

UNIT EIGHT

ECONOMY, ENVIRONMENT AND CLIMATE CHANGE

8.1 Economy and the Environment

- Economics is the study of the allocation of limited resources to satisfy human wants.
- The word “resource” is used synonymously with the factors of production (inputs).
- The commonly identified classes of production inputs include land, labour, capital, and entrepreneurship.
  - Sometimes, energy is also specified as a separate production factor.
- Economic resources are scarce in a sense that they are in finite quantities, whereas the claims to which these resources are put are at least to a reasonable extent limitless.
- The scarcity of resources implies that their use is costly and results in an opportunity cost.
- We can identify natural and environmental resources as a subset of a more general category of economic resources.
- Most environmental resources have become increasingly scarce, as the scale of economic activity expands.
  - There is recognition that economic activities degrade and deplete the natural environment.
- The stability and resilience of the ecosystem can be threatened by excessive expansion of economic activities.
- Environmental resources can be classified into different categories. The prominent classification is between Renewable Resources and non-renewable Resources .

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- Biologically renewable resources include forests, fish, animal population, and biomass stock.
  - We also have renewable physical stock which is capable of regeneration such as soil structure and fertility, the ozone layer, the earth's waste processing capacity.
  - Some resources yield monetized flows such as forests, exploited oil, and minerals.
  - Other resources yield nonmonetized benefits such as fresh air, rivers, lakes, and oceans.
- Environmental resources around the world face rising pressures with severe consequences for future growth potential and the quality of life.
- Generally, the global ecosystem is a flow of raw materials and energy from the planetary sources, which then go through the economy, to the planetary sinks, receiving the wastes of the economic system.
- Sustainable development is development that meets the needs of the present without compromising the ability of future generations .
- Ecology deals with nature's allocation of scarce resources.
- Environmental degradation is when there is a decline in the quality of the natural environment in particular of air water and land quality.

- Depletion of natural capital is reduction in the stock of natural resources such as oil and gas reserves, stocks of fish. Etc
- The **Environmental Kuznets Curve** (EKC) suggests that environmental degradation initially increases with economic development, but then decreases as income levels rise further.
  - This implies a U-shaped relationship between income per capita and environmental quality,
- The environment disproportionately affects the poor and poverty perpetuates environmental degradation.
- The attendant environmental degradation diminishes the pace of economic development by imposing high costs on developing countries through reduced productivity of resources.
- The damage to soil, water supplies, and forests resulting from unsustainable methods of production can greatly reduce long-term national productivity.
- For as long as the solutions to environmental problems involve enhancing the productivity of resources and improving living conditions, achieving environmentally sustainable growth is synonymous with economic development.

8.1.1 Rural Development and Environment

- Rural development refers to the process of improving the quality of life and economic wellbeing of people who live in rural areas.
- Improvement includes people's livelihoods (e.g., provision of electricity, clean water, access roads, and education).
- Rural development is an intervention that focuses on the use of natural resources to address the challenges of the rural areas.
- Some of the major issues that agriculture and agricultural development face include loss of agricultural land fertility, rapid urbanization, forest depletion, declining soil fertility, loss of topsoil, and air pollution.
- The effect of population on the environment is thus,
  - First, the intensification of soil erosion, natural depletion, destruction of soil structure,etc.
  - Second, there is the possibility of pollution from inputs such as fertilizer, pesticides, increased resistance of pests, biodiversity loss, reduction of resilience, sometimes irreversible salination, water logging and environmental degradation.
  - There is also extensification (land expansion) which causes deforestation and desertification.

8.1.2 Urban Development and Environment

- Urban development is the social, cultural, economic and physical development of cities and the underlying causes of these processes.
- It covers infrastructure for education, health, justice, solid waste, markets, and street pavements.
- The World Bank estimates that over 50% of the population lives in urban areas globally.
- By 2045, the world's urban population will increase by 1.5 times to 6 billion.
- Rapid population increases, accompanied by heavy rural-urban migration, leads to unprecedented rates of urban population growth, leading in turn to economic and social change.
- Urbanization in developing countries creates such problems as housing, power, water, transport etc.
- Congestion, vehicular and industrial emissions, and poorly ventilated household stoves inflate the high environmental costs of urban crowding.
- The inaccessibility of clean water and the lack of sanitation are some of the environmental factors which affect the health of the urban poor.
- Moreover, the rising levels of industrial emissions or pollution directly affect the health of urban inhabitants.

