

IPCC Sixth Assessment Report (AR6) - 2021

Why in news?

The Intergovernmental Panel on Climate Change (IPCC) recently released the 1st part of its Sixth Assessment Report (AR6) titled 'Climate Change 2021: The Physical Science Basis'.

What is the IPCC?

- It is established by the UNEP and the World Meteorological Organization in 1988.
- It is a body of world's leading climate experts.
- It provides reports on the current state of knowledge in climate change and its potential environmental and socio-economic impacts.
- Its first report in 1990 on consequences of rising greenhouse gas (GHG) emissions led to the forming of UNFCCC in 1992.
- Since then, reports have been produced roughly every 7 years.

What are the key factors of climate change as per the report?

Human Activities

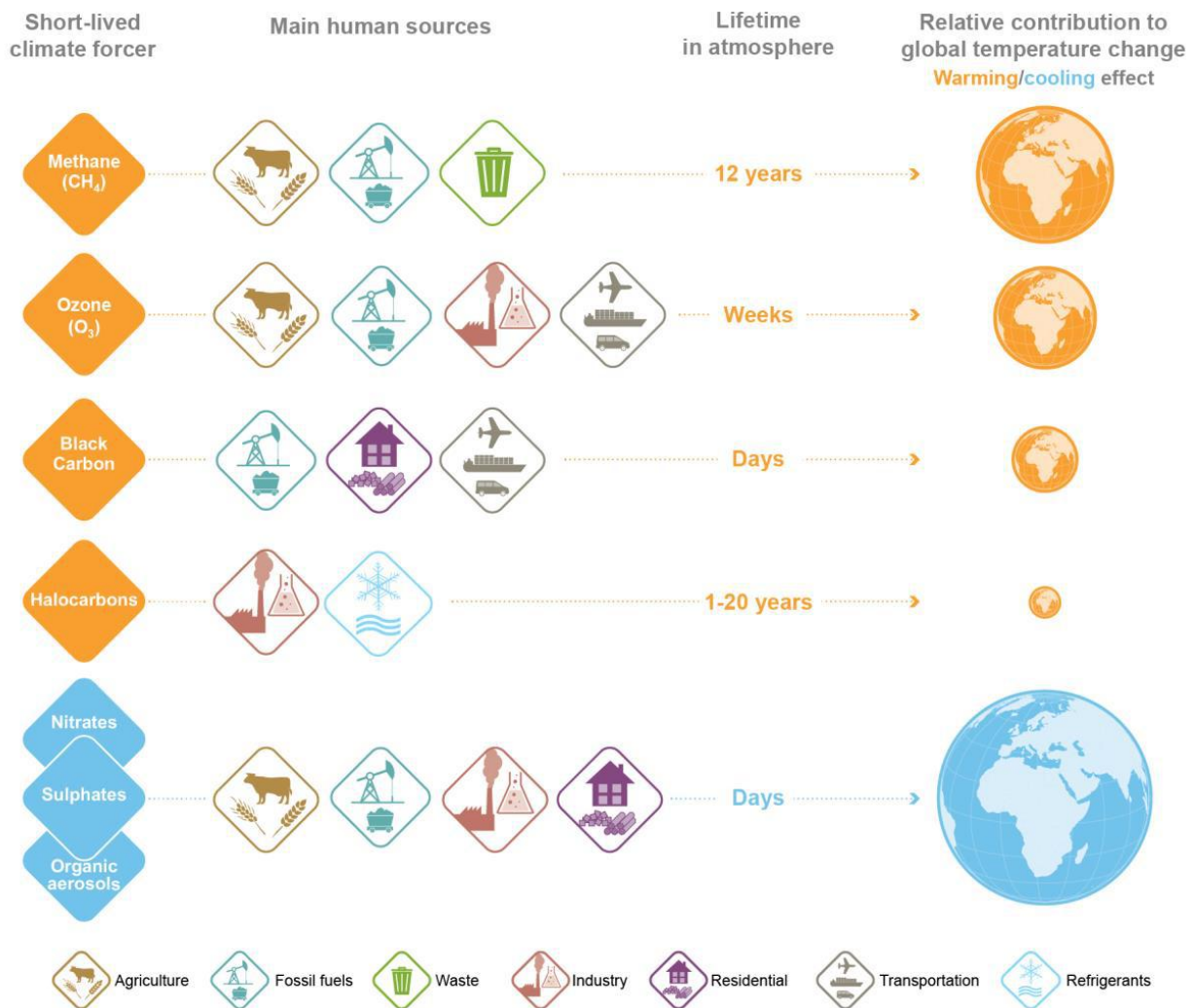
- The combined contribution to global warming by natural factors, such as the sun and volcanoes, is now estimated to be close to zero (negligible).
- 1.07°C out of the 1.09°C warming is due to GHG associated with human activities.
- Thus, almost 100% of global warming has been caused by humans.

