Climate Change Network Nepal

CLIMATE CHANGE TRAINING MANUAL

An Easy Guide for Teachers

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Few Words

Today, our environment is heavily deteriorated by the growing population pressure. Our nature is facing enormous challenge to save its existence due to the changing climate. We are in the point where we have no other options for our survival but to take actions for the Climate Solutions.

It is the generation next who will face more impacts of climate change in their lifetimes and it is also the same future generations, the children and youth, who can really change the climate change because they are the contributors of not only tomorrow but today as well. The Capacity Build Up of the Youth and Children are essential to lead a bright way towards a sustainable future. Imparting climate change education is therefore very important step. Realizing this, the concept of this training module evolved in order to facilitate the youth trainers and make students (Grade 7- 9) easily/conceptually aware on climate change.

British Council Nepal launched its International Climate Champions Project in 2009 which selected 10 dynamic youths "International Climate Champions" committed to work in climate change. Within that project, I took the opportunity to conduct Educational Awareness Program in 20 different schools of Kathmandu Valley. The consultation with the teachers and youth trainers and the evaluation of the students after presentations really helped us to come up with the content, methodology and the approaches that will make this module simple and effective. The final version of the module has been developed after running a pilot test in 3 schools.

I am very grateful to Clean Energy Nepal, Nepalese Youth for Climate Action and Clean Air Network Nepal who supported throughout the process of developing this module. My sincere thanks go to Embassy of Finland and Bangladesh Center for Advanced Studies (BCAS) for their support. I am equally thankful to Climate Change Network Nepal (CCNN) and Oxfam GB Nepal for their support to re print this manual.

This is just a beginning,
If not now when and if not us who?

Amita Thapa Magar
British Council International Climate Champion 2009/10

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WHY THIS TRAINING MANUAL?

The term climate change is a very serious topic because of the fact that it poses potential threat to the living species on the Earth. The impacts posed due to the climate change is what we are facing now and will be facing in future as well, probably in more intense form. It is directly affecting our livelihood. It is high time we need to unite to combat climate change for our planet, for ourselves.

The beginning of any action starts from its knowledge and information sharing of the subject matter. Then it creates an opportunity to involve people to work for their climate system. And who would be better learners than the children through their teachers? The teachers are the ones who can influence their students' learning and outreach it to the family and community through them. This emphasizes the strong need of resource material to feed students on the knowledge matter.

This is how the idea of developing a climate change training module came. This module will help the students learn about climate change in an interactive way which they would find easy by the teacher/trainer who will follow this module.

The objective of the tool kit is to facilitate the information and knowledge sharing on Climate Change among the youth and children.

Target group: The primary targets of the tool kit are the teachers and trainers who will take the opportunity in facilitating climate change education to the school students who are the secondary target.

How to use this?

Each Unit contains the similar format where the description on the particular unit, interactive activity, and key learning are placed. Before going to the module, it is important to know what each part is about:

Learning objective: This section provides the points emphasizing why it is important to learn particular topic.

Introduction: This section contains the background description and resource information of the specific topic. This will help the learner gain subject knowledge on each topic.

Activity: This is the interactive part on the module relevant with the topic. The procedure for the activity is given to facilitate the trainers in guiding the students. After the activity it is important to give the conclusive notion showing the clear linkage between the activity and the subject.

Knowledge meter: This section contains a set of three questions which will be asked to the students after the completion of each topic. The answers from the students will reflect if they are getting the things properly or not

Key learning: This will contain the main learning of each topic in bullet points. The students are expected to learn these things.

The trainers are requested to go through the module carefully. Then they can follow the same line in dealing with the students.

Guidelines for Trainers

- Avoid use of complicated words.
- Emphasize equally on all the students and use the space well while presenting. Do not just stand in one position.
- Always try to bring out preliminary answers from the students at the start of each unit. This will help you know about their understanding and also this makes them feel easy and comfortable.
- Always encourage students saying “good”, “excellent” and even if they hesitate or answer wrong make it easy for them to answer ahead.
- Never point out the students
- Use humor when necessary/ in between the lectures

Before starting

The basic objective of the training would be to supplement students with the climate change knowledge. So, it is very important to evaluate how much the students have really understood from the training.

Methods for the evaluation

Various methods can be used for the evaluation. Students’ performance in the follow up activities such as Art Competition, Speech and Debate give an idea how effective the training has been.

One of the best methods that can be applied could be the Questionnaire Evaluation Survey for the immediate evaluation. The students will fill the same questions themselves individually two times, before and after the Climate Change presentation. This will provide an estimate how much they have learnt. A format of the questionnaire has been presented for Pre- Survey and Post Survey of the students. However, depending upon the level of students, the questions can be changed.

Evaluation Survey form

1. **Are you familiar with the following terms? Please tick the one you are familiar with.**

- ☐ Green House Effect
- ☐ Climate Change
- ☐ Kyoto Protocol
- ☐ Glacier
- ☐ Sea Level rise
- ☐ GLOF
- ☐ Adaptation
- ☐ Global warming
- ☐ Conference of Parties (COP)
- ☐ UNFCCC (United Nations Framework Convention on Climate Change)
- ☐ Glacial lake
- ☐ Drought
- ☐ Renewable energy
- ☐ Mitigation

2. **What is the full form of GLOF?**

- ☐ Green Land of Flood Side
- ☐ Green Lake of Forest
- ☐ Glacial Lake Outburst Flood
- ☐ Global lake of Floods

3. **One of the differences between Weather and Climate is a**

- ☐ measure of time period
- ☐ difference in temperature
- ☐ its area
- ☐ its scope

4. **What is the average temperature increase of Nepal according to Dept of Hydrology and Meteorology, 2006?**

- ☐ 0.06^0 C
- ☐ 0.08^0 C
- ☐ 0.02^0 C
- ☐ 0.04^0 C

5. **What is Nepal's global share of total Green House Gas emission according to the Initial National Communications to the Conference of Parties of the UNFCCC, MoPE 2004?**

- ☐ 1.25%
- ☐ 0.25%
- ☐ 0.025%
- ☐ 2.5%

6. **Climate change affect the following**

- ☐ water resources
- ☐ none of the above
- ☐ Plants and animals
- ☐ all of the above

7. **Which of the following is not a green house gas?**

- ☐ Carbon dioxide
- ☐ Nitrogen
- ☐ Methane
- ☐ Ozone

8. **What do you think you can do to conserve your environment and control climate change?**

a. .....

b. .....

c. .....

