

<b>Unit 3</b>	<b>ENERGY AND GLOBAL ENVIRONMENTAL ISSUES</b>
Learning Outcomes (Student Learning Outcomes)	<p>Able to</p> <ul style="list-style-type: none"> <li>• To identify and understand conventional and non conventional sources of energy</li> <li>• To relate environmental implications to development of various energy sources</li> <li>• To understand the global environmental issues such as greenhouse effect, climate change, acid rain and ozone depletion</li> <li>• To understand the relevance of global environmental issues in the present context.</li> </ul>
Topics & Sub-topics	<p><b>Energy resources:</b></p> <ul style="list-style-type: none"> <li>• Global and Indian energy demand scenario</li> <li>• Future Projections, Conventional and Non-conventional sources of energy</li> <li>• Advantages and Limitations</li> <li>• Utilization, Exploitation and related Environmental problems</li> <li>• Environmental implications of Non conventional Energy Sources.</li> </ul> <p><b>Global Environmental Issues:</b></p> <ul style="list-style-type: none"> <li>• Climate Change</li> <li>• Global Warming and Green House Effect</li> <li>• Acid Rain</li> <li>• Depletion of Ozone layer</li> </ul>

## Global Environmental Issues:

### # Climate Change

- Our world is always changing. We see that the weather changes. Look even longer, and you'll see the seasons change. The Earth's climate is also changing, but in slower way that we can't feel it.
- The Earth is getting warmer because people are adding heat-trapping gases(CO<sub>2</sub>,CO,water vapour, methane, ozone etc.) to the atmosphere, mainly by burning fossil fuels. These gases are called greenhouse gases.
- Warmer temperatures are causing other changes around the world, such as melting glaciers and stronger storms.
- These changes are happening because the Earth's air, water, and land are all linked to the climate. The Earth's climate has changed before, but this time is different. People are causing these changes, which are bigger and happening faster than any climate changes that modern society has ever seen before.
- The Earth's climate is getting warmer, and the signs are everywhere.

-Rain patterns are changing,  
-Sea level is rising, and  
-Snow and ice are melting, and many more

- As global temperatures continue to rise, we'll see more changes in our climate and our environment. These changes will affect people, animals, and ecosystems in many ways.
- The average temperature in many regions has been increasing in recent decades. The global average surface temperature has increased by 0.6° + 0.2° C over the last century.
- Less rain can mean less water for some places, while too much rain can cause terrible flooding.
- More hot days can dry up crops and make people and animals sick.

- To control the impacts of global climate changes, peoples have to reduce the amount of greenhouse gases we're putting into the atmosphere, and It is very danger, if we continue producing these gases at current or faster rates.
- One can control the effect of climage changes by following ways,
  - [Switch to Clean Energy](#)
  - [Use Less Energy](#)
  - [Travel Green](#)
  - [Watch Your Water Use](#)
  - [Reduce Waste](#)

## # Global Warming

- Global warming is defined as the increase of the average temperature on Earth.
- Over the last 100 years, the average air temperature near the Earth's surface has risen by a little less than 1 degree Celsius or 1.3 degrees Fahrenheit, which is a one of the biggest problems facing the world today is global warming. Many experts believe that our production of carbon dioxide and other greenhouse gases is heating the atmosphere, and this could be very dangerous for human life.
- Many problems can rise due to global warming. One of the biggest is rising sea level. This can result in the flooding of low level coastal areas and cities, such as Egypt and Bangladesh, Mumbai etc.
- Another problem is changes in weather patterns. Many areas of the world are experiencing increased Storms (hurricanes), floods, and other natural disasters.
- One more serious issue associated with this phenomenon is the negative effect on animals. Fish populations could be effected, while some insects which spread disease might become more common.
- There are several things we can do to deal with global warming. One answer is to stop making CO<sub>2</sub>. We can do this by switching from oil, coal and gas to renewable energy.
- A second solution is to plant more trees. Trees absorb CO<sub>2</sub> and produce oxygen, which is not a greenhouse gas.
- A third idea is to use less energy and recycle more products. If we use less energy and are more environmentally friendly, the earth's temperature may not rise too much.
- Under the 1m sea level rise scenario, the Godavari-Krishna mangrove eco-region is predicted to lose more than a 25% of its area, while the UNESCO World Heritage site of Sundarbans in West Bengal is predicted to lose more than 50% or half of its area.
- While under the 6m sea level rise scenario, three eco-regions (Sundarbans freshwater swamp forests, Andaman Islands rain forests

and Maldives Lakshadweep-tropical moist forest) are predicted to lose more than a quarter of their land areas

