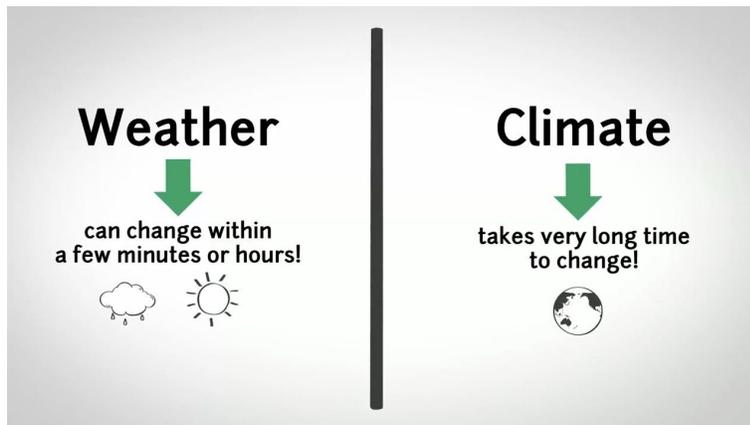


Climate change: An overview

Weather refers to atmospheric conditions that occur locally over short periods of time from minutes to hours or days. Familiar examples include rain, snow, clouds, winds, floods or thunderstorms. Climate, on the other hand, refers to the long-term regional or even global average of temperature, humidity and rainfall patterns over seasons, years or decades.



The difference between weather and climate : https://www.youtube.com/watch?v=_fANLICuYB8

Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates. It is a change of climate, which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Climate change and the resultant rise in temperature and rainfall will intensify the frequency and intensity of extreme weather events. Climate change increases vulnerability by destroying natural buffers , having an adverse impact on ecosystems.

Greenhouse effect and gases:

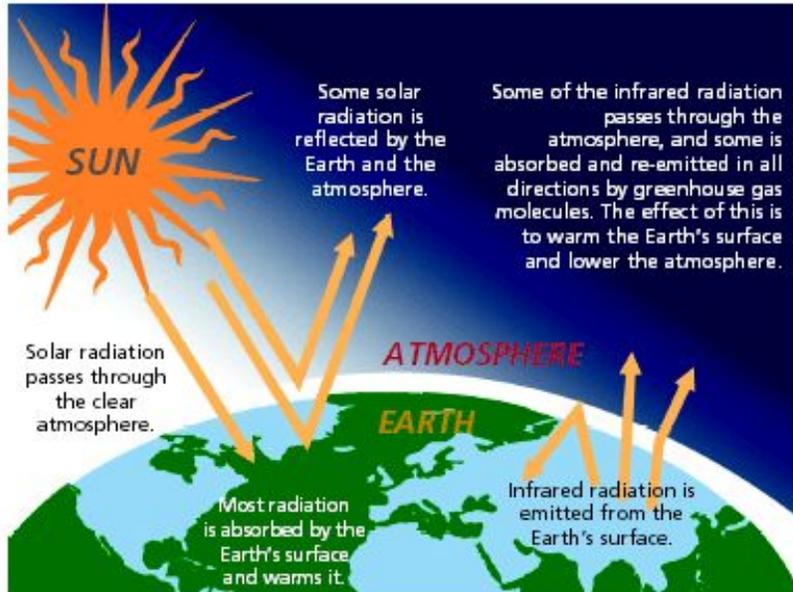
Solar energy radiating back to space from the Earth's surface is absorbed by greenhouse gases and re-emitted in all directions. This heats both the lower atmosphere and the surface of the planet. Without this effect, the Earth would be about 30 degree colder and hostile to life.

The greenhouse gas with the greatest impact on warming is water vapour. But it remains in the atmosphere for only a few days. Since the Industrial Revolution began around 1750, CO₂ levels have risen more than 30%. The concentration of CO₂ in the atmosphere is higher than at any time in at least 800,000 years.

