Climate Educational Toolkit 2024

Advocate for Climate Change

2024

Climate Educational Toolkit

LET’S HAVE A TALK ON MOTHER NATURE.

FXB CLIMATE ADVOCATES

Acknowledgement

We would like to express our deepest gratitude to everyone who contributed to the development and completion of the Climate Educational Toolkit. This project would not have been possible without the dedication, expertise, and passion of a diverse group of individuals and organizations.

Firstly, we extend our sincere appreciation to the contributors and authors, Muhammad Daniyal Kamal, Sayan Das, María Paz Mattenet Riva, Withney Zodan, Graham Favour Edidiong, Rosaria Etambuyu Simusandu, Agren Jonathan Mushema, Precious Abuo, Montella Silla and Ali Mohamed. Your commitment to climate advocacy and education has been instrumental in shaping this toolkit. Your diverse backgrounds and unique perspectives have enriched the content, making it comprehensive and impactful.

We also thank our community partners, RE-AD Resilience and Adaptation, Youth Eco-panel, Kapda Karo Recycle, and Alerta Celsius, for their unwavering support and collaboration. Your initiatives and efforts in promoting sustainability and environmental education have been a cornerstone of this project.

Lastly, we acknowledge the invaluable support of our families and friends. Your encouragement and belief in the importance of climate action have been a constant source of motivation.

Together, we are making strides towards a more sustainable future. Thank you for being part of this journey.

FXB INTERNATIONAL

FXB International is a non-profit organization dedicated to breaking the cycle of poverty and AIDS. Founded in 1989 by Albina du Boisrouvray in memory of her son François-Xavier Bagnoud, a helicopter pilot who died at the age of 24, FXB's mission is to provide vulnerable families with the tools and support they need to become self-sufficient. The organization operates in 13 countries across Africa, Asia, and Europe, delivering programs that focus on health, education, housing, and economic empowerment. FXB's integrated approach addresses the root causes of poverty and aims to create lasting change for communities affected by poverty and AIDS. By empowering families and strengthening communities, FXB International is committed to achieving sustainable development and improving the quality of life for those in need.

For more information, please visit their website at [FXB International] (https://fxb.org/).

Autobiographies

Muhammad Daniyal Kamal – Pakistan

Muhammad Daniyal Kamal is a 21 year old from and living in Pakistan. He is a student of Bachelors' degree in Environmental Sciences from Quaid-i-Azam University, Islamabad.

Daniyal started his climate action journey in 2021, by joining an organization "The Buraaq Association," an organization that works for women empowerment, digital empowerment, environmental protection and animal protection rights, as their Campus Ambassador. In January 2023, he was appointed as the Secretary SDGs for the years 2023-2024 at The Buraaq Association, where he leads a dynamic team towards finding the solutions that revolve around sustainability and teaches about the sustainable development goals. Recently in May 2024, he has been again appointed the Secretary SDGs in the organization for the years 2024-2025 for his remarkable contributions.

With a background in environmental sciences, Daniyal enhanced his skills, i.e., willingness to learn, creativity and organization, through over two internships at such prestigious institutes, Pakistan Environmental Protection Agency (Pak EPA) and Punjab Forest Department, Layyah.

In September 2023, Daniyal started his leadership journey by co-founding "RE-AD Resilience and Adaptation," a youth-led organization that has an aim to educate the students of schools and colleges in Pakistan on environment, climate change and disaster risk reduction practices, along with water conservation strategies. Currently, he is the CEO of RE-AD Resilience and Adaptation. He is also promoting the sustainable development goals proposed by the United Nations, with the help of President and founder of RE-AD.

He is the Finance Secretary of Quaidian Disaster Risk Management Society (QDRMS) at his university, a society that is leading in educating and training the individuals on the disaster risk management practices.

Daniyal is one of the One Million Leaders Asia Fellow 2024. He is currently under the training, provided by the OMLAS team to carry out his project efficiently in the near future.

In the modern era, Daniyal is playing his role as "The Nature's Advocate" for promoting the sustainability. He is engraving his name among the climate educators for green peace.

Sayan Das – India

Sayan Das is a dynamic force in the realm of sustainable innovation and youth leadership, fueled by a passion for business strategy, development, and combating climate change. Armed with a diploma and Bachelor's degree in Civil Engineering, Sayan's journey has been marked by a relentless pursuit of excellence and a commitment to making a difference.

With a diverse array of experiences, Sayan has honed his skills through over 10 internships at esteemed institutions such as IIT and IIIT, spanning climate change, sales, marketing, and supply chain management. His dedication extends beyond professional realms, as evidenced by his active involvement in volunteering initiatives. From being a delegate at the 11th Young India Challenge to volunteering at Josh Talks and facilitating at POP Movement, Sayan has consistently sought to contribute positively to society.

Recognized for his talents, Sayan has garnered accolades including the 2nd Prize at the Megalith 2020 model exhibition, IIT Kharagpur, and a superior performance certificate as a youth leader in the 2023 Kectil Program, supported by the Malmar Knowles Family Foundation, USA. Currently, he spearheads Kapda Karo Recycle, a textile recycling startup in West Bengal, India, championing sustainability with support from the MSME & Textiles Department, Govt. of West Bengal, and UCO Bank.

Sayan's visionary leadership and innovative endeavors have not gone unnoticed. He was honored with the Sustainable Innovation Award 2023 at the International Conference and POP Festival for Youth-Led Climate Action 2024, organized by the Protect Our Planet (POP) Movement, USA. Continuously striving to empower others, Sayan serves as a Trainee Mentor at POP Movement, USA, embodying his commitment to nurturing the next generation of changemakers.

In every endeavor, Sayan Das epitomizes resilience, creativity, and a steadfast dedication to creating a better, more sustainable world for future generations.

Paz Mattenet Riva – Argentina

María Paz Mattenet Riva (she/they) is a 25-year-old from and residing in Argentina. She is a professor and graduate in Social Anthropology from the University of Buenos Aires. She was a UBACyT scholarship holder at the Institute of Anthropological Sciences (FFyL, UBA), a team with which she developed her thesis on youth climate advocacy in Argentina. She was also teaching assistant at a Political Anthropology course at said university and head of an annual Health and Environment class at the Movement of Excluded Workers' School.

Paz started her climate activism through academia in 2020 researching Jóvenes por el Clima Argentina, an advocate group founded in 2019 to mobilize as part of Fridays For Future's Climate Strike, which today is one of the leaders of the climate movement in Argentina. In 2022, she co-founded and coordinated Alerta Celsius, a tech-ed with the aim of producing resources and providing training for students and teachers to promote awareness of the climate crisis in her country. She was awarded a UMIF grant to develop the School of Young Environmental Educators, a free program aimed at providing young people with theoretical and pedagogical tools so that they can design and implement projects to strengthen environmental education.

After founding their Environmental Education Area in 2022, Paz assumed as Operations Manager and Project Supervisor at Jóvenes por el Clima Argentina in late 2023. Currently she is coordinating the second edition of the School for Young Environmental Educators, now carried out simultaneously in three Argentine provinces, and “Desenganche”: a project aimed at delivering solar energy in a marginalized neighborhood in Buenos Aires.

She is also studying Transmedia Communications at the Superior Institute of Radiophonic Teaching, and Podcast Development at The Future Founders Co., where she is recording the podcast “Climate and Development: unheard stories of indigenous communities”. Moreover, she hosts a livestream show about climate politics.

Withney ZODAN – Benin

Currently pursuing a Master of Science degree at the African Climate and Environment Center – Future African Savannas (AFAS) in Abidjan, Ivory Coast, awarded as part of the Global Centers for Climate and Environment program by the German Academic Exchange Service (DAAD), marks Withney's dedication to becoming an expert at the intersection of science, policy, and practice.

In 2023, Withney demonstrated her commitment to gender equality and entrepreneurship through participation in the UNITAR Advanced Gender Equality and Women Empowerment Online Training Program. This initiative equipped her with valuable skills in entrepreneurship and financial literacy, reinforcing her holistic approach to sustainable development.

Having received the African Water and Sanitation Association (AfWASA) Research Scholarship in 2023, Withney exemplifies excellence in the field of water and sanitation. The accompanying research grant of $1,000 showcases her commitment to advancing knowledge and practical solutions in the WASH sector.

Recognized as a motivated and high-potential student, Withney was honoured with the Global Mentorship Initiative Program award in 2023, highlighting her commitment to building confidence and developing transferable soft skills across various industries.

In 2021, Withney ZODAN was granted the WACWISA full scholarship, sponsored by the World Bank and the Ghana Government, recognizing her as a promising student dedicated to addressing water scarcity issues in West Africa, further solidifying her role as a future leader in sustainable development.

Graham Favour Edidiong – Nigeria

Graham Favour Edidiong is a passionate entrepreneur and advocate for social enterprises and climate action. Graham Favour Edidiong is the Founder of Agrovest Logistics, a socially conscious agro-logistics and consultancy firm promoting African self-sufficiency sustainably.

His key roles include program coordination at Jumo Climate Change and consultancy with Plug-in Niger. Graham has been recognized for leadership in environmental reforms and recycling projects. He is also actively involved in leadership roles at the University of Uyo, including Chairman of the Advisory Board and Department of Chemical Engineering. Currently studying Chemical Engineering at the University of Uyo.

Graham is proficient in communication, leadership, and strategic planning.

Rosaria Etambuyu Simusandu – Zambia

Rosaria Etambuyu Simusandu is an adroit and strategic leader who is passionate about creating a positive impact on society. She is devoted to innovation, environmental issues and technology. She holds a BSc in Science from the University of Zambia.

Rosaria is currently volunteering as a Youth Ambassador for the World Summit Awards (WSA) an international non-profit organization that focuses on promoting digital innovation to contribute to the UN Sustainable Development Goals and impact society positively. She is also a Cluster Lead for the Environment Protection and Climate Justice cluster for an organization called the Young Professionals Network Zambia.

Rosaria is a trailblazer. During her time as a student, she revamped the University of Zambia Chemistry Society and served as President. Her exceptional leadership skills in this role allowed her to host the 2nd National Chemistry Symposium, an award ceremony with the East African Network for Women in Basic Sciences. She was part of the University of Zambia Biological Sciences Association (UNZABIOSA), where she served as a Committee Member. She had the privilege of serving as an Interim Executive Member of the University of Zambia School of Natural Sciences Association Mother Body (UNZANASA). Her role as an interim executive member ensured that all student associations in the School of Natural Sciences got efficient and effective student representation.

In line with her interest in environmental issues, she actively contributed to a project that aimed at optimizing the production of bioethanol from locally sourced organic substrates as a Research Laboratory Assistant.

Agren Jonathan – Tanzania

Introducing Agren Jonathan Mushema, an inspiring individual from Tanzania. Agren is currently immersed in her fifth year of medical studies at the prestigious Catholic University of Health and Allied Sciences in Tanzania.

Her journey into the realm of climate change awareness began during a transformative experience at the SOPHEA summer school on planetary health in Wurzburg, Germany. It was here that Agren's curiosity was piqued by the profound connection between climate change and human well-being, sparking a deep-rooted interest within her.

Back in Tanzania, Agren takes on the pivotal role of planetary health education coordinator for the CUHAS planetary health club. Through innovative initiatives and educational outreach, she empowers her peers to address pressing health issues, with a particular focus on the impacts of climate exchange.

Beyond her university commitments, Agren lends her voice and expertise as an FXB Climate Advocate, advocating for climate action and raising awareness about climate change issues.

With her unwavering dedication and boundless enthusiasm, Agren stands as a beacon of leadership and advocacy, working towards a future where the health of both people and planet thrives in harmony.

Precious Abuo – Nigeria

Precious Abuo is a driven professional with a diverse background in mechanical engineering and a passion for the oil and gas industry. His journey began with a strong academic foundation in mechanical engineering, where he developed a keen eye for detail, problem-solving skills, and a deep understanding of technical concepts.