Emissions

- CO₂ levels were greater in 2019 than they had been in "at least 2 million years."
- Methane and nitrous oxide (2nd and 3rd major contributors of warming respectively) levels are their highest in at least 800,000 years.
- CH₄ stays in the atmosphere only for a fraction of time compared to CO₂, but is far more efficient at trapping heat.
- Human-induced sources of methane
 1. consuming fossil fuels
 2. leaks from natural gas production, coal mining and landfills
 3. livestock and manure handling

FAQ 6.1: What are short-lived climate forcers and how do they affect the climate?

Short lived climate forcers do not remain for very long in the atmosphere, thus an increase or decrease in their emissions rapidly affects the climate system.



- Aerosols contribute to reducing the impact of warming therefore drastic reduction of aerosols actually leads to an increase in warming.

Weakened Natural allies

- The CO₂ emissions notably increased by half since 1960.
- In the same period, forests, soil and oceans have absorbed 56% of all the CO₂ humanity has released into the atmosphere.
- But these carbon sinks which are natural allies in the fight against global heating are showing signs of saturation.
- The percentage of human-induced carbon they soak up is likely to decline as the century unfolds.

“It’s suicidal and economically irrational to keep procrastinating”

Temperature Rise

- 2011-20 was hotter than any period of time in the past 1.25 lakh years.

