

PREDICTING POLLUTION LEVELS USING OCEANS' MEMORY

Prelims: Science & Technology- Newer Inventions

Mains:

GS-I- Important Geophysical phenomena such as earthquakes, Tsunami, Volcanic activity, cyclone etc., geographical features and their location - changes in critical geographical features (including waterbodies and ice-caps) and in flora and fauna and the effects of such changes.

GS-III- Science and Technology - developments and their applications and effects in everyday life Achievements of Indians in science & technology; indigenization of technology and developing new technology.

Context:

- ▶▶ Researchers from China and the U.S. have been successful in predicting air pollution levels in northern Indian States nearly a season in advance.

How does the model work?

- ▶▶ The model that has been developed by the researchers shows 75% accuracy in predicting pollution levels, and the prediction can be done even a season in advance.
- ▶▶ Studying a combination of El Nino, Antarctic Oscillation and the anomalies in sea surface temperature during autumn (September-November), can help forecasting the pollution conditions in winter (December-February).
- ▶▶ The model takes into account certain climatic patterns related to the ocean which have a regulatory effect on the wintertime air pollution over northern India.
- ▶▶ The ocean data serves as a memory and large-scale climate patterns like El Nino can tell what the weather conditions and pollution will be, nearly a season in advance.
- ▶▶ Climatic data and the aerosol optical depth for the period 2003- 2018 observed by various satellites were also used.

Benefits of The Model:

- ▶▶ The statistical model will help to identify if the weather conditions will be favourable or unfavourable for pollution, helping the government frame a more stringent pollution control plan if needed, before the winter arrives.
- ▶▶ There have been several studies in China that helped the government to make the needed reforms, especially in its industrial sector to bring down the pollution levels in the country.

- ▶▶ It is known that the aerosol over an area is modulated by meteorological conditions and circulation patterns. Stagnant weather conditions such as low wind speeds and descending air can favour rapid aerosol formation and accumulation. Understanding these climatic factors which influence the wintertime haze pollution can help foresee the future ventilation conditions too.

What is Antarctic Oscillation?

- ▶▶ Antarctic Oscillation is the dominant pattern of natural variability in the Southern Hemisphere outside the tropics. It is characterized by a poleward intensification (equatorward weakening) of the mid-latitude westerly winds that extends from the surface to the upper jet.
- ▶▶ The Antarctic Oscillation does not act directly to influence Indian climate but affects the Indian Ocean Meridional Dipole which in turn plays a role in our climatic conditions.

