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Assessment of Climate Change over the Indian Region: MoES

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Why in News

Recently, the **first Assessment of Climate Change over the Indian Region** has been published by the **Ministry of Earth Sciences (MoES)**.

- It is **India's first-ever national forecast on the impact of global warming** on the subcontinent in the coming century.
- These projections, based on a climate forecasting model developed at the **Indian Institute of Tropical Meteorology (IITM)**, Pune, will be **part of the next report of the Intergovernmental Panel on Climate Change (IPCC)**, expected to be ready in **2022**.
- This is a **significant step for climate science and policy in India** because existing projections are put in the context of historical trends in land and ocean temperatures, monsoon rainfall, floods, droughts and Himalayan warming and glacier loss.

Key Points

- **Temperature:**

- In a **worst-case scenario**, average surface air temperatures over India could **rise by up to 4.4°C** by the end of the century as **compared to the period between 1976 and 2005**.
 - The worst-case scenario is defined by the **Representative Concentration Pathway (RCP) 8.5** that calculates a radiative forcing of 8.5 watt per square metre due to the rising **greenhouse gas (GHG) emissions** in the atmosphere.
 - **Radiative forcing or climate forcing** is the difference between sunlight energy absorbed by the Earth (including its atmosphere) and the energy that it radiates back into space.
- Under an **intermediate scenario of RCP 4.5**, the country's **average temperature could rise by up to 2.4°C**.
 - The rise in temperatures will be even **more pronounced in the Hindu Kush-Himalayan region** where the **average could reach 5.2°C**.
 - The region is **already highly vulnerable** to climate-related variability in temperatures, rainfall and snowfall.
- **By 2100**, the **frequency of warm days and warm nights** might also **increase by 55% and 70% respectively**, as compared to the period 1976-2005 under the RCP 8.5 scenario.
- The **incidences of heat waves** over the country could also **increase by three to four times**. Their **duration of occurrence might also increase** which was already witnessed by the country in 2019.
- **Between 1900 and 2018**, the **average temperatures of India rose by 0.7°C**.
 - This rise in temperatures has been largely attributed to **global warming** due to GHG emissions and land use and land cover changes.
 - However, it has also been **slightly reduced by the rising aerosol emissions** in the atmosphere that have an **overall cooling characteristic**.
- The **latest global climate change assessments** indicate a **rise in worldwide average surface air temperatures by 5°C** by the end of the century if human activities keep emitting GHGs at the current rate.

The **global average temperature** in the last century has **gone up by 1.1°C**, according to the latest estimates by the IPCC.
- Even if the **Nationally Determined Contributions (NDCs)** declared by countries under the **Paris Agreement 2015** are met, the global average temperature **could rise by around 3°C**, which could be disastrous.

- **Rainfall:**

- Another significant highlight of the assessment is the **projected variability in the rainfall**, especially during the **monsoon season which brings 70% of the rainfall received** by India and is one of the **primary drivers of its rural agrarian economy**.
- Monsoon rainfall could **change by an average of 14% by 2100 that could go as high as 22.5%**. It is **not mentioned** if this change will be an **increase or a decrease but still represents variability**.
- **Overall rainfall during the monsoon** season has **decreased by 6%** between 1950 and 2015.
- In the past few decades, there has been an **increased frequency of dry spells** during the monsoon season that has **increased by 27%** between 1981-2011, as compared to 1951-1980.
- The **intensity of wet spells has also increased** over the country, with central India receiving **75% more extreme rainfall events** between 1950 and 2015.

For example: Monsoon seasons of 2018 and 2019 where dry spells were broken by extremely heavy rainfall spells, creating a flood and **drought** cycle in many regions in India.

Source: DTE