve or a perforated plate*

Steps:

- a. Tear the paper you are using into small pieces.
- b. Soak in warm water in a bucket for a little while with a little starch.
- c. After a few hours take it out of the water and pound it with the mortar and pestle till it becomes soft and pulpy. Add more starch to it to thicken it.
- d. Put this pulp in the sieve to allow the water to drip out. Press it if required to get the excess water out.
- e. Now turn the sieve slowly upside down over a smooth surface and put some weight on it to make it flat.
- f. Once it dries up your handmade paper is ready for use. You will not be able to write on it but you can draw on it or use it for some other purpose.

E.09 COMPOSTING. Follow these steps to create your own

LEVEL
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3 compost – an environmentally friendly way to keep your garden healthy!

- 2** **1** a. Dig a pit in the corner of your garden or use a box or a big tub and place it on your balcony.
- b. Line it with dry grass or straw.
- c. Put in all biodegradable waste such as leftover foodstuff (make sure that it does not have salt and sugar in it), vegetable peelings, paper, dried leaves, etc.
- d. Cover with a thin layer of soil.
- e. Water once or twice a week to keep it moist.

- f. Every 15 days or so turn the contents of the pit. Add more waste as it is generated.
- g. After 3 or 4 months the compost manure will be ready for use.

E.10 EARTH HOUR. Earth Hour is a global awareness event about climate change and energy consumption. It takes place on a Saturday in March each year. For Earth Hour, many people turn off their lights, and partake in activities that do not require electricity or other forms of energy. Is there an Earth Hour event taking place in your community already? Join in the Earth Hour event, or plan your own! If you choose to plan your own Earth Hour event, you can plan it on the day that Earth Hour is celebrated, or you may choose to celebrate Earth Hour on a day of your choice. You can find out more here: www.Earthhour.org.

E.11 ELECTRONICS-FREE CHALLENGE. Lots of young people throughout the world spend an increasing amount of time each day using electronics including mobile phones, computers and televisions. How much time do you spend using electronics each day? For this challenge, you will set aside one hour each day (this must be after school) where you promise to engage in activities that do not require electricity. During this hour you may choose to engage in activities such as going for a walk, playing a sport, reading a book, helping your parents or neighbours, dancing or doing your homework. Make a chart for your one-month challenge, and write down what you did during your electronics-free hour each day. What was the hardest part of this challenge? What did you learn from your electronics-free challenge? Do you think you can continue after your challenge month is up or even increase the amount of time you don't use electronics per day?

- E.12 WASTE NOT, WANT NOT.** Did you know that roughly
- LEVEL 3** one-third of the food produced for people to eat gets lost
LEVEL 2 or wasted? Have you ever thought about how much energy
LEVEL 1 is wasted along with that? In the United States of America alone, the energy equivalent of about 350 million barrels of petroleum a year could be saved by reducing food wastage. Start noting how much food, if any, goes to waste in your house. Calculate how much energy, water and other resources were used to produce the wasted food. Keep a diary of your observations. Then talk to your family about how you can reduce waste. After a week, compare notes with your friends: Which food-saving ideas worked? Which ones didn't?



Learn more in the **NUTRITION CHALLENGE BADGE**

- E.13 ENERGY WATCH.** Keep a diary of all the ways energy is
- LEVEL 3** used on a daily basis in your home. Look for ways to reduce
LEVEL 2 energy usage. For instance, do your brothers and sisters or
LEVEL 1 other family members leave the lights on in empty rooms? Or do you leave appliances plugged in when not in use? Share energy-saving tips with your family, and collect some facts to convince them. For example, using products that have earned the ENERGY STAR label can trim about USD600 from an average family's yearly energy bills! Check out these energy-saving tips and try to implement them in your home: https://www.energystar.gov/index.cfm?c=kids.kids_index. After one week, compare notes with your friends. What did you change at home? What did they manage to change? Who was the most successful? Make a pledge to keep up these changes for a month and then review your efforts. Can you keep going for six months? A year? Forever?

E.14 GREEN SCENE. Throw an Energy Efficient Party in your community that will demonstrate ways to save energy. From using food that consumes less energy, to using cups and plates that can be washed and reused, to using energy-efficient light bulbs: make it the most energy-friendly party possible! Create little cards that explain how each item is in keeping with sustainable energy goals.

