
UNIT 2 CLIMATE CHANGE

Structure

- 2.1 Introduction
- 2.2 What is Climate Change
- 2.3 What Causes Climate Change
- 2.4 How Climate Change Affect Humans
- 2.5 IPCC Report on Climate Change
- 2.6 Climate Change and the North-South Debate
- 2.7 India's Response to Climate Change Issues
- 2.8 Let us Sum Up
- 2.9 References and Selected Reading
- 2.10 Check Your Progress Possible answers

2.1 INTRODUCTION

In the recent years, climate change as a phenomenon has received unprecedented attention from different quarters of society including scientific institutions, policy planners, social and print media, academia and NGOs. The global attention of climate change issue is based on the available data and case studies from around the world which have demonstrated how the millions of world's poorest people are already being forced to cope with impacts of climate change. The global increased incidence of drought, more intense storms, floods and perceptible environmental stress impacts the efforts of the world's poor to build a better life for themselves and their children. This realization led to the Global discussions and debates on climate change, which got the momentum after the Bali Conference on Climate Change in 2007, where it was discussed that climate change is an environmental problem which impacts every aspects of life including international economy, public health, migration, livelihood, international peace and security.

The development of the climate regime can be traced from the environmental activities of 1980 and 90s. Climate change as an environmental fact has began to felt in the year 1987 with the release of the Brundtland Commission report, Our Common Future. The report comprehensively focused on the issues of environmental pollution with regard to depletion of ozone layer, loss of biological diversity and the rising greenhouse gas temperature and argued for achieving sustainability by formulating effective socio-economic policies.

The various linkages between global warming and climate change makes it necessary to understand the difference between these two terms, and how global warming contributes to the climate change. Global warming is the long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily

fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere. The term is frequently used interchangeably with the term climate change; though the latter refers to both human- and naturally produced warming and the effects it has on our planet. It is most commonly measured as the average increase in Earth's global surface temperature.

Climate as a global issue is affecting the lives of both developing and developed countries, moreover, the debates on climate change is helping to build up a comprehensive climate change regime with country-specific action plan. The present unit will focus on building the basic understanding of all issues relating to the climate change debates and its implications for both developing and developed countries, and building the response plan towards climate change regime.

After studying this unit, you will be able to:

- know the meaning and causes of climate change;
- how climate change affect human life and what can we do to mitigate climate change;
- understand India's response plan towards climate change regime.

2.2 WHAT IS CLIMATE CHANGE

Climate change has been defined differently by different institutions and individuals, but in a simplified way, it can be understood as a long-term change in the average weather patterns which define the Earth's local, regional and global climates. These changes also have a broad range of observed effects that are synonymous with the term. The changes which have been observed in Earth's climate since the early 20th century are primarily driven by human activities, particularly burning of the fossil fuel. The increased level of burning of fossil fuel increases heat-trapping greenhouse gas levels in Earth's atmosphere which raises the average surface temperature of the earth. The human produced increase in global temperature level is referred to as global warming. Some natural processes can also contribute to climate change, including internal variability (e.g., cyclical ocean patterns like El Niño, La Niña and the Pacific Decadal Oscillation) and external forcing (e.g., volcanic activity, changes in the Sun's energy output, and variations in Earth's orbit).

The study of climate change stemmed out of serious concern of the society which began many decades back by scientists across the worlds, who study the factors which propelled them in the past. The quantification of present impact of climate change and projection of future impacts of climate change processes have brought scientists from different disciplines and countries to understand its impact from ground, water, under water, air and outer space. The climate data generated over a period provide evidence of climate change key indicators, such as global land and ocean temperature increase; rising sea levels; ice loss on North and South poles and the recession of a number of glaciers in the mountains in general and Himalaya in particular. The frequency and severity of environmental changes which lead to extreme weather such as hurricanes, heat waves, wildfires, droughts, floods and precipitation; and cloud and vegetation cover changes are some of important

impacts where data on its different components are being collected to arrive at scientific conclusions and policy formulations globally. The study has further indicated that there is a global increase of 1 degree Celsius average temperature all across the world and it is currently increasing by 0.2 degrees Celsius (0.36 degrees Fahrenheit) per decade.

