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## Aerosol

- Aerosols are defined as a combination of liquid or solid particles suspended in a gaseous or liquid environment.
- In the atmosphere, these particles are mainly situated in the low layers of the atmosphere (< 1.5 km) since aerosol sources are located on the terrestrial surface.
- However, certain aerosols can still be found in the stratosphere, especially volcanic aerosols ejected into the high altitude layers.
- The origin of atmospheric aerosols is either natural or the result of anthropogenic activities.
- Natural sources of aerosols include sea salt generated from breaking waves, mineral dust blown from the surface by wind, and volcanoes.
- Anthropogenic aerosols include sulfate, nitrate, and carbonaceous aerosols, and are mainly from fossil fuel combustion sources.
- The atmospheric aerosols play a key role in the regional/global climate system through scattering and absorption of incoming solar radiation and by modifying the cloud structure.
- The transport of light-absorbing carbonaceous aerosols and dust from the polluted Indo-Gangetic Plain and desert areas over the Himalayas constitutes a major climatic issue due to severe impacts on atmospheric warming and glacier retreat.
- This heating over the Himalayas facilitates the “elevated-heat pump” that strengthens the temperature gradient between land and ocean and modifies the atmospheric circulation and the monsoon rainfall.

## Aerosol Optical Depth (AOD)

- AOD is a measure of how light is absorbed or reflected by airborne particles as it travels through the atmosphere.
- If aerosols are concentrated near the surface, an optical depth of 1 or above indicates very hazy conditions.
- An optical depth, or thickness, of less than 0.1 over the entire atmospheric vertical column is considered clean.
- The Angstrom Exponent is a parameter that describes how the optical

thickness of an aerosol typically depends on the wavelength of the light.
- The lower values of Angstrom Exponent (AE) in spring indicated dominance of coarse-mode dust aerosols.

## Aerosols Radiative Forcing in Trans- Himalayas

- Recently, a study by the Aryabhatta Research Institute of Observational Sciences (ARIES) has found that radiative forcing of aerosols i.e. effect of anthropogenic aerosols is much higher over the high altitudes of western trans-Himalayas.
- ARIES, Nainital is an autonomous research institute under the Department of Science and Technology (DST), Ministry of Science and Technology.
- The study analyzed the variability of aerosol optical, physical and radiative properties from January 2008 to December 2018 and the role of fine and coarse particles in Aerosol Radiative Forcing (ARF) assessment.
- ARF is the effect of anthropogenic aerosols on the radiative fluxes at the top of the atmosphere and at the surface and on the absorption of radiation within the atmosphere.
- The ARF values at top of the atmosphere were mostly low over Hanle and Merak.
- Hanle and Merak, situated in Ladakh are the part of Indian Astronomical Observatory (IAO).
- Highlights of the study are as follows

1. **Change in Temperature -** The study shows that monthly-mean atmospheric radiative forcing of aerosols leads to heating rates of 0.04 to 0.13 degree Celsius per day.
2. **Aerosol Optical Depth (AOD)** - The observations show that the Aerosol Optical Depth (AOD) exhibited a distinct seasonal variation with higher values (0.07) in May and lower (0.03) in winter months.
3. **Composition of Air -** Pure and polluted dust exhibited fractions between 16% and 23%, with a low frequency of less than 13% of absorbing aerosols, denoting weak influence of anthropogenic aerosols and Black Carbon over the trans-Himalayan sites.

## Trans-Himalayas

- The Trans-Himalayas Mountain Region is located to the north of the Great Himalayas which consists of Karakoram, Ladakh, Zaskar and Kailash mountain ranges.
- It is also called the Tibet Himalayan Region because most of the part of

these ranges lies in Tibet.

## World Food Safety Day (WFSD)

- World Food Safety Day (WFSD) is celebrated on 7 June 2020.
- It aims to draw attention and inspire action to help prevent, detect and manage foodborne risks, contributing to food security, human health, economic prosperity, agriculture, market access, tourism and sustainable development.
- WFSD reinforces the call to strengthen commitment to scale up food safety made by the Addis Ababa Conference and the Geneva Forum in 2019 under the umbrella of "The Future of Food Safety".
- WHO, in collaboration with the Food and Agriculture Organization of the United Nations (FAO) is pleased to facilitate Member States efforts to celebrate the World Food Safety Day.
- The first WFSD was celebrated in 2019.

## Task Force for Women

- Union Women and Child Development Ministry constitutes task force to examine issues related to lowering Maternal Mortality Rate.
- The Ministry has constituted a task force to examine issues related to age of motherhood, lowering Maternal Mortality Rate and improvement of nutritional levels.
- The task force will suggest suitable legislations and amendments in existing laws and also chalk out a detailed roll-out plan with timelines to implement these recommendations.
- The task Force will examine the issues related to Infant Mortality Rate, Maternal Mortality Rate, Total Fertility Rate, Sex Ratio at Birth, Child Sex Ratio (CSR) and any other issues pertaining to health and nutrition.
- It will also suggest measures for promoting higher education among women.
- Union Finance Minister in her Budget Speech for 2020-21 has announced to set up a task force for women.