Transitioning into the role of a product manager, be brings a unique blend of technical expertise and strategic thinking to the table. His key responsibilities revolve around defining product strategies, creating roadmaps, overseeing product development lifecycles, and collaborating effectively with cross-functional teams.

As an oil and gas enthusiast, Precious is deeply interested in leveraging innovative technologies and sustainable practices to drive efficiency, safety, and environmental responsibility within the industry. He thrives in dynamic environments where he can apply my skills in project management, user experience design, and agile methodologies to deliver impactful solutions.

He is committed to continuous learning, staying updated on industry trends, and building strong relationships with stakeholders to achieve mutual success. He is always excited about the opportunities to contribute meaningfully to the oil and gas sector while embracing new challenges and driving positive change.

Montella Silla – Kenya

Montella Silla is a finalist medical student at Kenyatta University in Kenya. As an avid climate action advocate. Montella champions for active involvement of healthcare professionals in the fight against climate change.

Aside from volunteering for several climate action organizations, he also chairs the Sub-Committee on Climate Change at Usawa Health Foundation, and the Technical Working Group on Climate Change at the Federation of African Medical Students Association (FAMSA).

He's also a fellow at the FXB Climate Advocates Program Sprong 2024, the Mercedes Benz Be Visioneers Fellowship, the ISO Environmental Management Youth Leadership Group, and the 2024 Eco Science Generation Climate Research Workshop.

Ali Mohamed – Egypt

Ali Mohamed is an Egyptian Renewable Energy Engineer with a strong drive for self and societal development. Through his academic journey, he has gained technical knowledge in various engineering fields including mechanical and electrical engineering as well as sustainability along with the application of leadership, organization, and strategic planning skills.

Beyond the theoretical understanding gained through his academic pursuits in renewable energy engineering, he has actively engaged in extracurricular activities, such as participating in the Schneider's Global Student Program of Sustainability as a business track, leading sustainability related-projects as the head of Project Management in Enactus's club in Zewail University, working on optimizing Hybrid EV to reduce its greenhouse gas emissions, and participating in the national competition of EVEREGYPT for building and racing electric vehicles.

Ali has gained practical insights into sustainable practices and the intersection of technology with environmental conservation. Participating in leading roles of project management, presentation, and Model United Nations has further developed his capacity for effective collaboration and leadership, and potentially effective communication skills.

Through joining FXB Climate Advocates Program, he has learned a lot about climate change, the effects it has on various parts of the world, the efforts made by enthusiastic individuals in various communities, through passionate personal stories shared by many.

Community Partners

RE-AD Resilience and Adaptation

RE-AD Resilience and Adaptation is an organization that has an aim of educating the students of schools and colleges in Pakistan on environment, climate change, disaster risk management practices, ecotourism, and water conservation strategies, etc. RE-AD also promotes the sustainable development goals (the SDGs) that were proposed by the United Nations. It is an organization that is co-founded by Mr. Muhammad Daniyal Kamal.

Youth Eco-panel

Youth eco-panel is a platform that is exploring opportunities for youth in climate change in Benin, founded by dedicated youth future leaders with the interest in nature-based solutions, biodiversity conservation, climate adaptation and mitigation and agroforestry. It is founded by Ms. Withney Zodan.

Kapda Karo Recycle

Kapda Karo Recycle is a textile recycling startup in West Bengal, India, championing sustainability with support from the MSME & Textiles Department, Government of West Bengal, and the UCO Bank. It has been founded by Mr. Sayan Das.

Alerta Celcius

Alerta Celcius is a tech-ed with the aim of producing resources and providing the training for students and teachers to promote awareness of the climate crisis in Argentina. It has been co-founded by Paz Mattenet Riva.

Table of Contents

Chapter: 1

Diagnosis of Climate Change

In this chapter, we will focus on what climate change is, analyzing the state of the world today, the history of this process, and the projections for the future.

1.1 Why is climate change a problem today?

1.1.1 What is climate change?

Climate change refers to significant and lasting changes in the Earth's climate patterns over an extended period. It is primarily driven by human activities that release greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), into the atmosphere. These gases trap heat, leading to the warming of the Earth's surface, a phenomenon often referred to as 'global warming.' However, it should be kept in mind that climate change has no proper definition.

1.1.2 Causes of climate change

The primary contributors to climate change include the burning of fossil fuels (coal, oil, and natural gas), deforestation, industrial processes, and agricultural practices. The increase in greenhouse gas concentrations enhances the natural greenhouse effect, causing an imbalance and leading to changes in temperature, weather patterns, and sea levels.

1.1.3 The impacts of climate change

The impacts of climate change include rising global temperatures, more frequent and severe weather events (such as hurricanes, droughts, floods, and wildfires), melting ice caps and glaciers, rising sea levels, and disruptions to ecosystems and biodiversity. Climate change poses significant challenges to communities, economies, and ecosystems worldwide and requires global efforts to mitigate its effects and adapt to the changes that are already underway. International initiatives, like the Paris Agreement, aim to unite countries in addressing climate change by setting targets for reducing greenhouse gas emissions and promoting sustainable practices.

Let us discuss some of the effects of climate change!

a) Rising temperatures.

Global average temperatures are increasing, leading to more frequent and intense heatwaves. Warmer temperatures affect ecosystems, agriculture, and human health.

b) Extreme weather events.

Increased frequency and intensity of hurricanes, typhoons, droughts, floods, and wildfires. Altered precipitation patterns, leading to more severe storms and changing regional climates.

c) Melting ice and rising sea levels.

Melting glaciers and ice caps contribute to rising sea levels, threatening coastal areas. Loss of Arctic sea ice affects marine ecosystems and contributes to global sea level rise.

d) Ocean acidification.

Increased absorption of carbon dioxide by the oceans leads to acidification. Climate change threatens marine life, particularly organisms with calcium carbonate shells and skeletons.

e) Disruption of ecosystems.

Changes in temperature and precipitation patterns affect the distribution and behavior of plant and animal species. The shifts in ecosystems and loss of biodiversity are impacting the food webs and ecological balances.

f) Impacts on agriculture.

Changes in temperature and precipitation affect crop yields and quality. It really alters the growing seasons of crops and increased pest and disease pressures.

g) Water scarcity and changes in water resources.

Changes in precipitation patterns contribute to droughts and water scarcity. It alters snowmelt patterns that affect river flows and water availability.

h) Health risks.

Climate change has the potential to increase the heat-related illnesses and deaths. The changes in the distribution of infectious diseases are influenced by temperature and precipitation patterns.

i) Threats to food security.

Agricultural productivity is reduced due to changing climate conditions. It really disrupts the global food supply chains.

j) Loss of habitat and migration patterns.

The disruption of natural habitats is mainly due to changing climate conditions. It has altered migration patterns of birds, mammals, and fish.

k) Increased wildfire risk.

Hotter and drier conditions contribute to more frequent and intense wildfires. It leads to threaten the ecosystems, communities, and air quality.

l) Social and economic disruptions.

Climate-related events lead to displacement of populations and increased migration. Economic losses are mainly responsible due to damage of infrastructure and increased costs of adaptation. The availability of natural resources is lessened due to the overpopulation of world.

Because of the interconnectedness of all these issues, we talk about a Climate Crisis.

Content that may be interesting to check out: "Leveraging comics for climate education!"

Blog: Visual Sustainability Tools – Sustainability Illustrated

1.2 How dinosaurs played their role towards changing the climate?

We all have been fascinated by dinosaurs at some point in our lives. Some of us have grown up watching the movies on dinosaurs.

Q: What was your first movie which made you think about dinosaurs?

If we talk about the famous movies till now, we have this huge franchise. Any guesses? We are talking about Jurassic Park trilogy and Jurassic World trilogy. It feels so amusing to see the dinosaurs at such massive screens in either cinemas or at homes.

Q: What is your favorite dinosaur till now?

In the modern world, the study of ancient life from dinosaurs is being carried out. It is termed to be known as "Paleontology." The word seems interesting. Isn't it? Well to be more precise, it is known to be the observation of fossils. Fossil evidence reveals how organisms changed over time and what our planet was like long ago. Now the question arises; what are fossils? Fossils are the remains of plants, animals, fungi, bacteria and

single-celled living things that have been replaced by the rock material or impressions of organisms preserved in rocks.

Today when we look at the remains of the dinosaurs, we try to simulate with the technological advancements that how they looked in that time, their structure, etc.

Let's have a thought in our minds. In today's world, is there any possibility to live in harmony with the dinosaurs if they were having life. We leave this thought to you, guys. If we move forward, there was an event that erased the existence of every dinosaur. That event is termed to be known as "extinction."

1.2.1 Extinction of dinosaurs.

Sixty six millions years ago, dinosaurs had a very bad day. With a devastating impact, a reign that had lasted 180 million years was abruptly ended.

The instantaneous devastation in the immediate vicinity and the widespread secondary effects of an asteroid impact were considered to be why the dinosaurs died out so suddenly. Now before we move on, let's first have a concept note of what actually is an asteroid, and a meteorite. There is some difference between them.

"Asteroids" are large, rocky bodies that orbit the Sun. They range from a few to hundreds of meters in diameter. Any fragment of an asteroid that survives landing on Earth becomes known as a "meteorite."

An asteroid impact is supported by really good evidence because the crater was identified by the paleontologists (a person who studies the fossils). It's now largely buried on the seafloor off the coast of Mexico. It is exactly the same age as the extinction of the non-bird dinosaurs, which can be tracked in the rock record all around the world.

The impact site, known as the Chicxulub crater, is centered on the Yucatán Peninsula in Mexico.

The asteroid is thought to have been between 10 and 15 kilometers wide, but the velocity of its collision caused the creation of a much larger crater, 150 kilometers in diameter. It's the second-largest crater on the planet.

The dinosaur-killing crash threw huge amounts of debris into the air and caused massive tidal waves to wash over parts of the American continents. There is also evidence of substantial fires from that point in history.

For a long time it was thought that the non-bird dinosaurs died out 65 million years ago.

1.2.2 Why extinction of the dinosaurs happened?

Around 75% of Earth's animals, including dinosaurs, suddenly died out at the same point in time.

The asteroid hit at high velocity and effectively vaporized. It made a huge crater, so in the immediate area there was total devastation. A huge blast wave and heatwave went out and it threw vast amounts of material up into the atmosphere.

It sent soot travelling all around the world. It didn't completely block out the Sun, but it reduced the amount of light that reached the Earth's surface. So it had an impact on plant growth.

Breeding seasons would have been shorter and conditions harsher. All living things would have been affected in some way, both on land and in the ocean.

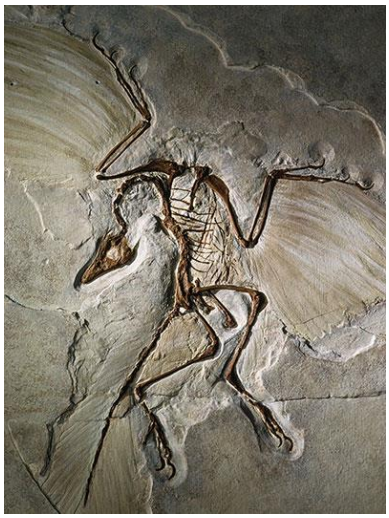
1.2.3 Global Climate Change

The blame can't solely rest on the asteroid. Prior to its crash landing, Earth was experiencing a period of climate change. This was making things harder for life on our planet.

In what is now central India, there was substantial volcanic activity that, although unrelated to the asteroid impact, was causing problems of its own. The resulting lava outcrop is now known as the "Deccan Traps."

For two million years there was a huge amount of volcanic activity going on, spewing gases into the atmosphere and having a major impact on global climate.

There were also longer-term changes. The continents were drifting around and splitting apart from each other, creating bigger oceans, which changed ocean and atmosphere patterns around the world. This also had a strong effect on climate and vegetation.



The last non-bird dinosaurs were living at a time of environmental change, some of which began millions of years before they went extinct. The asteroid was the final, killer blow.

All of the non-bird dinosaurs died out, but dinosaurs survived as birds. Some types of bird did go extinct, but the lineages that led to modern birds survived. Initially the survivors were small, with birds the first to experience evolution to larger sizes.