LEVEL
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E.15 RECYCLED ART. You already know about the importance of recycling and how it can help our planet conserve its resources. It is time to spread the word! With your class or group, collect many different rubbish items, for example, glass bottles, carton boxes, plastic containers, etc. and use them to create an artwork. You can make a 3-D rubbish monster or a cool mural showing an image. Be as creative as you can! Make sure you do this in a public space so you can raise awareness and encourage you family, friends, and community members to recycle.

LEVEL
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1

E.16 TEACHER FOR A DAY. Do you have younger brothers or sisters, cousins or neighbours? Get them together to hold a short class in which you teach them what you've learned about climate change. Collect pictures and facts to make it interesting. How did you enjoy teaching? Did your students become interested in climate change? You might even give them a quiz afterwards! Perhaps they have something to teach you too.

LEVEL
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1

E.17 BLOG IT! Create a group blog about climate change. You can write about how humans are causing climate change and the importance of following greener lifestyles. Liven it up with poetry, essays and stories about climate change written by all the members of your group. Be creative – why not update the blog every day with a different energy-saving tip or a news story about climate change. Send the link to your friends and family and invite them to follow and comment on your blog.

LEVEL
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1

- E.18 VOLUNTEERING.** Spend a few hours each week for a couple of months helping a local conservation organization, whether for forests, the ocean, biodiversity or any other cause you care about which is affected by climate change.

- E.19 CLIMATE POLICY.** What kind of government policies do you have in your country that aim to promote renewable energy or to decrease greenhouse gas emissions? Find out if you have any policies, financial incentives, energy standards on products, or even education initiatives funded by your government. How can the policy be improved? Or what kinds of policies would you recommend? Discuss with your group to see what kinds of ideas you come up with together. Do you think that it is important to have policies that address climate change? Come up with reasons to support your answer as a group. Do any of these policies affect you personally? How?

- E.20 CONTACT DECISION-MAKERS.** In addition to United Nations agencies, there are other organizations that work on tackling climate change, too. From research agencies to private companies, all kinds of organizations are busy searching for solutions. Learn about some of these actors and decision-makers. What is one issue that they are working on that really interests you? Why is the issue important to you? What might be a possible solution? Share your opinion about a specific climate change policy with your government or elected official. You can contact them by writing, phoning or visiting them in person. Write to politicians and show your concern about climate change (see a possible example on the next page). For greater impact, you could send another copy of your letter also to your local/national newspaper as well. Remember to include your address and date at the top of the letter. Making the letter personal by including local issues is also a good idea.

..... [Your address]

..... [Date]

Dear ... [name]

I am writing to express my concern about the threat climate change poses to our country, to our people and the future of our children. An overwhelming number of scientists agree, and signs abound, that climate change is occurring much faster than was initially predicted. We have only a few critical years before the changes become irreversible.

More than 2 000 scientists contributing to the Intergovernmental Panel on Climate Change (IPCC) have made it clear that cuts of at least 50 percent to 70 percent in global greenhouse gas emissions are necessary to allow our climate to re-stabilize. Therefore, the Government should be making every effort to reduce greenhouse gas emissions – now.

Specifically, I believe you should act to address the issues below, and I ask you to provide me with information on what the Government is doing to reduce greenhouse gas emissions in the following areas:

1. Reducing carbon dioxide emissions from coal-fired power plants
2. Reducing emissions from the transport sector
3. Funding initiatives for alternative and renewable energy technology
4. Incentives for the uptake of renewable energy
5. Removal of subsidies for fossil-based fuel sources

To secure a future for our nation and our children now is the time to set a new and positive direction for our national energy policy. We need policies that will lead our nation away from fossil-based fuels.

Our addiction to fossil fuel harms human health, causes global warming, degrades land and marine ecosystems and pollutes the Earth. We need energy systems that provide clean, renewable and reliable energy that does not threaten human health or the environment. We do create our future, and not to reach for it would be a gross abdication of our moral responsibility.

I understand that focusing on climate change is just one of many issues during these challenging times. However, we cannot wait until tomorrow – we must take strong action now to address the daunting issues that climate change poses.

Sincerely,

[Signature]

[Your Name]



E.21 BE AN ECOTOURIST. Research some examples of

LEVEL 3

- ③ **ecotourism** in your country. How does this help in addressing **climate change**? Design your own **ecotourism** activity and test it on your friends and family. For example, you could go on a hike in your local area and explore your natural environment. Explain how protecting the environment is crucial towards tackling **climate change**, e.g. soils and forests are huge carbon storehouses and the more they are damaged, the less able they are to store carbon.