MODULE ONE

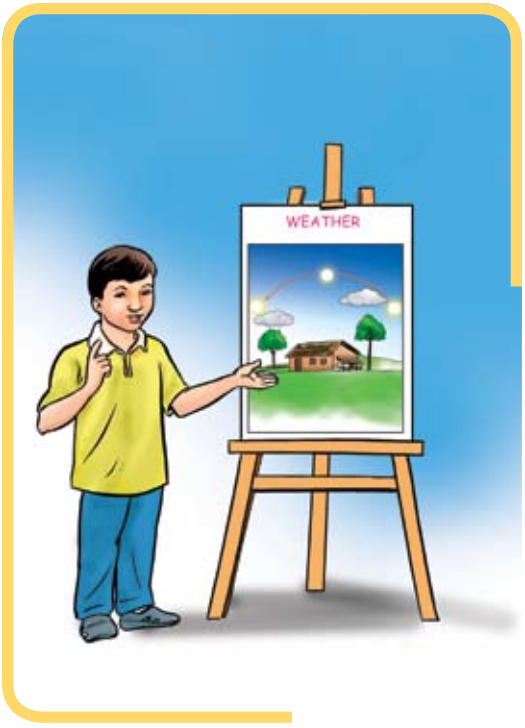
WEATHER AND CLIMATE

Learning Objective

- Provide basic information about weather and climate
- Know the difference between weather and climate

Introduction

Weather is the conditions of the atmosphere over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time. Weather is a day to day state of atmosphere in terms of temperature, moisture content and air movements; it derives from the chaotic (disordered) nature of the atmosphere and is unstable as it is affected by small disturbances.



Climate can be basically defined as the 'average weather'. The term climate is a scientific concept. It deals with statistics such as the averages of all weather patterns over a long period of time (normally 30 years).

The difference between weather and climate is a measurement in the given time. Weather can be directly perceived by people but climate cannot.

Climate is what you expect and what it was, Weather is what you get.

There are different types of climatic condition in the Earth. Polar region has cold climate, desert have warm climate.

For e.g. during winter (Poush/ Magh) in Nepal, the climate is cold. We expect cold at winter. That is climate of that place at the time. Even in winter we get rainfall or sunny days. These are the weather conditions what we get.

Activity

- Divide the students in two groups
- Ask one group to draw a picture which represents weather and other group to draw a picture that represents climate
- Then ask each group to explain about the picture on their own

Notion: If the students picture particularly focus on the sunny day or windy day or any event of a day then it can be concluded that it is weather whereas If that shows the expected condition of any particular area over a long period of time (for eg, autumn season, winter, desert condition etc

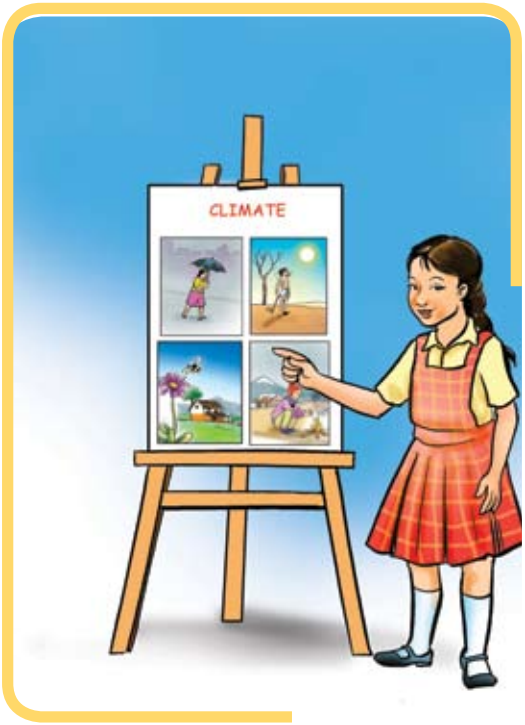
Knowledge Meter

Use this interactive tool to test the knowledge of the students after each topic.

- Put three relevant rapid questions to the students and make it open to answer by anybody.
- Let them discuss in group and share their answer or stories they know.

Rapid fire questions: ROUND 1

- What is the main difference between weather and climate?
- How many years of data are required for climate analysis?
- Today is Feb 14. It is a beautiful sunny day. Suddenly the sky is covered with clouds and became windy. Is this a weather or climate event?



Key Learning

- Weather is a day to day state of atmosphere.
- Climate can be basically defined as the 'average weather' over a long period of time. Rainfall in monsoon season, cold in winter is regarded as the climate.
- Weather is what you get; Climate is what you expect and what it was.

MODULE TWO

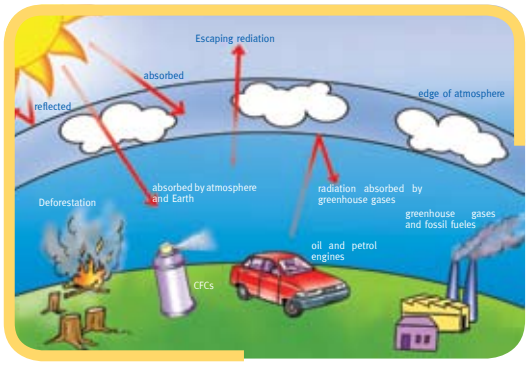
GREEN HOUSE EFFECT AND GLOBAL WARMING

Learning Objective

- Provide concept of greenhouse effect and source of greenhouse gases
- Relate green house effect and global warming
- Make aware about the unprecedented warming rate of the Earth

Introduction

When the sun's energy reaches earth, most of the energy warms the atmosphere and the earth's surface. The earth then radiates some of this energy back into space as infrared rays. Green house gases in the atmosphere trap some of the infrared rays before they escape outside the atmosphere. This leads to the addition of more solar energy and thus heat to the earth's atmosphere.



The effect of heat trapping due to increasing **green houses gases** in the earth's atmosphere is known as green house effect. The earth's "natural greenhouse effect" is what makes this planet suitable for life. Had not there been any Green House Effect, the Earth's temperature would have been (-18° C), i.e., below the freezing point. Thus Earth's natural green house effect makes the life possible.