2.3 WHAT CAUSES CLIMATE CHANGE

Natural and manmade are the two main factors that have primarily contributed to the climate change system. The natural factors that have contributed to climate change include the sun's intensity, volcanic eruptions, and changes in naturally occurring greenhouse gas concentrations. A number of manmade factors have accelerated the process of climate change system at a much faster rate since the 20th century. The most important manmade factor is the emission of greenhouse gas (GHG), and is now the leading cause of the earth's rapidly changing climate. An optimum amount of greenhouse gas in our environment is essential to keep the planet warm enough for the existence of plants and animals. Now, due to the ever increasing economic activities since the last century, coupled with the sporadic increase of human population have increased the volume of these gases in our atmosphere. The increase of greenhouse gases in our atmosphere has increased the concentration of carbon dioxide, methane, and nitrous oxide to unprecedented levels. According to the data collected by the Intergovernmental Panel on Climate Change (IPCC), the atmosphere's share of carbon dioxide, which is the planet's chief climate change contributor, has risen by 40 percent since preindustrial times.

2.4 HOW CLIMATE CHANGE AFFECT HUMANS

Humans had adjusted and adapted to the microclimatic and geographic conditions of their habitat and locations on the earth. They had further evolved their agricultural and other allied economic activities in conformity with their climatic conditions. The changes in their climatic conditions as a result of climate change will affect their balanced economic activities, and change the balance it had evolved in their agriculture, pastoralism, shelter, housing pattern, clothing and fooding pattern. Climate change transforms global ecosystems balance, the higher temperature worsens and increases the frequency of many types of disasters, including storms, floods, heat waves, and droughts. Such events can have devastating consequences leading to jeopardizing the access to clean drinking water, availability of fuel wood and fodder. The global increase in temperature can also result in decrease in agricultural production and create wild fires damaging forests, property, creating hazardous-material spills, polluting the air, and leading to loss of life.

Weather and Climate have a profound influence on life on Earth. They affect landforms, soil types and vegetation. They are part of the daily experience of human beings and are essential for their health, food production and well being. The mental alertness, physical characteristics and even social differences, when closely examined, have at least some relationship with climate. There are many causes of climate change. Many are natural and involve processes which influence the flows of energy into, out of and within

the Climate system. However, concern has grown that man's activities may be affecting these processes, thus also affecting climate. If one wishes to understand, detect and eventually predict the human influence on climate, one need to understand the system that determines the climate of the Earth and the processes that lead to Climate Change.

Climate change will also increase the intensity of air pollution. When the earth's temperatures rise, not only does our air gets dirtier—with smog and soot levels going up—but there are also more allergenic air pollutants such as circulating mold (thanks to damp conditions from extreme weather and more floods) and pollen (due to longer, stronger pollen seasons). As its ice sheets melt into the seas, our oceans are on track to rise one to four feet higher by 2100, threatening coastal ecosystems and low-lying areas. Island nations face particular risk, as do some of the world's largest cities, including New York, Miami, Mumbai, and Sydney. The earth's oceans absorb between one-quarter and one-third of our fossil fuel emissions and are now 30 percent more acidic than they were in preindustrial times. This acidification poses a serious threat to underwater life, particularly creatures with calcified shells or skeletons like oysters, clams, and coral. It can have a devastating impact on shellfisheries, as well as the fish, birds, and mammals that depend on shellfish for sustenance.

According to the World Health Organization, "climate change is expected to cause approximately 250,000 additional deaths per year" between 2030 and 2050. The fatalities and illness from heat stress, heatstroke, and cardiovascular and kidney disease would increase. The worsening of air pollution would result in worsening of the respiratory health particularly for the 300 million people living with asthma worldwide. Extreme weather events, such as severe storms and flooding, can lead to injury, drinking water contamination, and storm damage that may compromise basic infrastructure or lead to community displacement. Indeed, historical models suggest the likelihood of being displaced by a disaster is now 60 percent higher than it was four decades ago—and the largest increases in displacement are driven by weather- and climate-related events.