E.22 INVEST IN SOLUTIONS. Do some research on initiatives

LEVEL 3

- ③ working to fight **climate change** and select one that inspires you. Here are some useful links that might give you some ideas:

- ★ **350.org**
- ★ **climaterealityproject.org**
- ★ **wwf.panda.org/about_our_earth/aboutcc**
- ★ **www.kiva.com**
- ★ **www.greenpeace.org**
- ★ **www.rainforest-alliance.org**

Once you have picked an initiative to invest in, set yourself a fund-raising goal and come up with a plan to raise this money in your local community (e.g. you could hold a bake sale, organize a "run for climate" or even hold a climate-themed fair, with information booths, educational games and other engaging features). Explain to those you are encouraging to donate what their money will help to achieve – how will the environment benefit? How will other communities benefit? How will YOUR community benefit?

E.23 PLAN'S SAFE SCHOOLS GLOBAL PROGRAMME, RED CROSS' MASTERS OF DISASTER AND UNICEF'S BOARD GAME "RISKLAND". Find out what natural

LEVEL 3

disasters or hazards are most likely to take place where you live and make a plan for how you would adapt to them. If an event has already happened, look at how well your community reacted to this, and see how you could improve this response in the future, or how you could better adapt if it were to happen again.

- * <https://plan-international.org/about-plan/resources/publications/emergencies/safe-schools-global-programme>
- * www.redcross.org/prepare/location/school/preparedness-education
- * www.unisdr.org/2004/campaign/pa-camp04-riskland-eng.htm

E.24 Do any other activity approved by your teacher or leader.

LEVEL 1 2 3



CHECKLIST

Teachers and youth leaders can use the following checklist for each individual to keep track of the activities they are undertaking and have completed.

Once the individual has completed all the activities, he/she has earned the Climate Change Challenge Badge! Certificate templates can be requested by the teacher or youth leader from YUNGA (yunga@fao.org) and cloth badges can be ordered from the WAGGGS online shop (see details below).



NAME OF PARTICIPANT:

AGE OF PARTICIPANT: ① (5–10 years) ② (11–15 years) ③ (16+ years)

	Activity n°	Activity name	Completed on (date)	Approved by (signature)
A Climate is life				
B Causes of climate change				
C Impacts of climate change				
D Solutions to climate change				
E Take action				

RESOURCES

AND ADDITIONAL INFORMATION

STAY UPDATED

This Challenge Badge is one of several complementary resources and activities developed by YUNGA and its partners. Please visit www.fao.org/yunga for additional resources or subscribe to the free newsletter to receive updates of new materials by sending an e-mail to yunga@fao.org

SEND US YOUR NEWS

We would love to hear about your experience of undertaking the Challenge Badge! Which aspects did you particularly enjoy? Did you come up with any new ideas for activities? Please send us your materials so we can make them available to others and gather ideas about how to improve our curricula. Contact us at yunga@fao.org or www.twitter.com/UN_YUNGA and www.facebook.com/yunga.un

CERTIFICATES AND BADGES

E-mail yunga@fao.org for details on certificates and cloth badges to reward course completion! Certificate templates are FREE and cloth badges can be purchased from the WAGGGS online shop. Alternatively, groups can print their own cloth badges; YUNGA is happy to provide the template and graphics files on request.

WEB SITES

The following Web sites provide useful educational materials, including lesson plans, experiments, articles, blogs and videos, which could be useful when undertaking the Challenge Badge with your class or group.



CC:INET is a web portal with materials on education, training and public awareness in the field of climate change: http://unfccc.int/cc_inet
It showcases climate change initiatives, projects, campaigns, educational tools, Web sites and publications, produced by and for young people: http://unfccc.int/cc_inet/cc_inet/youth_portal/items/6578.php



CONNECT FOR CLIMATE
Connect4Climate is a global community where people and organizations come together to act on climate change: www.connect4climate.org



NASA'S CLIMATE KIDS is an interactive platform with information and games about topics relating to climate change, including energy: <http://climatekids.nasa.gov/menu/energy>



SUSTAINABLE ENERGY FOR ALL is a United Nations Web site that addresses the need for all people to have access to sustainable energy, including ways to achieve this by 2030: www.sustainableenergyforall.org



THE NATURE CONSERVANCY has a lot of information about climate change, its impacts and how to calculate your carbon footprint: www.nature.org/ourinitiatives/urgentissues/global-warming-climate-change



TUNZA is the children and youth programme of the United Nations Environment Programme. This Web site has information about youth activities and campaigns, as well as publications and multimedia resources: www.unep.org/tunza



WWF CLIMATE CHANGE has interesting and simple information about climate change and how we can all make a difference: http://wwf.panda.org/about_our_Earth/aboutcc/how_cc_works



350.ORG is a global climate movement where you can jump in and take action: <http://350.org>

GLOSSARY

ACID RAIN: Any type of precipitation (e.g. rain, snow and sleet) containing acid that harms the environment, especially water ecosystems and forests. It is caused by pollutants in the air, mostly from the burning of fossil fuels.

