MONTHLY MAGAZINE

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JANUARY 2026

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CALL FOR A BAN ON 10-MINUTE DELIVERY MODELS

CONTEXT

Gig workers from platforms such as Swiggy, Zomato, Blinkit, and Zepto staged nationwide strikes on Christmas and New Year's Eve, calling for a ban on 10-minute delivery models.

What Is the 10-Minute Delivery Model?

The 10-minute delivery model offers ultra-fast delivery of food and groceries by using algorithmic task assignment and time-based performance metrics. It depends on closely located dark stores, real-time monitoring systems, and high-pressure last-mile logistics, where earnings and penalties are closely tied to delivery speed rather than safety or feasibility.

Key Trends in Instant Delivery

- **Since 2021, quick-commerce platforms have expanded rapidly, using speed as a key competitive advantage.**
- **Algorithm-driven management systems increasingly dictate rider behaviour, pushing them to meet rigid time targets.**
- **Demand peaks during festivals and late-night hours, intensifying workload and risk exposure.**
- **Worker resistance has grown globally, with strikes and protests challenging the sustainability of hyper-fast delivery promises.**

Arguments for Prohibiting 10-Minute Deliveries:

Threat to Road Safety and Public Welfare

- **Compressed delivery deadlines turn public roads into high-risk environments, encouraging traffic violations as riders attempt to avoid income loss or algorithmic penalties.**
- **Example: Traffic enforcement data from Bengaluru indicates higher instances of signal jumping and wrong-way riding during peak instant-delivery periods, demonstrating a direct link between speed targets and unsafe conduct.**

Occupational Health and Mental Well-being

- **Algorithmic incentive structures trap riders in cycles of constant urgency, where long hours of heightened alertness lead to physical strain and psychological stress.**
- **Example: Clinics near dark-store hubs in Delhi-NCR have reported a rise in musculoskeletal injuries, repetitive strain, and anxiety-related conditions among riders working extended, speed-driven shifts.**

Erosion of Labour Dignity and Human Rights

- **Treating workers as interchangeable, time-optimised units deprives them of rest, autonomy, and basic working conditions, undermining the principle of dignified employment.**
- **Example: Protests near quick-commerce warehouses have highlighted the absence of essential facilities such as toilets, rest spaces, and shelter, exposing systemic disregard for worker welfare.**

Shifting Costs onto Workers

- **While platforms profit from faster deliveries, operational risks and expenses—fuel, vehicle maintenance, and accident liability—are entirely borne by workers, leading to unfair compensation structures.**
- **Example: Despite higher delivery intensity, many riders report falling per-order earnings as unstable bonuses replace predictable wages, even as fuel and repair costs escalate.**

Regulatory and Legal Gaps

- **Instant delivery frameworks treat safety hazards as individual choices rather than organisational responsibilities, allowing platforms to evade their duty of care.**
- **Example: This approach conflicts with the Code on Social Security, which mandates health protection and accident coverage for platform-based workers.**

Challenges in Regulating Instant Delivery Systems:

Consumer Dependence on Speed

- **As hyper-convenience becomes routine, regulatory efforts face resistance from consumers who perceive any slowdown as a loss rather than a safety measure.**
- **Example: Public backlash during gig-worker strikes revealed how instant delivery has shifted from a luxury to an assumed necessity.**

Lack of Algorithmic Transparency

- **Hidden performance rankings and order allocation systems obscure penalties, making violations difficult to detect or regulate.**
- **Example: Riders are often quietly deprioritised through reduced order visibility rather than explicit fines, leaving no clear evidence of coercion.**

Uneven State-Level Regulation

- **Differing labour protections across states allow platforms to concentrate operations where oversight is weakest.**
- **Example: The contrast between states with dedicated gig-worker legislation and those without creates opportunities for regulatory avoidance.**

Income Insecurity Concerns

- **Speed-based incentives form a significant portion of earnings, making workers wary that safety reforms may reduce their already fragile incomes.**
- **Example: Many riders hesitate to support bans, fearing that slower delivery norms will eliminate surge bonuses.**

