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Daily News Analysis

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1. Cold Wave and Chill-e-Kalan

- **Prelims** - Cold Wave and Chill-e-Kalan
- **Mains** - GS 1 - Geography (Climateology), GS 3 - Environment (Climate Change)

Why in the news?

- The India Meteorological Department (IMD) has issued an 'orange' alert for dense to very dense fog, cold wave conditions in North India ahead of Chill-e-Kalan.

Cold Wave

- **Definition:** *A cold wave is a meteorological phenomenon characterized by a sudden and significant drop in temperature over a short period, typically associated with the intrusion of cold air masses into a region.*
- **Features of a Cold Wave:**
 - **Rapid Temperature Decline:** A noticeable drop in temperature over a few hours to days.
 - **Duration:** Can last from a few days to several weeks.
 - **Regional Variation:** The temperature threshold for a cold wave varies depending on the climatic norms of the region.
 - **Associated Weather Conditions:**
 - ★ Strong winds.
 - ★ Clear skies, which often exacerbate cooling during the night.
 - ★ Formation of frost, freezing rain, or snow in some cases.
- **Causes of Cold Waves:**
 - **High-Pressure Systems:** Cold air masses from polar or arctic regions are pushed towards lower latitudes by high-pressure systems.
 - **Jet Stream Shifts:** A dip in the jet stream can allow cold polar air to move southward into warmer regions.
 - **Snow and Ice Cover:** Reflects sunlight, reduces heat absorption, and contributes to colder temperatures.
 - **Geographic Features:** Valleys, mountains, and open plains can influence how cold air pools and moves.



- **Impact of Cold Waves:**

- **Human Health:**

- ★ Hypothermia and frostbite risks.
 - ★ Increased mortality rates among vulnerable populations (e.g., elderly, homeless).

- **Agriculture:**

- ★ Crop damage and reduced yield.
 - ★ Livestock fatalities due to extreme cold.

- **Infrastructure:**

- ★ Frozen water pipes.
 - ★ increased demand for heating, leading to energy shortages.
 - ★ Disruption to transportation systems (e.g., icy roads, rail, and air travel delays).

- **Ecosystems:**

- ★ Stress on wildlife, affecting their survival and migration patterns.

Chill-e-Kalan

- **What is it?**: Chillai-Kalan (or Chilla-i-Kalan) is the local name for the harshest, 40-day peak of winter in the Kashmir Valley.
- **Features**: Temperatures drop below freezing, with frequent heavy snowfall that replenishes glaciers and reservoirs essential for summer water supply. Nights remain intensely cold, while daytime highs stay in single digits, often accompanied by fog and overcast skies.



2. Doppler Weather Radar (DWR)

- **Prelims** - Doppler Weather Radar (DWR)
- **Mains** - GS 3 - Science and Technology (Communication)

Why in the news?

- The Government of India informed Parliament that 47 Doppler Weather Radars (DWRs) are currently operational across the country, covering about 87% of India's geographical area.

Doppler Weather Radar (DWR)

- **What is it?**: A Doppler Weather Radar (DWR) is a sophisticated remote sensing instrument used to track weather by sending out radio waves and analyzing how they bounce off particles like rain, snow, or hail.
- **Basic Principle:** The DWR operates based on the **Doppler Effect**.
- **How does it work?**
 - Detect precipitation (rain, snow, hail)
 - Track movement of clouds and storms
 - Estimate rainfall intensity
 - Provide short-term forecasts (nowcasting) for extreme weather events

Doppler Effect

- The Doppler effect describes the change in frequency or wavelength of a wave in relation to an observer moving relative to the wave source. Waves compress to a higher frequency when the source approaches and stretch to a lower frequency when it recedes. Named after Christian Doppler, who described it in 1842, this phenomenon applies to sound, light, and radio waves.



3. Forest Rights Act (FRA) of 2006

- **Prelims** - Forest Rights Act (FRA) of 2006
- **Mains** - GS 2 - Governance (Policy)

Why in the news?

- The Union Government is developing a national web portal to try and take the entire process of forest rights recognition and management online under the Forest Rights Act (FRA), 2006.

Forest Rights Act (FRA) of 2006

- **Oher Name:** Also known as the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act.
- **Aim:** To recognize and vest forest rights and occupation in forest land to forest-dwelling Scheduled Tribes (STs) and other traditional forest dwellers (OTFDs), who have been residing in such forests for generations but whose rights have not been recorded.
- **Features:**
 - **Recognition of Forest Rights:** The Act recognizes the rights of forest-dwelling Scheduled Tribes and other traditional forest dwellers to live in and cultivate forest land for habitation or self-cultivation.
 - **Vesting of Rights:** It provides for the vesting of forest rights and occupation in forest land to eligible individuals and communities.
 - **Types of Rights:** The Act recognizes various types of rights, including land rights, ownership rights, habitat rights, and community forest rights.
 - **Process of Recognition:** The Act outlines the process for the recognition and verification of forest rights by the concerned authorities at the gram sabha (village assembly) level.
 - **Appeals and Grievance Redressal:** It establishes mechanisms for filing appeals and resolving grievances related to the recognition of forest rights.
 - **Protection of Forests and Wildlife:** While recognizing the rights of forest dwellers, the Act also emphasizes the conservation and protection of forests, wildlife, and biodiversity.



4. Gaganyaan Mission

- **Prelims** - Gaganyaan Mission
- **Mains** - GS 3 - Science and Technology (Space Technology)

Why in the news?

- ISRO conducts fresh tests to check parachute systems to bring back Gaganyaan astronauts.

Gaganyaan Mission

- **Launched by:** Indian Space Research Organisation (ISRO) in 2018.
- **Objective:** The Gaganyaan project plans to launch a crew of three people into orbit at a 400-kilometer altitude for a three-day mission before returning them safely to land in Indian sea waters.
- **Mission Components**
 - **Launch Vehicle:**
 - ★ HLVM3 (Human-rated LVM3) – modified version of the LVM3 rocket (formerly GSLV Mk III).
 - ★ Equipped with Crew Escape System (CES) for emergency evacuation.
 - **Crew Module (CM):** Pressurised capsule to house three astronauts, fitted with life support, avionics, and parachute-based recovery system.
 - **Service Module (SM):** Unpressurised section containing propulsion and power systems.
 - **Orbital Module:** Combination of CM + SM; total weight ~8 tonnes.
- **Collaboration**
 - Training of astronauts: Conducted in collaboration with Glavkosmos (Russia) at the Yuri Gagarin Cosmonaut Training Centre.
 - Partnership with DRDO for space-grade life support and food systems.
- **Significance:** Gaganyaan will be India's first manned mission to space (The US, Russia, and China have conducted manned missions to space)