## **# Green House Effect**

- The greenhouse effect is the gradual(slow) rise in temperature of the Earth
- The direct cause is an increase in the presence of certain gases in the atmosphere, which are called greenhouse gases and they include carbon dioxide, methane, nitrous oxide, most man-made gases, and even water vapor
- greenhouse gases cause the Earth's temperature to increase because they allow sunlight to pass through the Earth's atmosphere, but when the light is reflected off of the Earth's surface as infrared radiation the greenhouse gases absorb it, trapping the heat in the atmosphere
- Their concentrations in the atmosphere have increased about 25% in the last 150 years since large-scale industrialization begins.
- The gases are needed because without them the Earth's average temperature would be 15 °C or 60° F colder, which would not be enough for humans to live.
- the Earth's environment is in a sensitive equilibrium, even a little extra change in temperature could cause problems for humans, plants, and even animals also.

### **why is it called the greenhouse effect?**

- plants are grown in greenhouses that have windows that let light pass through but keep heat from escaping this causes the greenhouse to heat up like a car that is parked in the sunlight

### **reasons for increases in greenhouse gases**

- increased industrialization has led to the burning of more fossil fuels, which emit carbon dioxide
- plants absorb carbon dioxide, but as large forests are being cut down the amount of plants to absorb the carbon dioxide is decreased

## # Acid Rain

- When fossil fuels such as coal, oil and natural gas are burned, chemicals like sulfur dioxide and nitrogen oxides are produced.
- These chemicals react with water and other chemicals in the air to form sulfuric acid, nitric acid and other harmful pollutants like sulfates and nitrates.
- These acid pollutants spread upwards into the atmosphere, and are carried by air currents, to finally return to the ground in the form of rain which is known as acid rain.
- The corrosive nature of acid rain causes many forms of environmental damage.
- Acid pollutants also occur as dry particles and gases, which when washed from the ground by rain, add to the acids in the rain to form a more corrosive solution. This is called acid deposition.
- Damage from acid rain is widespread in North America, Europe, Japan, China and Southeast Asia. In the US coal burning power plants contribute to about 70% of sulfur dioxide.
- Motor vehicle exhaust fumes are the main source of nitrogen oxides. The acids in acid rain chemically react with any object they come in contact with. Acids react with other chemicals by giving up hydrogen atoms.

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**Effects:** Acid rain is known to cause widespread environmental damage.

- Acid rain dissolves and washes away nutrients in the soil which are needed by plants.
- Acid rain indirectly affects plants by removing nutrients from the soil in which they grow.
- Acid rain causes the water to become acidic. This affects plant and animal life in aquatic ecosystems.
- Acid rain and dry acid deposition damages buildings, automobiles, and other structures made of stone or metal.

## # Depletion of Ozone layer

- Ozone is formed by the action of sunlight on oxygen.
- It found at a height of 20 to 50kms above the surface of the earth, known as Stratosphere. This action takes place naturally in the atmosphere, but it is very slow.
- Ozone is a highly poisonous gas with a strong odour. It is a form of oxygen that has three atoms in each molecule.
- It is considered a pollutant at ground level and constitutes a health problems (hazard) by causing respiratory disease like asthma and bronchitis.
- Ozone in the upper atmosphere however, is vital to all life as it protects the earth from the sun's harmful ultraviolet radiation.
- The ozone layer in the upper atmosphere absorbs the sun's ultraviolet radiation, preventing it from reaching the earth's surface.
- In the 1970s, scientists discovered that chemicals called **chlorofluorocarbons** or **CFCs**, which were used as refrigerants and deodorants spray etc. is very dangerous for the ozone gas and layer
- The CFC molecules are virtually unbreakable until they reach the stratosphere, where UV radiation breaks them down to release chlorine atoms.
- The chlorine atoms react with ozone molecules which break down into oxygen molecules, which then do not absorb UV radiations.
- the early 1980s, scientists detected a thinning of the ozone layer in the atmosphere above Antarctica. This phenomenon is now being detected in other places as well including Australia which is known as a Depletion of ozone layer
- Although the use of CFCs has been reduced and now banned in most countries.
- The destruction of the ozone layer is seen to cause increased cases of skin cancer and cataracts(भोतियो).
- It also causes damage to certain crops and to plankton, thus affecting nature's food chains and food webs. This in turn causes an increase in carbon dioxide due to the decrease in vegetation.