However, human activities, primarily the burning of fossil fuels and clearing of forests, have greatly intensified the natural greenhouse effect, causing global warming. This is the major concern for us.

Green House Gases

Carbon dioxide (CO_2)
Methane (CH_4)
Ozone (O_3)
Water Vapor (H_2O)
Nitrous Oxide (N_2O)
Halo Carbons

Sources of Green House Gases

Forest fires/Deforestation: Plants take carbon dioxide in the presence of sunlight for the preparation of their food through the process known as photosynthesis. Forests act as the carbon sink as it intake carbon. When the forests are degraded, the amount of carbon that it used to absorb will be released to the atmosphere thus contributing to additional green house gases in the atmosphere. On the other hand, various types of gases including CO2 are released when fires take place.

Vehicular/Industrial emission: Mixing of any unwanted substances in the air in quantity that is harmful to human, plants and animals is the air pollution. Air pollutants are also a contributor to the green house effect. Its scope is from local to regional level due to its transboundary nature. The release of harmful gases, especially the green house gases in the atmosphere through different sources like industries, vehicles etc is accelerating the green house effect and thus global warming.

Mismanagement of Solid Waste: When the wastes are decomposed in absence of air (oxygen), methane gas is produced. Methane is 21 times more potential in causing Green House Effect than Carbon Dioxide.

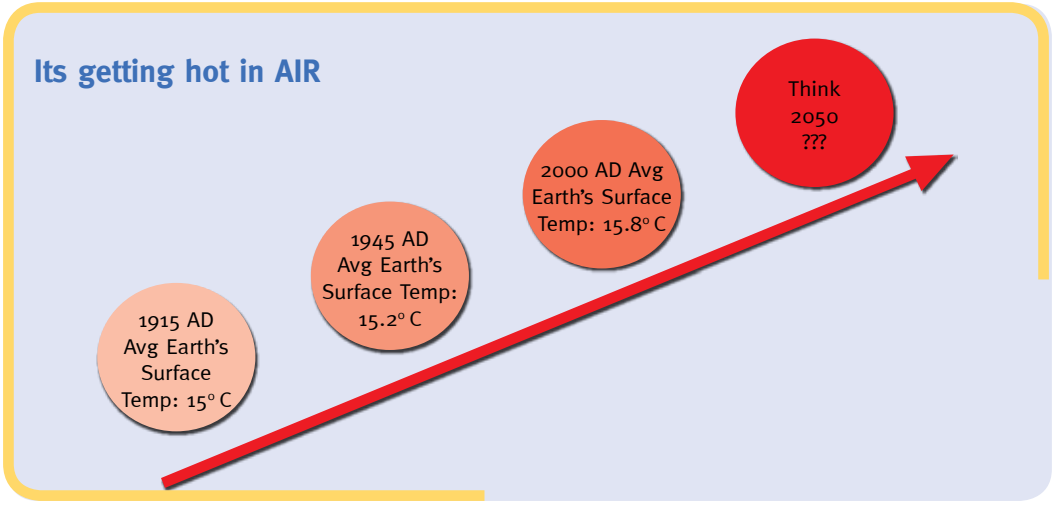
That means, 1 Methane = 21 Carbon Dioxide

Tyre burning: The burning of tyres emit very harmful gases into the atmosphere

Aviation Sector: Aviation (Airplane travel) is another fast growing source of green house emissions.

Global Warming

Global warming is the increase in the average temperature of Earth's near surface air and oceans since the mid - 20th century and its projected continuation.



Activity

Global Warming

- Ask two students to volunteer to participate in the activity
- Bring them at the front and let one student sit on a chair
- Give a blanket/ cloths to the standing student ask him/ her to cover his/ her friend who is sitting on the chair
- Add on the blanket to the sitting student one by one up to 4-5 blankets
- Then ask him/ her how he/she is feeling.
- Notion: AS the blankets are added and added the student feel warmer and warmer. Similarly, the earth gets warm and warm by the addition of green house gases which causes the green house effect and hence global warming occurs.
- Here, the blanket acted as the Green House Layer and the student as the earth. Whatever difficulty the student is feeling, more difficulty is being faced by the earth.

Green House Effect

- Divide the students in a group of 5-6.
- Let them do the paper cutting of the following: Earth, name of Green House Gases, Green House Layer, Sun, and arrow (drawing in papers); which are required to show the Green House Effect:
- Ask them to arrange the pictures in correct order to represent Green House Effect. Pictures can be attached at the board or wall.
- Then ask them to explain brief about their picture arrangement and green house effect.
- Give prize for the group who does correct at the shortest time.

Did you know?

- Globally, 10 of the hottest years on record have occurred since 1990 (records began in 1861)
- The upper safer limit of the CO_2 and CO_2 equivalent in atmosphere is 350 ppm (parts per million) as quoted by James Hanson, a NASA scientist. The current level has already reached 387 ppm.
- Nepal emits only 0.025% of the total Global GHGs emission (Source: MoPE,2004, Initial National Communications to the Conference of Parties of UNFCCC)
- The average annual temp rise of Nepal is 0.06° C (Source: Dept of Hydrology and Meteorology, 2006)
- One long-haul return flight can produce more carbon dioxide per passenger than the average UK motorist in one year.
- Road transport made up around 18 per cent of total man-made carbon dioxide emissions in the world

Knowledge Meter

Rapid Fire Questions: ROUND 2

- Is global warming happening due to green house effect?
- What are the major sources green house gases?
- Is green house effect good or bad? Why?

Key Learning

- The effect of heat trapping due to increasing of green houses gases in the earth's atmosphere is known as green house effect
- The main cause of global warming is the green house effect due to accumulation of green house gases
- Excessive human induced Green house gas emission during the industrialization in the 19th century is the main cause for global warming

MODULE THREE

WHAT IS CLIMATE CHANGE ?

Learning Objective

- Know how and why climate is changing
- Learn about the consequences of Climate Change

Introduction

Climate change is a Natural Phenomenon, But uncommon and rapid rate of changing climate in these last few decades is purely Anthropogenic (human induced) as a result causing Global Warming due to emission of large quantity of Green house gases.

According to IPCC: Any change in climate overtime, whether due to natural Variability or as result of human activities is the Climate Change.