There were a couple of lineages of gigantic birds - predatory and herbivorous - but they weren't around for very long and also went extinct.

1.3 How is our Paris Agreement tackling the climate change?

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It entered into force on 4 November 2016.

The Paris Agreement outlines three scenarios for limiting global warming: 1.5 degrees Celsius, 2 degrees Celsius, and 3 degrees Celsius. The 1.5-degree scenario is considered the most ambitious and crucial for avoiding the worst impacts of climate change. In this scenario, efforts are made to rapidly reduce greenhouse gas emissions and transition to renewable energy sources. However, if

the world fails to meet this goal and temperatures rise by 2 or 3 degrees Celsius, the impacts of climate change will worsen significantly.

One impact of climate change is the depletion of fossil fuels. As temperatures rise, the demand for energy increases, putting further strain on finite fossil fuel resources. This can lead to more extraction activities, causing environmental degradation and contributing to greenhouse gas emissions. Additionally, as fossil fuel reserves become scarcer, competition for remaining resources may intensify, leading to geopolitical tensions and conflicts.

In the 1.5-degree scenario, efforts to transition away from fossil fuels are accelerated, reducing reliance on these finite resources and mitigating their depletion. However, in the 2 and 3-degree scenarios, continued reliance on fossil fuels exacerbates their depletion, leading to increased environmental degradation and worsening climate impacts. Therefore, meeting the goals of the Paris Agreement is essential for avoiding the deepening of impacts associated with fossil fuel depletion and climate change.

Chapter: 2

Climate Change and its Impacts on Human Health

2.1 Pollution and Waste

Before diving into the impacts of climate change, let us first look onto the questions. Is pollution a leading cause to impact on human health, alongside contributing to climate change? What is meant by the word, "pollution"? Is it really deadly for us and the environment? Are we, the human beings contributing to the pollution? If yes, then how are we causing pollution? What are the major types of pollution? Are there some other minor types of pollution?

2.1.1 What is pollution?

Pollution may be defined as "the introduction by man into the environment of substance or energy liable to cause hazards to human health, harm to living resources and ecological systems, damage to structures or amenity or interference with legitimate use of the environment."

In simple words, pollution is defined as "the waste materials that people produce in such large quantities, that it interferes with their health or well being."

Pollution is an environmental issue. Mainly we, the human beings, are considered as the source of pollution. But nature also pollutes and balances itself. Here comes a question! So far, we have studied the two definitions of pollution. Is the addition of unwanted substances termed as "pollution"?

We can also say that pollution is a condition in which harm is given to the different aspects of the environment. There are two primary factors that affect the amount of damage done by the pollution; the size of the population and the development of the technology that 'invents' new form of pollution. Let's have another question, and this time with its answer. What is waste?

The thing that we discard or a material the owner cannot utilize and he introduces it in the environment, is called as "waste."

2.1.2 Types of environmental pollution

There are four major types of pollution. They are listed below;

- Air Pollution.
- Water Pollution.
- Soil and Land Pollution.
- Noise Pollution.

Apart from these four major types, there are also some other types of environmental pollution. These are:

- Nuclear Pollution.
- Chemical Pollution.
- Food Pollution. (Spoiled/Unspoiled)
- Fertilizer Pollution.
- Chemical Pollution.
- Pesticide Pollution.
- Light Pollution.

2.1.3 Causes of environmental pollution

Are we the prime suspects for causing the environmental pollution? The answer is certainly yes. There are a lot of causes due to which we pollute our surroundings. Some of them are listed below:

- Urbanization.

  Urbanization is a term that explains the concept of migration from rural to urban areas. There will be more industries, agricultural practices and a humongous consumption of resources in the urban areas. People usually migrate due to these three reasons. The emissions from the substance and the energy are linked to the resources. Utilizing the resources more will lead to a lot of emissions.

  How can we overcome it? The answer is that the control measures should be given to the small industries, as implementation could be done easily. You must be wondering, why. The reason is, we always have to start at the small level.

- Industrialization.

  We are in the modern era. Man always wants to progress and to push his limits in every sector. Industries came into being, when there was a rise seen in population. The industries were developed to fulfill the basic and necessary needs of the people. More industries were developed, that led to a rise in carbon emissions. Even today, there is a race between the nations to develop new and more industries.

  Is there a way out? Yes, there is. The development of rural areas should be done as a control measure for this cause 'industrialization.'

Also, let's have an example of the hospitals in South Kora. It has every resource prepared for its every city.

- Transportation.
  Today in the modern world, there is a small number of houses that do not have a personal vehicle. Could you list some of the transport vehicles? Some are motor bikes, cars, airplanes, trains, etc. Every vehicle is responsible to emit a huge amount of gases.
  What should we do? The answer is simple. We can shift to public transport. Metro bus services are to an extent environment friendly. We should not forget that the change is always gradual in terms of development and growth.
- Deforestation.
  Cutting down of trees in simple words, is termed as deforestation. Deforestation often leads to habitat loss. The chances of soil erosion are increased due to this.
  Can we fight with deforestation? Yes, we can. Concept of "vertical building" shall be introduced. Forestation on barren lands shall be done. We can also add the organic matter or silt in sand for proper cultivation.

- Modern Agriculture.
  The word modern agriculture seems fascinating. Isn't it? It is defined as the growth of crops (ploughing) on land/soil through machinery, and tractors etc. Fertilizers and pesticides are used to increase the yield and meet the demand of food. But do the fertilizers and pesticides lead to environmental pollution? Yes, if they are used in excess.
  To overcome the challenges, we have to introduce the environment friendly technology. For example: The diesel used in tractors leads to emissions. Advancements are being done to refine the diesel or increase the tractor's efficiency.
- Arms race, nuclear plants and radioactive materials,
  When do we hear about them? We usually hear about them during the production of warfare. Radio-isotopes are often treated as a nuclear waste. Here, a question arises. Do we have a mechanism to control and treat the nuclear waste? There is no such mechanism developed, to control the nuclear waste.
  For an instance, radio-isotopes were found in the groundwater of Dera Ghazi Khan, a district in the province Punjab of Pakistan. It led to a lot of health problems such as anemia, mouth necrosis, bone cancer, chronic lung diseases and acute leucopoenia.
  The shooting ranges are the places, where the ammo is tested. The bullets contain the heavy metals, 'lead' and 'copper.' This usually leads to pollution. Can you think, which type of pollution it leads to?

2.1.4 Pollutant vs. Contaminant

A “pollutant” is a substance that exists in the environment and causes harm and hazards. While, a “contaminant” is a substance that exists in the environment and has the potential to cause harm.

The technical definition of pollutant is any substance introduced into the environment that adversely affects the usefulness of a resource. By the resource, we mean air, water and soil. Just as a weed is ‘a plant out of place’, a pollutant is ‘a chemical out of place.’

2.1.5 What substance pollute?

Everything can cause pollution at some level. Almost any chemical, any substance, any material whether generated by human beings or nature can pollute. Organic substances even those difficult to degrade can be destroyed when the conditions are right. Inorganic substances, although they can be converted into other compounds, are not destroyed.

2.1.6 Sources of pollution

Wherever there is an activity happening, there is pollution caused. Some of the sources of pollution are; motor vehicles, agricultural operations, manufacturing facilities, mining operations, commercial operations, food processing operations, electric power plants, chemical and petroleum refineries, military operations, forestry operations, construction and road building, consumer product use, and municipal operations.

Could you think of some other sources of pollution?

2.1.7 Why does pollution occur?

There is some pollution in every process of this universe. No process is 100% efficient. Our body cannot use 100% of the food we eat. For example; the unbroken food fibers are excreted with the feces as solid waste. Another example is the unabsorbed nutrients from enzyme action are excreted in urine as chemical waste.

Carelessness or poor technology aggravates (increases) the amount of pollution produced as do poorly designed processes. The process we carry out, we try to have it with maximum efficient.

2.1.8 How is pollution leading to climate change?

Air pollution is the major type of pollution that leads to climate change. Air pollutants and greenhouse gases often come from the same sources, such as coal-fired power plants and diesel-fueled vehicles. Some air pollutants do not last long in the environment, notably black carbon – a part of fine particulate matter ($PM_{2.5}$). Other short-lived climate pollutants include methane, hydrofluorocarbons, and ground-level or tropospheric ozone. These are far more potent climate warmers than carbon dioxide.

A World Bank study found that $PM_{2.5}$ from the burning of fossil fuels such as coal combustion or diesel-fueled vehicle emissions is among the most toxic types of $PM_{2.5}$. Particles from these sources are more damaging to health than particles from most other air pollution sources. Addressing these sources of $PM_{2.5}$ – like coal combustion and traffic – would address the most

toxic air pollution. Given that these sources are also key contributors to climate warming, tackling air pollution from these sources also mitigates climate change.

2.1.9 Waste Categories

The word “waste” differs from pollutant, although waste can pollute. Waste often refers to garbage or trash. Waste is regarded as an unavoidable by-product of most human activity. But waste is categorized into many types. Some of its types are:

- Municipal solid waste.
  Municipal solid waste (MSW) is generated from households, offices, hotels, shops, schools and other institutions. The major components are food waste, paper, plastic, rags, metal and glass.
- Industrial solid waste.
  Industrial solid waste encompasses a wide range of materials of varying environmental toxicity. Typically this range would include paper, packaging materials, waste from food processing, oils, solvents, resins, paints and sludge, glass, ceramics, stones, metals, plastics, rubber, leather, wood, cloth, straw, abrasives, etc.
- Agricultural waste and residues.
  Agricultural waste is defined as waste left over after cultivating and processing agricultural products like fruits, vegetables, dairy and grains, as well as meat, poultry and crops.
- Hazardous waste.
  Hazardous waste is considered to be any solid or liquid substance that can cause damage to the environment or that represents a risk to people's health. Hazardous wastes can be toxic substances, reactive chemicals, flammable, corrosive, or radioactive substances.
- Electronic waste.
  Electronic waste is defined as various forms of electric and electronic equipment that have ceased to be of value to their users or no longer satisfy their original purpose. It is also known as techwaste or e-waste.

Could you think of some other major types of wastes? If yes, then you have started your journey to protect the environment.

2.2 Climate Change in relation with Water and Vector Borne Diseases

Imagine a big playground where the sun, the wind, and the rain all play together. But wait, something's changing – it's like the music of our playground is getting a little different. That's because of something called climate change. It's like when the weather starts acting differently because of things people do, like driving cars that make the air warmer. Now, let's imagine this playground is also home to some tiny creatures called germs and bugs. They might seem small, but they can do big things, especially when it comes to making people sick. So, here's the deal; in this adventure, we're going to explore how climate change is mixing things up for these sneaky

germs and bugs. From buzzing mosquitoes to tricky water germs, we'll discover how they're changing because of the weather getting warmer and weirder.

Let us dig deep into the discussion of vector borne diseases.

2.2.1 Temperature changes

Warmer temperatures can affect the life cycles of insects like mosquitoes and ticks. They might hatch earlier or live longer, giving these insects more time to spread diseases like malaria, dengue fever, and Lyme disease. So, as the Earth gets warmer due to climate change, these insects might spread to new areas where they couldn't survive before, bringing diseases with them.

2.2.2 Rainfall patterns

Changes in rainfall can create more breeding grounds for mosquitoes. When it rains a lot, puddles and standing water can form, which are perfect spots for mosquitoes to lay their eggs. This can lead to more mosquitoes and more chances for diseases like Zika virus and West Nile virus to spread.

2.2.3 Shifts in habitat

As temperatures change, some animals that carry diseases might move to new areas, where they can survive. For example, ticks that carry Lyme disease might move north as temperatures warm, bringing the disease with them to new regions.

Now, let us study the relation between climate change and water borne diseases.

2.2.4 Changes in rainfall

Climate change can lead to more intense and unpredictable rainfall patterns. When it rains a lot, rivers, lakes, and other water sources can become contaminated with germs like bacteria and viruses. This can happen because rain washes pollutants from the land into the water, making it unsafe to drink or swim in.

