

Impact of climate change and its mitigation

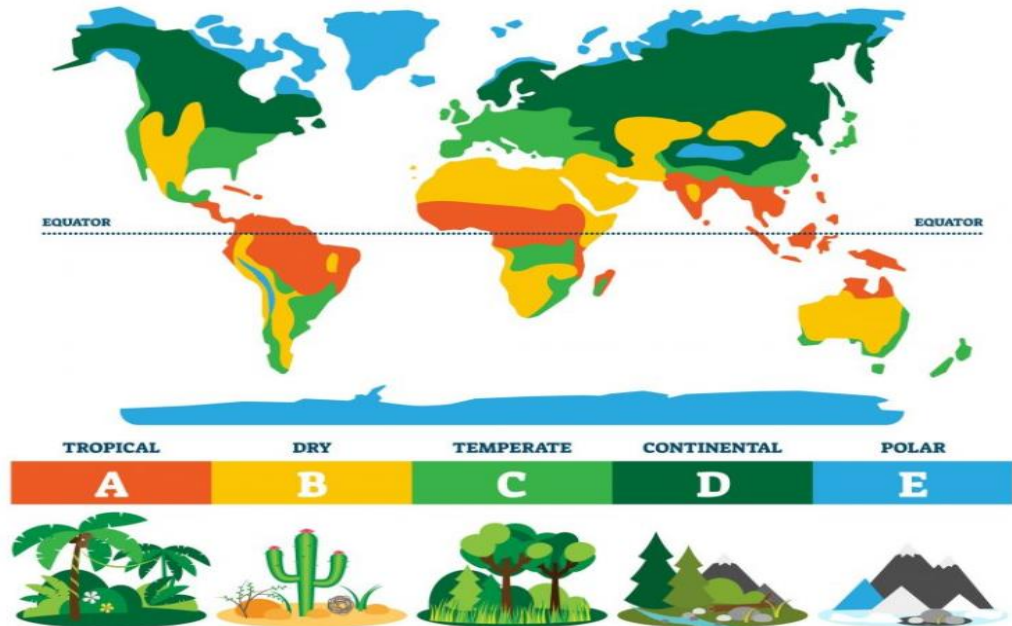
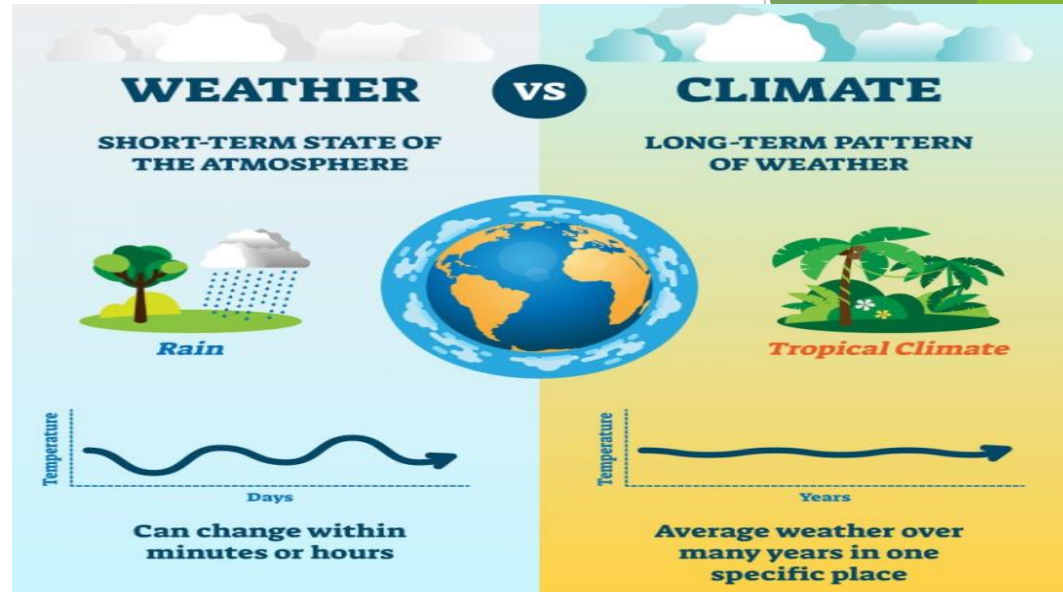


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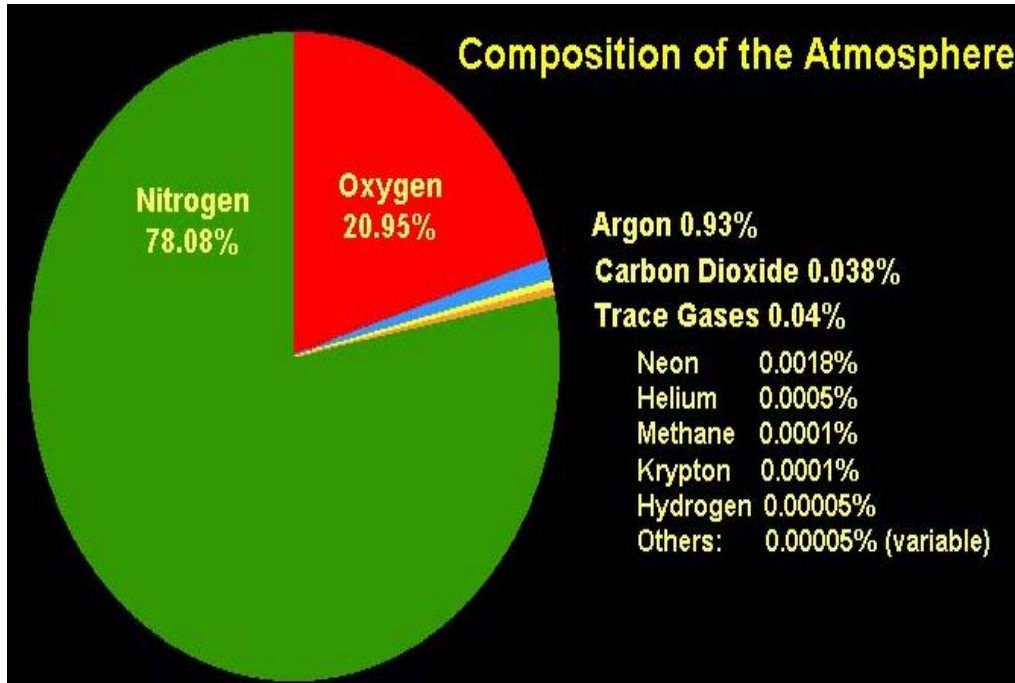