The Earth's climate is not static, and has changed many times in response to a variety of natural causes. 'Climate change' refers to a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to internal processes and external forcing. Some external influences, such as changes in solar radiation and volcanism, occur naturally and contribute to the total natural variability of the climate system. Other external changes, such as the change in composition of the atmosphere that began with the industrial revolution, are the result of human activity. (IPCC, 2007)

Climate change is a change in the statistical distribution of weather over periods of time that range from decades to millions of years. It can be a change in the average weather or a change in the distribution of weather events around an average (for example, greater or fewer extreme weather events). Climate change may be limited to a specific region, or may occur across the whole Earth.

Consequences of Climate Change

Temperature Rise

The contingency and prevalence of disease becomes high in the increased temperature. Heat Waves resulted from the high temp kills many people. It also accelerates snow melting reducing the fresh water sources and possibly bringing water scarcity.

Variation in precipitation

Excess precipitation results in floods thereby resulting landslide, erosion whereas deficit or no rainfall result in very dry condition drought, water scarcity etc.

Snow melting and Sea Level Rise

Melting of snow is shrinking the snow cover in the mountains reducing the source of fresh water. It also brings impacts like Glacial lake Outburst Flood.

Rapid pouring of snow melting from the snowline is accelerating sea level rise. Sea level rise possesses instant threat to some of the island countries which are in danger to submerge.

Extreme Weather events

Climate change increases the frequency and intensity of the extreme weather events like cyclone, hurricane are recorded more in a shorter period of times in a more intense form.

All these consequences can lead to a huge disaster. (More on the Module Four: Climate Change impacts)

Activity

Story telling

- Divide the students into group of 5 to 6.
- Ask them if they have heard about the changes in their locality or country from their parents or grandparents over a period of time. For eg, change rainfall pattern, the type of crops that used to be harvested, agricultural calendar (cropping time etc)
- Ask each group to collect information from their home and locality. Then ask them to develop a story of their own based on the information they heard or seen regarding changes in the climate.
- Hear stories from them next time.

Notion: If they have known about some changes and tell that in their stories, conclude that climate change is happening. Their story will tell the changes observed in local places then give some examples at regional or global level so that they can know that climate change is happening at global level as well. It will show how big the problem is.

Did you know?

- The average temperature of the Earth has increased by 0.740 C from 1906 to 2005
- Sea Level has risen by 1.8 mm per year from 1961 to 2008
- Global mean sea level could rise by almost a metre by 2100.
- Arctic sea ice has reduced by about 40% in recent decades
- There has been a 10% decrease in snow cover in the Northern Hemisphere since the late 1960s

Knowledge Meter

Rapid Fire Questions: ROUND 3

- What are the major consequences of Climate Change?
- Is climate change natural phenomenon or anthropogenic?
- What do you think is the causes of climate change?

Key Learning

- Any change in climate overtime, whether due to natural Variability or as result of human activities is the Climate Change.
- Climate Change is real and it is happening all around the globe mainly because of the fossil fuel consumption (fossil fuel based development)
- The major consequences of climate change are temperature rise, variation in precipitation and the snow melting and sea level rise.

MODULE FOUR

IMPACTS OF CLIMATE CHANGE

Learning Objective

- To study the potential impacts of climate change on different regions of the world.
- To understand impact of climate change specifically in Nepal

Introduction

Various Impacts of Climate Change are explained below:

Water Resources

Water resources have high impacts due to the climate change. More than 60% of the impacts observed today because of climate change fall on the water resources.

Snow and ice are important sources of fresh water for us particularly for maintaining flows in rivers during the dry season. But the rapid melting of snow due to global warming has clearly indicated water scarcity in future. The disturbance in the rain cycle as a matter of changing climate illustrates the impacts further. The overall impacts of climate change on water resources can be described in these points:

Too much water and Too little water- As a result of climate change, the distribution pattern of rainfall has changed. Some areas receives high amount of rainfall whereas some areas receive very little or no rain. Because of too much water in some area faces different problems like landslides, floods etc while with too little water the drought intensifies the problem in other parts.

Wrong type of water- Particular in our region, drought and erratic rainfall events have been observed in more intense form with longer duration. Such events make the water availability scarce or muddy making it unsafe for drinking. Those zones with wrong type of water become highly prone to water induced diseases, sometimes breaking out epidemics. This causes loss of life.

While in coastal areas, salt water intrusion is big problem and it is one of the reasons which are making the fresh water saline (adding and increasing salinity). This water is not potable (drinkable). That means the water being wrong type for us. Because of Sea Level Rise, salt water intrusion is also very prone in coastal region. Therefore water becomes salty and thus of wrong type.

Wrong time of water- The onset of monsoon in Nepal is June and particular month/time in each part of the world. But now if we see the past trends we can see that there has been a shift in the rainfall pattern. When we expect rain, we do not get and when we do not expect we get rainfall in wrong time.

All this because of the changing climate.

Melting Glaciers and GLOF

Nepal comprises of about 3252 glaciers and 2323 glacial lakes which are the fresh water resources for more than 1.3 billion population across South Asia. These are also regarded as the Water Tower of Asia. But the rapid rate of warming is challenging the existence of such glaciers due to the rapid melting. Water scarcity will be a major problem in this region.

Rika Samba Glacier in the Dhaulagiri zone is shrinking at the rate of 10 meter per year. With this rate, AX010 glacier based at Shorong Himal might disappear by 2060 AD.

About 67 percentage Glaciers of the Himalayan Region have already witnessed change in its size.

The melting of glaciers accumulates large volume of water in the glacial lake. The natural dam (moraines) covering the lake then cannot withstand the pressure exerted by water and finally outbursts as a flood. This is called as Glacial Lake Outbursts Flood (GLOF). This creates massive loss in the downstream areas. The loss includes loss of life, property, costly Infrastructure of

education, health, basic services etc. This also forces in the population displacement. Impact on freshwater sources

A Hydropower station was washed away by Dig Tsho Glacier Lake Outburst Flood back in 1985 AD. Climate change is challenging our development activities as well.

5 glacial lakes of Sagarmatha National park and Kanchanjangha Conservation Area have already outburst. More than 20 glacial lakes of Nepal carry potential risks for GLOF

Agriculture

Agriculture is going to be the most critical sector from climate change perspective. All the consequences of climate change, i.e.; temperature RISE, variation in rainfall, sea level rise and increasing intensity and frequency of extreme climatic events will adversely affect the global agricultural practice and production.