2.2.5 Rising temperatures

Warmer temperatures can also affect water quality. When it's hot outside, water can heat up, creating the perfect breeding ground for harmful bacteria like E. coli. This can make swimming in lakes and rivers risky, as these bacteria can cause stomach problems and other illnesses.

2.3 Climate and Mental Health

We're going on an exciting adventure to explore how the weather outside and the feelings inside are connected. Have you ever noticed that when the sun is shining, you feel happy and full of energy? Or when it's raining, you might feel a little bit sad or bored? Well, guess what? There's a big puzzle piece called "climate change" that's changing the way our world looks and how we feel. Let's put on our explorer hats and dive into the mystery of how our changing planet affects our emotions.

Climate change impacts on mental health include; natural disasters, such as hurricanes, floods, and heatwaves, can cause trauma, anxiety, and depression among those affected.

Displacement and loss of homes – as a result of natural Disaster such as floods, hurricanes can lead to feelings of instability and distress, exacerbating mental health issues. The displacement of communities due to climate-related factors can disrupt social networks and support systems, further impacting mental well-being.

Witnessing the destruction of natural habitats and wildlife can evoke feelings of grief and helplessness, contributing to emotional distress.

Concerns about food and water scarcity due to drought, as well as the loss of livelihoods, can heighten feelings of insecurity and fear. The displacement of communities due to climate-related factors can disrupt social networks and support systems, further impacting mental well-being.

Most marginalized communities, including those living in poverty or facing discrimination, often bear the brunt of climate-related impacts and may have limited access to mental health resources.

2.4 Physical Impacts on Human Health

Humans can be affected by climate change in both ways, i.e.; directly and indirectly. Extreme heat waves, rising sea level, changes in precipitation resulting in flooding and droughts, and intense hurricanes can directly cause injury, illness, and even death. The effects of climate change can also indirectly affect health through alterations to the environment. For example, worsening air pollution levels can have negative impacts on respiratory and cardiovascular conditions.

Exposure to climate-related hazards can include biological, chemical, or physical stressors and can differ in time, locations, populations, and severity. These are referred to as exposure pathways. These threats can occur simultaneously, resulting in compounding health impacts. Climate change threats may also accumulate over time, leading to longer-term changes in resilience and health.

Climate change can affect human health by changing the severity, duration, or frequency of health problems and by creating unprecedented or unanticipated health problems or health threats in places or populations where they have not previously occurred.

Let us discuss, how climate change is leading to degradation of human health.

2.4.1 Climate change and foodborne illnesses

Changes in temperature and precipitation can affect the distribution and survivability of pathogens that cause foodborne illnesses. Changes in climate can cause severe droughts or flooding. These events can in turn affect pathogens and introduce toxins to crops. Ingestion of food contaminated with pathogens can result in foodborne illnesses, such as norovirus infection or salmonellosis.

Climate change is also projected to affect the quality of food. The increase in atmospheric carbon dioxide associated with climate change can affect the nutritional value of staple crops and exacerbate malnutrition by reducing protein content and essential minerals.

Changes in air and water temperatures can modify the seasonal and geographic occurrence of bacteria, viruses, parasites, fungi, and pests as well as chemical contaminants. Higher temperatures can increase the number of pathogens already present on produce and seafood, while bacterial populations can increase during food storage which, depending on time and temperature, can also raise food spoilage rates.

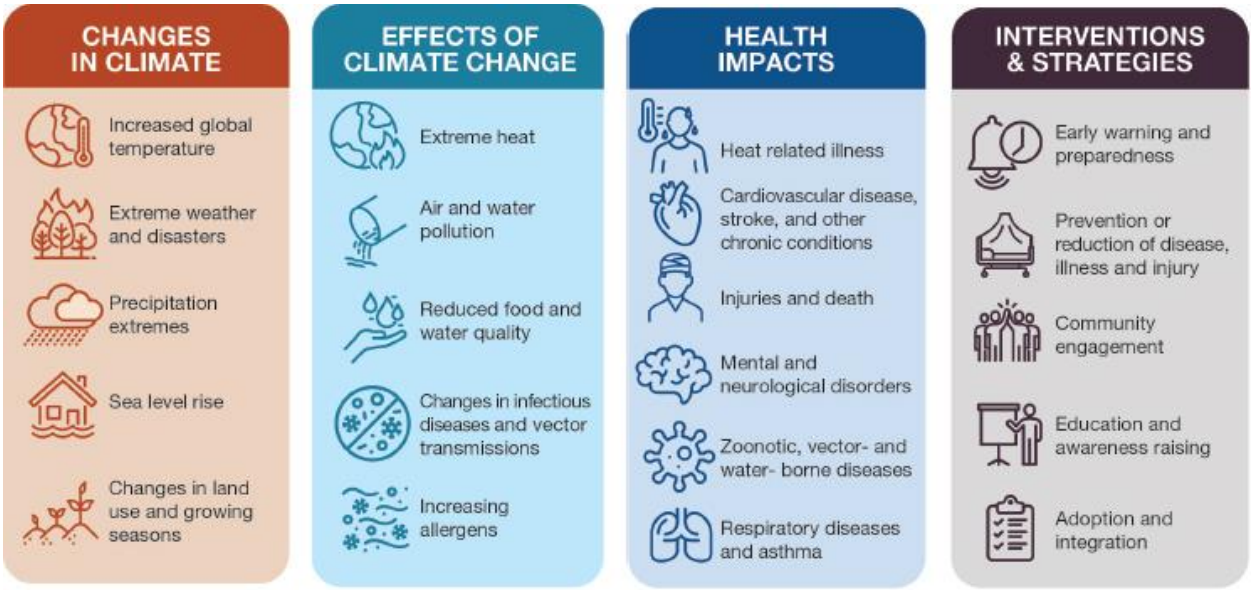
According to the Food and Agriculture Organization of the United Nations, 800 million people are undernourished, while 76% of the global population gets most of its daily nutrients from plants. The impacts of climate change on food systems can affect everyone, but some groups are more vulnerable. Women, children, older adults, low-income populations, Indigenous Peoples, and small-scale food producers more often experience malnutrition.

2.4.2 Health impacts of air quality

Climate change affects air quality, which in turn can lead to adverse health outcomes. Disruptions to weather patterns influence our air quality by increasing and distributing air pollutants, such as ground-level ozone, fine particulates, wildfire smoke, and dust.

Poor air quality can negatively affect human health. Exposure to air pollutants or airborne allergens can directly harm our respiratory and cardiovascular systems or exacerbate existing conditions in susceptible populations. Children, older adults, persons with asthma, and immunocompromised persons are most vulnerable to air quality impacts.

Respiratory impacts can include asthma, respiratory allergies, and airway diseases, while cardiovascular impacts can include hypertension, coronary artery disease, heart attack, and stroke. Globally, millions of premature deaths are caused by air pollution. Exposure to and inhalation of ground-level ozone and particulate pollution account for tens of thousands of hospital visits each year. Symptoms of ozone and particulate pollution exposure can include chest pain, coughing, throat irritation, congestion, and reduced lung function. Similarly, higher pollen concentrations and longer growing seasons, consequences of warming temperatures, can increase sensitivity to allergens and severe allergic reactions, such as allergy-induced asthma attacks.



Chapter: 3

Political Analysis

As young people, advocates and professionals, we believe we need to share a common framework to reach better strategies for climate change mitigation, social adaptation and environmental preservation. Here is our shared perspective on how to tackle solutions:

3.1 Why do we speak about a climate crisis and not just about climate change?

The shift in terminology from "climate change" to "climate crisis" reflects the urgency and severity of environmental challenges. This terminology underscores the rapid pace at which climate-related impacts are occurring globally. Scientists warn of potential tipping points in the Earth's climate system, beyond which irreversible and catastrophic changes could occur. Instances like the increasing frequency of extreme weather events and rapid ice melt in polar region highlight the need for immediate action to address these accelerating changes.

Moreover, describing the situation as a "climate crisis" emphasizes its global scale and interconnected nature. Climate change affects every corner of the planet and every aspect of human society. It exacerbates existing social, economic, and environmental challenges, amplifying the urgency of addressing these interconnected issues. The term underscores the need to recognize the complex relationships between environmental degradation, poverty, inequality, biodiversity loss, and water scarcity, and to develop holistic solutions that address these challenges collectively.

Also, referring to climate change as a "crisis" underscores the moral and ethical imperatives of taking urgent action. It emphasizes the responsibility of governments, corporations, and individuals to mitigate greenhouse gas emissions, adapt to climate impacts, and transition to a sustainable future. The term highlights the need to prioritize justice and equity in climate action, particularly to protect the most vulnerable communities and future generations. It underscores the importance of recognizing the ethical dimensions of environmental stewardship and ensuring that decisions are guided by principles of fairness, responsibility, and intergenerational equity.

Last but not least, by framing climate change as a "crisis," there's potential to mobilize public opinion and galvanize political will for action. The urgency of the situation empowers individuals and communities to recognize their agency in driving positive change. This terminology can inspire collective action at local, national, and international levels to address the root causes of environmental degradation and build a more sustainable society. It underscores the need for effective communication, education, and engagement efforts to raise awareness about the climate crisis and empower people to take meaningful action in their own lives and communities.

3.2 Climate Justice: The lens from where we want to generate answers.

In recognizing the complexity of the climate crisis, we want to provide an understanding of this issue that is not just technical, but also social and political. Climate solutions give us the chance to reshape the world in a way they is not just kinder to earth, but also fair for all. Climate justice is a framework that seeks to address the disproportionate impacts of climate change on vulnerable communities, particularly those in the Global South and marginalized groups within societies. Some of its core ideas are:

3.2.1 Historical responsibility.

Climate justice recognizes the historical responsibility of developed countries, which have historically emitted the majority of greenhouse gases, to take the lead in addressing climate change and supporting vulnerable nations in adapting to its impacts.

3.2.2 Intersecting inequalities.

Climate justice acknowledges that climate change exacerbates existing inequalities based on the race, gender, class, and other social factors. It seeks to address these intersecting inequalities by ensuring that climate policies and solutions are inclusive and equitable.

3.2.3 Right to development.

Climate justice emphasizes the right of all people, particularly those in developing countries, to pursue sustainable development pathways that prioritize social equity, economic prosperity, and environmental sustainability.

3.2.4 Recognition of loss and damage.

Climate justice acknowledges that some communities, particularly in the Global South, are already experiencing irreversible loss and damage due to climate change. It calls for support and compensation for these communities to cope with and recover from the impacts.

3.2.5 Democratic governance.

Climate justice advocates for democratic and participatory governance structures that empower the marginalized communities to have a say in decision-making processes related to climate policy and resource allocation.

3.2.6 Solidarity and cooperation.

Climate justice emphasizes the need for global solidarity and cooperation to address the climate change collectively. It calls for developed countries to provide the financial and technical support to developing countries to enhance their climate resilience and transition to low-carbon economies.

3.2.7 Reparations and redress.

Climate justice includes demands for reparations and redress for the harms caused by climate change, particularly to indigenous and marginalized communities who have contributed the less to global emissions but suffer the most from its impacts.