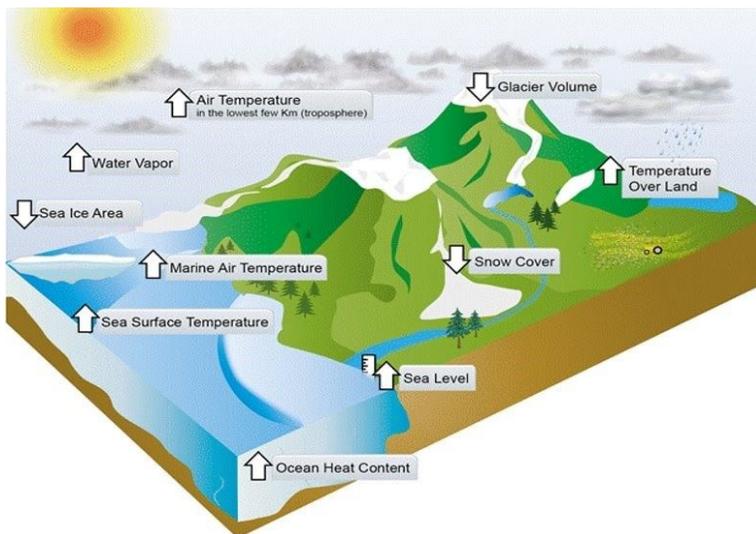
Other greenhouse gases such as methane and nitrous oxide are also released through human activities, but they are less abundant than carbon dioxide. Carbon dioxide

(CO₂), however, persists for much longer. It would take hundreds of years for a return to pre-industrial levels and only so much can be soaked up by natural reservoirs such as the oceans.

Most man-made emissions of CO₂ come from burning fossil fuels. When carbon-absorbing forests are cut down and left to rot, or burned, that stored carbon is released, contributing to global warming.



The Greenhouse Effect - Source: <http://www.who.int/globalchange/summary/en/index1.html>



Indicators of Climate change: Source (IPCC, 2016)

Human activities have increased carbon dioxide emissions, driving up temperatures. Extreme weather and melting polar ice are among the possible effects. The Earth's average temperature is about 15C, but has been much higher and lower in the past.

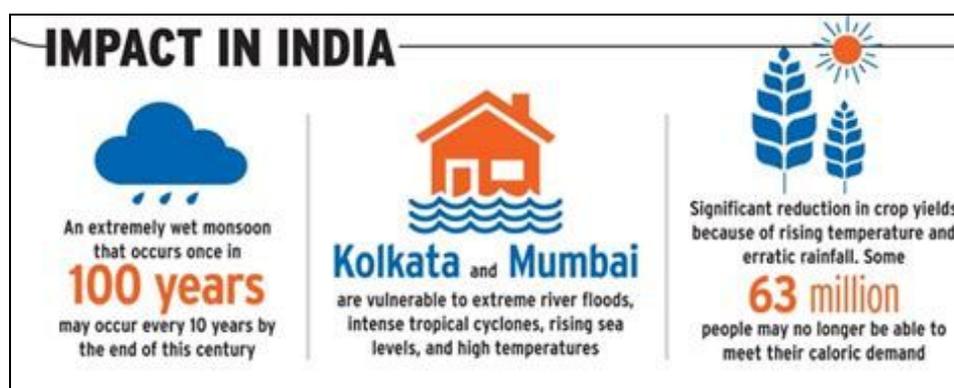
There are natural fluctuations in the climate, but scientists say temperatures are now rising faster than at many other times. However, melting ice is now thought to be the main reason for rising sea levels. Most glaciers in temperate regions of the world are retreating.

India among worst climate impacted - *Source: Climate Awareness Report for Earth, January 2021*

Vulnerable people in developing countries suffer most from extreme weather events and India ranked among the top ten worst affected countries in 2019. Over 475 000 people lost their lives as a direct result of more than 11,000 extreme weather events globally, with losses amounting to around US\$ 2.56 trillion during the period 2000- 2019.

These are some of the main results of the Global Climate Risk Index 2021, published recently by the environmental think tank Germanwatch ahead of the Global Climate Adaptation Summit. The index analyses and ranks to what extent countries and regions have been affected by impacts of climate related extreme weather events like storms, floods, heatwaves etc., with the most recent data available.