More than 67% of the total population of Nepal is engaged in Agriculture (Source: Census 2001). Also it contributes for more than 40% in the Nation's Gross National Product. Our agriculture is totally dependent on the Precipitation as the irrigation facility is only limited to certain part of the country due to lack of resources. Therefore the change in precipitation pattern arose due to climate change has bought a decline in the agricultural production. Similarly the fluctuations in the temperature, decline in the soil moisture content, wind events and hailstorm have also affected our traditional mode of agricultural system. Floods and drought also reduces the fertility of the soil because of which the agricultural yield decreases.

Also, new variety of pests and diseases hamper the crops.

Health

Climate change is a significant and emerging threat to public health, and changes the way we must look at protecting vulnerable populations. The health status of millions of people is being affected. Disease and injury due to heat waves, cold waves, floods, storms, fires and droughts are increased as the increase in climate induced disasters. Moreover, in hot areas, the diseases become highly prone to break out.

Skin, respiratory and other infectious diseases becomes very prone.

Forests and Biodiversity

Forest fires, deforestation, extinction of tree species are the dangers to forest and biodiversity.

The forest cover of Nepal is about 29 percentages. Forest holds high significance ecologically and economically. They act as Carbon Sink as they intake carbon dioxide during photosynthesis thus contributing in reducing climate change impacts to some extent. Forests are the habitat of different varieties of Flora and fauna. The massive deforestation that occurred after 1950s has greatly reduced the biodiversity and local economy of the inhabitants dependent on the forests. This has created loss and even extinction of species.

Forest, plants and animals require good environment with optimum temperature, water, food and nutrients. They are unable to adjust to the changing climate which causes their extinction also. According to a study about 2.4 percentage of the biodiversity is in danger of extinction due to climate change.

Increasing temperature is reducing the soil moisture and keeping air dry because of which forests become prone to fires. Floods, landslides, soil erosion also trigger the forest destruction.

Forest destruction will directly impact plants and animals and the people whose livelihood are directly linked with the forests.

Did you know?

- Nepal accounts for 2.1 % of share of biodiversity in the world, and Climate Change possess significant loss of habitats and possible extinction of some plant and animal species
- Direct financial losses from climate change could run globally at £213 billion a year by 2050, not counting social and environmental costs

Activity

- This game is called **Impact Game** as the students have to act as per the climate change impact.
- Divide the students in a group of 4.
- Write various climate change impacts separately in separate paper and give that to all the groups. e.g., hurricane, drought, floods, GLOF, sea level rise etc
- Brief the students that they will imagine and fit themselves in the climate change event as given in the paper. Each group will then act and speak few words thinking what they will do if they face such situation.
- For e.g., if a group receives the paper cheat of GLOF, then from the group one will act as human, one as plants and wildlife, and one as soil or infrastructure or any other thing that is prevailing there. The group will compile impact on each aspect and present as a group or can do individually as well.

Notion: This activity will help them have thought on other vulnerable people situation and know to extent how climate change is affecting many people around and the whole natural system.

Knowledge Meter

Rapid Fire Questions: ROUND 4

- What are the climate change impacts in Nepal?
- What is a GLOF?
- Will sea level rise affect Nepal?

Key Learning

- Glacial Lake Outburst Flood (GLOF), erratic rainfall pattern, extreme weather events such as cyclones, hurricanes, forest fires, Sea level rise are the potential impacts of climate change.
- There are more than 3252 glaciers and 2323 glacial lakes in Nepal which are in great risk due global warming.
- More than 20 glacial lakes of Nepal are in real danger of outbursts
- More than 60% of the climate change impacts are reflected in water.

MODULE FIVE

ADAPTATION AND MITIGATION

Learning Objective

Provide conceptual basis on adaptation and mitigation approaches
Know how these approaches are important for Nepal

Introduction

There are two parallel strategies to combat climate change:

- Mitigation
- Adaptation

What is Mitigation?

1. Mitigation- "avoids the unmanageable..."

What is Adaptation?

2. Adaptation- "...and manage the unavoidable"

MITIGATION

"The causes of climate change are removed by reducing Green House Gases emissions and increasing the carbon stock."

ADAPTATION

"The effects of climate change are dealt with by coping with their negative impacts by the responsive adjustments."

Nepal's green house gas (GHG) contribution to the global share is very low. So, it doesn't have significant role in terms of GHG reduction from global scale. However it can do its best to utilize it in carbon trading. That means, the level of GHG reduced from a part of Nepal can be claimed for money from developed countries which have mandatory obligations in GHG reduction set by Kyoto Protocol.

But the impacts of the climate change are inevitable. The only way to do is reducing the vulnerability of the negative impacts. This can be done by adopting necessary approaches or measures at local or community level. Adaptation can reduce vulnerability, both in the short and the long term. It is a better combating strategy for developing countries.

There are few organizations in Nepal who are doing Community Based Adaptation Practices.
For examples,

- Landslide stabilization, Pond construction, Flood control techniques are some of the adaptation measures
- Increasing the height of the dykes can protect from flooding
- Introduction of New variety of disease resistant and high productive crops
- Introducing cash crops like banana in rice field where precipitation has significantly reduced to support rice plants

- Intercropping, crop rotation and shifting cultivation
- Floating houses in the coastal region
- Climate induced disaster Preparedness by the community

These are few examples of adaptation practices adopted in a community.

Activity

- Give students a situation "a city with air pollution, major air pollution sources being the vehicles",
- Ask them what they would do to deal with the pollution (say vehicular or industrial pollution)
- Also make them to categorize which action is adaptation and which one is mitigation with reasons.
- Precede the discussion
- Hear from the students.

Notion: Wearing a mask while being exposed to the polluted environment is a form of adaptation. In this, we manage the unavoidable. While reducing the emission directly from the vehicles is mitigation approach. Also, planting trees are a form of mitigation because they absorb carbon dioxide, a green house gas. Forests act as the carbon sink.

Knowledge Meter

Rapid Fire Questions: ROUND 5

- Which strategic approach is better for Nepal, Adaptation or Mitigation?
- What is adaptation?
- For example, Russia reduced Green House Gas Emission by 10% by using electricity over coal in industry. Is this adaptation or mitigation?

Key Learning

- Adaptation is the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploit beneficial opportunities.
- Mitigation is an anthropogenic intervention to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks.