Climate

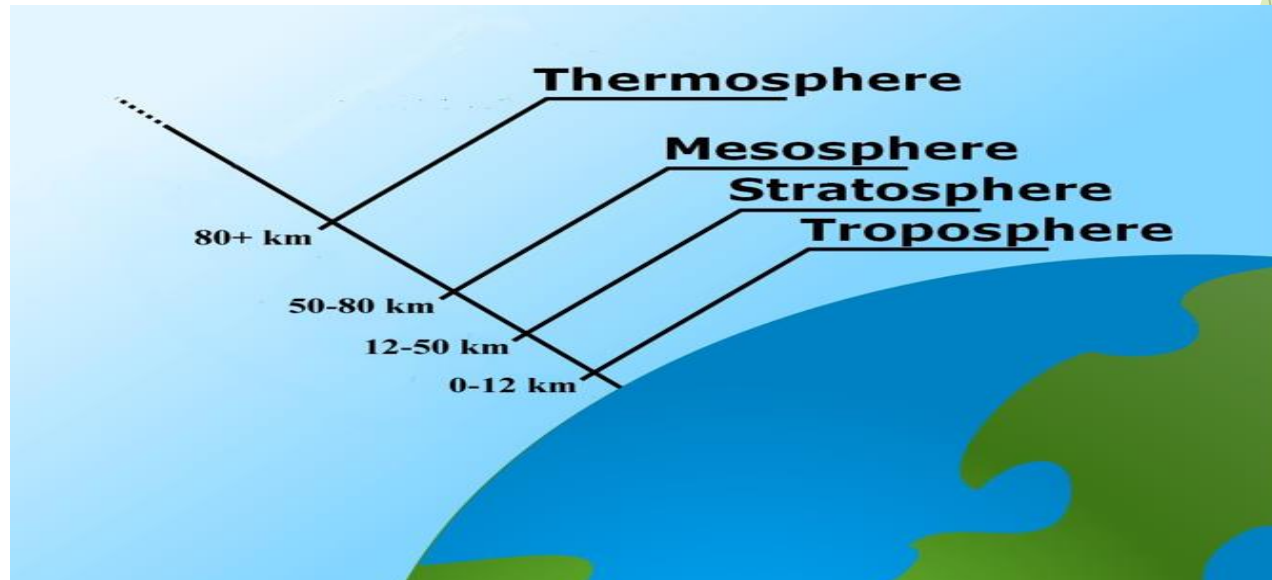
► Weather refers to the short-term conditions of the atmosphere, such as temperature, precipitation, and wind, in a specific location. Climate, on the other hand, describes the long-term patterns and averages of weather over a region.



Atmosphere

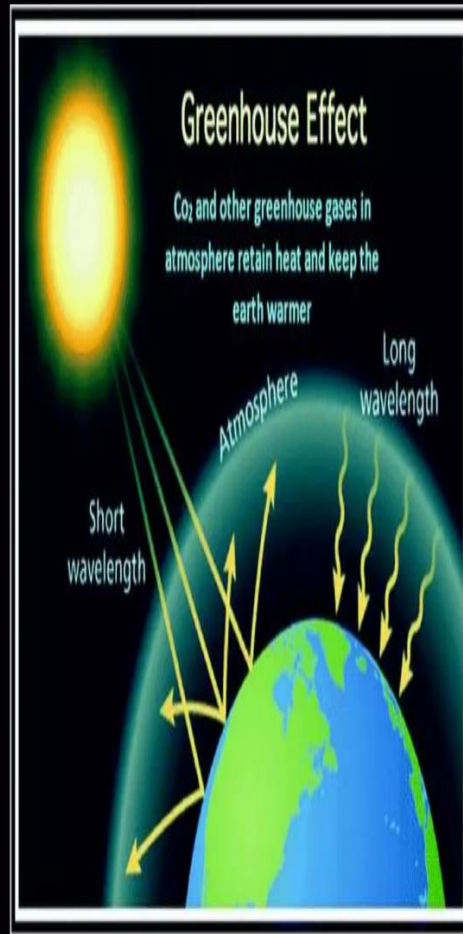


► Earth's atmosphere is composed of about 78 percent nitrogen, 21 percent oxygen, 0.9 percent argon, and 0.1 percent other gases. Trace amounts of carbon dioxide, methane, water vapor, and neon are some of the other gases that make up the remaining 0.1 percent.



GREENHOUSE EFFECT

The greenhouse effect is a natural process that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is reflected back to space and some is absorbed and re-radiated by greenhouse gases. The absorbed energy warms the atmosphere and the surface of the Earth.

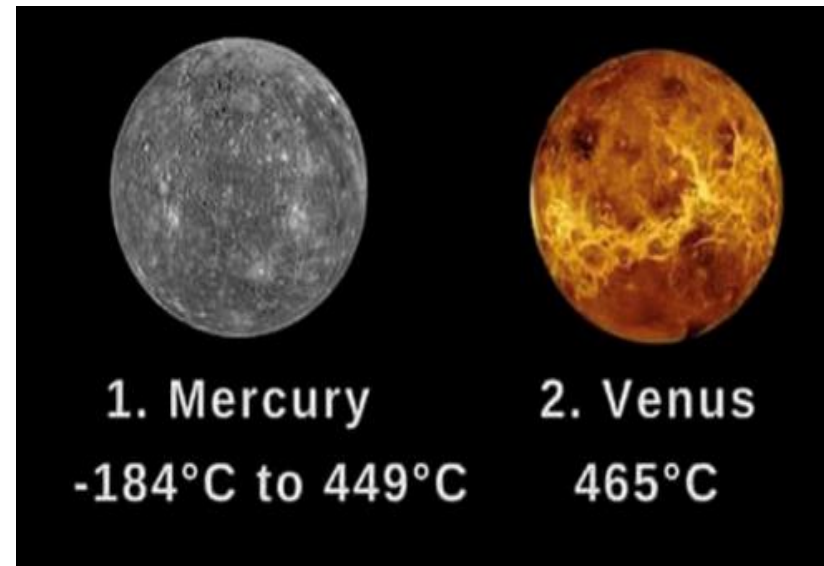


► Imagine these gases as a cozy blanket enveloping our planet, helping to maintain a warmer temperature than it would have otherwise. Greenhouse gases consist of carbon dioxide, methane, ozone, nitrous oxide, chlorofluorocarbons, and water vapor. During the day, the sun shines through the atmosphere, warming the earth's surface. At night the earth's surface cools, releasing heat back into the air. But some of the heat is trapped by the greenhouse gases in the atmosphere. That's what keeps the earth's temperature at an average 14°C (57°F). The gases act like the glass walls of a greenhouse - hence the name, greenhouse gases. Without this greenhouse effect, temperatures would drop to as low as -18°C (-0.4°F); too cold to sustain life on earth.

Green House gases importance

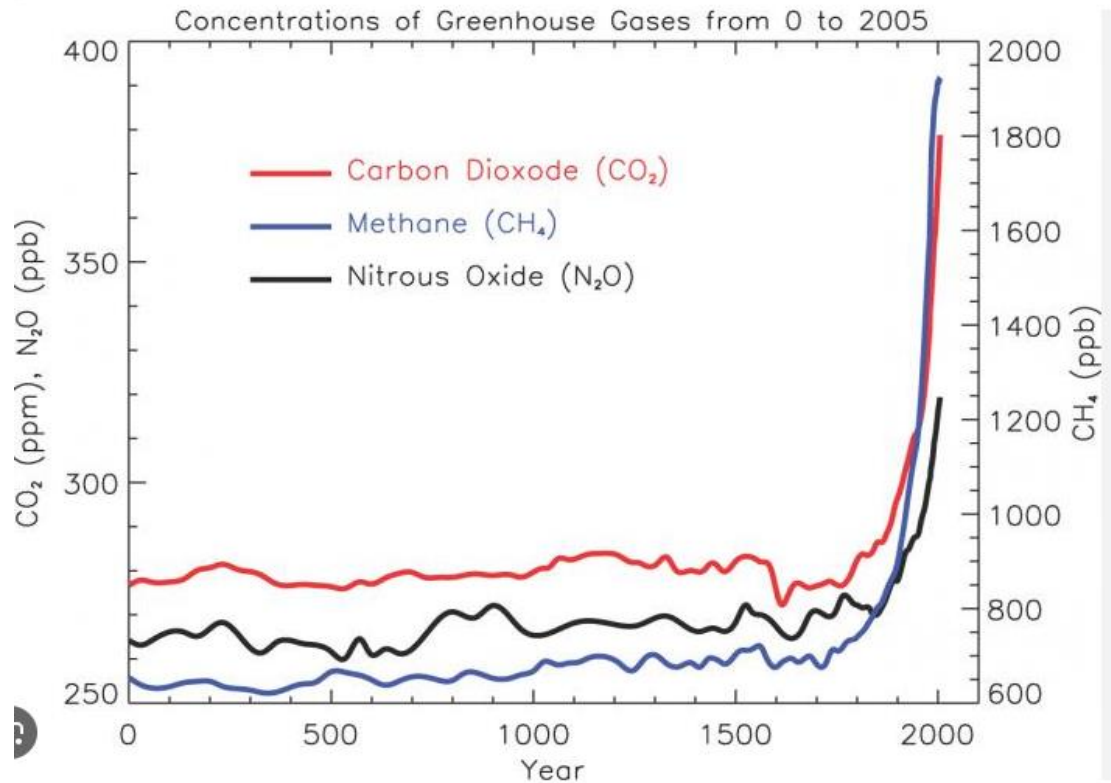
► first planet in the solar system is Mercury. Mercury has no atmosphere to speak of, which means there are no clouds or storms. Due to its proximity to the sun and its lack of an atmosphere, temperatures soar during the day and plummet at night. During the day, temperatures can reach as high as 426 deg C. At night, without an atmosphere to keep the heat in, the temperatures drop to almost - 180 deg C.