ACIDIFICATION: The process of becoming acidic.

ADAPTATION: A special characteristic that helps an organism to survive and reproduce under specific conditions in a particular place. Adaptations evolve over time, making some species better at surviving in a given area than others. In the context of climate change, adaptation refers to being prepared for the changes global warming will bring about, and taking action to minimize any damage and disruption.

ADAPTIVE CAPACITY: The ability of a system to adjust to climate change: to minimize damage, take advantage of opportunities or to cope with the consequences.

ANTHROPOGENIC: Caused or produced by humans.

APPLIANCE: Large machine that uses energy (usually electricity or natural gas), such as refrigerators, washing machines and water heaters.

ATMOSPHERE: A layer of gases in the air surrounding the Earth, including a mixture of nitrogen, oxygen and trace gases such as greenhouse gases. The atmosphere protects the Earth and keeps us warm due to the greenhouse effect.

BIODIVERSITY: The variety of all the different kinds of plant and animal life on Earth, and the relationships between them.

BIOFUEL: Liquid (oil) or gas fuel created from biomass (animal and plant materials).

BIOMASS: Accumulation of living matter (of plant and animal origin) that can often be used as a fuel or energy source (e.g. wood).

CARBON: A non-metallic element that makes up all living things. It is everywhere – in your body, clothes, food, plants and animals and in waste products. It is also in the ocean, air and rocks. When

organisms change or die, they still contain carbon. Carbon in dead organisms turns after a very long time into usable fossil fuels.

CARBON CYCLE: The continuous movement of the Earth's carbon through the air, the ocean, the environment and different organisms.

CARBON DIOXIDE/CO₂: A colourless and odourless gas made up of carbon and oxygen; it makes up less than 1 percent of the air. The scientific name is CO₂. It is absorbed by plants and used in photosynthesis. People and animals exhale carbon dioxide when breathing. Burning fossil fuels and biomass produces carbon dioxide emissions into the air, contributing to climate change.

CARBON FOOTPRINT: The total amount of greenhouse gas emissions produced by a person or group of people due to their consumption, particularly of energy, (e.g. transportation, electricity, heating and cooling and cooking). Carbon footprints refer to greenhouse gas emissions in terms of carbon dioxide equivalent (calculated using a special formula).

CARBON SEQUESTRATION: The natural process of removing carbon from the atmosphere and storing it somewhere else, for example in soils or the ocean.

CARBON SINK: A reservoir (for example forests and soils) that stores carbon dioxide that has been removed from the atmosphere.

CLIMATE: It refers to the long-term average, or overall picture, of the everyday weather experienced in a location. It is the big picture of temperatures, rainfall, wind and other conditions over a long period of time (30 years or more).

CLIMATE CHANGE: A change in the overall state of the Earth's climate (such as temperature and rainfall). It is caused by natural (e.g. volcanic eruptions, changes in ocean currents and changes in the activity of the Sun) and human causes (e.g. burning of fossil fuels).

COAL: A fossil fuel and a non-renewable resource. It is a brownish-black rock below the soil that is used mostly to make electricity. It is formed from the dead remains of trees, ferns and other plants that were buried under swamps millions of years ago.

COLLECTIVE ACTION: An action taken together by a group of people to achieve a common objective.

CONDENSATION: The process by which gas or vapour cools and turns into liquid (also see **evaporation**).

DECOMPOSE/DECOMPOSITION: When the remains of dead plants and animals rot and break down into basic elements over time. Heat, light, bacteria and fungi play a role in this process. **Fossil fuels** are produced from materials that decomposed over very long periods of time.

DEFORESTATION: Removing a forest or part of a forest (e.g. by cutting it down and burning it) to use the wood (e.g. to make paper or furniture) or to use the land for something else (e.g. farming or building on it).

DEGRADATION: Degradation takes place when parts of an **ecosystem** (e.g. a forest) are damaged (e.g. because some of it is cut down) but the **ecosystem** is not yet lost. This may only be temporary, in which case a damaged forest could grow back into a healthy one over time.