8.1.3 Population, Resources and the Environment

- The world's population reached about 7.7 billion in 2019. and to rise to about 8.1 billion in 2025 and about 9.6 billion by the year 2050.
- The overwhelming majority or more than three-quarters of the world's population will live in the developing world.
- In order to meet the expanded food needs of rapidly growing populations, it is estimated that food production will have to increase by at least 50% in the next three decades.
- Rapid population growth tends to overuse a country's natural resources such as land, thereby endangering the welfare of future generations.
- With a rapidly rising population, agricultural land holdings become smaller and unviable to cultivate.
- There is no possibility of increasing farm production through the use of new land (extensive cultivation).
  - Consequently, many households continue to live in poverty.
- Increasing population density contributes to severe and accelerating degradation of the very resources that the populations depend on for survival in the following manner.
  - Rapid population growth disturbs the land-man ratio.

8.2 Global Warming and Climate Change

8.2.1 Global Warming

- Global warming refers to increasing average air and ocean temperatures.
- The primary greenhouse gases in the earth's atmosphere are water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3).
- Due to increasing economic activities, global GhG emissions of these gasses have grown since pre-industrial times, with an increase of 70% between 1970 and 2004.
- Three GhGs, in particular, had increased in the atmosphere. They are CO_2, CH_4, and N_2O.
- Greenhouse gases of the atmosphere are both natural and anthropogenic which absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface.
  - This property causes what is known as the greenhouse effect.
- It so happens that the GhGs trap long-wave radiation in the upper atmosphere, raise atmospheric temperatures and produce other changes in the climate system.
  - In all, rising GhGs are the main drivers of climate change.

8.2.2 Climate Change

- Climate change refers to significant and persistent change in the mean state of the climate system that alters the composition of the global atmosphere which is observed over long periods of time.
- It includes such changes as average temperatures, precipitation, humidity, wind conditions, and all other aspects of the earth's climate.
- There is a difference between climate and weather.
  - Climate is the average weather pattern over many years expressed through variables such as temperature, precipitation and wind.
  - Weather represents short-term atmospheric conditions expressed in the mix of events such as temperature, rainfall and humidity that occur each day or week.
- Climate change is one of the most urgent and complex challenges for societies and economies.
- For many parts of the world, climate change is an everyday reality with implications for people's livelihoods, infrastructure and institutions, as well as beliefs, cultures and identities.

8.2.3 Scope of the Problem and the Causes of Climate Change

- The Intergovernmental Panel on Climate Change (IPCC) predicted that,
- By 2099 there will be a probable rise in mean temperatures between 1.5°C and 4°C unless something is done to curb intensive fossil fuel emissions,.
    - By 2016, the mean temperatures had already reached 1°C above the pre-industrial level.
- Climate change is caused by or attributed to the emissions of greenhouse gases triggering global warming. Of the greenhouse gases,
    - CO2 is the largest in causing global warming and hence, climate change.
    - CO2 contributes 77%, Methane (CH4) about 14%, and nitrous oxide (N2O) with 8% (IPCC, 2007) to the greenhouse effect.
- The largest source of greenhouse gas emissions from human activities is from burning fossil fuels (oil, coal, natural gas) for electricity, heat, and transportation.
- In developing countries, deforestation is said to contribute over 20% of harmful greenhouse gases.

8.2.4 Indicators of Climate Change

- The evidence comes from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.
- There are several indicators of climate change. They include
  - Unpredictable rain patterns,
  - Too much and too little rain,
  - Higher average air and ocean temperatures,
  - Floods, sea level rise and the melting of glaciers and ice caps.
  - Cold days, cold nights, and frosts have become less frequent while heat waves are more common.
- Moreover, the emergence of diseases such as malaria and respiratory diseases are common.
- Globally, precipitation has increased in Australia, Central Asia, the Mediterranean Basin, the Sahel, the Western United States.
- Heavy rainfall and floods have become more common; so are storms and tropical cyclones.

8.2.5 Impacts of Climate Change

- Climate change has direct impact on the physical and ecological environments, additional indirect impacts.
- Flooding from heightened rainfall, moisture stress from reduced rainfall, and displacement from rising sea levels are some of them.
  - There could also be losses of grasslands, farmlands, and marine ecosystems.
- Long-term changes can influence agriculture, water, health and other sectors.
- In semi-arid and arid areas, the area that is suitable for agriculture, the length of growing seasons and yield potential are expected to decrease.
- Impacts of climate change also have health dimension.
  - Over 140,000 excess deaths per year were due to diarrhea, malaria, and malnutrition.
- In sum, one or more of the following impacts are expected to affect most of the poorest countries. They are
  - Prolonged droughts,
  - Expanded desertification,
  - Increased severity of storms with heavy precipitation and flooding and consequent erosion,
  - Longer and more severe heat waves, etc