3.2.8 Cultural preservation.

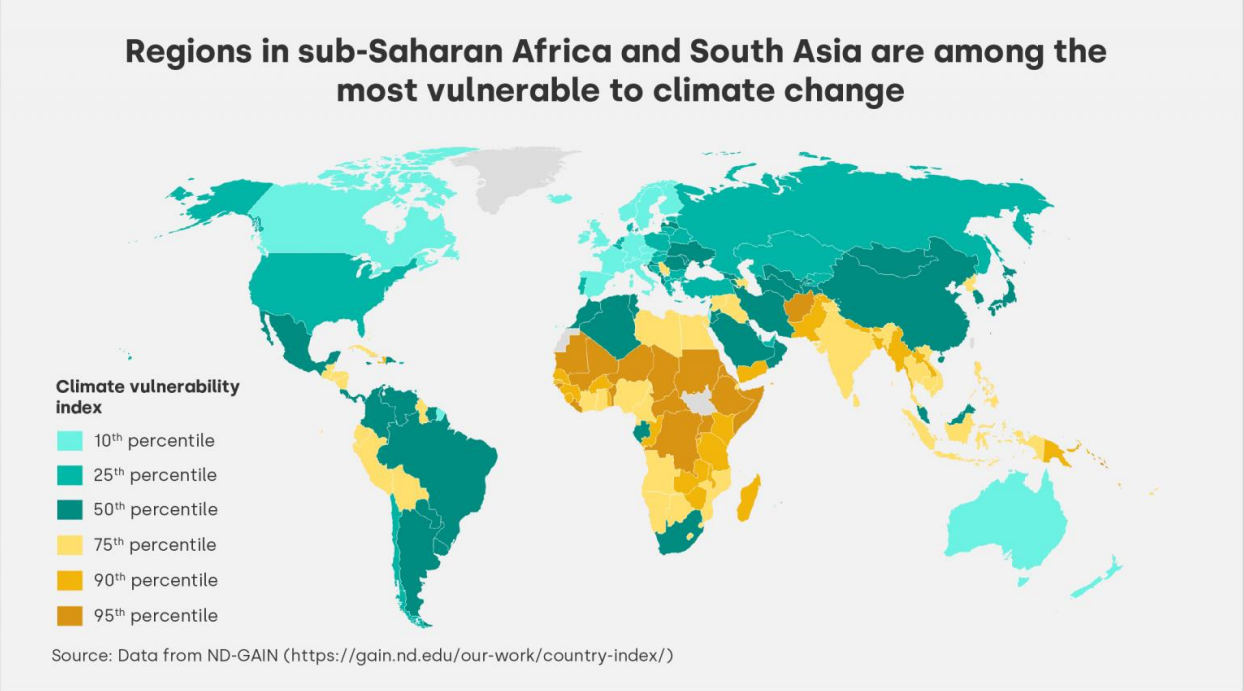
Climate justice recognizes the importance of preserving cultural heritage and indigenous knowledge systems that are threatened by climate change. It seeks to support efforts to protect and promote diverse cultural identities in the face of environmental challenges.

3.2.9 Global solidarity movements.

Climate justice movements mobilize diverse stakeholders, including grassroots organizations, civil society groups, indigenous peoples, and youth activists, to advocate for systemic change and transformative solutions that prioritize people and planet over profit.

3.3 Vulnerable countries and communities

The impacts of the climate crisis are not evenly distributed around the world. Some regions, particularly those in the Global South, are more severely affected than others due to a combination of geographical, socioeconomic, and environmental factors. Here are some key reasons why certain parts of the world are more impacted.



3.3.1 Geographic vulnerability.

Certain regions of the world face heightened vulnerability to the impacts of the climate crisis due to their geographical characteristics. Low-lying coastal areas, such as small island nations in the Pacific and the Caribbean, are at risk of inundation and saltwater intrusion from sea-level rise. Arid and semi-arid regions, particularly in Sub-Saharan Africa, the Middle East, and Central Asia, experience more frequent and intense droughts, exacerbating water scarcity and threatening agricultural productivity. Additionally, areas prone to natural disasters, including hurricanes, typhoons, floods, and wildfires, face heightened risks as climate change intensifies these events, leading to displacement, infrastructure damage, and loss of livelihoods.

3.3.2 Socioeconomic factors.

The impacts of the climate crisis are compounded by socioeconomic factors, particularly in regions with high levels of poverty and inequality. Vulnerable populations, including women, children, indigenous peoples, and marginalized groups, bear the brunt of climate-related hardships due to limited resources, weak infrastructure, and inadequate social safety nets. Agricultural-dependent economies, such as those in rural areas of Africa, Asia, and Latin America, are highly vulnerable to climate variability, facing crop failure, livestock losses, and reduced food security. Climate-related stresses can exacerbate existing social and political tensions, leading to conflicts over resources and migration pressures.

3.3.3 Environmental degradation.

Environmental degradation exacerbates the impacts of the climate crisis and undermines the resilience of ecosystems and communities. Biodiversity hotspots, such as tropical rainforests, coral reefs, and mangrove ecosystems, face habitat destruction and species loss, threatening ecosystem services critical for human well-being. Degradation of natural resources, including deforestation, soil erosion, and freshwater depletion, reduces the capacity of ecosystems to absorb carbon dioxide and regulate climate patterns, exacerbating climate-related risks.

3.3.4 Historical and structural factors.

Historical emissions and structural inequalities shape the distribution of climate impacts around the world. Countries with a history of high greenhouse gas emissions, primarily industrialized nations in North America, Europe, and parts of Asia, have contributed significantly to global warming. However, the impacts of climate change are disproportionately felt by countries in the Global South, which have contributed the least to emissions but are least equipped to cope with its consequences. The legacy of colonialism, including extractive and exploitative practices, has left many countries economically disadvantaged and environmentally degraded, exacerbating vulnerability to climate change.

In summary, the impacts of the climate crisis are complex and multifaceted, influenced by geographical, socioeconomic, environmental, and historical factors. Vulnerable regions in the Global South face heightened risks of extreme weather events, environmental degradation, and socio-economic disruptions, highlighting the need for global cooperation, solidarity, and equity in addressing climate change.

3.4 How does the climate crisis impact different marginalized communities?

In this section, we are going to dig a bit deeper on how the climate crisis impacts different marginalized communities. Although North and Global South differences serve the purpose to show how different regions of the world are affected by different process, there are still extremely vulnerable people in all parts of the world. Some of these communities are:

3.4.1 Low-income communities.

Low-income communities bear a disproportionate burden of the impacts of the climate crisis, as they often live in inadequate housing located in high-risk areas such as flood plains, coastal zones, and informal settlements. Climate-related disasters, such as floods, hurricanes, and heatwaves, can lead to property damage, displacement, and homelessness, exacerbating existing vulnerabilities.

Economic disruptions from climate change, particularly in sectors such as agriculture and tourism, can result in job losses, reduced incomes, and increased food and energy prices, further deepening poverty and inequality. Limited access to resources and services essential for climate resilience, such as clean water, healthcare, transportation, and emergency response infrastructure, further amplifies the vulnerability of low-income communities to climate-related risks.

3.4.2 Indigenous people.

Loss of Traditional Territories: Indigenous peoples often have deep connections to Indigenous communities worldwide face significant impacts from the climate crisis due to their deep connection to their lands and traditional ways of life. Climate change-induced environmental changes, such as deforestation, desertification, and sea-level rise, threaten the integrity of their territories and cultural heritage. Many indigenous peoples rely on subsistence agriculture, hunting, fishing, and gathering for their livelihoods, which are increasingly at risk due to climate-related disruptions to ecosystems and biodiversity loss. This loss of traditional knowledge and cultural identity further exacerbates the social and psychological impacts of climate change on indigenous communities, highlighting the urgent need to support their rights and resilience in the face of environmental challenges.

3.4.3 Women and children.

Women and children are disproportionately affected by the climate crisis due to socio-cultural factors, economic disparities, and gender-based discrimination. During extreme weather events, displacement, and food and water scarcity, women and children often face greater risks and vulnerabilities. Climate-related health risks, including malnutrition, waterborne diseases, and maternal and child mortality, disproportionately impact women and children, particularly in low-income and marginalized communities with limited access to healthcare and sanitation facilities. Disruptions to education systems from climate-related disasters can further perpetuate cycles of poverty and inequality, as children, especially girls, are forced to drop out of school to help their families cope with the impacts of climate change.

3.4.4 LGBTQ+ communities.

LGBTQ+ communities face unique challenges during climate-related disasters and displacement, including discrimination, violence, and exclusion from relief efforts and support services. Social stigma and legal barriers can exacerbate their vulnerability to climate impacts, compounding existing inequalities. Higher rates of mental health issues, substance abuse, and suicide within LGBTQ+ communities can be exacerbated by climate-related stressors, such as loss of community support networks and trauma from disaster experiences. Barriers to accessing support services and resources during climate-related emergencies, including shelters, healthcare, counseling, and legal

assistance, highlight the need for inclusive and culturally competent approaches in disaster response and recovery efforts to address the specific needs and vulnerabilities of LGBTQ+ individuals.

3.5 Just energy transition

Energy transition refers to the shift from reliance on fossil fuels to renewable and sustainable sources of energy, such as solar, wind, hydroelectric, and geothermal power. It involves transforming energy systems, technologies, and infrastructure to reduce greenhouse gas emissions, mitigate climate change, and promote energy efficiency and resilience.

When we talk about this transition being *just*, we refer to energy solutions that balance energy security, economic growth, environmental sustainability, and social equity in energy policy and planning.

An energy transition in and for the global south requires….

- Equitable Distribution of Burden and Benefits: A just transition ensures that the burdens of transitioning to a low-carbon economy are equitably distributed and that vulnerable communities are not left behind.
- Access to Clean Energy: Access to affordable and clean energy is essential for sustainable development in the Global South, reducing reliance on fossil fuels and promoting energy independence.
- Technology Transfer and Capacity Building: International cooperation is necessary to facilitate the transfer of clean energy technologies and build capacity in developing countries to adopt and deploy renewable energy solutions.
- Community Participation: Engaging local communities in decision-making processes regarding energy development projects ensures that their voices are heard and their needs are met.
- Promotion of Resilience: A just transition involves building resilience in vulnerable communities to adapt to the impacts of climate change and ensure their long-term sustainability.

3.6 State, Corporate and Civil Society Responsibilities

Although much can be done by individuals to change our circumstances, a bigger difference can be made by those in power. In the following section we will be exploring State and Corporate responsibility, and dig a little bit into what people can do to help.

3.6.1 How can states collaborate?

By the following ways, states can collaborate;

- Policy Frameworks:

States in the Global South have a responsibility to enact robust climate policies and frameworks that prioritize sustainable development, resilience-building, and emissions reduction.

- Capacity Building:
  Governments should invest in building institutional capacity, scientific research, and technological innovation to address climate change effectively and support local communities in adapting to its impacts.
- Resource Allocation:
  States must allocate adequate resources and funding to climate adaptation and mitigation efforts, prioritizing the needs of vulnerable communities and sectors most affected by the climate change.
- Climate Diplomacy:
  Global South countries should engage in climate diplomacy to advocate for their interests and priorities in international negotiations, ensuring that their voices are heard and their concerns are addressed.
- South-South Cooperation:
  Encouraging collaboration and knowledge-sharing among Global South countries can strengthen their collective resilience and capacity to address climate change, leveraging their unique experiences and challenges.
- Accountability Mechanisms:
  Governments should establish transparent and accountable mechanisms to monitor and report on their climate commitments, ensuring that they are held accountable for meeting their targets and fulfilling their obligations under international agreements.

3.6.2 How can corporations collaborate?

The way, corporations collaborate is listed below;

- Emissions Reduction:
  Corporations, particularly those operating in high-emission industries such as fossil fuels, agriculture, and manufacturing, have a responsibility to reduce their greenhouse gas emissions and transition to low-carbon business models.
- Supply Chain Management:
  Companies should adopt sustainable and ethical practices throughout their supply chains, including sourcing raw materials responsibly, reducing waste and pollution, and ensuring fair labor practices.
- Community Engagement:
  Corporations operating in the Global South should engage with local communities and indigenous peoples to ensure that their projects and activities respect their rights, mitigate adverse impacts, and contribute to local development.
- Investment in Renewable Energy:

Private sector investment in renewable energy projects can accelerate the transition to clean energy in the Global South, providing affordable and reliable energy access while reducing dependence on fossil fuels.

- Climate Risk Disclosure:
  Companies should disclose their climate-related risks and opportunities to investors, shareholders, and other stakeholders, enabling informed decision-making and accountability for their climate performance.
- Technology Transfer and Innovation:
  Corporate partnerships with governments, research institutions, and civil society organizations can facilitate technology transfer and innovation in climate-resilient solutions tailored to the needs of the Global South.

