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News: La Nina and Air Quality

- Recently, a new study has been published by researchers at the Pune-based Indian Institute of Tropical Meteorology and the Bengaluru-based National Institute of Advanced Studies, suggesting that even air quality in India could be influenced by El Nino and La Nina events.

Key Findings of the Study

Link between Pollution and Winter Months in India

- During October to January, northern Indian cities, like Delhi, typically have high levels of PM2.5 due to various meteorological factors and pollution transport from regions like Punjab and Haryana.
- The western and southern parts of the country have always had relatively lower levels of pollution, because of their proximity to oceans.
- The winter of 2022, however, showed a significant deviation from this normal.
- Northern Indian cities, including Delhi, were cleaner than usual, while cities in the west and the south, like Mumbai, Bengaluru and Chennai, experienced worse-than-usual air quality.

Anomalous Behaviour in winter 2022

- PM 2.5 concentrations in Ghaziabad and Noida reduced significantly, while Delhi saw a slight reduction. In contrast, Mumbai and Bengaluru experienced rises in PM2.5 levels.
- Northern Indian cities had cleaner air than western and southern cities.

Factors Causing Anomaly

- The most crucial factor in explaining the anomaly of winter 2022 was a change in the normal wind direction.
- During winter, the wind usually blows in the northwesterly direction. For example, from Punjab towards Delhi and further into the Gangetic plains.
- It is a reason for transporting agricultural waste pollutants from Punjab and Haryana into Delhi.
- In the winter of 2022, however, the wind circulation was in the north-south direction.
- The pollutants being carried from Punjab and Haryana bypassed Delhi and surrounding areas and flew over Rajasthan and Gujarat to southern regions.

La Nina's Influence

- Extended La Nina persisted for an unusually long three years by the winter of 2022, impacting wind patterns.
- The three consecutive years of La Niña conditions (2020-23) — a rare “Triple-Dip” phenomenon — had widespread impacts on the ocean and climate across the globe.
- Not all La Nina events might produce noticeable changes in wind circulation over India.
- The 2022 event is particularly strong. And the impact on air circulation became evident only in the third year of La Nina. So, there may be an accumulative effect.
- The study suggests an unclear impact of El Nino on air quality in India.

World Air Quality Index (WAQI)

- The World Air Quality Index project is a non-profit project started in 2007.
- Its mission is to promote air pollution awareness for citizens and provide a unified and world-wide air quality information.

- The project is providing transparent air quality information for more than 100 countries, covering more than 12,000 stations in 1000 major cities via those two websites: aqicn.org and waqi.info.
- The founding team, located in Beijing China, is composed of several contributors in the domain environmental sciences, system engineering, data science, as well as visual design.
- The Air Quality Index is based on measurement of **particulate matter (PM 2.5 and PM 10), Ozone (O₃), Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂) and Carbon Monoxide (CO) emissions.**
- Most of the stations on the map are monitoring both PM 2.5 and PM 10 data, but there are few exceptions where only PM 10 is available.
- All measurements are based on **hourly readings**: For instance, an AQI reported at 8AM means that the measurement was done from 7AM to 8AM.