MODULE SIX

GLOBAL CLIMATE INITIATIVES

Learning Objective

- Provide information on the Global Climate Change Efforts
- Know about the climate change initiatives at National and local level

Introduction

Climate change is a global issue that has its impact on local level and local people. The impacts are being felt by our fragile and vulnerable mother earth and all of us living here. We all are citizen of the globe. It becomes our responsibility to act for the Climate Solutions. Feeling the necessity and urgency, initiatives have already started at Global, National and local level.

Global Initiatives

United Nations has already started the initiatives at the global level.

United Nations Framework Convention on Climate Change (UNFCCC)-

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty produced at the Earth Summit, held in Rio de Janeiro in 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The Convention is legally non binding and has encouraged industrialized countries to stabilize GHG emissions.

As of December 2009, UNFCCC had 192 parties. That means, 192 countries have already signed the UNFCCC document.

Conference of Parties (COP)

All the countries that have signed the UNFCCC document meet every year, which is known as the Conference of Parties (COP). The parties have met annually from 1995 in Conference of the Parties (COP) to assess progress in dealing with climate change. In 1997, the Kyoto Protocol was concluded and established legally binding obligations for developed countries to reduce their greenhouse gas emissions.

Kyoto Protocol


Photograph: Adrian Dennis/AFP/Getty Images

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The Kyoto has broadly categorized the world into two sets- Developed and Developing Countries. Kyoto Protocol has provided Emission reduction targets for the developed countries. Kyoto Protocol is legally binding in nature. Any Party (Country) signing the Protocol will have legal obligation to follow the mandate of the Protocol. But there are no obligations for developing countries to reduce their green house gas emission.

Kyoto has set binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions by 5.2 % against 1990 levels over the five-year period 2008-2012. This period of time is also called as the "First Commitment Period."

The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. Nepal has ratified Kyoto Protocol on 16th Feb 2005. But still one of the leading Green House Emitters of the world, USA has not signed Kyoto Protocol.

Nepal, India and China also fall on the developing countries category. Now, India and China are among the largest Green House Gas emitters of the world. So, the developed countries are also asking for their emission reduction in the negotiations.

Most of the developed countries economy is based on the fossil fuel and coal (non renewable source of energy). Though the Kyoto mandates the signatory developed countries to reduce their green house gas emission, it is not easy for them to so. It becomes rather costly for them to reduce their emission. To facilitate this work, Kyoto Protocol has set three mechanisms for both developed and developing countries.

The Kyoto mechanisms

The Kyoto mechanisms are:

Emissions Trading – known as "the carbon market"

The developed countries that have signed and ratified Kyoto Protocol have to reduce their green house gases emission as per the target. In this course if they reduce the emission beyond the targets, the excess amount will be called as the Carbon Credit. Any country can sell the carbon credit to other developed countries. So, other countries can also fulfill their emission reduction target by buying this carbon credit. This trading can only take place among the industrialized countries because only they have compulsion for emission reduction.

Clean Development Mechanism (CDM)

Though we live in different parts of the globe, we share a single earth and same atmosphere. Whoever emits the green house gases in the atmosphere it affect the whole climate system. And whoever reduces the emission, it will be reduced from the atmosphere. So both developed and developing countries can benefit from the Clean Development Mechanism.

The developed industrialized countries will invest on the Carbon reduction projects in the developing countries. In return, they get the Carbon Credit to their account for their investment. Nepal has few CDM projects in operation. Biogas Project is one of them.

Joint implementation (JI)

Emission reduction technology and the projects are very expensive to operate and execute smoothly. Financial, technical and also human resources require high cost. For this, any country can partner with other to jointly implement the project and facilitate the process

Which	Where	When
COP 1	Berlin, Germany	1995
COP 2	Geneva, Switzerland	1996
COP 3	Kyoto, Japan	1997
COP 4	Buenos Aires, Argentina	1998
COP 5	Bonn, Germany	October 25 and November 5, 1999
COP 6	The Hague, The Netherlands, 13	November 13-November 25 , 2000
COP 7	Bonn, Germany	July 17-27 2001
COP 7	Marrakech, Morocco	October 29-November 10 2001
COP 8	New Delhi, India	October 23 – November 1, 2002
COP 9	Milan, Italy	1 – 12 December 2003
COP 10	Buenos Aires, Argentina	6 – 17 December 2004
COP 11	Montreal Canada	28 November to 9 December 2005
COP 12	Nairobi, Kenya	6 and 17 November 2006 6-17 Nov 2006
COP 13	Bali, Indonesia	December 3 and December 15, 2007
COP 14	Poznan, Poland	1-12 Dec 2008
COP 15	Copenhagen, Denmark	6- 18 Dec 2009
COP 16	Cancun, Mexico	29 November 2010 to 10 December 2010
COP 17	Durban, South Africa	The 2011 COP 17 is to be hosted by South Africa from 28 November to 9 December 2011
COP 18		Two countries, Qatar and South Korea, are currently bidding to host the 2012 COP 18

COP 3: Kyoto Protocol

COP 7: Marrakech Accord

COP 15: Copenhagen Accord

COP 16: Cancun Agreement

NATIONAL INITIATIVES FROM NEPAL

- Nepal being a UNFCCC member country, it has been participating in International Climate Change Conferences. Nepal signed UNFCCC on 12th June 1992 (B.S. 2049 Jestha 30).
- Nepal has ratified Kyoto Protocol on 16th September 2005 (B.S. 2062 Bhadra 31)
- Nepal has already formulated climate change relevant policies which includes National Adaptation Programme of Action (NAPA) and National Climate Change Policy.
- Government and Non Government Organizations are promoting renewable and clean energy through various programs. Alternative Energy Promotion Centre (AEPC) and other NGOs are promoting alternative energy like Biogas, Solar, and Micro- Hydropower etc.
- Various organizations are conducting awareness raising and advocacy campaigns against climate change

Activity

Making your points

- Set a topic (relevant to environment at least) for discussion.
- Divide the students in three groups, A, B and C. Let group A speak for the topic, B against the topic. The third group C can speak for or against the topic or support the views of both group A and B.
- Give some time for preparation.
- Give time for each group to speak by one person on their topic separately.
- After their speech, provide time to them to clarify the points asked for. Precede the discussion
- Then provide a slot for group C to review the points of earlier teams A and B.
- Ask A and B to merge in one group or support the opponent groups. See what they do.