DESERTIFICATION: The **degradation** of land in arid (dry), semi-arid and dry subhumid areas resulting from various factors, including changes in climate and human activities. Desertification causes the **degradation** of the natural **ecosystem** and reduces agricultural productivity.

DEVELOPED COUNTRY: A socially and economically well-off country, with high levels of industry, technology, infrastructure and so on.

DEVELOPING COUNTRY: A poor country that is trying to become more economically advanced. The economies of developing countries rely heavily on agriculture. Almost all of the people without access to **electricity** live in developing countries.

DRYLANDS: Regions with low rainfall.

ECOSYSTEM: A community of living **organisms** (plants and animals) and non-living things (water, air, rocks, etc.) interacting in a certain

area. **Ecosystems** don't have a defined size and can be as small as a puddle or as big as an entire lake. The whole world is one big, very complex **ecosystem**.

ECOTOURISM: A kind of tourism that has a low impact on the environment and supports local livelihoods. Ecotourists often like going to areas of natural beauty to enjoy nature.

ELECTRICITY: The flow of electrical charges, created when tiny particles (electrons) move around freely. Examples include lightning and from energy sources such as **coal** or **natural gas**. Lighting is a form of electricity, and **electronics** and electrical **appliances** are powered with electricity.

ELECTRONICS: Things that use **electricity** when they are plugged into electrical outlets. Examples of electronics include televisions, computers and mobile phones.

EL NIÑO AND LA NIÑA: El Niño and La Niña are opposite phases of what is known as the El Niño-Southern Oscillation (ENSO) cycle. The ENSO cycle is a scientific term that describes changes in temperature between the ocean and **atmosphere** in the east-central Equatorial Pacific. La Niña is sometimes referred to as the cold phase of ENSO and El Niño as the warm phase of ENSO. They both cause deviations from normal surface temperatures that have large-scale impacts not only on ocean processes, but also on global **weather** and **climate**. El Niño and La Niña events occur about every three to five years. Typically, El Niño occurs more frequently than La Niña. (Source: <http://oceanservice.noaa.gov/facts/ninonina.html>).

ENERGY EFFICIENT: The goal of reducing the amount of energy used or wasted. This can be achieved by energy-saving technologies (e.g. energy-saving light bulbs, home insulation systems, energy production systems that produce less waste heat energy) and through individual actions to save energy in daily activities.

EROSION: Erosion means “wearing down”. Rocks and soils are eroded when they are picked up or moved by rain, running water, waves, ice, wind, gravity or other natural or human agents.

EVAPORATION: The process by which heat turns a liquid substance into gas or vapour.

EX-SITU CONSERVATION: plants and animals are removed from their natural habitat and placed in a new location such as a zoo or seed bank to preserve and reproduce them.

FERTILIZER: A chemical or natural substance that is added to soil or land that contains plant nutrients and, therefore, helps improve and sustain the growth of plants.

FOOD CHAIN: The links between **organisms**, showing what eats what. Food chains show how energy passes among individuals, starting with primary producers (plants).

FOOD INSECURITY: It exists when people lack access to sufficient amounts of safe nutritious food and, for this reason, are not consuming enough for an active and healthy life. This may be due to the unavailability of food, poverty or waste (Source: FAO).

FOSSIL: The preserved remains of an ancient animal or plant.

FOSSIL FUEL: Fuels that are made from old plant and animal remains and take millions of years to form. Fossil fuels include **petroleum**, **coal** and **natural gas**. Fossil fuels contain lots of stored **carbon** or **methane**, which is burned to produce **electricity** and to produce energy for other uses. Fossil fuels are known to produce lots of **greenhouse gas emissions**, which contribute to **climate change**.

FRESHWATER: Naturally occurring water that is not salty (e.g. in rivers, lakes and groundwater).

GEOENGINEERING: Manipulating environmental processes on a large scale, as a way to tackle **global warming**.

GEOHERMAL ENERGY: Heat energy originating from underground sources on the Earth.

GLACIAL PERIOD: A period in the Earth's history when polar and mountain ice sheets were spread unusually far across the Earth's surface.

GLOBAL WARMING: A gradual increase in the overall temperature of the Earth's atmosphere generally believed to be happening because of the greenhouse effect.

GREENHOUSE EFFECT: Greenhouse gases in the atmosphere let heat from the Sun warm the Earth and trap some of the heat near the Earth, keeping the Earth warm.

