Impact of global warming-1

July 16, 2019
Source: *The Hindu*

Manifest pedagogy

Global warming as a topic has been asked multiple times at both prelims and mains stage. Impact of global warming varies across the region and sectors. Specific impact are key areas for preparation for mains.

Placing it in syllabus

- **Changes in critical geographical features**

Static dimensions

What is global warming?

Current dimensions

- Impact of global warming on Himalayan Glaciers
- Impact of global warming on coastal areas
- Impact of global warming and heatwaves

Content

Global warming is the phenomenon of **increasing average air temperatures** near the surface of Earth over the past one to two centuries. Climate scientists have since the mid-20th century gathered detailed observations of various weather phenomena (such as temperatures, precipitation, and storms) and of related influences on climate (such as ocean currents and the atmosphere's chemical composition). These data indicate that the Earth's climate has changed since the beginning of geologic time and the influence of human activities since the beginning of Industrial Revolution has contributed more towards global warming.

According to scientific studies, in the last decade, the rate of Antarctica's ice mass depletion has tripled. Surface ocean waters today are roughly 30 percent more acidic than at the start of the Industrial Revolution. Scientists predict that the Arctic Ocean will barely have ice before 2050. For the last twenty years, sea levels rose at twice their rate during the last century. Global temperatures could increase by as much as 10.4 degrees Fahrenheit by 2100

Global warming occurs when carbon dioxide (CO2) and other air pollutants and greenhouse gases collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface. The pollutants in the air trap the heat and cause the planet to get hotter. This phenomenon is known as the **greenhouse effect.** The burning of fossil fuels to make electricity is the largest source of heat-trapping pollution and thermal power plants and vehicles emissions are by far the biggest polluters.

The impacts of global warming are being felt across the globe. Extreme heat waves have caused tens of thousands of deaths around the world in recent years. Antarctica has been losing about 134 billion metric tons of ice per year since 2002. This rate could speed up if we keep burning fossil fuels at our current pace causing sea levels to rise several meters over the next 50 to 150 years. Melting glaciers, early snowmelt, and severe droughts will cause more dramatic water shortages and increase the risk of wildfires.

The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC), dealing with greenhouse-gas-emissions mitigation, adaptation, and finance, signed in 2016. As of March 2019, 195 UNFCCC members have signed the agreement, and 186 have become party to it. The **Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels and to limit the increase to 1.5 °C, since this would substantially reduce the risks and effects of**

climate change.

Impact of global warming on Himalayan glaciers

The Himalayas is one of the world's most sensitive hotspots to global climate change, with impacts manifesting at a particularly rapid rate. The **Himalayan glaciers are the water towers of Asia,** and the source of many of the world's great rivers The Yangtze, the Ganges, the Indus and the Mekong. Over a billion people depend directly on the Himalayas for their survival. Climate change in the Himalayas poses a serious threat to the source of these great rivers with dire and far-reaching impacts on biodiversity, food, water and energy security.

A significant threat posed by climate change in the Himalayas is the continual formation of a large number of glacial lakes. The lakes consist of vast quantities of glacial melt water held in place by natural dams of stone and rubble. The enhanced rate at which the snow and ice is melting means that the water accumulating in these lakes is increasing rapidly. And if the natural rubble dams holding back the waters break, a tsunami of water, mud, ice, and stone is swept down the valleys. Such events can have devastating consequences to infrastructure and local communities; washing away roads, bridges, houses, people, livestock and crops.

One example is **Lake Imja, a high altitude glacial lake near Mount Everest** in the Himalayas, Nepal. The lake has been formed by the accelerated melt of the Imja glacier as a result of climate change. The continued glacial melt, bad weather, a landslide, or a seismic event could at any moment trigger the bursting of its swollen waters; releasing a violent **'Glacial Lake Outburst Flood' (GLOF).** This poses a constant threat to the lives, livelihoods, communities and crops of the villages situated along the flood route.

Over the next few decades, the melting could accelerate due to warming and increased air pollution from a growing population. The air pollutants come from the Indo-Gangetic Plain, one of the world's most polluted regions. The dirty air makes the glacier situation worse by depositing black carbon and dust on the ice, hastening the thaw. Even if the world takes dramatic action and limits warming to 1.5C by the end of the century, 36% of the glaciers will have disappeared.