Notion: Like the group of students, in negotiations different countries are associated in groups. They have their own priority and issue to get convinced by other groups, especially the developed countries. You can see the students discussing intensely to make their voice heard. It also gets difficult to come to the conclusion. You can then say that same type of discussion take place in the Conferences, even more intense. No group is willing to step back from their agenda until and unless strong points are made to be implemented which are convincing enough. That is why it is taking long to come to a consensus and joint plan from both developed and developing countries.

Knowledge Meter

Rapid Fire Questions: ROUND 6

- How often (In how many years) the Conference of Parties held?
- Which countries have compulsion (obligation) to reduce the Green House Gas emission?
- What is Kyoto Protocol?

Key Learning

- UNFCCC is the biggest international treaty on Climate Change.
- The UNFCCC focal point in Nepal is the "Ministry of Environment".
- Kyoto Protocol is a legally binding protocol.
- Every year the UNFCCC signatory nations meet at the Conference of Parties (COP) to discuss on global climate change agenda.

MODULE SEVEN

MAKING A DIFFERENCE

Learning Objective

- Discover the ideas and information how you can help to combat climate change
- Follow and share learning with family, friends

Why?

Climate change is a very serious issue which is impacting every sector and each aspect of our life. Its impact is going to last for long. We are already in the tipping point of climate change though we are not in the point of NO RETURN. We can bring the change.

Who?

Each individual from their side can contribute in making our environment sustainable and livable for our future generations.

Youths and children can make a huge difference in this long run.

How?

Each of our choices can make a difference, either going Green or ignoring it.
It is a must to do situation because we are in the tipping point

WHAT CAN WE DO?

Save energy

- Power down your house, rooms, even your classrooms
- Choose energy efficient bulbs and materials.
- You can save energy by taking the bus, riding a bicycle, or walking.

Photo by Rajan Kathet

Think Globally Act Locally

Plant and save trees

- Trees absorb carbon dioxide, a greenhouse gas, from the air.
- They provide fresh air and shelter to the wildlife.

Learn about climate change

- Learn yourself first and then talk what you have learnt to your friends, family about climate change
- Start what you can do, from today

Change your consumption pattern

- Use organic food, organic materials because they are bio-degradable and are nature friendly
- Promote and buy local products
- Refill your bottle instead of buying a new one every time

Reduce Reuse Recycle

You can Reduce

- Carry a big bag while going for shopping and ignore extra polythene

You can Reuse

- The bottles
- The plastic
- You can Recycle
- Recycle kitchen water, bath top water for toilet flushing
- Paper is recycled. So, give your paper to the recycling centre or the collector nearby
- Waste paper are used in making briquette

When you recycle, you send less trash to the landfill and you help save natural resources, like trees, oil, and elements such as aluminum.

Never doubt that a small and highly committed group of individuals can change the world; indeed it is the only thing that ever has. - Margaret Mead

Switch to clean energy

- Solar Energy
- Micro-hydropower
- Wind Energy

Go Green

- Install Rain water harvesting at your home and school
- Install Bio gas plant
- Start composting

  Other options: VSBK, Watermill, Cable car, gravity ropeway

Reduce your carbon footprint

- Walk where possible
- Pedal your cycle
- Use Electric vehicles

Raise Your Voice
For Climate Change Policies
Against the Environmental degradation
Along with your family, friends and your community
We need to create the CLIMATE MOVEMENT,
For you, for me, for us, for OUR FUTURE

Activity

How Green are you?

This activity is called **"How Green are you?"**

Here the students will explain about a picture. The pictures will demonstrate one of our careless behaviors (examples given below) which are directly/ indirectly hampering our environment. The student is shown the picture and then simply asked "what is wrong in the picture?" If he/she is able to identify the careless behavior then he/she moves on to the next picture, if not, the student is explained what is wrong with the picture and why.

Be the change you want to see in this world. - Mahatma Gandhi

Colored pictures, preferably on full A4 sheets that show a setting with one careless behavior of ours that lead to environmental deterioration can be used.

(Here the teacher can direct students in collecting the required pictures in early notice before doing the activity)

- Collect the pictures
- Stick it on the wall of the classroom
- Call each student from each group divided to come at the front, where pictures are stick.
- Ask them to explain what is wrong in the picture and why, one by one
- Also let them explain how they can improve such careless behavior

In case, collection of pictures in difficult, same activity can be done by explaining the situation mentioned.

Some of the careless behavior could be:

- Not separating organic and inorganic garbage
- Leaving the fan/lights on when there is no one in the room
- Leaving the tap on while brushing our teeth/ washing our hands with soap
- Wasting paper by not using both sides
- Leaving the engine on while in a traffic jam
- Plugging in appliances when it is fully charged more commonly known as Vampire Load
- A child playing outside leaving TV on inside the room

Notion: The students will find out those behaviors which can impact our environment and resources. They can relate those actions to their real life. Also, the discussion on how they can improve such behavior and what they can do will help them internalize their own behavior. This way, they will be encouraged to take simple yet important actions and initiatives from their individual level. These actions make a difference.

Knowledge Meter

Rapid Fire Questions: ROUND 7

- Who need to take action?
- Name few things you can do in your daily life from climate change perspectives.
- What can you do on your own?

Key Learning

- Renewable energy and clean technologies are the best nature friendly options for us.
- Each of us can make a difference from our side. The only thing that requires going for change is the will, a strong will.

You don't want have to reduce your quality of life, but you do have to change the way you live. - Mayor of London

FREQUENTLY ASKED QUESTIONS

Q. What is the difference between Weather and Climate?

Weather is the conditions of the atmosphere over a short period of time; day to day state of atmosphere in terms of temperature, moisture content and air movements, and climate is how the atmosphere "behaves" over relatively long periods of time; can be basically defined as the 'average weather'.

Q. Why is summer warmer and winter colder despite of global warming?

The ultimate effect of global warming is the climate change. Climate change increases the fluctuation in the temperature. It can go very high and very low as well. That is why the fluctuation in the temperature makes summer warmer and winter colder.