GREENHOUSE GAS: Gases in the Earth's atmosphere, including water vapour, carbon dioxide, methane and nitrous oxides. These gases absorb energy from the Sun and trap some of this heat. This keeps the Earth warm, but too many greenhouse gases in the atmosphere are causing climate change.

GREENHOUSE GAS EMISSION: When natural systems or people's activities release greenhouse gases into the atmosphere. High levels of emissions come from burning fossil fuels for electricity and using petroleum for transportation.

GROSS DOMESTIC PRODUCT (GDP): The total value of all goods and services produced within a country in a year, or over a given period of time.

HABITAT: A local environment within an ecosystem where an organism usually lives.

HUMAN SETTLEMENT: Cities, towns, villages, and other concentrations of human populations that inhabit a given segment or area of the environment (*Source: EIONET*).

HYDROPOWER: Energy that comes from the force of moving water (mechanical energy).

INDIGENOUS PEOPLE: The people who were the original or oldest known inhabitants of a particular area (also known as native peoples, first nations peoples or aboriginals). These communities often have a strong cultural, and sometimes spiritual, connection to the area in which they live.

INFRASTRUCTURE: The basic facilities, services and installations needed for a community or society to function effectively, such as transportation and communications systems, water and power lines, and public institutions including schools and post offices.

INTERGLACIAL PERIOD: A period of warmer global average temperature lasting thousands of years, occurring between two glacial periods.

INVASIVE SPECIES: Animals, plants and other species that have been introduced to an area from elsewhere, either by accident or on purpose, and negatively affect the native habitat by out-competing native species.

IRRIGATION: The action of applying water to land or soil. It is used to assist in the growing of crops, for the maintenance of landscapes and revegetation of disturbed soils in dry areas, or during periods of insufficient rainfall.

THE KYOTO PROTOCOL: This is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets.

LA NIÑA: See El Niño.

LEAST DEVELOPED COUNTRIES (LDCS): The world's most impoverished and vulnerable countries. They have been classified as "least developed" in terms of their low gross national income (GNI), their weak human assets and their high degree of economic vulnerability.

METHANE: A greenhouse gas that is found in natural gas and in biogas.

MICROBE/MICRO-ORGANISM: A creature too small to be seen with the human eye alone, but which can be seen through a microscope.

MITIGATION (OF CLIMATE CHANGE): Decreasing the amount of greenhouse gases in the atmosphere. There are different ways in which greenhouse gases can be removed from the atmosphere.

The first one is to reduce emissions and the second one is to protect the forests. Trees need **carbon dioxide** to respire – which is why REDD+, an international mechanism for **climate change** mitigation, supports the planting and protection of trees and forests.

NATIVE: it refers to the place or environment in which a person was born or a thing came into being.

NATURAL DISASTER: A natural event such as a flood, earthquake or hurricane that causes great damage or loss of life.

NATURAL GAS: A **fossil fuel** that is made up mainly of **methane**; it is burned to create usable heat energy. It is formed when **organisms** that built up in water are buried under ocean or river sediments in hot regions underground millions of years ago.

NATURAL HAZARDS: A naturally occurring event, such as a cyclone or drought, that could have a negative effect on people or the environment.

NATURAL RESOURCE: Living and non-living things that we can find in our environment, such as sunlight, water, air, soil, animals, forests, **fossil fuels** and food.

NITROUS OXIDE: A **greenhouse gas**, that is colourless with a sweetish odour.

NON-RENEWABLE RESOURCE: A **natural resource** that cannot be made again in a short period of time if it gets used up, such as metals and fossil fuels.

NON-RENEWABLE ENERGY: Energy produced from **non-renewable resources**. Types of **non-renewable energy** are **nuclear power** and energy produced from **petroleum**, **coal** and **natural gas**.

ORBIT: An orbit is a regular, repeating path that an object in space takes around another one. Planets, comets, asteroids and other objects in the solar system orbit the Sun. Orbits have different shapes. All orbits are elliptical, which means they are an ellipse, similar to an oval. For the planets, the orbits are almost circular. (Source: NASA).

ORGANIC: Materials derived from living matter or organisms. They contain carbon.

ORGANISM: A living creature, like a plant, animal or micro-organism.

OZONE: A form of oxygen that is found in a layer high in the Earth's atmosphere.

PASTORALISM: Is the herding and raising of animals such as camels, alpacas, cattle, goats, llamas and sheep. Pastoralism generally has a mobile aspect, when herds are moved to different areas, sometimes depending on the season, to access fresh pasture and water.

PERMAFROST: A thick subsurface layer of soil that remains frozen throughout the year, occurring mainly in polar and subpolar regions.