Adaptive Platform Strategies

- **Even when restrictions are introduced, platforms often modify terminology rather than practices, maintaining the same pressures under new branding.**
- **Example: Replacing "10-minute delivery" with labels such as "priority" or "express" preserves unrealistic expectations while evading regulation.**

The Way Forward

Safety-First Delivery Timeframes

- **Regulations should replace rigid promises with delivery windows adjusted for distance, traffic conditions, and legal compliance.**
- **Example: A standard such as 20 minutes for a 5-km radius aligns delivery expectations with urban traffic realities.**

Algorithmic Transparency and Oversight

- **Platforms must be required to disclose how speed, pay, and penalties are calculated to prevent hidden coercion.**
- **Example: Independent audits of algorithmic systems would enable regulators to identify unsafe or discriminatory incentive structures.**

Inflation-Linked Earnings Protection

- **Worker pay should automatically adjust to rising fuel and maintenance costs to preserve real income levels.**
- **Example: Indexing per-kilometre rates to fuel prices or inflation indices would prevent earnings erosion.**

Accessible Grievance Redressal Mechanisms

- **Dedicated legal forums are necessary to resolve disputes over wages, suspensions, and de-platforming efficiently.**
- **Example: Karnataka's proposed grievance officer framework offers a model for timely, worker-focused resolution.**

Universal and Mandatory Social Security

- **Safety and welfare benefits must be guaranteed through statutory mechanisms rather than optional platform schemes.**
- **Example: State-run welfare boards with automatic enrollment would ensure coverage regardless of platform policies.**

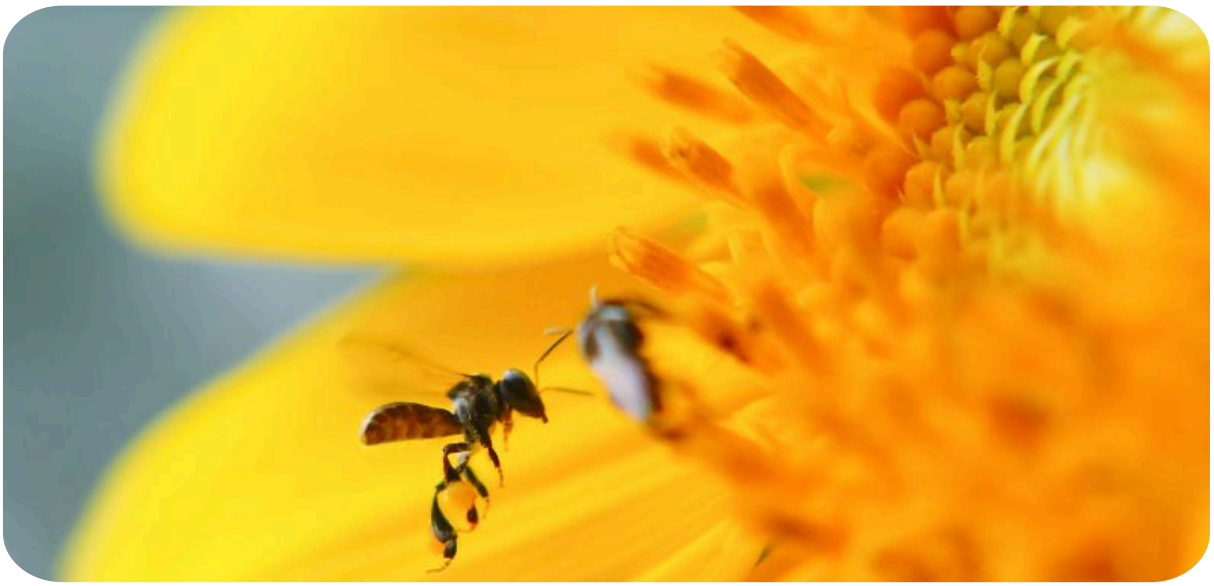
Conclusion

The promise of 10-minute delivery effectively transfers risk onto workers through algorithmic pressure and market competition. India must move toward a "safe delivery economy" that prioritises transparency, fair compensation, enforceable protections, and universal social security. Acting now will prevent convenience from being built on injury, indebtedness, and silent coercion

AMAZON'S STINGLESS BEES

CONTEXT

Amazonian stingless bees have become the world's first insects to receive legal rights, following a landmark ordinance by Peruvian municipalities that recognises their right to exist and thrive.