8.2.6 Vulnerability to Climate Change

- Vulnerability to climate change refers to the degree to which a system is likely to experience harm as the result of exposure to climatic hazard.
- It depends on the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.
- Those who are most exposed and vulnerable to the adverse impacts of climate change are the poor and marginalised people who live particularly in low-income areas.
- The IPCC identified four zones which are highly vulnerable to climate change: sub-Saharan Africa faces drying, Asia faces flooding, and small islands face multiple sensitivities, while the Arctic face melting glaciers.
  - Bangladesh, is highly prone to flooding while the Horn of Africa for droughts. Towns like Dire Dawa in Eastern Ethiopia are prone to flooding.
- The poorest developing countries will be hit the earliest and hardest by climate change.
- The international community has an obligation to support them in adapting to climate change.
  - Without such support there is a serious risk that development progress will be undermined.

8.2.7 Means to Address Climate Change Challenges

- There are two main ways to address the climate change crisis. These are

Mitigation of Climate Change

- Mitigation deals with the causes of climate change.
- Mitigation efforts are linked to reducing GhGs, especially CO2 or stabilization of GhGs concentrations in the atmosphere.
- Mitigation policy is a preventive policy approach in some sense by its attempt to reduce costs.
- Many strategies have been proposed for the mitigation of emissions, including development of carbon markets, taxes on carbon, and subsidies to encourage faster technological progress. As a policy strategy, mitigation involves long-term limits on the amount of greenhouse emissions.
  - Some of the mitigation measures are linked to the Reducing Emissions from Deforestation and Forest Degradation (REDD) mechanism. Another mitigatory mechanism is called Clean Development Mechanism.
- Policies and mechanisms have been introduced essentially to pay for costs of avoiding emissions in developing countries.
- New technologies shoul have also been developed that will enable further reductions as well as successful

Adaptation to Climate Change

- Adaptation to climate change refers to the process of responding and adjusting to the actual or potential impacts of changing climate.
- It is a process by which strategies to moderate, cope with and take advantage of the consequences of climatic events are enhanced, developed and implemented.
- It is a reactive policy that attempts to minimize the adverse impact of climate change ex post.
- It is a universal condition of humanity.
- Adaptation takes place in two forms:
  - Planned (or policy) adaptation that is undertaken by governments and
  - Autonomous (or private) adaptation that is undertaken directly by households, farms, and others.
- There are four classes of adaptation strategies:
  1. Mobility avoids risks across space;
  2. Storage reduces risks which are experienced over time;
  3. Diversification reduces risks across assets owned by households or collectives, and
  4. Communal pool involves joint ownership of assets and resources; sharing of wealth, labour…

8.3 Green Economy and Green Growth

- A green economy is an economy that results in improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities.
- It uses low carbon; it is resource efficient; and it is socially inclusive.
- Green growth is defined as fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our wellbeing relies.
- In a green economy, economic growth is supposed to be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services.
- The motive for using renewable energy emerges from the perceived scarcity of fuel fossils.
- The sources of renewable energy are: solar, biomass and bio fuel, geothermal, hydroelectricity, tidal, and wind-driven.
- Hence, the green economy is said to be relevant not only to advanced economies but also a key catalyst for growth and poverty eradication in developing countries.

8.4 Overview of Environment and Climate Change in Ethiopia

- Ethiopia is an East African country with immense geographical diversity and topographical variation.
- The country is cited as one of the most vulnerable countries to future climate change.
- Drought, soil erosion and land degradation are the most critical and far-ranging environmental issues which have been affecting Ethiopia due to increased crop cultivation in marginal areas and livestock grazing pressure.
- To address the problems of climate change, the Ethiopian government produced the National Adaptation Programme of Action (NAPA) in 2007 and Nationally Appropriate Mitigation Actions (NAMA) in 2011.
- The government identified agriculture, health, transport, natural resources, energy and industry sectors as most vulnerable to climate change.
- In 2011, the government initiated the Climate Resilient Green Economy (CRGE) strategy, that envisioned carbon-neutral growth based on an energy-efficient development trajectory.
- In June 2020, the Ethiopian Government launched the Green Legacy Initiative, which is a tree-planting campaign aimed at curbing the effects of climate change and deforestation.
- Its aims are preventing flooding, food insecurity, environment-related conflicts, and other adverse effects of climate change and deforestation.


Thank you… !