The UN Framework Convention on Climate Change and the Kyoto Protocol has reflected the existing disparities between developing and developed countries in creating the environmental problem over a period of time and demanded to develop a legal framework in addressing the challenges of climate change in terms of sharing responsibility at the international level. The 4th Report of Inter-governmental Panel on Climate Change (IPCC) clearly attributed human activities as the cause of green house gas emission and the warming of the earth's surface. In this context, climate change is often argued from the perspective of North-South conflict and contestation.

You have read about what is climate change, what causes climate change, how climate change affect humans. Now answer the questions in Check Your Progress 1.

Check Your Progress 1

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1. What do you understand by climate change?

2. What are the important factors that are responsible for Climate Change?

2.5 IPCC REPORT ON CLIMATE CHANGE

The Inter-governmental Panel on Climate Change (IPCC) was set up jointly by the United Nations' bodies and the World Meteorological organizations and the first meeting was convened in the year 1998 to discuss the scientific uncertainties prevailing over the issues of climate change. The IPCC has described climate uncertainties in relation to magnitude, timing, and regional patterns of climate change. The first meeting of IPCC was held as part of the political interest among countries over the world to participate in the development of models to address the challenges of global climate change. IPCC being an inter-governmental body has assured the involvement of government representatives, scientists and policy makers in the process.

Subsequently, the issue of global warming was accepted and discussed in the United Nations Conference on Environment and Development (UNSED) at Rio, 1992. The acceptance of global warming at the global platforms led to the formulation of international Framework Convention on Climate Change (FCCC), which was signed by over 160 countries. The Climate Convention signed at the Rio conference acknowledged the importance of the balanced relationship between humans with their environment. The Convention emphasized to maintain the harmonious relationship between human society and their environment towards stabilizing the greenhouse gas concentration in the environment. Further, it set the objective for concrete action to reduce and stabilize the climate change. The signatories to the Convention consensually agreed upon the initiation of mitigation actions to combat the impacts of climate change.

2.5.1 Some Highlights of the Climate Change Convention

- The convention showed its serious concern on the increasing concentration of greenhouse gas in the atmosphere due to human activities.
- Convention noted that the largest share of global greenhouse gases emission was from the developed countries as compared to developing countries.
- The convention recognized various mitigation actions which can help in reducing the emission of greenhouse gas.
- The convention specified the most vulnerable countries with low-lying coastal areas, which were liable to get submerged under water and flooded due to climate variability.

- Convention affirmed that actions responding to climate change needs to be coordinated with the socioeconomic development in an integrated pattern.
- The Convention mentioned its determination in protecting the climate systems from further deterioration due to human economic activities.
- The stabilization of the concentration of greenhouse gases needs to be achieved within a specific timeframe while ensuring effective food production and economic development in a sustainable way.
- The stabilization of concentration of greenhouse gases needs to be achieved within a specific timeframe while ensuring effective food production and economic development in a sustainable way.

2.6 CLIMATE CHANGE AND THE NORTH-SOUTH DEBATE

The existing dialogue between the developed and the developing countries over issues of disparity in economy, infrastructure, income level, GDP, education, employment, health and environmental parameters shows huge difference. This difference is also referred as the North-South divide since most of the developed countries are located in northern hemisphere and developing countries in southern hemisphere of our earth. Hence, there are two different interest groups with different economic, social, political and environmental interests, and this is referred as North – South debate. The emerging issues of climate change also has similar north – south interests and challenges, and requires to be addressed separately for the developing and the developed world. The climate change debate needs to address the issue of equity not only in relation to the future generation but also in relation to the present generation. In this context, the main concern of the International Community was the development of an international legal regime which can reflect and address the vast disparities between developing and developed countries with regard to wealth and the greenhouse gas emission. In response to the new challenge relating to climate change, the international community phrased the common but differentiated responsibility (CBDR) principle as the guiding principle of climate change science. The principle of differentiated responsibility was well incorporated in the UN Framework Convention on Climate Change.