What Are Stingless Bees?

Stingless bees are a diverse group of bees that either do not possess stingers or have stingers that are ineffective, making them non-threatening to humans. Despite their gentle nature, they play a vital role as pollinators in tropical ecosystems.

Origins and Evolution

These bees are among the oldest known pollinator species, having existed for nearly 80 million years, dating back to the age of dinosaurs. Of the roughly 500 stingless bee species found worldwide, almost half are native to the Amazon region.

Habitat and Distribution:

Stingless bees inhabit tropical forests across the globe, with their greatest diversity concentrated in the Amazon rainforest. Peru alone is home to more than 170 species, making it a key stronghold for their survival.

Key Characteristics and Ecological Role:

- **They are the primary pollinators of rainforest ecosystems, facilitating the reproduction of over 80% of Amazonian plant species.**
- **Their pollination services support economically significant crops such as coffee, cacao, avocados, and blueberries.**
- **Stingless bees hold deep cultural, medicinal, and spiritual significance for Indigenous communities, including the Asháninka and Kukama-Kukamiria peoples.**

LEGAL RECOGNITION OF AMAZONIAN STINGLESS BEES

What Does Legal Protection Mean?

The new legal framework recognises stingless bees as rights-bearing entities. These rights include the right to exist, sustain healthy populations, restore natural ecological cycles, inhabit pollution-free environments, and receive legal representation when their survival is at risk.

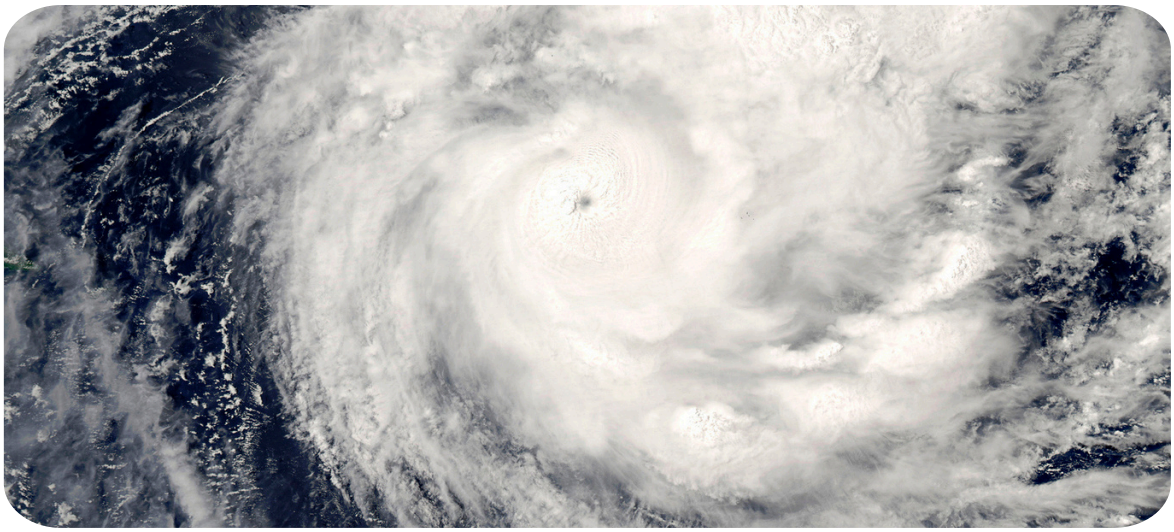
Why Is This Important?