► second planet from the sun, Venus is the hottest planet in the solar system. This is due to its thick atmosphere (90 times thicker than Earth's atmosphere at sea level) of carbon dioxide and sulfuric acid clouds. The atmosphere traps heat and warms the planet, acting as a greenhouse and a model of global warming. Temperatures can reach 450 degree C. It has a dense atmosphere of carbon dioxide (96.5%)

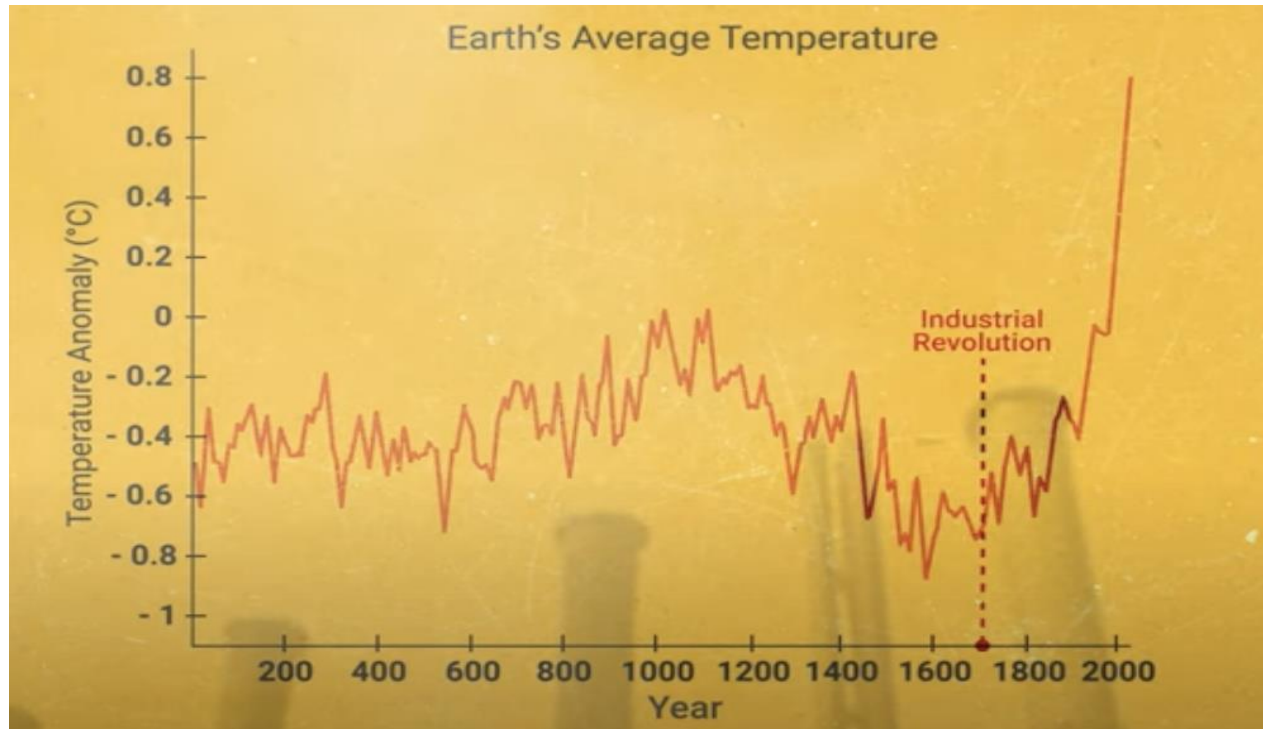


Global Warming-

► *Global warming is a gradual increase in the earth's temperature generally due to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants. its pace has significantly increased in the last hundred years due to the burning of fossil fuels. As the human population has increased, so has the volume of fossil fuels burned. This change has disturbed the climatic pattern of the earth. Warmer temperatures over time are changing weather patterns and disrupting the usual balance of nature. This poses many risks to human beings and all other forms of life on Earth.*

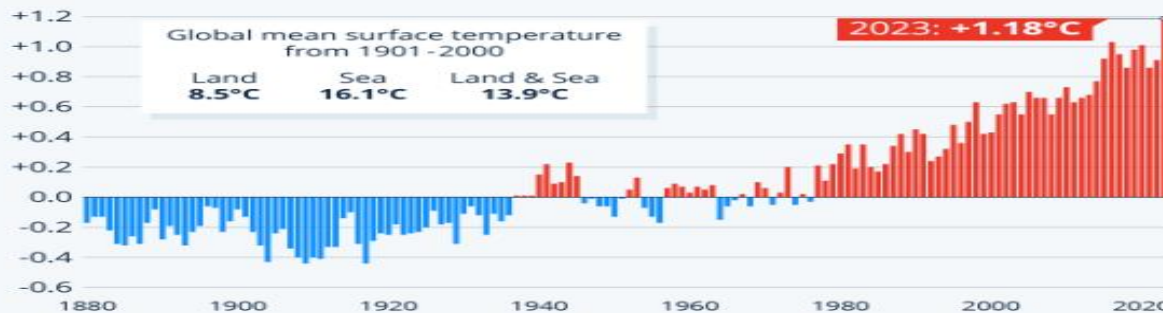


Global Warming-



2023 Was the Warmest Year on Record – by a Record Margin

Global land and ocean surface temperature anomalies (in degrees Celsius compared to the 20th century average)



Dangers Beyond 1.5°C Global Planet Temperature Rise

Over 70% of coral reefs will die at 1.5°C
At 2°C **virtually all reefs will be lost.**



Over 6 million people live in coastal areas vulnerable to sea level rise at 1.5°C degrees, and at 2°C this would affect **10 million more people** by the end of this century.



Sea-level rise will be **1 meter higher** at 2°C than at 1.5°C.



Insects, vital for pollination of crops and plants, are likely to **lose half their habitat** at 1.5°C but this becomes almost twice as likely at 2°C.



The Arctic Ocean being **completely bare of sea ice** in summer would be a once per century likelihood at 1.5°C but this leaps to a once a decade likelihood at 2°C.



The frequency and intensity of **droughts, storms and extreme weather events** will rise

❑ Melting Permafrost

Permafrost is there where glaciers are present. It is a frozen soil that has environmental gases trapped in it for several years. As the permafrost melts, it releases the gases back into the atmosphere increasing the earth's temperature.



❑ Forest Blazes

Forest blazes or forest fires emit a large amount of carbon-containing smoke. These gases are released into the atmosphere and increase the earth's temperature resulting in global warming.