Global warming and heat waves

As global surface temperatures have increased, heatwaves are becoming more frequent. Scientific studies have revealed that **record-breaking monthly temperature records are already occurring five times more often than they would in the absence of human-caused global warming.** This means that there is an 80% chance that any monthly heat record today is due to human-caused global warming.

Extreme heat can increase the risk of other types of disasters. Heat can exacerbate drought. This, in turn, can encourage more extreme heat, as the sun's energy acts to heat the air and land surface, rather than to evaporate water. Hot, dry conditions also increase the risk of wildfires.

In 2015, a prolonged heatwave had killed more than 3,500 in India and Pakistan. Now about two-thirds of India is facing the record-breaking heatwaves at the same time that roughly half of the country is struggling through its worst drought in six decades. June's heatwave is already one of the longest India has ever seen. Officials in Bihar have reported that around 76 people in total had died of heat-related conditions as temperatures in the region hovered around 113 degrees Fahrenheit.

High humidity and elevated night temperatures appear to be key ingredients in causing heat-related illness and mortality. Normally, the body can cool itself through sweating, but when

humidity is high, sweat will not evaporate as quickly, potentially leading to heat stroke.

High temperatures at night can be particularly damaging to agriculture. Some crops require cool night temperatures, and heat stress for livestock rises when animals are unable to cool off at night. Heat-stressed cattle can experience declines in milk production, slower growth, and reduced conception rates.

The higher temperatures lower the ability of transmission lines to carry power, possibly leading to electricity reliability issues during heat waves. As rivers and lakes warm, their capacity for absorbing waste heat from power plants declines. This can reduce the thermal efficiency of power production, make it difficult for power plants to comply with environmental regulations regarding their cooling water.

Impact of global warming on coastal areas

Climate change threatens coastal areas, which are already stressed by human activity, pollution, invasive species, and storms. Since 1901, global sea level has risen approximately eight inches. Models based on thermal expansion and ice melt estimate that global sea level is very likely to rise between 1 and 3 feet by the end of the century.

- Coasts are sensitive to sea level rise, changes in the frequency and intensity of storms, increases in precipitation, and warmer ocean temperatures.
- Sea level rise could erode and inundate coastal ecosystems and eliminate wetlands and cause shoreline flooding.
- Rising atmospheric concentrations of carbon dioxide (CO_2) are causing the oceans to absorb more of the gas and become more acidic. This rising acidity can have significant impacts on coastal and marine ecosystems including plankton, molluscs, and other shellfish.

- Higher sea surface temperatures increase the risks of coral bleaching, which can lead to coral death and the loss of critical habitat for other species.
- Rising sea level increases the salinity of ground water and pushes salt water further upstream. Higher salinity can make water non -potable and harms aquatic life.
- Coastal areas are also vulnerable to increase in the intensity of storm surge and heavy precipitation. Storm surges flood low-lying areas, damage property, disrupt transportation systems, destroy habitat, and threaten human health and safety.
- Warmer temperatures in mountain areas could lead to more spring runoff due to melting of snow. In turn, increases in spring runoff may also threaten the health and quality of coastal waters. Some coastal areas, such as the Gulf of Mexico are experiencing "**dead zones**." Dead zones occur when land-based sources of pollution (e.g., agricultural fertilizers) contribute to algal blooms. As increases in spring runoff bring more nitrogen, phosphorus, and other pollutants into coastal waters, many aquatic species could be threatened due to decrease in oxygen in water.
- Droughts reduce fresh water input into tidal rivers and bays, which raises salinity in estuaries, and enables salt water to mix further upstream.
- Warming coastal waters cause suitable habitats of temperature-sensitive species to shift poleward. Some areas have recently seen range shifts in both warm- and cold-water fish and other marine species. Pollock, halibut, rock sole, and snow crab in Alaska and mangrove trees in Florida are a few of the species whose habitats have already begun to shift. Suitable habitats of other species may also shift, because they cannot compete for limited resources with the southern species that are moving northward.

Reducing the carbon footprint, promoting the use of renewable

resources, conserving energy, reducing emissions by taking public transportation, implementing climate-friendly and climate change preparedness policies and transitioning from dirty fossil fuels to clean power should be a top priority to combat further global warming and to build healthy and more secure communities