3.6.3 How can WE help?

We can help through the following ways;

- Advocacy and Awareness:
  Civil society organizations play a crucial role in advocating for climate action and raising awareness about the impacts of climate change, particularly among marginalized communities. They can mobilize public support, influence policy decisions, and hold governments and corporations accountable for their climate commitments.
- Capacity Building and Education:
  Civil society organizations can empower local communities with the knowledge, skills, and resources needed to understand and address climate change. This includes providing training on climate adaptation and mitigation strategies, promoting sustainable practices, and fostering environmental stewardship.
- Community Engagement and Participation:
  Civil society organizations should facilitate meaningful engagement and participation of local communities, including indigenous peoples, women, youth, and other marginalized groups, in decision-making processes related to climate policy and projects. This ensures that their voices are heard, their needs are addressed, and their rights are respected.

- Monitoring and Advocacy:

Civil society organizations can monitor the implementation of climate policies and projects, assess their impacts on local communities and ecosystems, and advocate for equitable and just outcomes. They can raise awareness about environmental injustices, human rights violations, and corporate abuses related to climate change, and campaign for accountability and restitution.

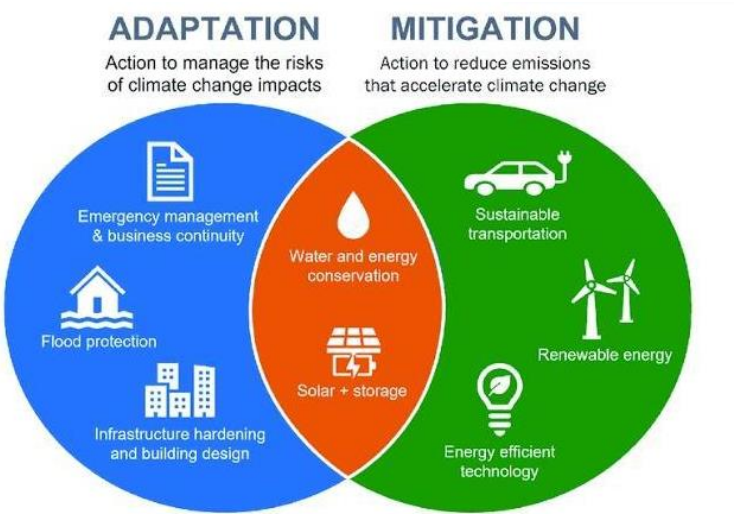
- Building Coalitions and Partnerships:
  Civil society organizations can build coalitions and partnerships with governments, businesses, academia, and other stakeholders to leverage resources, expertise, and influence in addressing climate change. They can foster collaboration, knowledge-sharing, and collective action to accelerate the transition to a low-carbon and climate-resilient future.
- Promoting Climate Justice:
  Civil society organizations should promote climate justice principles and values, including equity, fairness, solidarity, and human rights, in all aspects of their work. They should prioritize the needs and aspirations of marginalized communities, challenge structural inequalities and power imbalances, and advocate for transformative solutions that address the root causes of climate change and social injustice.

Chapter: 4

Action to Fight Climate Change

4.1 Mitigation and Adaptation in Climate Change

Climate change poses significant challenges globally, impacting ecosystems, economies, and human well-being. To address these challenges, two primary approaches are employed: mitigation and adaptation. Each strategy plays a crucial role in combating climate change and enhancing resilience to its impacts.



4.1.2 Mitigation: Reducing greenhouse gas emissions

Mitigation aims to reduce or prevent the emission of greenhouse gases (GHGs) into the atmosphere, thereby limiting global warming and its associated impacts. Key mitigation strategies include:

4.1.2.1 Transition to renewable energy

Shifting from fossil fuels to renewable energy sources (solar, wind, hydro, geothermal) reduces carbon emissions from electricity generation.

4.1.2.2 Energy efficiency improvements

Implementing energy-efficient technologies and practices in industries, buildings, and transportation sectors reduces energy consumption and associated emissions.

4.1.2.3 Afforestation and reforestation

Planting trees and restoring forests can sequester carbon dioxide from the atmosphere, acting as carbon sinks.

4.1.2.4 Decarbonization of industry

Adopting low-carbon technologies and processes in manufacturing, agriculture, and other sectors reduces emissions.

4.1.2.5 Benefits of mitigation

The benefits of following the mitigation strategies are listed below:

- Slows down global warming and limits temperature rise, preserving ecosystems and biodiversity.
- Reduces air pollution and improves public health.
- Stimulates innovation and economic growth in clean energy sectors.
- Enhances energy security and resilience to energy price fluctuations.

4.1.3 Adaptation: Building resilience to climate impacts

Adaptation involves adjusting to climate change impacts to minimize harm and take advantage of new opportunities. Adaptation strategies include:

4.1.3.1 Climate-resilient infrastructure

Designing and retrofitting infrastructure (such as buildings, roads, and water systems) to withstand extreme weather events like floods, hurricanes, and heatwaves.

4.1.3.2 Water management

Implementing sustainable water management practices to cope with changing precipitation patterns, droughts, and sea-level rise.

4.1.3.3 Crop diversification and soil conservation

Adopting resilient agricultural practices to maintain food security amidst changing climate conditions.

4.1.3.4 Ecosystem restoration

Protecting and restoring natural ecosystems (wetlands, mangroves, coral reefs) to enhance their resilience and provide critical services like flood control and habitat preservation.

4.1.3.5 Benefits of adaptation

The benefits of following the adaptation strategies are as follows:

- Reduces vulnerability and enhances communities' ability to cope with climate impacts.
- Safeguards livelihoods and protects assets from climate-related risks.
- Preserves biodiversity and ecosystem services vital for human well-being.
- Supports sustainable development and fosters social and economic resilience.

4.1.4 Integrated approach and synergies

Effective climate action requires an integrated approach that combines mitigation and adaptation strategies. Synergies between the two approaches can maximize benefits and minimize trade-offs:

- Nature-Based Solutions: Practices like reforestation and ecosystem restoration contribute to both carbon sequestration (mitigation) and resilience-building (adaptation).
- Resilient Infrastructure: Climate-resilient buildings and transportation systems not only reduce emissions but also protect communities from climate impacts.

- Capacity Building and Knowledge Sharing: Enhancing awareness, building institutional capacity, and sharing best practices facilitate effective implementation of climate actions.

In conclusion, a comprehensive approach that combines mitigation and adaptation measures is essential for addressing climate change challenges. By reducing emissions and enhancing resilience, we can create a more sustainable and resilient future for generations to come, mitigating risks and unlocking opportunities in a changing climate.

4.2 Renewable Energy

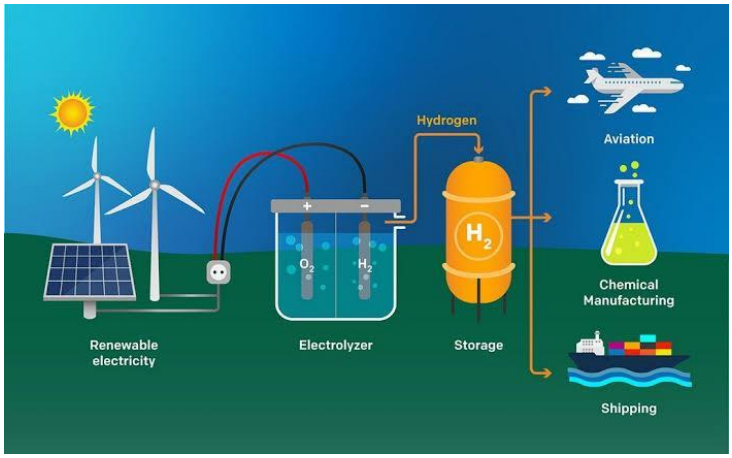
Renewable energy comes from unlimited, naturally replenished resources, such as the sun, tides, and wind. Renewable energy can be used for electricity generation, space and water heating and cooling, and transportation. Renewable energy sources, such as biomass, the heat in the earth's crust, sunlight, water, and wind, are natural resources that can be converted into several types of clean, usable energy.

Let us talk on different forms of renewable energies!

4.2.1 Hydrogen fuel

Hydrogen, the rising star in the energy sector, wears a spectrum of colors: "blue," "green," "gray," and even "yellow." Navigating through this chromatic maze, even for experts, can be challenging. What do these hues signify? Are they markers of purity or diverse applications? Let's delve into the rainbow of hydrogen.

Understanding the Colors: A Quick Primer



Hydrogen, not an energy source but a vector, necessitates synthesis from raw materials. Presently, over 95% of this synthesis relies on fossil fuels, mainly natural gas and hydrocarbons.

Hydrogen energy is produced through a process called electrolysis, where electricity is used to split water (H2O) into hydrogen (H2) and oxygen (O2). The hydrogen can be stored and later used in fuel cells to generate electricity, producing only water and heat as byproducts. Alternatively, hydrogen can be combined with oxygen in combustion engines to produce mechanical power, emitting only water vapor. Hydrogen is considered a clean energy carrier because its production and use can be carbon-free when powered by renewable electricity. It has potential applications in various sectors like transportation, industry, and power generation, contributing to a low-carbon energy future.

4.2.1.1 Gray hydrogen - Dominating the scene

Gray hydrogen, produced through steam reforming of natural gas, prevails in industrial sectors, contributing to 70-80 million tons annually. It's cost-effective but emits significant CO2, making it environmentally taxing.

4.2.1.2 Green hydrogen - A renewable revolution

To address environmental concerns, green hydrogen emerges. Produced via electrolysis of water using 100% renewable energy, it's a sustainable alternative.

4.2.1.3 Blue hydrogen - Capturing emissions

By capturing CO2 during steam reforming through Carbon Capture and Storage (CCS), we get blue hydrogen. Though pricier, it's a cleaner option, with limited pilot productions worldwide.

4.2.1.4 Yellow hydrogen - Powered by nuclear energy

Utilizing nuclear energy in electrolysis gives us yellow hydrogen, an eco-friendly alternative in the color palette.

4.2.1.5 Future challenges and conclusions

As we strive for a decarbonized hydrogen future, challenges like CCS costs and technological maturity persist. In conclusion, the colors associated with hydrogen reflect its production methods throughout the chain. The press, industries, and the socio-economic realm embrace these hues, though the scientific community sees hydrogen as the same molecule, irrespective of its colorful journey.

4.2.2 Solar energy

Solar energy, derived from the sun’s radiation, presents a renewable and sustainable solution to our global energy needs. Over the past few decades, advancements in solar technology have made it increasingly efficient and cost-effective, revolutionizing the energy landscape.

4.2.2.1 Types of solar energy

a) Photovoltaic (PV) solar systems

PV systems convert sunlight directly into electricity using solar panels composed of photovoltaic cells. This technology is widely deployed for residential, commercial, and utility-scale applications.

Percentage Growth:

The global installed PV capacity has grown exponentially, with an average annual growth rate of over 40% in recent years.

Years:

The solar PV industry has experienced significant expansion since the early 2000s, with rapid growth particularly in the last decade.

b) Solar thermal systems

Solar thermal technologies harness solar energy to generate heat, used for water heating, space heating, and industrial processes. This includes concentrating solar power (CSP) systems that use mirrors or lenses to focus sunlight onto a small area to produce heat.

- Data: CSP plants globally have a combined capacity of over 6,500 megawatts (MW), providing clean and dispatchable electricity.

4.2.2.2 Benefits of solar energy

a) Clean and renewable.

Solar energy produces electricity without emitting greenhouse gases, helping mitigate climate change.

b) Cost-effective.

The cost of solar photovoltaic panels has plummeted over the years, making solar energy increasingly competitive with fossil fuels.

c) Energy independence

Solar power reduces dependence on imported fossil fuels, enhancing energy security for nations.

d) Job creation

The solar industry has created millions of jobs worldwide in manufacturing, installation, and maintenance.