Global Warming-

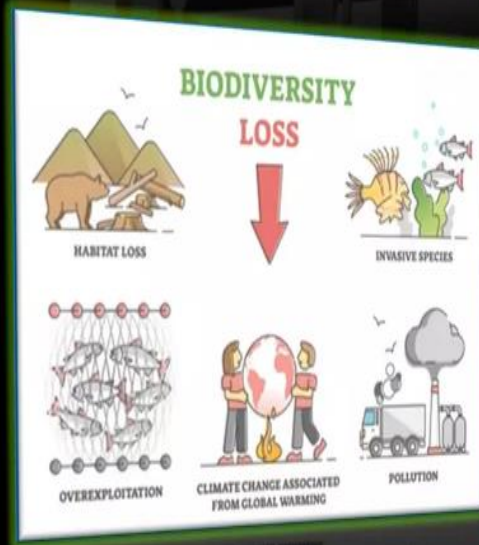
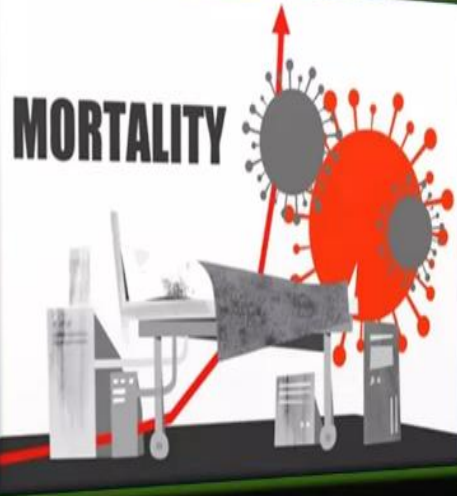


❖ Rise in Temperature

Global warming has led to an incredible increase in earth's temperature. Since 1880, the earth's temperature has increased by ~1 degrees. This has resulted in an increase in the melting of glaciers, which have led to an increase in the sea level. This could have devastating effects on coastal regions.

❖ Threats to the Ecosystem

Global warming has affected the coral reefs that can lead to a loss of plant and animal lives. Increase in global temperatures has made the fragility of coral reefs even worse.



❖ High Mortality Rates

Due to an increase in floods, tsunamis and other natural calamities, the average death toll usually increases. Also, such events can bring about the spread of diseases that can hamper human life.

❖ Loss of Natural Habitat

A global shift in the climate leads to the loss of habitats of several plants and animals. In this case, the animals need to migrate from their natural habitat and many of them even become extinct. This is yet another major impact of global warming on biodiversity.



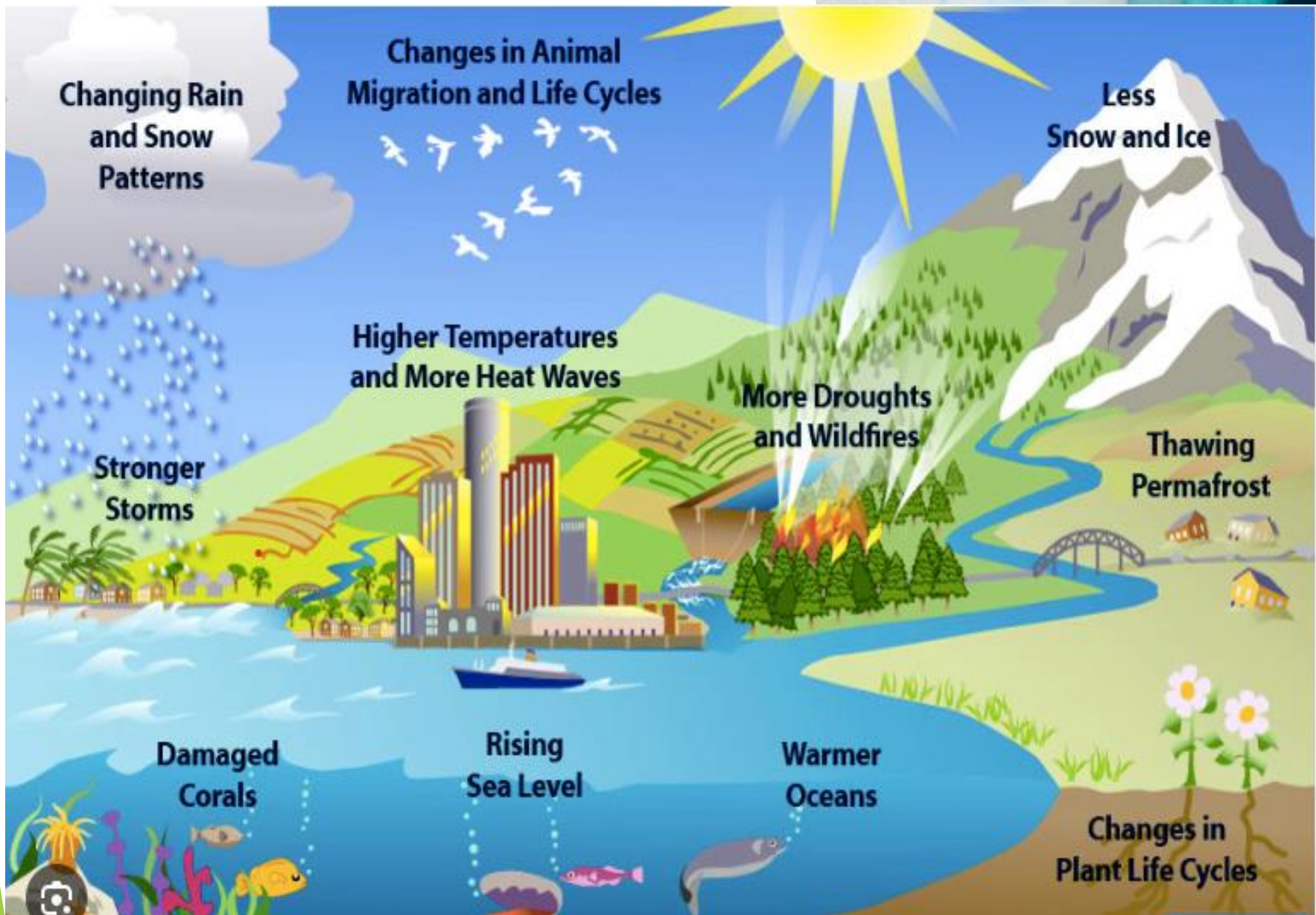
❖ Climate Change

Global warming has led to a change in climatic conditions. There are droughts at some places and floods at some. This climatic imbalance is the result of global warming.

► Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. But since the 1800s, industrial revolution, human activities, notably fossil fuel use, have intensified the greenhouse gas effect, causing global warming. Key contributors include energy consumption, industrial processes, vehicular emissions, deforestation, and landfills. Burning fossil fuels generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun's heat and raising temperatures. Increasing temperatures caused by climate change and the consequences are evident: glacial melting, rising sea levels, warmer oceans impacting currents, heightened extreme events, and declining biodiversity. This unnatural warming disrupts Earth's systems.