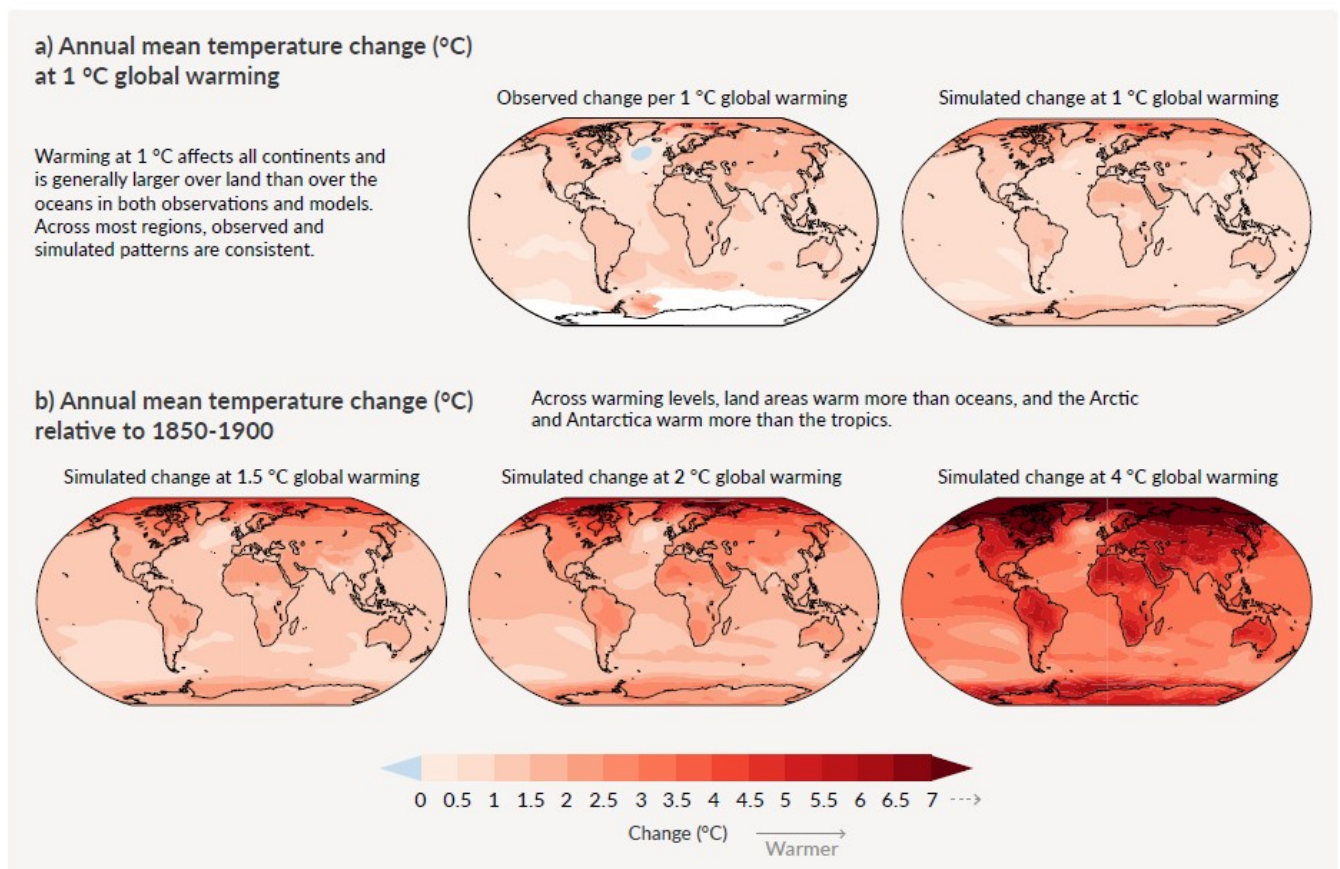
- Global surface temperature was 1.09°C higher in 2011-20 than between 1850-1900.

What are the impending threats?

Global Warming

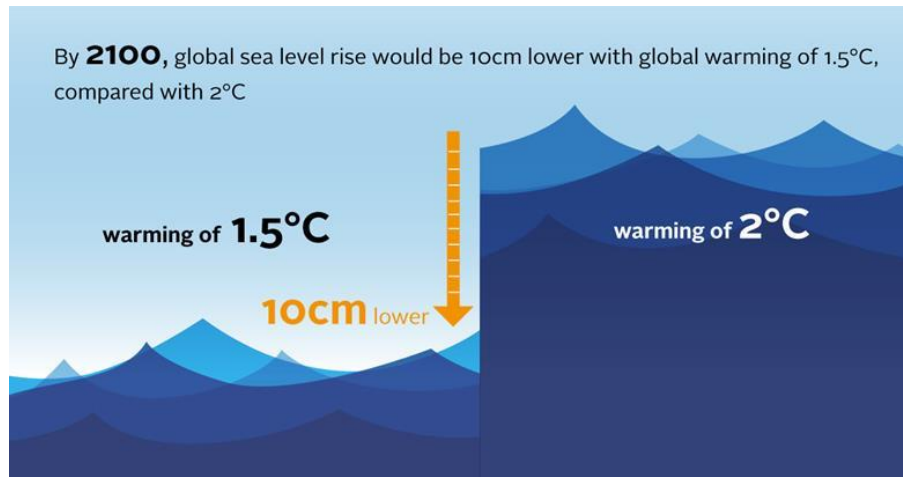
- Within the next two decades, temperatures are likely to rise by more than 1.5 °C above pre-industrial levels.
- Additional warming will weaken the Earth's carbon sinks present in plants, soils, and the ocean.
- Air pollution reduction and steep climate change mitigation are not complementary goals but require independent efforts over the short and medium-term.
- Human-induced global warming has been more rapid in Africa than the rest of the world.