4.2.2.3 Agrovoltaics: Integrating solar with agriculture

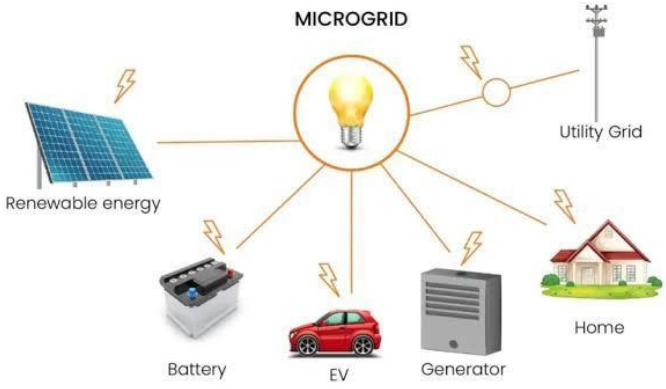
Agrovoltaics is an innovative approach that combines agriculture with solar energy production on the same land. By installing solar panels above crops, farmers can optimize land use, reduce water evaporation, and improve crop yields.

Land use:

Agrovoltaics can increase land productivity by up to 60% compared to conventional agriculture alone. The concept of agrovoltaics has gained traction in recent years, with pilot projects demonstrating its feasibility and benefits.

4.2.2.4 Solar microgrid technology

Solar microgrids are small-scale, localized energy systems powered by solar panels and often coupled with energy storage (like batteries). These systems provide reliable electricity to remote or off-grid communities, improving energy access and resilience.



Solar microgrids have been deployed in numerous off-grid regions, serving millions of people worldwide. The adoption of solar microgrids has accelerated in the past decade, driven by falling costs of solar PV and energy storage technologies.

4.2.2.5 Solar green building energy

Solar energy plays a key role in green building practices, where photovoltaic systems are integrated into the design and construction of energy-efficient buildings.

Energy savings.

Buildings equipped with solar panels can achieve significant energy savings, reducing reliance on grid power. Solar green building technologies have gained prominence over the last two decades, with architects and developers incorporating solar solutions into sustainable designs.

In conclusion, solar energy offers a pathway towards a cleaner, more sustainable energy future. From rooftop solar installations to large-scale solar farms, the versatility and scalability of solar technologies continue to drive global energy transformation, fostering economic growth while reducing environmental impact.

4.3 The Pursuit of Net Zero

In response to the growing climate crisis, the concept of achieving "net zero" emissions has gained significant traction worldwide. Net zero refers to achieving a balance between the amount of greenhouse gases emitted into the atmosphere and the amount removed or offset, resulting in no additional increase in overall emissions. This ambitious target is essential for mitigating climate change and limiting global warming to safe levels.

4.3.1 Understanding net zero

a) Definition and concept

Net zero aims to achieve a balance between greenhouse gas emissions (e.g., carbon dioxide, methane) and removals (e.g., through natural sinks like forests or technological methods like carbon capture and storage).

It involves reducing emissions through decarbonization strategies (shifting to renewable energy, electrification of transport, energy efficiency improvements) and offsetting remaining emissions through carbon removal technologies or nature-based solutions.

b) How net zero works

To achieve net zero, countries and organizations set targets to drastically reduce emissions over a defined timeline (e.g., by 2050).

This involves transitioning away from fossil fuels towards clean energy sources like solar, wind, and hydropower. Implementing energy-efficient technologies in industries, transportation, and buildings to reduce energy demand and emissions. Investing in carbon removal technologies such as afforestation, reforestation, soil carbon sequestration, and direct air capture. Encouraging sustainable practices in agriculture, land use, and waste management to minimize emissions and enhance carbon sinks.

4.3.2 Global progress towards net zero

a) Percentage reduction targets

Numerous countries and regions have committed to achieving net zero emissions by mid-century or earlier. For example, the European Union aims for a 55% reduction in emissions by 2030 and net zero by 2050.

b) Years and milestones

The Paris Agreement, adopted in 2015, set the goal of limiting global warming to well below 2 degrees Celsius above pre-industrial levels, with efforts to limit it to 1.5 degrees. Since then, countries like the UK, Japan, South Korea, Canada, and others have announced legally binding net zero targets by 2050 or earlier.

4.3.3 Countries leading the net zero transition

a) United Kingdom (UK):

The UK aims to achieve net zero emissions by 2050, enshrined in law through the Climate Change Act. The government has set interim targets to phase out petrol and diesel vehicles, transition to renewable energy, and promote sustainable practices across sectors.

b) United States (US):

The Biden administration has set a target to achieve net zero emissions by 2050, with ambitious plans to invest in clean energy infrastructure and decarbonize the economy.

c) European Union (EU):

The EU has committed to becoming the world's first climate-neutral continent by 2050, with an intermediate target of reducing emissions by at least 55% by 2030.

d) China:

China, the world's largest emitter of greenhouse gases, has pledged to achieve carbon neutrality by 2060, emphasizing a shift towards renewable energy and sustainable development.

e) Other Countries:

Japan, South Korea, Canada, New Zealand, and many other nations have announced net zero targets, signaling a global consensus on the urgency of climate action.

4.3.4 Challenges and opportunities

a) Technological Innovation:

Advancements in renewable energy, energy storage, carbon capture, and sustainable practices are critical to achieving net zero goals.

b) Policy and governance

Robust policies, regulations, and international cooperation are needed to support the transition to a low-carbon economy and ensure a just transition for affected communities.

c) Investment and finance

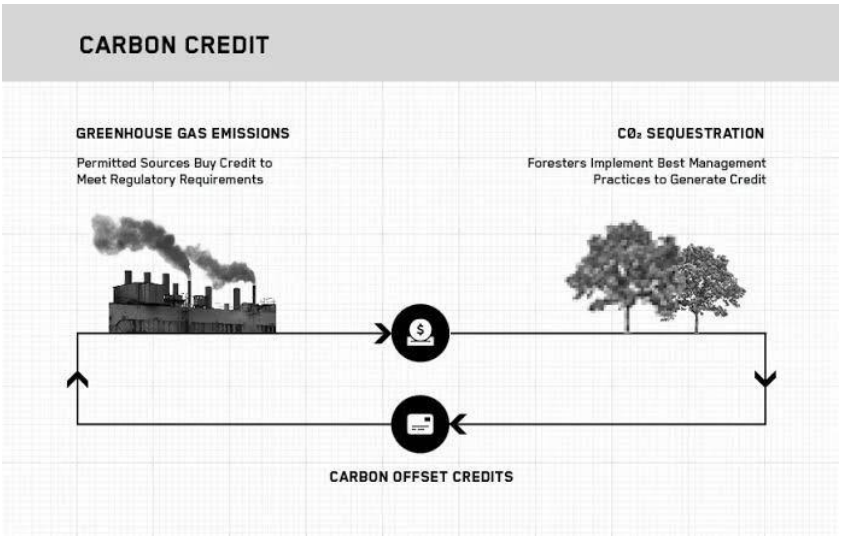
Mobilizing private and public investments towards green technologies and sustainable infrastructure is essential for scaling up net zero efforts.

In conclusion, the pursuit of net zero emissions represents a transformative shift towards a sustainable and resilient future. By setting ambitious targets, implementing effective policies, and fostering global collaboration, countries can lead the way in combating climate change and preserving the planet for future generations.

4.4 Understanding Carbon Credits: A Pathway to Carbon Neutrality

Carbon credits, also known as carbon offsets, play a crucial role in mitigating climate change by incentivizing emissions reductions and supporting sustainable projects worldwide.

4.4.1 What are carbon credits?



Carbon credits represent a unit of measurement that equals one ton of carbon dioxide (CO_2) or its equivalent in other greenhouse gases. They are generated from projects that either reduce emissions or remove carbon from the atmosphere, such as renewable energy installations, reforestation initiatives, or methane capture from landfills.

4.4.2 How carbon credits work

a) Emissions reduction projects

Projects are implemented to reduce greenhouse gas emissions. For example, a wind farm displacing fossil fuel-based electricity generation. These projects are independently verified to ensure they meet rigorous standards and result in genuine emissions reductions.

b) Carbon offset generation

Each ton of CO_2-equivalent reduced or removed by the project generates one carbon credit. These credits can be bought and sold on carbon markets.

c) Carbon market transactions

Companies, governments, or individuals purchase carbon credits to offset their own emissions and achieve carbon neutrality. The funds generated from carbon credit sales support ongoing emission reduction projects.

4.4.3 Benefits of Carbon Credits

- Climate Impact.

  Carbon credits facilitate real reductions in greenhouse gas emissions, contributing to global climate goals.

- Support for Sustainable Projects.

  Revenue from carbon credit sales funds sustainable initiatives like renewable energy, forestry, and community development projects.

- Market Incentives.

  Carbon markets incentivize innovation and investment in low-carbon technologies and practices.

- Corporate Social Responsibility (CSR).

  Organizations use carbon credits to demonstrate their commitment to sustainability and offset unavoidable emissions.

4.4.4 Carbon credit pricing country-wise

Carbon credit prices vary significantly based on market demand, regulatory frameworks, and project types across different countries. Here's an overview of carbon credit pricing in select regions:

a) Europe (EU Emissions Trading System – EU ETS)

Carbon credits in the EU ETS are traded on the European carbon market. Prices fluctuate but have ranged from €20 to €50 per ton of CO_2 in recent years.

b) United States

Carbon credit prices vary by state and voluntary markets. In California's cap-and-trade program, prices have exceeded $15 per ton of CO_2.

c) China

China operates the largest carbon market in the world. Prices are regulated and have ranged from $5 to $10 per ton of CO_2.

d) Global Voluntary Markets

Voluntary carbon credit prices vary widely based on project type and credibility. Prices typically range from $5 to $15 per ton of CO_2.

Carbon credits offer a powerful mechanism to drive emissions reductions and support sustainable development globally. By investing in carbon credits, individuals and organizations can play a proactive role in combating climate change while promoting cleaner, more sustainable practices across industries and geographies. As the world moves towards a low-carbon future, carbon credits will continue to play a vital role in achieving carbon neutrality and preserving the health of our planet.

4.5 Infusion of the A.I Technology

Welcome, young minds, to our exploration of how artificial intelligence (AI) can be a powerful ally in the fight against climate change. As we embark on this journey, let's take a moment to appreciate the historical evolution of AI and its profound impact on addressing the pressing challenges of our time, particularly climate change.

4.5.1 Understanding A.I.

Artificial intelligence, or AI, has its roots in the quest to create machines that can mimic human intelligence. Dating back to the mid-20th century, pioneers like Alan Turing laid the groundwork for AI with concepts such as the Turing Test. Over the decades, advancements in computing power and algorithmic techniques have propelled AI from theoretical speculation to practical implementation.

Today, AI encompasses a broad range of technologies and methodologies, including machine learning, neural networks, and natural language processing. At its core, AI involves the development of algorithms that enable computers to learn from data, recognize patterns, and make decisions with minimal human intervention.

4.5.2 The impact of AI on climate change

Now, let's look into how AI intersects with one of the most pressing issues of our time: climate change. With its remarkable ability to analyze vast amounts of data, AI is revolutionizing our understanding of climate dynamics and empowering us to take proactive measures in mitigating its impacts.

Statistics reveal the staggering scale of the climate crisis we face. According to the Intergovernmental Panel on Climate Change (IPCC), global temperatures have risen by approximately 1.1 degrees Celsius since the pre-industrial era, leading to widespread ecological disruption and extreme weather events.

In this context, AI serves as a powerful tool for climate scientists and policymakers alike. By analyzing climate data from satellites, sensors, and other sources, AI algorithms can identify complex patterns and make accurate predictions about future climate trends and extreme weather events. This predictive capability is crucial for developing effective strategies for climate mitigation and adaptation.

4.5.3 Infusing the A.I into climate action

So, how exactly can we harness the power of AI to combat climate change? Let's explore some exciting applications:

a) Energy efficiency.

A.I algorithms can optimize energy usage in buildings, industries, and transportation systems, leading to significant reductions in energy consumption and carbon emissions. By analyzing data from smart meters and the internet of things (the IoT) devices, A.I systems can identify opportunities for energy savings and automate energy management processes.

b) Renewable energy integration.