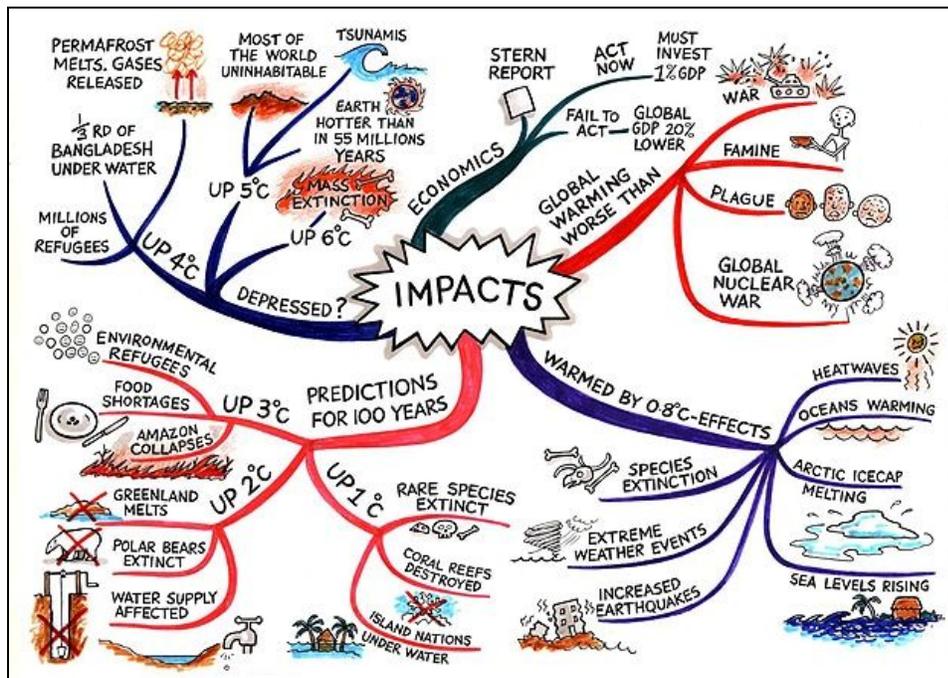
The countries most affected in 2019 were Mozambique, Zimbabwe, as well as the Bahamas. For the period from 2000 to 2019 Puerto Rico, Myanmar and Haiti rank highest. India was ranked at 7th in the list with an estimated economic damage of US\$ 10 billion from floods during the extended and intense monsoon season and further losses of over US\$ 8 billion from cyclonic storms.



Storms and their direct implications – precipitation, floods and landslides – were one major cause of losses and damages in 2019. Of the ten most affected countries in 2019, six were hit by tropical cyclones. Recent science suggests that the number of severe

tropical cyclones will increase with every tenth of a degree in global average temperature rise.

Developing countries are particularly affected by the impacts of climate change. They are hit hardest because they are more vulnerable to the damaging effects of a hazard but have lower coping capacity. Eight out of the ten countries most affected by the quantified impacts of extreme weather events in 2019 belong to the low- to lower-middle income category and half of them are Least Developed Countries.



Climate Literacy for Climate Action:

Climate change education increases “climate literacy” among young people, encourages changes in their attitudes and behaviour, helps the population adapt to climate change related trends and increases the resilience of already vulnerable communities who are the most likely to be adversely affected by climate change. The main goals of climate change education include building a sustainable future, inspiring action and practicing influencing skills at the social and personal levels.