Q. What are the direct impacts on human due to climate change?

We depend on water, food for our survival. Besides, plants, animals are also integral part to maintain the food web in the nature. Because of climate change, the water resources, agricultural production are being affected. Plants and animals are loosing their habitat from different extreme events. Also, increasing temperature is making the vector borne disease more prevalent. In all the way, the human are the one getting direct impacts due to climate change.

Q. Is Ozone layer depletion a cause of global warming?

The ozone hole is a completely different phenomenon to global warming; however there are links between them. The ozone hole is caused by ozone depleting chemicals in the atmosphere, which have been produced by industry, for example CFCs. One link is that CFCs are also 'greenhouse gasses'. Enhanced global warming is a probable consequence of increasing amounts of 'greenhouse gases', such as carbon dioxide and methane, in the atmosphere. Although the surface of the earth warms, higher up the atmosphere cools, thus increasing the area where stratospheric clouds can form. This makes a larger area susceptible to ozone depletion and provides another link between the two issues.

Q. Who are responsible for Climate Change?

The industrialized countries that have more share on the Green House Gas emission globally are principally responsible for climate change.

Treat the Earth as it is on loan to our children

Q. How is Climate change affecting Nepal?

Because of climate change various impacts could be observed in Nepal:
More than 20 Glacial Lakes are in the verge of potential outbursts

Melting of snow is shrinking the snow line, the fresh water source of Nepal and entire south Asia.

The variation in precipitation has resulted floods, drought and severe situation in agriculture. Also the shift in rainfall pattern is adding more strains.

Forest fires event are being more frequent in more intense form.

Climate induced Health Hazards are increasing. Mosquito are observed in some of the Hilly areas of Nepal which spread different diseases like Kala-azar, Malaria, and Dengue etc.

Q. Does Green House Effect have negative effect only?

Green house effect is very essential to sustain life on earth. This keeps the earth warm and hence makes life possible. Had there been no green house effect, the average temperature of the earth would have been -18 oC, which is below the freezing point.

But it is the rapid rate of green house gas accumulation in the atmosphere which is creating the negative effect.

Q. How can we control climate change?

From individual level we can help in controlling climate change by saving energy, reducing our dependency on natural resources, changing our consumption pattern, planting trees, using eco friendly technology and products, walking short distances, biking and adopting the 3R Principle(Reduce, Reuse and Recycle).

GLOSSARY

Adaptation

Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploit beneficial opportunities

Anthropogenic

Human induced

Atmosphere

It is the gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen and oxygen, together with trace gases including carbon dioxide and ozone.

Biodiversity

The total diversity of all organisms and ecosystems at various spatial scales (from genes to entire biomes)

Consequences

It is the concept of a resulting effect

COP

Conference of Parties, all the countries who have signed the UNFCCC meet every year in a Conference called COP

Disaster

A disaster is the tragedy of a natural or human-made hazard (a hazard is a situation which poses a level of threat to life, health, property, or environment) that negatively affects society or environment.

Disasters are seen as the consequence of inappropriately managed risk. These risks are the product of hazards and vulnerability.

Drought

The phenomenon that exists when precipitation is significantly below normal recorded levels, causing serious hydrological imbalances that often adversely affect land resources and production systems.

Ecosystem

The interactive system formed from all living organisms and their abiotic (physical and chemical) environment within a given area. Ecosystems cover a hierarchy of spatial scales and can comprise the entire globe, biomes at the continental scale or small, well-circumscribed systems such as a small pond.

Emission

Flue gas occurring as a result of the combustion of a fuel, an act or instance of emitting

Epidemic

Occurring suddenly in incidence rates clearly in excess of normal expectancy, applied especially to infectious diseases but may also refer to any disease, injury, or other health-related event occurring in such outbreaks.

Erosion

The process of removal and transport of soil and rock by weathering, mass wasting, and the action of streams, glaciers, waves, winds and underground water.

Flora Fauna

Plants and Animals

Food security

A situation that exists when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development and an active and healthy life. Food insecurity may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level.

Glacier

A mass of land ice flowing downhill (by internal deformation and sliding at the base) and constrained by the surrounding topography (e.g., the sides of a valley or surrounding peaks). A glacier is maintained by accumulation of snow at high altitudes, balanced by melting at low altitudes or discharge into the sea.

Glacial Lake

A glacial lake is a lake with origins in a melted glacier.

Habitat

The locality or natural home in which a particular plant, animal, or group of closely associated organisms lives.

Heat Wave

A heat wave is prolonged period of excessively hot weather, which may be accompanied by high humidity.

Impact

A high force or shock (mechanics) over a short time period

Industrialization

The process of establishing and developing more industries

Infrastructure

The basic equipment, utilities, productive enterprises, installations and services essential for the development, operation and growth of an organization, city or nation.

IPCC

Intergovernmental Panel on Climate Change, A panel consisting of thousands of scientists around the world.

Landslide

A mass of material that has slipped downhill by gravity, often assisted by water when the material is saturated; the rapid movement of a mass of soil, rock or debris down a slope.

Microclimate

Local climate at or near the Earth's surface

Mitigation

An anthropogenic intervention to reduce the anthropogenic forcing of the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks.

Negotiations

Negotiation is a dialogue intended to resolve disputes, to produce an agreement upon courses of action, to bargain for individual or collective advantage, or to craft outcomes to satisfy various interests. It is the primary method of alternative dispute resolution.

ppm

Parts per million, one part in a million

Precipitation

Various forms of water falling from the sky such as rain, drizzle, sleet, hail, snow and other

Polar Region

Earth's Polar Regions are the areas of the globe surrounding the poles also known as frigid zones. The North Pole and South Pole being the centers, these regions are dominated by the polar ice caps, resting respectively on the Arctic Ocean and the continent of Antarctica. Polar sea ice is currently diminishing, possibly as a result of anthropogenic global warming.

Renewable Energy

Renewable energy is energy generated from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are renewable (naturally replenished)

Troposphere

It is the lowest portion of Earth's atmosphere. It contains approximately 75% of the atmosphere's mass and 99% of its water vapor and aerosols.

UNFCCC

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty produced at the Earth Summit, held in Rio de Janeiro in 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

Vector-borne diseases

Disease that are transmitted between hosts by a vector organism (such as a mosquito or tick); e.g., malaria, dengue fever and leishmaniasis

Vulnerability

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

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Pictures Source

Internet (Pages 6, 24, 25, 26 and few sections including Learning Objective, Activity & Knowledge Meter)

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