A.I plays a key role in integrating renewable energy sources like solar and wind power into existing energy grids. By forecasting energy production and optimizing grid operations, A.I enables smoother integration of renewables, facilitating the transition towards a low-carbon energy system.

c) Transportation optimization.

AI-powered systems can optimize transportation networks, reducing congestion, and minimizing fuel consumption. By analyzing traffic patterns and optimizing route planning, A.I algorithms can enhance the efficiency of public transportation systems and logistics networks, thereby reducing carbon emissions from transportation. One of the biggest breakthrough are the inventions of electric vehicle.

Electric vehicles (EVs):

EVs are a key component of efforts to reduce carbon emissions from transportation. A.I plays a vital role in optimizing the adoption and usage of EVs by analyzing data on driving patterns, charging infrastructure, and energy demand. By optimizing EV charging schedules and managing grid integration, A.I helps maximize the environmental benefits of electric mobility.

d) Carbon capture and storage (CCS).

A.I technologies can enhance the efficiency of carbon capture and storage (CCS) processes, which are critical for reducing CO2 emissions from industrial sources and power plants. By optimizing the capture, transport, and storage of CO2 emissions, AI helps mitigate the impact of greenhouse gases on the climate.

e) Emissions monitoring and compliance.

A.I enables more accurate monitoring and reporting of greenhouse gas emissions from industrial facilities and power plants. By analyzing sensor data and satellite imagery, AI systems can detect emission hotspots, identify sources of pollution, and ensure compliance with environmental regulations.

The integration of AI into climate action offers immense potential to accelerate our efforts towards a more sustainable and resilient future. By leveraging the power of AI technologies, we can enhance our understanding of climate change, develop innovative solutions, and empower communities to take proactive measures. Together, let's harness the transformative power of AI in the fight against climate change.

4.5.4 Exercises

1. Climate Data Analysis (Ages 9-12):

   - Task: Analyze climate data with basic AI techniques.

   - Objective: Develop data analysis skills and understand AI's role in interpreting climate data.

2. Renewable Energy Optimization (Ages 13-15):

- Task: Design a virtual renewable energy system using AI for optimization.

- Objective: Gain hands-on experience in AI-driven energy optimization for climate action.

3. Natural Resource Monitoring (Ages 16-19):

- Task: Collaborate on a project using AI and satellite imagery for environmental monitoring.

- Objective: Apply advanced AI tools for conservation efforts.

4. Climate Adaptation Simulation (Ages 16-19):

- Task: Participate in a simulation using AI-based predictive modeling for climate adaptation.

- Objective: Develop decision-making skills for addressing climate challenges in a simulated scenario.

Chapter: 5

Current Word Agreements

5.1 Global Policies.

In the face of unprecedented environmental challenges, the international community has recognized the urgent need for concerted action to protect our planet's fragile ecosystems and secure a sustainable future for all. At the heart of this collective effort lie a series of landmark international treaties, conventions, and agreements that serve as pillars of global environmental governance.

The chapter 5 of our Climate Education Toolkit 2024 delves into the realm of global policies that are instrumental in safeguarding Earth's biodiversity, mitigating climate change, and combating land degradation. Through a comprehensive exploration of key agreements such as the Rio Convention, the Paris Agreement, and the Sustainable Development Goals (SDGs), we unravel the intricate tapestry of multilateral cooperation aimed at addressing pressing environmental issues.

From the rainforests of the Amazon to the icy expanses of the Arctic, these policies not only outline ambitious targets and frameworks but also embody a shared commitment to collective action and environmental stewardship. As we embark on this journey through the labyrinth of international environmental governance, let us uncover the pivotal role of these global agreements in shaping a more resilient and sustainable future for generations to come.

Join us as we delve into the first segment of chapter 5, where we explore the profound impact of global policies on Earth's protection, highlighting the significance of each treaty, convention, and protocol in our quest for a harmonious coexistence with nature.

5.1.1 Rio Convention.

The Rio Convention consist of three major international agreements adopted at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. These are the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), and the United Nations Convention to Combat Desertification (UNCCD).

Each of these conventions addresses key environmental issues, including climate change, biodiversity loss, and land degradation, respectively. They provide frameworks for international cooperation, research, and action to mitigate these challenges and promote sustainable development.

a) United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC is an international treaty adopted in 1992 that aims to stabilize greenhouse gas concentrations in the atmosphere to prevent dangerous human interference with the climate system.

The UNFCCC provides the overarching framework for global climate action, including negotiations for emission reduction targets, adaptation measures, and financial assistance to developing countries. Its key achievement is the Paris Agreement, which sets the ambitious goal of limiting global warming to well below 2 degrees Celsius.

b) Convention on Biological Diversity (CBD)

The CBD is an international treaty established to promote the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from genetic resources.

The CBD guides efforts to conserve and sustainably manage ecosystems, species, and genetic diversity worldwide, recognizing their crucial role in supporting human livelihoods, food security, and ecological resilience.

c) United Nations Convention to Combat Desertification (UNCCD)

The UNCCD is a legally binding international agreement that addresses desertification, land degradation, and drought, aiming to improve the living conditions of affected populations and ecosystems.

By promoting sustainable land management practices and mobilizing resources for affected regions, the UNCCD contributes to halting land degradation, restoring degraded lands, and enhancing the resilience of ecosystems and communities.

Let us discuss some of the agreements!

i) Convention on Wetlands (Ramsar Convention):

The Ramsar Convention is an international treaty adopted in 1971 for the conservation and sustainable use of wetlands, emphasizing their importance for biodiversity and human well-being.

By promoting the conservation and wise use of wetlands, the Ramsar Convention helps protect vital ecosystems that support diverse flora and fauna, regulate water cycles, and provide essential services such as flood control and water purification.

ii) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):

CITES adopted in 1973, is an international agreement aimed at ensuring that international trade in specimens of wild animals and plants does not threaten their survival.

CITES plays a crucial role in safeguarding endangered species by regulating and monitoring their international trade, thus helping to combat illegal wildlife trafficking and preserve biodiversity.

iii) Cartagena Protocol on Biosafety:

The Cartagena Protocol is an international treaty adopted in 2000, that addresses the safe transfer, handling, and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biodiversity.

The protocol promotes the environmentally sound management of LMOs to minimize risks to biodiversity and human health, fostering biosafety measures and public awareness of biotechnology's potential impacts.

iv) Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization:

The Nagoya Protocol is an international legal instrument adopted in 2010, that aims to ensure the fair and equitable sharing of benefits arising from the utilization of genetic resources, with a particular focus on biodiversity-rich countries.

By promoting access to genetic resources in a manner that respects national sovereignty and the rights of indigenous and local communities, the Nagoya Protocol supports biodiversity conservation and sustainable use, fostering equitable partnerships for biodiversity conservation and sustainable development.

v) Kyoto Protocol:

The Kyoto Protocol is an international treaty adopted in 1997, that sets binding emission reduction targets for developed countries to mitigate climate change.

Though it has been largely superseded by the Paris Agreement, the Kyoto Protocol played a significant role in shaping international climate policy by establishing mechanisms such as emissions trading and Clean Development Mechanism (CDM) projects, fostering early efforts to address global warming.

vi) Paris Agreement:

The Paris Agreement is an international treaty adopted in 2015 under the UNFCCC, aiming to strengthen the global response to climate change by keeping global temperature rise well below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit it to 1.5 degrees Celsius.

The Paris Agreement represents a landmark commitment by nearly all countries to undertake ambitious climate action, including setting nationally determined contributions (NDCs), enhancing adaptation efforts, and mobilizing climate finance. It provides a flexible framework for collective action to transition to a low-carbon, climate-resilient future.

5.1.2 Sustainable Development Goals (SDGs):

The SDGs are a set of 17 global goals adopted by all United Nations Member States in 2015 as part of the 2030 Agenda for Sustainable Development, addressing social, economic, and environmental dimensions of sustainable development.

The SDGs provide a comprehensive framework for global development that integrates environmental sustainability with social and economic progress. By addressing interconnected

challenges such as poverty, inequality, and environmental degradation, the SDGs promote a holistic approach to advancing human well-being while safeguarding the planet for future generations.

5.1.3 How do Nations collaborate?

To fight against the climate action, the Nations usually collaborate with each other in form of;

Conference of Parties (COP):

To ensure that all parties of the UNFCCC have set obligations to undertake climate action, a Conference of Parties (COP) is held yearly as agreed upon. The COP is the main decision-making body of the UNFCCC.

The parties involved in the COP are the 198 nations that have ratified the United Nations Convention framework on Climate Change (UNFCCC).

The COP reviews the emissions and emissions reduction plans of each country. This creates an accountability system for existing plans and determination of the effectiveness of the plans. The COP is important because it ensures that different nations come together to make decisions about how to mitigate and adapt to the climate crisis. The first COP was held in Berlin, Germany in 1995. All COPs are named after the country in which they were held.

While every COP is significant in shaping global climate action, certain gatherings stand out for their historic decisions and landmark agreements. From the adoption of the Kyoto Protocol in COP3 to the landmark Paris Agreement reached at COP21, these pivotal moments underscore the COP's pivotal role in driving ambitious climate action and fostering international cooperation in the face of the climate crisis.

As the world grapples with the escalating impacts of climate change, the COP remains a beacon of hope, embodying the collective resolve of nations to forge a sustainable and resilient future for generations to come.

Youth Conferences:

Young people play a very crucial role in contributing to decisions towards climate action. Hence, the UNFCCC has an official children and youth constituency known as YOUNGO.

YOUNGO was formed as a constituency in 2009 and was fully confirmed in 2011. It is responsible for organizing the Conference of Youths (COY) to ensure that youths contribute in decisions towards fighting climate change.

There are 4 types of conference of youths hosted.

1. Global COY (GCOY)- This is the biggest youth conference held before COP. It usually consists of YOUNGO members and all youths that are interested in contributing to documents presented at the Conference of Parties (COP).

2. Virtual COY (VCOY)- This conference occurs virtually to accommodate youths interested in contributing towards climate action but are unable to travel due to lack of funds, age barriers or visa restrictions to attend the GCOY.

3. Regional COY (RCOY) and Local COY (LCOY)- These conferences are usually held before the GCOY. They are held to ensure proper representation of youths within a specific region or nation at the GCOY.

The COYs are very important as they promote proper policy documentation, effective capacity building, skill building workshops and cultural exchange.

FXB Climate Advocates Program

The FXB Climate Advocates program was launched to address the urgent need for global action on climate change, recognizing its disproportionate impact on marginalized and vulnerable populations. Young people are seen as key stakeholders in driving meaningful change, not only in advocating for environmental sustainability but also in promoting social justice.

The program equips participants with the knowledge, skills, and resources needed to become effective advocates. Through their efforts, they aim to influence policies and practices that contribute to climate change, advocating for sustainable solutions that benefit both people and the planet.

By mobilizing communities and raising awareness, Climate Advocates create a ripple effect of change, inspiring others to take action. Their work not only addresses the immediate impacts of climate change but also contributes to long-term resilience and sustainable development.

The FXB Climate Advocates program embodies a commitment to empowering young leaders and fostering a global movement for climate justice. Through their advocacy efforts, participants are driving positive change, ensuring that environmental sustainability and social justice go hand in hand.

For more information, you can visit their website at [FXB Climate Advocates] (https://www.fxbclimateadvocates.org/).

Thank you, FXB International!

FAVOUR GRAHAM, NIGERIA

PAZ MATTENET RIVA, ARGENTINA

AGREN JONATHAN, TANZANIA

ALI MOHAMED EMBARAK, EGYPT

PRECIOUS ABUO NIGERIA

WITHNEY ZODAN, BENIN

Global Climate Education Toolkit

MONTELLA SILLA, KENYA

SAYAN DAS, INDIA

MUHAMMAD DANIYAL KAMAL, PAKISTAN

ROSARIA E. SIMUSANDU, ZAMBIA