- **This marks the first instance anywhere in the world where insects have been formally granted legal rights.**
- **The ordinance empowers authorities and communities to legally challenge deforestation, environmental pollution, and habitat degradation.**
- **It represents a shift in environmental governance—from protecting nature solely for human benefit to recognising ecosystems as entities deserving of justice in their own right.**

BOMB CYCLONE

CONTEXT

A severe winter system, Winter Storm Ezra, quickly strengthened into a bomb cyclone over the United States, severely disrupting peak holiday travel and triggering widespread flight cancellations, blizzard conditions, power outages, and hurricane-force winds across several states.



BOMB CYCLONE :

What Is It?

A bomb cyclone is an intense mid-latitude storm that undergoes explosive cyclogenesis, characterised by a very rapid drop in central atmospheric pressure within a 24-hour period, leading to extreme weather conditions over a vast area.

Formation Mechanism

Bomb cyclones develop when cold polar air masses collide with warm, moisture-laden air, usually over oceans where strong temperature contrasts exist.

The rapid ascent of warm air causes a sharp fall in surface pressure, which draws in surrounding air at high speeds, resulting in sudden and dramatic storm intensification.

Key Characteristics:

- **Rapid Pressure Decline: Central pressure falls by at least 24 millibars in 24 hours, indicating highly unstable atmospheric conditions.**
- **Severe Weather Events: Generates blizzards, freezing rain, heavy precipitation, and hurricane-force winds, often causing dangerous whiteout conditions.**
- **Abrupt Temperature Changes: Cold fronts can trigger sudden temperature drops of 40–50°F within hours, straining public health, transport, and energy systems.**
- **Large Spatial Extent: Affects areas spanning hundreds of kilometres, disrupting aviation, road networks, maritime operations, and power infrastructure simultaneously.**

Significance:

Bomb cyclones combine multiple weather hazards—snow, wind, rain, and ice—thereby amplifying disaster risks beyond what single-hazard preparedness systems can manage.

Critical infrastructure such as airports, power grids, ports, and supply chains remains particularly vulnerable due to the limited warning time caused by rapid storm intensification.

MINISTRY OF STATISTICS AND PROGRAMME IMPLEMENTATION LAUNCHES NEW LOGO AND MASCOT

CONTEXT

Ministry of Statistics and Programme Implementation (MoSPI) has introduced a new logo and mascot as part of an effort to modernise its institutional image and enhance public engagement.

What Is It?

The Ministry of Statistics and Programme Implementation serves as India's central authority for official statistics. It oversees the collection, processing, analysis, and dissemination of data to inform policy decisions and support national development planning.

Objective

- **Advance the vision of "Data for Development" by making statistical information more accessible, credible, and user-friendly.**
- **Improve transparency and accuracy in the statistical system while encouraging greater public cooperation in national surveys.**

KEY FEATURES OF THE NEW IDENTITY

Logo Elements

- **Ashoka Chakra: Represents integrity, transparency, and sound governance.**
- **Rupee Symbol: Emphasises the importance of statistics in economic management and fiscal decision-making.**
- **Numerical Motifs and Growth Bar: Reflect modern data ecosystems and progress enabled by reliable statistics.**
- **Colour Scheme (saffron, white, green, deep blue): Symbolises growth, sustainability, stability, and knowledge.**

Mascot – "सांख्यिकी"

- **A people-focused character created to explain statistical concepts in a simple and engaging manner.**
- **To be deployed in surveys, awareness drives, educational programmes, digital outreach, and public events.**

Significance

- **Builds greater public trust in official data through consistent and recognisable communication.**
- **Promotes higher participation in surveys, leading to improved data reliability.**
- **Strengthens evidence-based policymaking and supports India's transition toward transparent, data-driven governance.**

BSNL LAUNCHES VOICE OVER WIFI(VOWIFI)

CONTEXT

BSNL has rolled out Voice over WiFi (VoWiFi) services nationwide across all telecom circles, allowing users to make calls and send messages using Wi-Fi networks.

What is VoWiFi?

Voice over WiFi (VoWiFi) is a technology that allows users to make and receive voice calls and SMS over a Wi-Fi network instead of relying on a mobile tower.