With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture



Sea level rise

- Sea-level rise has tripled compared with 1901-1971 in the last decade.
- Global oceans have risen about 20 cm since 1900.
- The Arctic Sea ice is the lowest it has been in 1,000 years.
- Crumbling and melting ice sheets atop Antarctica have replaced glacier melt as the main drivers of sea level rise.
- If global warming is capped at 2°C, the ocean watermark will go up about half a metre over the 21st century.



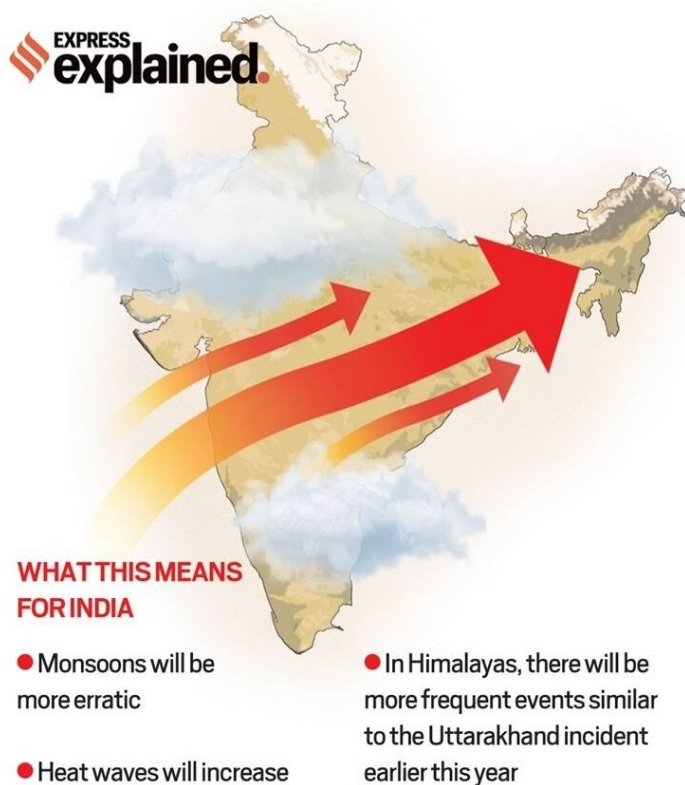
Impact on Cities

- Floods and sea-level rise in coastal areas & Ice sheet collapse or rapid changes in ocean circulations
- **Least developed countries** will increasingly bear the brunt of global warming
- **Other common threats** - increased heatwaves, more intense storms, and more serious droughts and floods etc
- With every 1°C rise in temperature, there will be a 7% increase in the intensification of extreme rain events.

New IPCC report is "a code red for humanity" - UN Secretary-General António Guterres

Impact on India

- With a 7,517 km coastline, India will face significant threats from rising seas
- Also, Indian Ocean is warming faster than the global average.
- Across 6 Indian port cities - Chennai, Kochi, Kolkata, Mumbai, Surat and Visakhapatnam - 28.6 million people will be exposed to coastal flooding.
- The snowlines are retreating, and this can cause a change in the water cycle, the precipitation patterns, increased floods as well as an increased scarcity of water in the future in the states across the Himalayas.
- Changes in monsoon precipitation are also expected, with both annual and summer monsoon precipitation projected to increase.



What is the 1.5°C mark that IPCC advocates?

The 2015 Paris Agreement set the goal to limit global warming to well below 2°C, compared to pre-industrial levels, in this century.

It also sets 1.5°C as an **aspirational target** to channelize countries' efforts.

- Temperatures have now risen by about 1.1°C since the period 1850 to 1900.
- Even if we start reducing emissions now, we will still overshoot the 1.5°C mark by 2030. But we will see a drop in temperatures to around 1.4°C by 2100.