2.6.1 Common but Differential Responsibility

The CBDR principle was derived from the principle of equity, which is an important principle of international law. For the first time, the Rio Declaration on Environment and Development was being instrumental in incorporating the principle of CBDR at the global level. The principle 7 of Climate Convention in Rio Declaration conveys that States shall co-operate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command (Atapattu, 2008).

This principle has become the most contested issues in the forum of Rio Conference. Principle 7 often emphasised the legal responsibilities of the developed countries to combat climate change impacts due their contributions towards environmental problems in the past. Often, the principle 7 was debated over the issue of whether the principle is implying legalities or it can be adopted as guiding principle in the Climate Convention. CBDR as the guiding principle was profusely endorsed by the UN Framework for Climate Convention in the Article 3 under 'principles'. Article 3 states The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, developed country Parties should take the lead in combating climate change and the adverse effects thereof.

The Protocol embodies substantive obligations in relation to climate change for both developing and developed countries. These commitments ranged from developing national inventories/strategies of greenhouse gas emissions, formulating and implementing national level programs with regard to mitigate and adaptation strategies of climate change, promoting and cooperating the transfer of sustainable technology, promoting sustainable and integrated development, cooperating in preparing adaptation plans, promoting and supporting scientific research and promoting education, training and public awareness about the effect of climate change (Atapattu, 2008). For instance, in the first commitment period from 2008-12, the industrialized countries are committed for specific quantitative reductions in emissions. The Protocol involved inbuilt mechanisms to facilitate concrete action plan for combating climate change and the action plan aimed towards including the developing countries under the general obligations of the Climate Convention.

2.6.2 The Kyoto Mechanism

The Kyoto mechanisms include three strategies to reduce emission level such as:

- i. Joint Implementation (JI)** will allow industrialized countries to facilitate the implementation of projects pertaining to reduction of emission level.
- ii. The Clean Development Mechanisms (CDM)** allows industrialized countries to implement projects which will reduce the emission level of developing countries. For example, the project on rural electrification by providing solar panels or encouraging reforestation on the degraded land.
- iii. Emission Trading** allows industrialized countries to purchase assigned amount of units of emission from other industrialized countries to meet the emission target (Houghton 2009).

Thus, the Kyoto Protocol involves specific principles and mechanisms to reduce the greenhouse gas emission; however, it does contain any obligations for developing countries with regard to reduction of emission. Therefore, the protocol had led to intense controversy on the issue of equity over climate change. In this context, most of the debates had happened with regard to the principle of general obligations of all the states to cooperate

and protect the environment. On the contrary, it was also argued that since the Kyoto protocol applies for the commitment period; therefore, no specific obligations were formulated for the developing countries on the basis of their minimal contributions to greenhouse emission. The exclusion of developing countries from the global climate change regime has reflected the notion of differential principles for developing vis-à-vis developed countries. Further, it was argued that there may be a need to impose differential policies within the developing countries with regard to climate change policies.

You have read almost IPCC report on climate change, climate change on the North-South debate, Now answer the questions in Check Your Progress 2

Check Your Progress 2

Note:a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1. What are the important highlights of Climate Change Convention

2. What do you understand by The Kyoto Mechanism?

2.7 INDIA'S RESPONSE TO CLIMATE CHANGE ISSUES

Within the developing nations, India's around 700 million rural population is dependent on the climate sensitive sectors such as agriculture, forest, fisheries, water, biodiversity and coastal zones. Further, the rural population is more vulnerable to the climate variability as they have low adaptive capacity in relation to extreme and fluctuating weather condition. The National Commission Report found out that the impact of climate change can be felt in sectors of natural ecosystem and the socio-economic system. In the context of current debate, developing countries like India is taking necessary actions in terms of execution of programmes and action research. Technology transfer needs to take priority in the mitigation and adaptation process. The central argument on the position of India and the other developing countries in the global climate change debate is as follows:

- Developing countries India, in particular have a strong opinion that the unsustainable consumption pattern of the industrialized countries are responsible for the climate change.
- India and other developing countries economy are vulnerable to climate change and the impact of climate change can hamper the progress in poverty eradication, and the socio-ecological condition of the country.
- Developing countries have potential in limiting GHG emission by facilitating effective programmes like policies aiming towards effective energy and economic management, development of both

conventional and renewable energy resources, and limitation of health hazards.