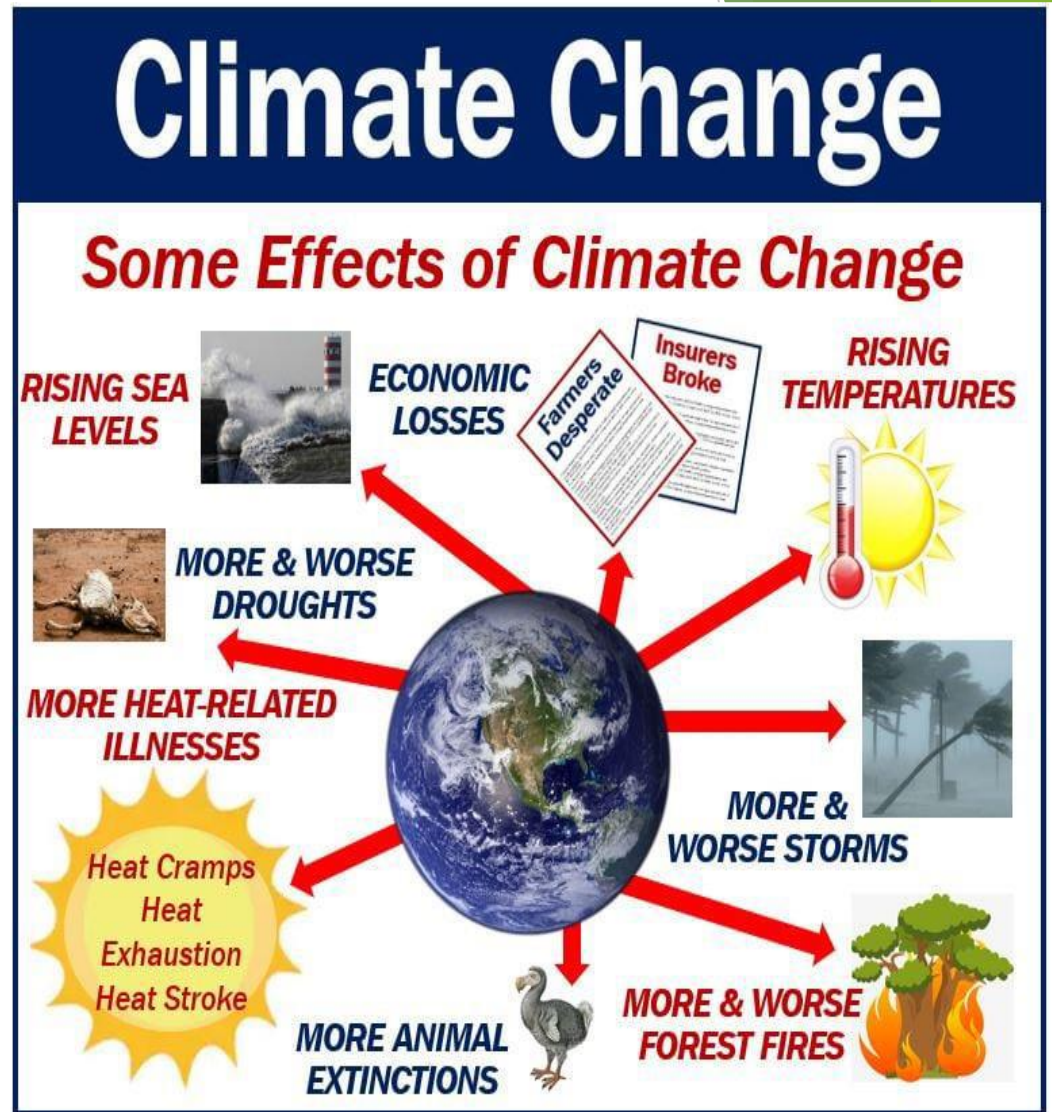
► Since 1880, the average global temperature has risen by 1.1°C , according to the Intergovernmental Panel on Climate Change (IPCC), the leading scientific body on climate change, if current trends continue, the world is likely to reach 1.5°C of warming by 2030-2052. The current international agenda as reflected in the Paris Accord is to limit the warming to 1.5°C from pre-industrial levels to secure a livable future for all. A 2°C rise will set a chain of irreversible reactions in Earth's climate. Despite the scientific community and activists pushing for long to take climate action, a lack of political will, institutional changes and industry accountability have kept us way beyond the target. At current policy rates, we are projected to reach a 2.8°C rise by 2100

IMPLICATION OF CLIMATE CHANGE: -



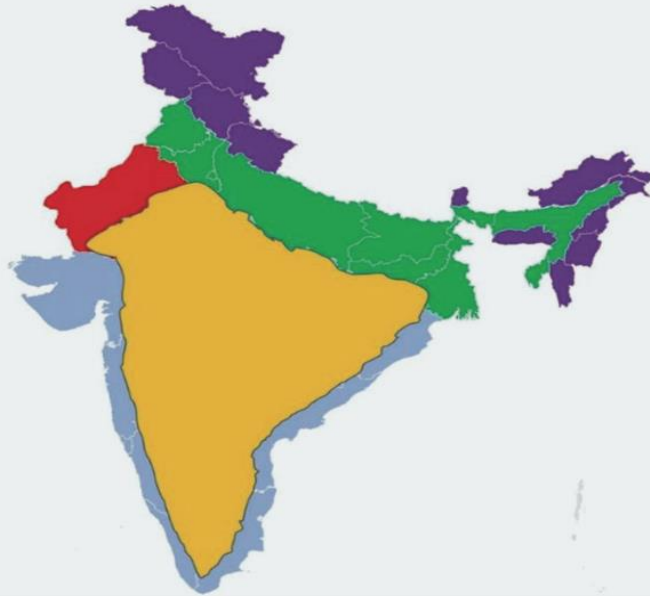
IMPLICATION OF CLIMATE CHANGE: -

- ▶ Loss of species:-
- ▶ Not enough food:-
- ▶ More health risks:-
Changing weather patterns are spreading diseases such as malaria, dengue, and other vector-borne illnesses
- ▶ Poverty and displacement:-
- ▶ Reduced Agricultural Output:
- ▶ Ecosystems and Biodiversity:
- ▶ Coastal Vulnerability
- ▶ Disruption of the Fisheries Sector



IMPLICATION OF CLIMATE CHANGE: IN INDIA -

Chart II.1: Risks Emanating from Climate Change across Geographical Regions in India



Thar Desert Heatwaves	Great Himalayas Landslides Cloudbursts Melting of glaciers	Indo-Gangetic Plains River floods Heatwaves Thunderstorms
Coastal Plains and Ghats Heavy precipitation Urban floods Cyclones Landslides	Central Peninsular Plateau Heatwaves Forest fires Droughts	

Note: Map not to scale.

► **Glacial retreat in the Himalayas:** Rising temperature and rain can cause glacial lake outburst floods. It could be evident from the February 2021 incidence of glacial burst from Uttarakhand.

► **Flooding, Landslides and Cyclones:** Compounding effects of sea-level rise and intense tropical cyclones lead to flooding in India's various regions. e.g., Mumbai and Konkan region (2021 flood) is prone to sea-level rise and flooding. Increasing cyclones (in Gujarat, Maharashtra, Odisha and West Bengal) in the last 3-4 years are the cause of concern.

► **Draughts:** Draughts are expected to be more frequent in some areas, especially northwestern India, Jharkhand, Orissa, and Chhattisgarh. Agricultural production will be affected by 2040.

► **Erratic monsoon:** Monsoon rain will be dominated by aerosols and internal variability shortly, but in the long term, it will increase erratic monsoon rain caused a devastating loss in the 2021 flood in Maharashtra, Uttarakhand and Kerala.

► **Intense heat stress:** Heat extremes are increasing, and marine heatwaves will continue to increase. These are likely to impact India in recent years as it currently affecting the Andhra and Telangana region.

CAUSES OF CLIMATE CHANGE: -



Industrialisation

↓
More fossil fuel burnt
like Coal, Petroleum

↓
Increase in Carbon dioxide
and Methane



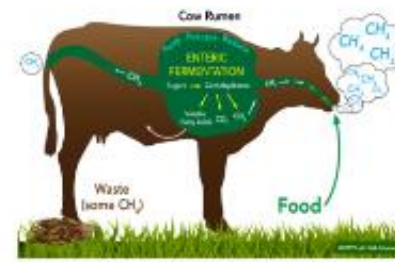
Deforestation

↓
Cutting of trees

↓
Less trees in
Environment

↓
Less Carbon dioxide
converted into Oxygen

↓
More Carbon Dioxide
in Environment



Increase in Cattle Production

↓
Higher Animal Waste Created

↓
Increase in Methane

*Increase in Gases like Carbon dioxide and Methane
These gas trap heat of sun (causes **Green house Effect**)*

❖ Deforestation

Plants are the main source of oxygen. They take in carbon dioxide and release oxygen thereby maintaining environmental balance. Forests are being depleted for many domestic and commercial purposes. This has led to an environmental imbalance, thereby giving rise to global warming.



❖ Use of Vehicles

The use of vehicles, even for a very short distance results in various gaseous emissions. Vehicles burn fossil fuels which emit a large amount of carbon dioxide and other toxins into the atmosphere resulting in a temperature increase.