Will 1.5°C level address all climate risks?

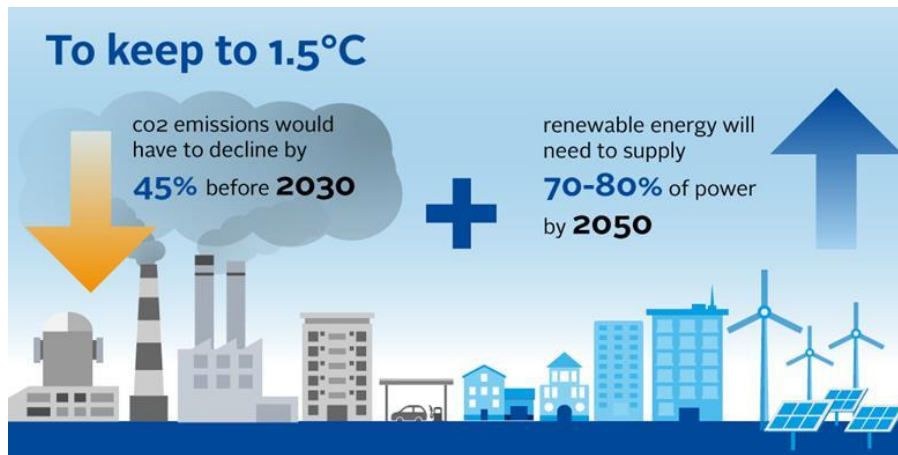
- It will take a lot of time for nature to heal; 20-30 years to see global temperatures stabilise.
- So, some long-term impacts of warming that are already in line are likely to be witnessed - Sea level rises, Melting of Arctic ice, Warming and acidification of the oceans.
- Nevertheless, the 1.5°C level will represent a much smaller risk than 2°C.
- And notably, this report is likely to be the last from the IPCC while there is still time to stay below 1.5°C.

What does IPCC call for?

Emission Control

- IPCC has recommended that countries strive to achieve **net zero emissions** i.e no additional greenhouse gases were emitted by 2050.
- Drastic cuts in GHG emissions are needed this very decade (2021-2030).
- End to new coal plants and new fossil fuel exploration and development.

- Efforts of governments, investors and businesses towards a low-carbon future.



Cumulative Emissions

- Reaching net zero alone is not enough to reach the 1.5°C target.
- Historical cumulative emission i.e total emission by each country throughout the industrial phase is the cause of the climate crisis that the world faces today.
- They cannot be mitigated by promises of net zero 30 years from now.
- Therefore cumulative emissions should be factored in while calculating net zero.

Negative emissions

- Warming could be brought back down via “negative emissions” i.e., to cool down the planet by
 - 1. sucking out or sequestering the carbon from the atmosphere
 - 2. stopping the use of fossil fuels and stopping deforestation
- But the technology at this end is not yet evolved and perfect, and needs attention.

Peak by 2025

- Earth could exceed 1.5°C of global warming as soon as the early 2030s.
- So, staying below 2°C this century will happen only if emissions reach net zero by 2050.
- For this to happen, global emissions must peak sometime in the middle of this decade itself (by 2025).
- **Indigenous and Traditional knowledge** had played an increasing role in historical climatology.
 1. Peruvian fishermen had first thought of the name ‘El Niño’ for the now well-known climate phenomenon in the tropical eastern Pacific Ocean, that scientists link with the Southern Oscillation.
 2. Inuit communities had contributed to community-based monitoring across the Arctic.
 3. Indigenous Australian knowledge of climatic patterns has been offered as a complement to observational records, such as those of sea-level rise.
- Such traditional knowledge must be assessed and integrated with scientific literature.

To test your knowledge on IPCC Report, Click [here](#)

Source: The Hindu, The Indian Express, The Guardian, Down to Earth

Related article: [IPCC Report on Global Warming 2018](#)