PETROLEUM: A fossil fuel that is also known as oil. It is made up mainly of carbon and burned to create usable heat energy. Petroleum was created by organisms that built up in water and were buried under ocean or river sediments millions of years ago.

PHOTOSYNTHESIS: The process by which plants take in energy from sunlight together with carbon dioxide and water to make their own chemical energy that provides food for plants (sugars and other useful chemicals).

PHYTOPLANKTON: A microscopic plant that lives in the sea.

PIPELINE: A long pipe (usually underground) to transport petroleum and natural gas.

PRECIPITATION: The process in which water vapour in the atmosphere condenses and falls in the form of rain, sleet, snow or hail.

QUALITY HOUSING: Quality housing means not only a form of shelter but also includes some other qualities such as safety, comfort and convenience, utility facilities such as water supply, electricity and sanitation, proper air, sunlight and ventilation, and a healthy environment for the emotional and social well-being of families.

RAINFED: An agricultural system (such as crops) that relies only on rainfall as its only source of water for the plants to grow (rather than using water pumps and irrigation systems).

RENEWABLE RESOURCE: A natural resource that can be made again by the Earth's natural processes in a short period of time. Air, water and sun are renewable resources.

RENEWABLE ENERGY: Energy produced from renewable resources. Types of renewable energy include geothermal energy, wind energy, energy from biomass (including biofuels), hydropower and solar energy.

RESILIENCE: The ability to cope with a hazardous event and recover quickly from its difficulties.

RUNOFF: Also known as overland flow, refers to the flow of water that occurs when excess water, from storms or snowmelt for example, flows downhill over the land.

SMALL ISLAND DEVELOPING STATES (SIDS): A distinct group of developing coastal countries facing specific social, economic and environmental vulnerabilities due to their small size and remote location. They are highly vulnerable to climate change and natural disasters.

SILVICULTURE: The process of developing and caring for a forest.

SLASH-AND-BURN: A process of clearing forests by cutting and burning trees to clear land for temporary agriculture or cattle grazing.

SLUM: A heavily populated urban area characterized by poor housing and low living conditions.

SOLAR ENERGY: Energy from the Sun (a form of radiant energy) that can be converted into electricity and other forms of usable energy.

SUSTAINABLE/SUSTAINABILITY: The ability to maintain a steady level over time, such as maintaining a relatively steady amount of natural resources.

TRANSPIRATION: The process where moisture is released from tiny holes on the underside of plant leaves.

URBANIZATION: The increasing number of people that migrate from rural areas to cities or urban areas.

WATER CYCLE: The continuous movement of the Earth's water, on, above and below its surface.

WEATHER: The conditions of the atmosphere (such as sunshine, participation, temperature, cloud cover, winds, etc.) over a short period of time (day to day).

WIND ENERGY: Energy from moving air (mechanical energy). Wind energy is a renewable energy created by the uneven heating of the Earth's surface.

YOUR

NOTES

This image shows a full page of white paper with horizontal dotted lines, typical of notebook paper. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

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The illustrations in this booklet are a selection from more than 20 000 drawings received from various drawing competitions. We thank all the children who so enthusiastically took part in the drawing competitions. See our Web site (www.fao.org/yunga) or register to receive our free mailing list (by writing to yunga@fao.org) to find out about current competitions and activities.

This document was developed under the coordination and editorial supervision of **Reuben Sessa**, YUNGA Coordinator and Youth Focal Point for FAO.



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www.sida.se

This badge was developed in collaboration with and is endorsed by:



Convention on
Biological Diversity

Secretariat of the Convention of Biological Diversity (CBD)

The Convention on Biological Diversity came into force on 29 December 1993 with the objectives to conserve biodiversity, use it in a sustainable fashion and to share its benefits fairly and equitably. The CBD Secretariat manages biodiversity policy discussions, facilitates the participation of countries and groups in biodiversity processes and supports the implementation of the Convention.

www.cbd.int/youth



Food and Agriculture
Organization of the
United Nations

Food and Agriculture Organization of the United Nations (FAO)

FAO leads international efforts to defeat hunger and enhance sustainable food production globally, including agriculture, forestry, fisheries and aquaculture production systems. Serving both developed and developing countries, FAO acts as a neutral forum where all nations meet as equals to negotiate agreements and debate policy. FAO is also a source of knowledge and information, helping countries to modernize and improve agricultural policies in relation to land and water management.

www.fao.org



Plan International

Founded over 75 years ago, Plan International is one of the oldest and largest children's development organizations in the world. It works in 51 developing countries across Africa, Asia and the Americas to promote child rights and lift millions of children out of poverty. In 2014, Plan worked with 86 676 communities. Its work areas had a population of 164.9 million people – including 81.5 million children. Plan is independent, with no religious, political or governmental affiliations.