❖ Chlorofluorocarbon

With the excessive use of air conditioners and refrigerators, humans have been adding CFCs into the environment which affects the atmospheric ozone layer. The ozone layer protects the earth surface from the harmful ultraviolet rays emitted by the sun. The CFCs has led to ozone layer depletion making way for the ultraviolet rays, thereby increasing the temperature of the earth.

❖ Industrial Development

With the advent of industrialization, the temperature of the earth has been increasing rapidly. The harmful emissions from the factories add to the increasing temperature of the earth



❖ Agriculture

Various farming activities produce carbon dioxide and methane gas. These add to the greenhouse gases in the atmosphere and increase the temperature of the earth.



❖ Overpopulation

Increase in population means more people breathing. This leads to an increase in the level of carbon dioxide, the primary gas causing global warming, in the atmosphere.

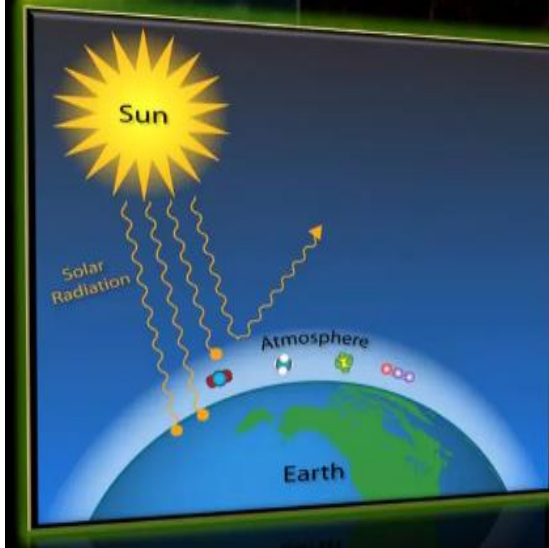


CAUSE OF CLIMATE CHANGE: -



☐ Volcanoes

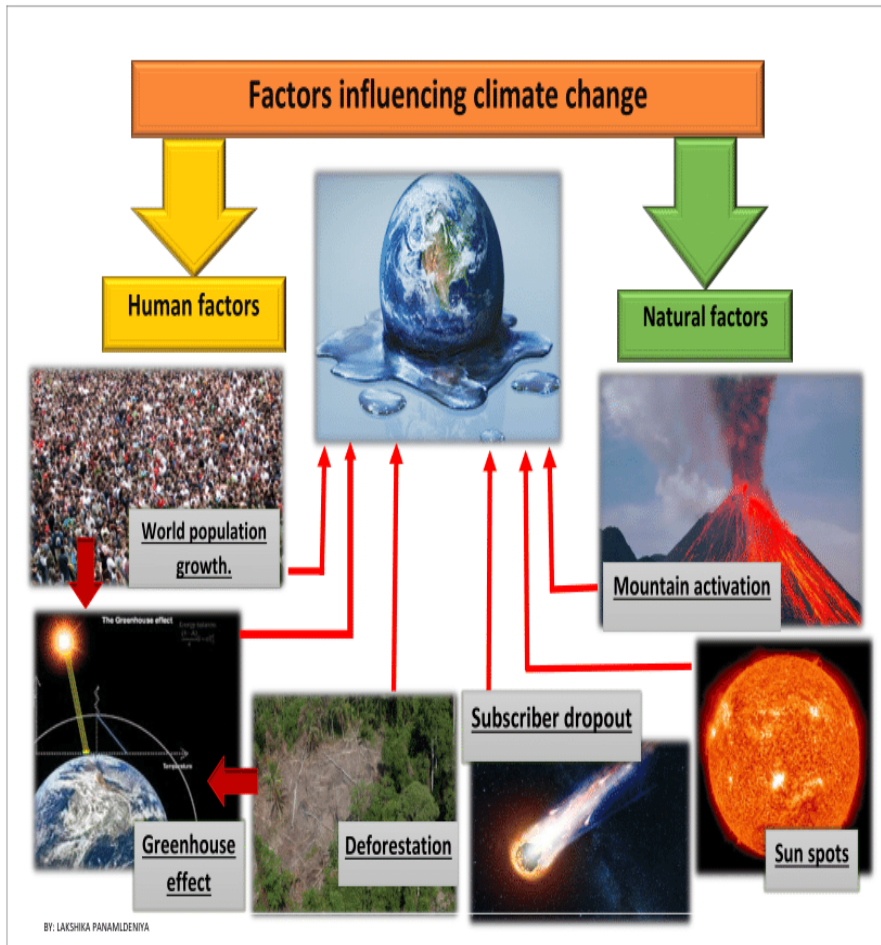
Volcanoes are one of the largest natural contributors to global warming. The ash and smoke emitted during volcanic eruptions goes out into the atmosphere and affects the climate.



☐ Water Vapour

Water Vapour is a kind of greenhouse gas. Due to the increase in the earth's temperature more water gets evaporated from the water bodies and stays in the atmosphere adding to global warming.

FACTORS CONTRIBUTING TO CLIMATE CHANGE:-



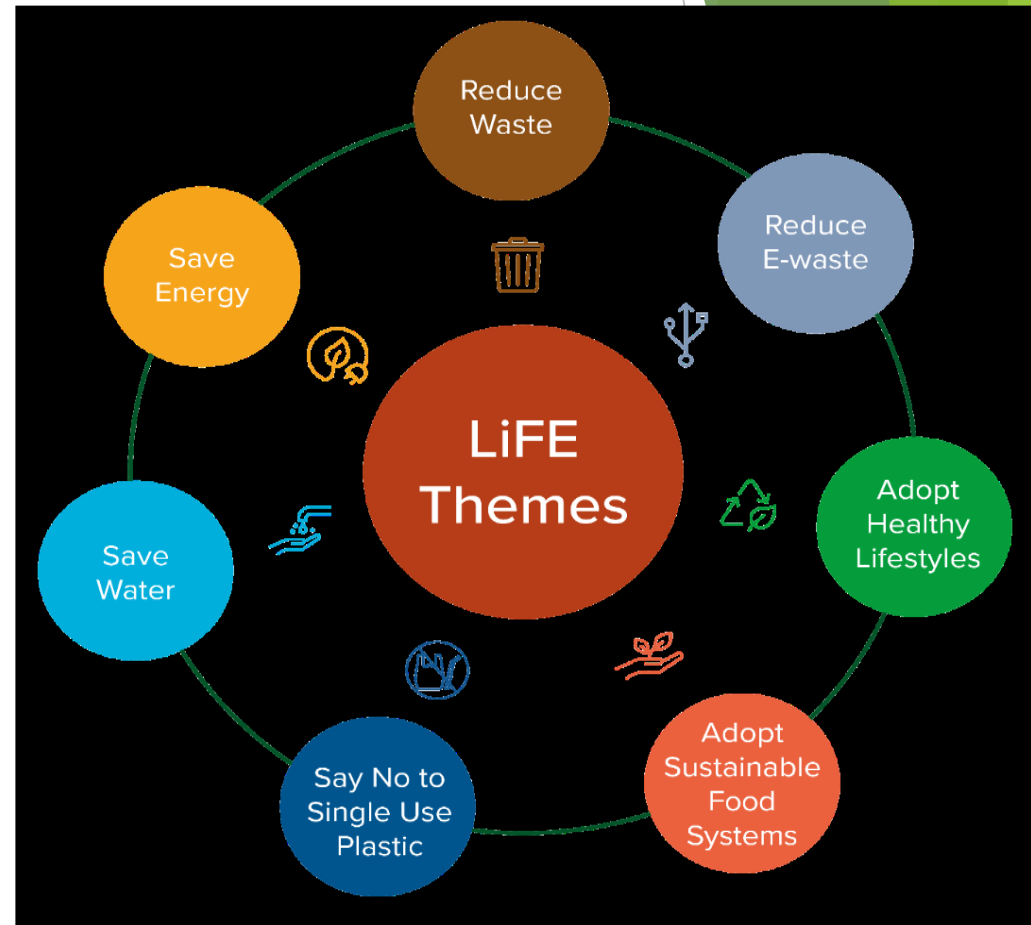
► As greenhouse gas emissions blanket the Earth, they trap the sun's heat. This leads to global warming and climate change. The world is now warming faster than at any point in recorded history.