- Developing countries have undertaken certain price reforms and removing subsidies which have positive impact in the context of energy saving.
- With regard to differentiated responsibility, countries like India needs to stabilize the carbon emission level and further aims at reducing the GHG concentration at a sustainable level.
- Developing countries including India needs to adopt an equitable approach while framing the mitigation strategies. The approach will accommodate differing perspective of uncertainties and risks associated with every country with respect to carbon emission to initiate a global trading system of carbon emissions.

2.8 LET US SUM UP

The understanding of issues relating to climate change as a global phenomena surrounds around the economic, social, political and environmental in the context of developed and developing countries contribution to climate change. The north south dialogue further explains the two interest groups with two different types of claims and contribution to climate change and the possibility of framing the action plan for combating the climate change events. The efforts of the international agencies and scientific community in bringing out the issues revolving around the CDBR and Kyoto Mechanisms highlights the various initiatives in this direction. The unit has broadly focused on the conceptualization of climate change through basic science and the related debates in the context of increasing global warming and its impact on the human communities, ecosystems, economy, technological innovation, and mitigation policy options at national and international level.

2.9 REFERENCES AND SELECTED READINGS

Atapattu, Sumudu (2008) “Climate change, Equity and Differentiated Responsibilities: Does the Present Climate Regime Favor Developing Countries?”. Presented in the Conference on “Climate Law in Developing Countries post-2012: North and South Perspectives” University of Ottawa: IUCN Law Academy.

Climate Change: Road to Copenhagen, India’s Response Framework (2009). Infraline Energy: Research and Information Services.

Houghton, John (2009) *Global Warming: The Complete Briefing*. New York: Cambridge University Press

2.10 CHECK YOUR PROGRESS POSSIBLE ANSWERS

Check Your Progress 1

1. Climate change has been defined differently by different institutions and individuals, but in a simplified way, it can be understood as a long-term change in the average weather patterns which define the Earth’s local, regional and global climates. These changes also have a broad

range of observed effects that are synonymous with the term. The changes which have been observed in Earth's climate since the early 20th century are primarily driven by human activities, particularly burning of the fossil fuel. The increased level of burning of fossil fuel increases heat-trapping greenhouse gas levels in Earth's atmosphere which raises the average surface temperature of the earth.

2. There are many causes of climate change. Many are natural and involve processes which influence the flows of energy into, out of and within the Climate system. However, concern has grown that man's activities may be affecting these processes, thus also affecting climate. If one wishes to understand, detect and eventually predict the human influence on climate, one need to understand the system that determines the climate of the Earth and the processes that lead to Climate Change.

Check Your Progress 2

1. Some Highlights of the Climate Change Convention

The convention showed its serious concern on the increasing concentration of greenhouse gas in the atmosphere due to human activities.

Convention noted that the largest share of global greenhouse gases emission was from the developed countries as compared to developing countries.

The convention recognized various mitigation actions which can help in reducing the emission of greenhouse gas.

The convention specified the most vulnerable countries with low-lying coastal areas, which were liable to get submerged under water and flooded due to climate variability.

Convention affirmed that actions responding to climate change needs to be coordinated with the socioeconomic development in an integrated pattern.

The Convention mentioned its determination in protecting the climate systems from further deterioration due to human economic activities.

2. The Kyoto mechanisms include three strategies to reduce emission level such as:

Joint Implementation (JI) will allow industrialized countries to facilitate the implementation of projects pertaining to reduction of emission level.

The Clean Development Mechanisms (CDM) allows industrialized countries to implement projects which will reduce the emission level of developing countries. For example, the project on rural electrification by providing solar panels or encouraging reforestation on the degraded land.

Emission Trading allows industrialized countries to purchase assigned amount of units of emission from other industrialized countries to meet the emission target.