It works through the IP Multimedia Subsystem (IMS) and uses the same mobile number and phone dialer, without requiring any third-party application.

How VoWiFi Works

1. **Connection via Wi-Fi: The smartphone connects to an available Wi-Fi network—home, office, or public—in place of the cellular network.**
2. **Secure SIM-based Authentication: Users are verified through their SIM cards, ensuring the same level of security and identity validation as conventional mobile calls.**
3. **Internet-Based Call Transmission: Voice is converted into digital packets and transmitted over the internet, enabling communication even in areas with weak or no mobile signal.**

4. **Seamless Handover: If Wi-Fi coverage weakens or is lost, ongoing calls automatically switch to the mobile network (VoLTE) without interruptions or call drops.**

Key Features:

- **IMS-Based Service: Utilises IMS to manage calls and allow smooth transitions between Wi-Fi and cellular networks.**
- **Use of Existing Mobile Number: Calls and messages use the regular phone number and default dialer, with no additional apps needed.**
- **No Extra Charges: Wi-Fi calls are treated as standard voice calls, free of additional fees.**
- **Enhanced Indoor and Low-Signal Coverage: Ensures connectivity in basements, offices, high-rises, and remote areas with poor cellular reception.**
- **Wide Device Compatibility: Supported on most modern VoWiFi-enabled smartphones, usually requiring just a settings toggle.**
- **Reduces Network Congestion: Offloads voice traffic from mobile towers to Wi-Fi, improving overall network efficiency and call quality.**

Benefits:

- **Reliable Calling Without Mobile Signal: Ensures uninterrupted communication in areas with poor network coverage, especially rural or indoor locations.**
- **Improved Call Quality: Provides clearer and more stable voice calls compared to weak or fluctuating cellular networks.**
- **Enhanced Security: SIM-based encryption and authentication offer protection equivalent to VoLTE services.**

BULGARIA JOINS EUROZONE

CONTEXT

Bulgaria officially joined the eurozone on January 1, 2026, adopting the euro as its currency and phasing out its national currency, the lev, becoming the 21st member of the bloc.

About Bulgaria

Bulgaria is a country in Southeastern Europe, located in the eastern part of the Balkan Peninsula. It has been a member of the European Union (EU) since 2007 and NATO since 2004. On January 1, 2026, Bulgaria adopted the euro, replacing its national currency, the lev, which had been in use since 1881, after meeting the EU's convergence criteria.

Geographical Location and Neighbours:

- **Borders Romania, Greece, Turkey, Serbia, and North Macedonia.**
- **Lies along the Black Sea coast, giving it strategic importance for trade and tourism.**

Major Geographical Features:

- **Danubian Plain in the north – fertile agricultural region.**
- **Balkan Mountains running east–west across the country.**
- **Rila–Rhodope Massif in the south, home to Mount Musala, the highest peak in the Balkans.**
- **Black Sea coastline supports ports, trade, and tourism.**

ABOUT THE EUROZONE:

The eurozone, or euro area, consists of EU countries that have adopted the euro (€) as their official currency and follow a common monetary policy.

Timeline of the Euro:

- **1992 – Maastricht Treaty: Established the Economic and Monetary Union (EMU), defining convergence criteria and a roadmap for a single currency to ensure fiscal discipline and macroeconomic stability.**
- **1999 – Euro as "book money": Introduced for electronic payments, accounting, and financial markets, while national currencies continued to circulate at fixed exchange rates.**
- **2002 – Physical euro launch: Banknotes and coins were introduced, fully replacing national currencies in participating countries.**

Members (as of 2026):

21 EU countries, including Germany, France, Italy, Spain, Greece, Croatia (2023), and Bulgaria (2026).

Key Features:

- **Single currency (euro) as legal tender.**
- **Monetary policy unified under the European Central Bank (ECB).**
- **Eliminates currency exchange costs within the eurozone.**
- **Facilitates free movement of goods, services, capital, and labour.**
- **Member countries have representation on the ECB Governing Council.**

MONROE DOCTRINE

CONTEXT

Invoking the 19th-century Monroe Doctrine, Donald Trump defended the U.S. intervention in Venezuela and the arrest of its president.