- Generating power:-
- Manufacturing goods:-
- Cutting down forests
- Using transportation:-
- Producing food:-
- Powering buildings:-
- Consuming too much

MEASURES TO MITIGATE CLIMATE CHANGE

▶ Everyone can help limit climate change. From the way we travel, to the electricity we use and the food we eat, we can make a difference. Start with these 10 actions to help tackle the climate crisis.

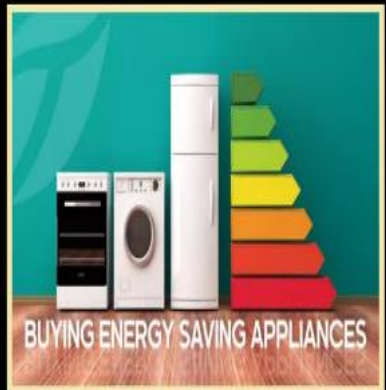
- ▶ Save energy at home:-
- ▶ Walk, cycle, or take public transport:-
- ▶ Eat more vegetables:-
- ▶ Consider your travel:-
- ▶ Throw away less food:-
- ▶ Reduce, reuse, repair & recycle:-
- ▶ Change your home's source of energy:
- ▶ Switch to an electric vehicle:-
- ▶ Transition to Renewable Energy
- ▶ Forest Conservation and Reforestation:
- ▶ Adoption of Sustainable Agriculture:
- ▶ International Cooperation



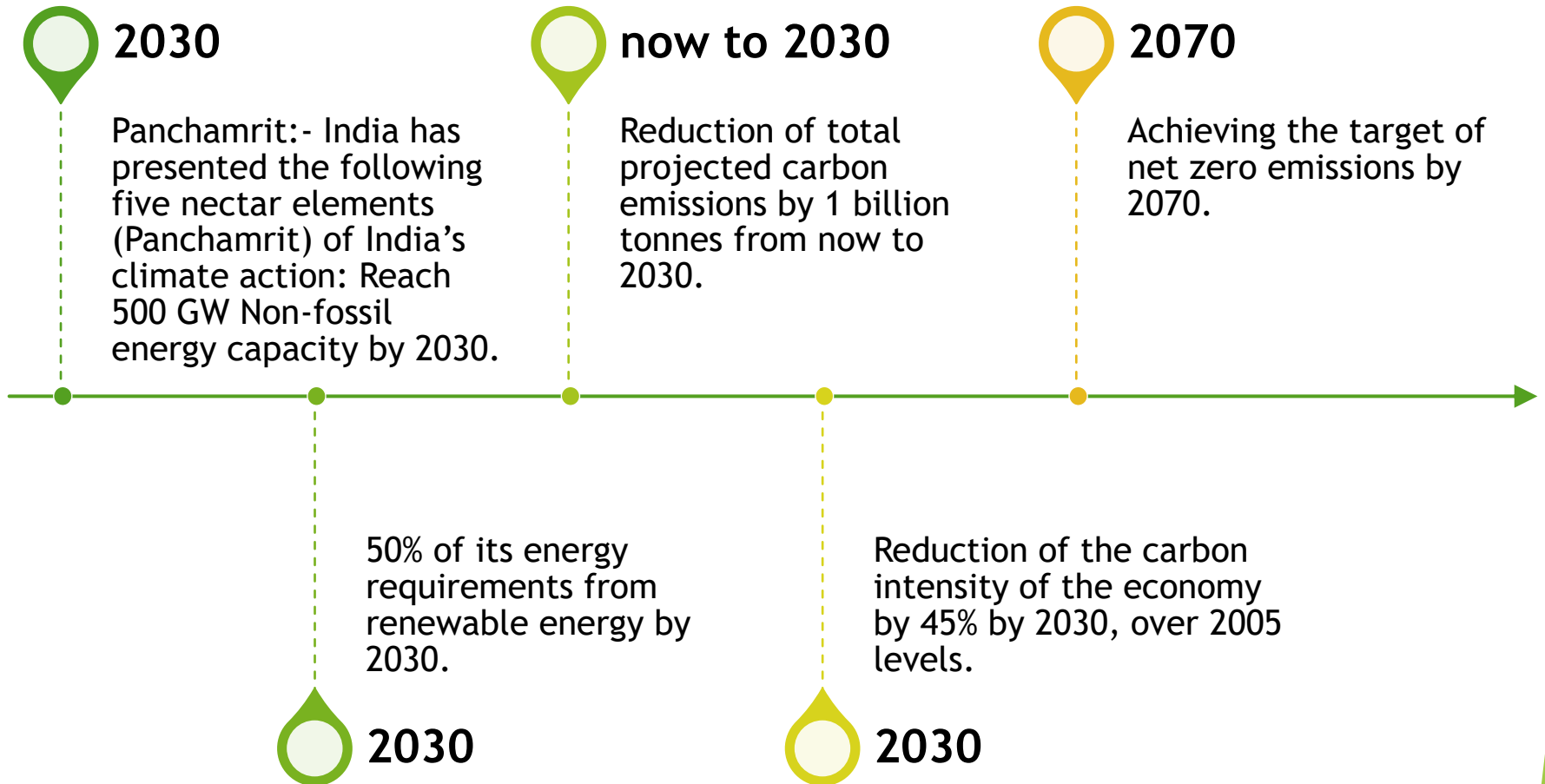
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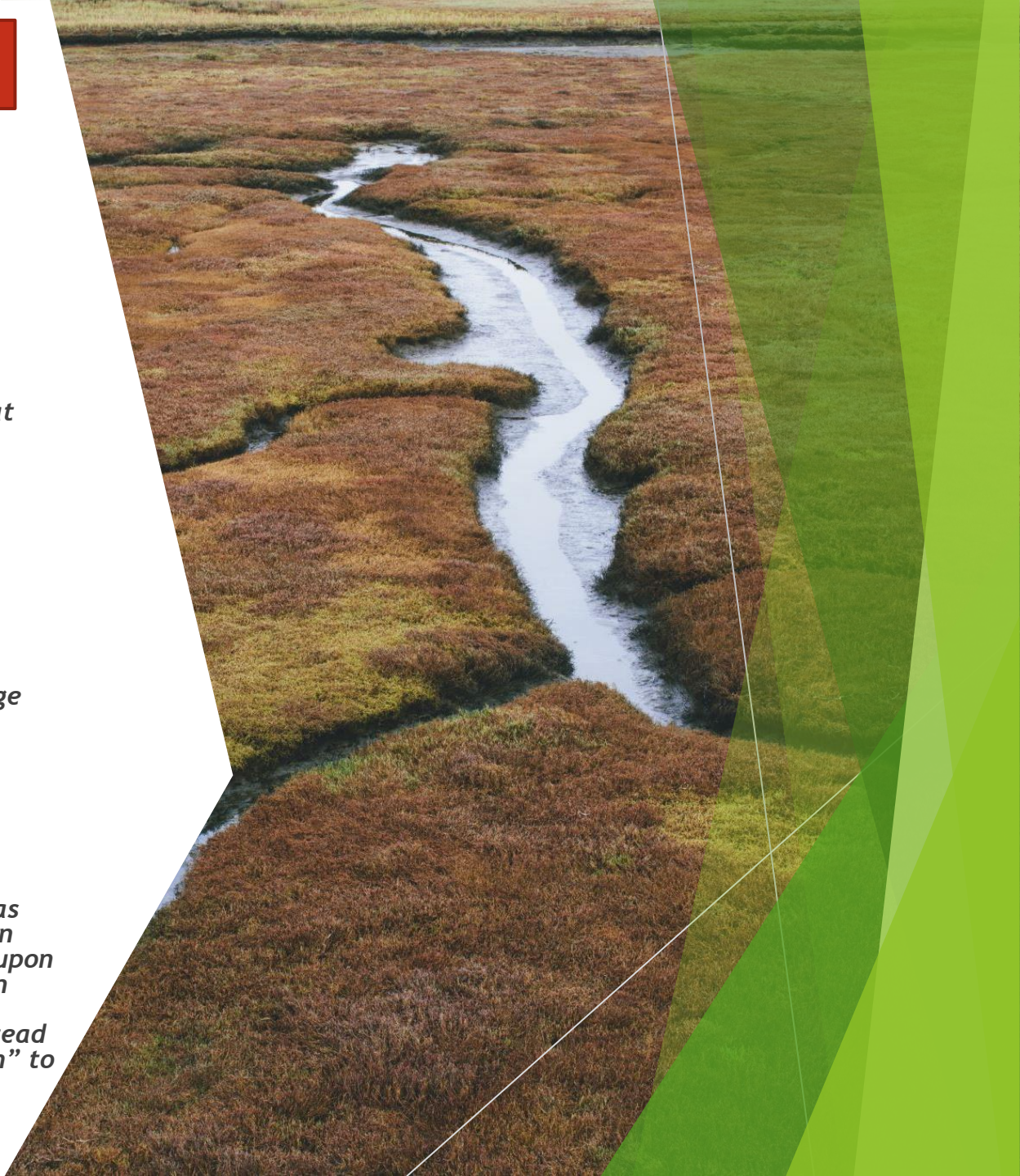