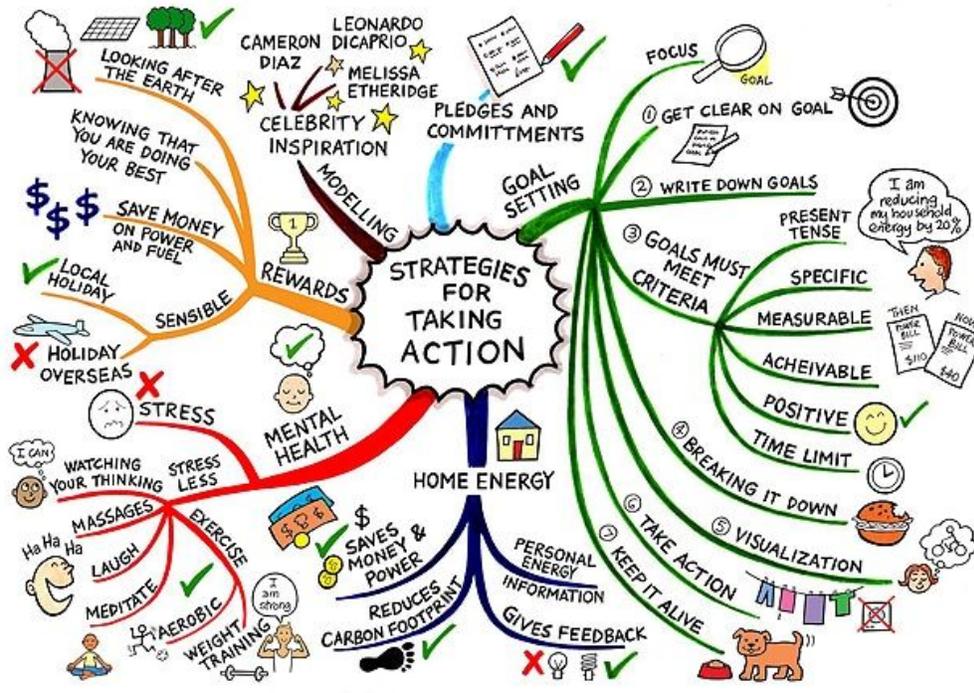
Education and awareness-raising enable informed decision-making, play an essential role in increasing adaptation and mitigation capacities of communities, and empower women and men to adopt sustainable lifestyles. Climate change will bring economic and environmental challenges as well as opportunities, and citizens who have an

understanding of climate science and policy will be better prepared to respond to both. Society needs citizens who understand the climate system and know how to apply that knowledge in their careers and in their engagement as active members of their communities.



Concerns about climate change have contributed to growth in industries that promote the use of renewable resources to produce energy without causing pollution and these concerns have also prompted demand for more professionals who study climate change or seek strategies to repair environmental damage. All of these professionals are concerned with understanding climate and some specialize in understanding how Earth's climate is changing while others concentrate on determining the long-term impacts of climate change.

As awareness about the causes of climate change has grown people have turned to environmentally safe ways of producing power, which is one of the reasons that solar photovoltaic installation is seeing such a high rate growth in the field. The ambit opens up channels for exploration of various sectors that are getting affected by climate change and imprint sustainable solutions.