## Maternal Mortality Ratio

- MMR is the annual number of maternal deaths per 100,000 live births.
- Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy.
- It is a key performance indicator for efforts to improve the health and safety of mothers before, during, and after childbirth.

- MMR of India is 122 ( 2015-2017 Data)

## Infant Mortality Rate

- Infant Mortality Rate (IMR) is defined as the 'number of deaths of children under the age of 1 year per 1000 live births for a given year.'
- India's IMR is 33 deaths per 1,000 live births. ( 2017 Data)

## Total Fertility Rate

- The number of children who would be born per woman (or per 1,000 women) if she/they were to pass through the childbearing years bearing children according to a current schedule of age-specific fertility rates.
- India's TFR is 2.24 births per woman.

## Sex Ratio at Birth

- The natural "sex ratio at birth" is no of male births per female births.
- India's Sex Ratio at birth is 919.

## Child Sex Ratio

- In India, the child sex ratio is defined as the number of females per thousand males in the age group 0–6 years in a human population.
- Thus it is equal to 1000 x the reciprocal of the sex ratio (ratio of males to females in a population) in the same age group, i.e. under age seven.

## Mangroves

- Mangroves are the plant communities occurring in inter-tidal zones along the coasts of tropical and subtropical countries.
- Mangrove forests perform multiple ecological functions such as production of woody trees, provision of habitat, food and spawning grounds for fin-fish and shellfish, provision of habitat for birds and other valuable fauna; protection of coastlines and accretion of sediment to form new land.
- Among the states and Union Territories, West Bengal has the highest percentage of area under total Mangrove cover followed by Gujarat and Andaman and Nicobar Islands.
- The India State of Forest Report gives the data about mangroves and their conditions in the country.


## Sundarbans

- It is a vast contiguous mangrove forest ecosystem in the coastal region of Bay of Bengal spread over India and Bangladesh on the delta of the Ganges, Brahmaputra and Meghna rivers.
- The site is intersected by a complex network of tidal waterways, mudflats and small islands of salt-tolerant mangrove forests and presents an excellent example of ongoing ecological processes.
- It constitutes over 60% of the country's total mangrove forest area.
- Indian Sundarbans was recognised as UNESCO World Heritage Site in 1987, 'Wetland of International Importance' under the Ramsar Convention in January 2019 and also a Biosphere Reserve in 1989.
- The area is known for its wide range of fauna, including 260 bird species and is home to many rare and globally threatened wildlife species such as the Estuarine Crocodile, Royal Bengal Tiger, Water Monitor Lizard, Gangetic Dolphin and Olive Ridley Turtles.
- The Sundarbans Delta is the only mangrove forest in the world inhabited by tigers.
- For its preservation, Discovery India and World Wide Fund (WWF) India

partnered with the Government of West Bengal and local communities in the Sundarbans in 2019.

## Solar micro-grids in Sundarbans

- Solar micro-grids are small, localized grids that supply electricity in the range of 10 to 100 kilowatt using solar power.
- The micro-grids are not connected to the main grid and can cater to only the local population.
- Non-profit WWF-India built six such micro-grids in Satjelia island, Sundarbans, of 10 KW each catering to about 600 families.
- The micro-grids have been handed over to the local user community for day-to-day running.
- A family has to pay about Rs 50 a month to use three electrical points, generally a tube light, fan, mobile phone charging and television.
- Sundarbans has had one of the highest solar power installations in the world since mid-1990s about 200,000 off-grid connections.
- The thrust on solar, however, eventually eroded after the entry of mainstream electrical grid in 2012.

## Oil Spill in Krasnoyarsk

- Recently, Russia has declared a state of emergency in its Krasnoyarsk Region after a power plant fuel leaked causing 20,000 tonnes of diesel oil to escape into the Ambarnaya River.
- The Ambarnaya river flows to the Pyasino lake and river Pyasina, which connects it to the Kara Sea, a part of the Arctic Ocean.
- Krasnoyarsk Region is located in the vast and sparsely populated Siberian peninsula and the Ambarnaya river is part of a network that flows into the environmentally sensitive Arctic Ocean.
- The thermoelectric power plant which is located near Norilsk city (known as the country's nickel capital), around 3000 km northeast of Moscow, is built on permafrost which has weakened over the years owing to climate change.
- This caused the pillars that supported the plant's fuel tank to sink, leading to a loss of containment.
- According to a report, Norilsk is one of the most heavily polluted places on Earth.


## Permafrost

- The ground that remains frozen for two or more consecutive years is considered permafrost.
- Permafrost is composed of rock, soil, sediments and varying amounts of ice that bind elements together.
- Some permafrost is frozen for tens, hundreds or even thousands of years.

**Source:** PIB, Down to Earth, News on AIR