INDIA'S INITIATIVES TO TACKLE CLIMATE CHANGE:-



INDIA'S INITIATIVES TO TACKLE CLIMATE CHANGE :-

- ▶ **National Action Plan on Climate Change (NAPCC):-**
 - ▶ **National Solar Mission**
 - ▶ **National Mission for Enhanced Energy Efficiency**
 - ▶ **National Mission on Sustainable Habitat**
 - ▶ **National Water Mission**
 - ▶ **National Mission for Sustaining the Himalayan Ecosystem**
 - ▶ **National Mission for A Green India**
 - ▶ **National Mission for Sustainable Agriculture**
 - ▶ **National Mission on Strategic Knowledge for Climate Change**
- ▶ **Adoption of LiFE :-**
- ▶ **Lifestyle for the Environment (LiFE) was introduced by Prime Minister at COP26 in Glasgow on 1st November 2021, calling upon the global community to drive LiFE as an international mass movement towards “mindful and deliberate utilization, instead of mindless and destructive consumption” to protect and preserve the environment.**



India's Updated NDCs (Nationally Determined Contributions)



1. 'LIFE'—'Lifestyle for Environment' as a key to combating climate change.



2. To adopt a climate-friendly and cleaner path.



3. To reduce the emission intensity of its GDP by 45% by 2030, from 2005 level.



4. To achieve about 50% cumulative electric power installed capacity from non fossil fuel based energy resources by 2030, with the help of transfer of technology and low cost international finance, including from GCF.



5. To create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030.



6. To better adapt to climate change by enhancing investments in sectors vulnerable, particularly agriculture, water resources, Himalayan & coastal regions, health and disaster management.



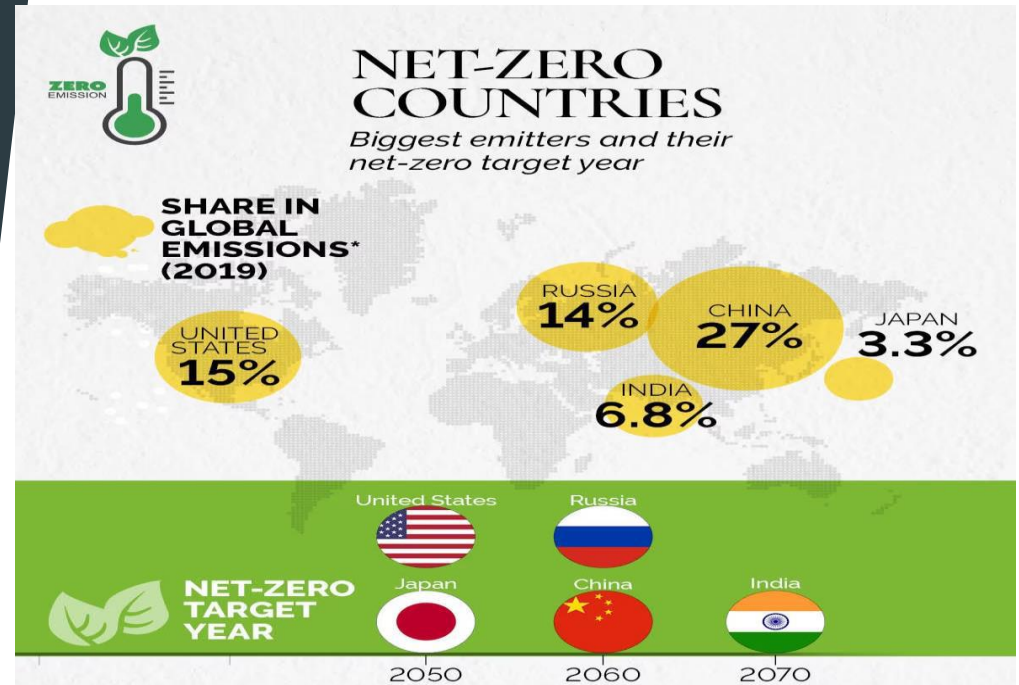
7. To mobilise domestic and new & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.



8. To build capacities and create a domestic framework and international architecture for quick diffusion of cutting-edge climate technology in India and for joint collaborative R&D for such future technologies.

GOING NET ZERO

► Net zero emissions describes the state where emissions of carbon dioxide due to human activities and removals of these gases are in balance over a given period. It is often called simply net zero. To keep the global temperature within the limit, only a specific amount of CO₂ and other GHGs can be present in the earth's atmosphere. Any increase above that budget should be countered by removal into natural or artificial sinks. Net zero is crucial to keep the temperatures around 1.5°C and forms an important reference level to keep the individual national emissions in check. It becomes pivotal as 1.5°C targets are critical to keeping severe climate change-related disasters under control.



According to the World Bank, climate change could push more than 100 million people into extreme poverty by 2030 by disrupting agriculture and fuelling the spread of malaria and other diseases. Therefore, implementing global and individual country's efforts under the Paris agreement is the urgent need of time.



**Bhutan
is the world's most
carbon-negative**



**China
is now the
world leader**



**Costa Rica
has achieved
99% renewable
energy.**

Climate Change Quotes From Inspirational Leaders

- ❑ “The world must come together to confront climate change. There is little scientific dispute that if we do nothing, we will face more drought, famine and mass displacement that will fuel more conflict for decades.” - **Barack Obama**
- ❑ “When the well is dry, we know the worth of water.” - **Benjamin Franklin**
- ❑ “Preservation of our environment is not a liberal or conservative challenge, it's common sense.” - **Ronald Reagan**
- ❑ “Earth provides enough to satisfy every man's need, but not every man's greed.” - **Mahatma Gandhi**
- ❑ “Climate change is a terrible problem, and it absolutely needs to be solved. It deserves to be a huge priority.” - **Bill Gates**
- ❑ “We are running the most dangerous experiment in history right now, which is to see how much carbon dioxide the atmosphere can handle before there is an environmental catastrophe.” - **Elon Musk**

THANK YOU