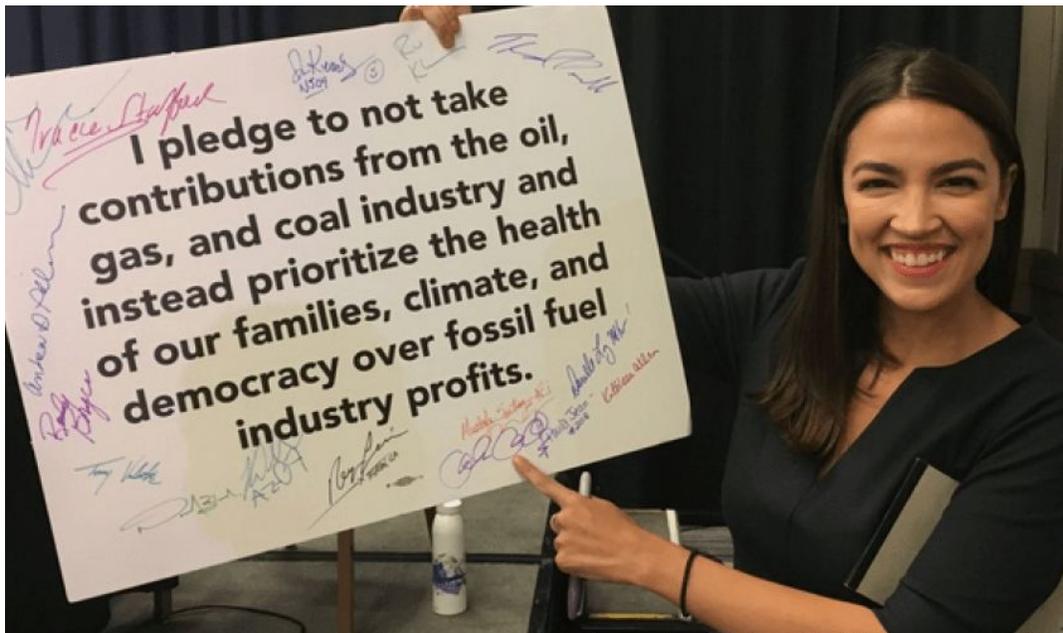


There are Conference of Parties (COPs) conducted in alliance with various United Nations (UN) agencies adopting declared agreements and frameworks like Kyoto Protocol, Stockholm Convention, Basel agreement, Paris Agreement, etc. aiming to bring nations under its signatories to tackle climate change. There are national level policies and frameworks at country level in line with the agendas of international objectives enhancing a collaborative and cooperative effort for climate change.

In 2014 UNESCO launched the Global Action Program (GAP), the official follow-up to the United Nations Decade of Education for Sustainable Development (ESD), with climate change as a critical thematic focus. It aims to make climate change education a more central and visible part of the international response to climate change. The objectives of the Global Action Program are:

- To reorient education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development.
- To strengthen education and learning in all agendas, programs and activities that promote sustainable development.

Climate change policies/frameworks



Market-based instruments

- Market-based approaches include carbon taxes, subsidies, and cap-and-trade programs.
- In a tradable carbon permit system, permits equal to an allowed level of emissions are distributed or auctioned. Parties with emissions below their allowance are able to sell their excess permits to other parties that have exceeded their emissions allowance.
- Market-based instruments are recognized for their potential to reduce emissions by allowing for flexibility and ingenuity in the private sector.

Regulatory instruments

- Regulatory approaches include non-tradable permits, technology and emissions standards, product bans, and government investment.

Voluntary agreements

- Voluntary agreements are generally made between a government agency and one or more private parties to achieve environmental objectives or to improve environmental performance beyond compliance. Public and private sectors to oversee a variety of voluntary programs aimed at reducing GHG emissions, increasing clean energy adoption, and adapting to climate change.

Paris Agreement:



It is a multilateral agreement within the United Nations Framework Convention on Climate Change (UNFCCC) signed to reduce, mitigate greenhouse-gas-emissions.

The goal of the Paris Agreement:

- To curtail the rise of global temperature this century below 2-degree Celsius, above pre-industrial levels; and also pursue efforts to limit the increase to 1.5 degrees celsius.
- Develop mechanisms to help and support countries that are very vulnerable to the adverse impacts of climate change. An example would be countries like the Maldives facing threat due to sea-level rise.
- Confirms the obligation that developed countries have towards developing countries, by providing them financial and technological support.
- Carbon Dioxide emissions reductions by 20%,
- Work on increasing the renewable energy market share by 20%
- Target to increase energy efficiency by 20%

Nationally Determined Contributions (NDC):

It means the contributions that need to be done by each country to achieve the overall global goal set in the Paris Agreement. The contributions need to be reported every 5

years to UNFCCC. The contributions are not legally binding but the goal is to make sure that all countries have access to technical expertise and financial capability to meet the climate challenges.

National Action Plan for Climate Change (NAPCC): India

NAPCC is a Government of India's program launched in 2008 to mitigate and adapt to the adverse impact of climate change. The action plan was launched in 2008 with 8 sub-missions. The plan aims at fulfilling India's developmental objectives with focus on reducing emission intensity of its economy. The plan will rely on the support from the developed countries with the prime focus of keeping its carbon emissions below the developed economies at any point of time. The 8 missions under NAPCC are as follows:

- **National Solar Mission**
- **National Mission for Enhanced Energy Efficiency**
- **National Mission on Sustainable Habitat**
- **National Water Mission**
- **National Mission for Sustaining Himalayan Ecosystem**
- **Green India Mission**
- **National Mission for Sustainable Agriculture**
- **National Mission on Strategic Knowledge for Climate Change**