<https://plan-international.org>



United Nations
Framework Convention on
Climate Change

United Nations Framework Convention on Climate Change (UNFCCC)

With 196 Parties, the United Nations Framework Convention on Climate Change (UNFCCC) has near universal membership and is the parent treaty of the 1997 Kyoto Protocol. The Kyoto Protocol has been ratified by 192 of the UNFCCC Parties. The ultimate objective of both treaties is to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system.

www.unfccc.int



The United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS)

The United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) is a leading research and teaching institute based in Tokyo, Japan. Its mission is to advance efforts towards a more sustainable future, through policy-oriented research and capacity development focused on sustainability and its social, economic and environmental dimensions.

www.ias.unu.edu



Youth Climate

The Youth Climate Movement (YouNGO) or International Youth Climate Movement (IYCM) refers to an international network of youth organizations that collectively aims to inspire, empower and mobilize a generational movement of young people to take positive action on climate change. It is a growing movement of international youth who are building education, creating awareness, and taking action on climate change.

www.youthclimate.org



Youth and United Nations Global Alliance (YUNGA)

YUNGA was created to allow children and young people to be involved and make a difference. Numerous partners, including UN agencies and civil society organizations, collaborate in developing initiatives, resources and opportunities for children and young people. YUNGA also acts as a gateway to allow children and youth to be involved in UN-related activities such as the Sustainable Development Goals (SDGs), food security, climate change and biodiversity.

www.fao.org/yunga



The United Nations Alliance on Climate Change has been developed with, and in support of, the UNFCCC Article 6 on education, training and public awareness. This interagency programme aims to promote meaningful, results-oriented and effective cooperation on climate change education, training, public awareness and participation, and access to information:

http://unfccc.int/cooperation_and_support/education_and_outreach/items/7403.php



The World Association of Girl Guides and Girl Scouts (WAGGGS)

The World Association of Girl Guides and Girl Scouts (WAGGGS) is a worldwide movement providing non-formal education where girls and young women develop leadership and life skills through self-development, challenge and adventure. Girl Guides and Girl Scouts learn by doing. The Association brings together Girl Guiding and Girl Scouting associations from 145 countries, reaching 10 million members around the globe.

www.waggsworld.org



The World Organization of the Scout Movement (WOSM)

The World Organization of the Scout Movement (WOSM) is an independent, worldwide, non-profit and non-partisan organization that serves the Scout Movement. Its purpose is to promote unity and the understanding of Scouting's purpose and principles while facilitating its expansion and development.

www.scout.org



THE YOUTH AND UNITED NATIONS GLOBAL ALLIANCE (YUNGA) IS A PARTNERSHIP BETWEEN UNITED NATIONS AGENCIES, CIVIL SOCIETY ORGANIZATIONS AND OTHER ENTITIES THAT DEVELOPS INITIATIVES, RESOURCES AND OPPORTUNITIES FOR CHILDREN AND YOUNG PEOPLE TO LEARN, GET INVOLVED AND MAKE A DIFFERENCE.

YUNGA ACTS AS A GATEWAY TO ALLOW CHILDREN AND YOUTH TO PARTICIPATE IN THE ACTIVITIES AND INITIATIVES OF THE UNITED NATIONS.

WE ARE MANY. WE ARE YUNGA!



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The purpose of the **United Nations Challenge Badges** is to raise awareness, educate and, most of all, motivate young people to change their behaviour and be active agents of change in their local communities. Challenge Badges are appropriate for use with school classes and youth groups, and are endorsed by WAGGGS and WOSM. They include a wide range of activities and ideas that can easily be adapted by teachers or leaders. Additional badges are available or are being developed on a number of other topics, including: Agriculture, Biodiversity, Energy, Forests, Gender, Governance, Hunger, Nutrition, the Ocean, Soils and Water.

The **CLIMATE CHANGE CHALLENGE BADGE** is designed to help educate children and young people about the vital role the climate plays in supporting life on Earth. The badge looks at how our daily lives impact the Earth's climate and provides ideas on how individuals can take action to help make this close relationship more sustainable.

FOR MORE INFORMATION ON THIS AND OTHER MATERIALS CONTACT



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