What is MONROE DOCTRINE ?

The Monroe Doctrine is a foundational U.S. foreign policy principle stating that the Americas are effectively a sphere of influence for the United States, and that foreign interference from outside powers—especially European nations—would be considered hostile to U.S. interests.

When it was established:

It was first announced on December 2, 1823 by President James Monroe in his annual message to Congress.

Core elements of the doctrine:

- **Opposition to new European colonisation: European powers were warned against establishing new colonies in the Americas.**

- **No external interference: Any European intervention in the Western Hemisphere was framed as a threat to U.S. security.**
- **Mutual restraint: The United States agreed not to meddle in existing European colonies or in Europe's internal affairs.**
- **Separate spheres: The political systems of the Americas and Europe were meant to remain distinct.**

Expansion under the Roosevelt Corollary:

In 1904, President Theodore Roosevelt added what became known as the Roosevelt Corollary, asserting that the U.S. had the right to intervene in Latin American countries to prevent instability or foreign intervention (especially over debt issues). This shifted the doctrine from a defensive posture into a justification for active U.S. involvement in regional affairs.

Connection to the recent Venezuela situation:

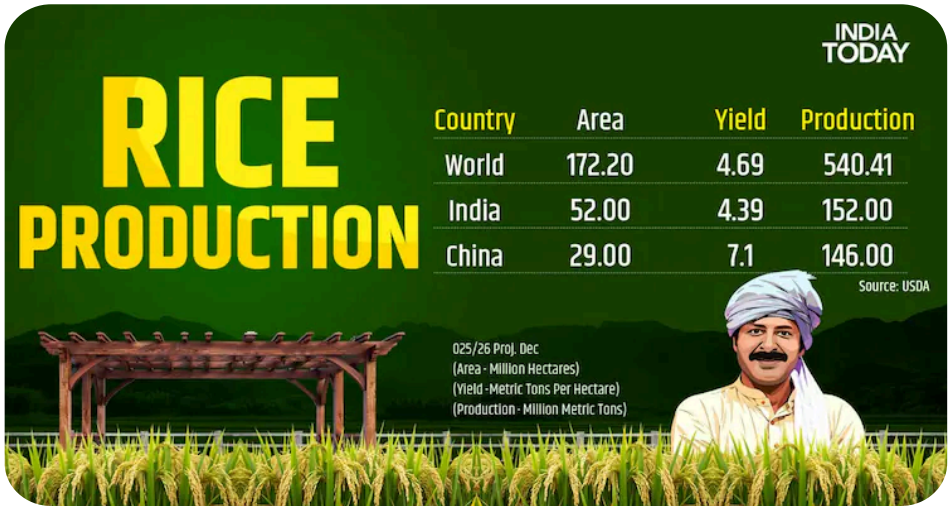
In January 2026, after U.S. forces carried out an operation in Venezuela that resulted in the capture of President Nicolás Maduro and his removal to the United States, President Donald Trump described the action as a version of the Monroe Doctrine applied today—sometimes referred to by the administration as the "Don-roe Doctrine."

The U.S. government argued that turmoil in Venezuela and the involvement of rival powers in the region made American intervention necessary during a transitional phase. Critics, however, view this as a revival of an older hemispheric dominance policy and argue it echoes past interventions in countries like Cuba, Nicaragua, Haiti, and the Dominican Republic—raising concerns about neo-imperialism and violations of sovereignty and international law.

INDIA BECOMES WORLD'S LARGEST RICE PRODUCER

CONTEXT

According to the Union Agriculture Minister, India has overtaken China to become the world's leading rice producer, recording an output of 150.18 million tonnes compared to China's 145.28 million tonnes



India as the World's Largest Rice Producer

India has surpassed China to become the world's leading rice-producing nation. According to the Union Agriculture Minister, India's rice output for 2024–25 stood at 150.18 million tonnes (MT), placing it at the top globally.

India's global position:

- **India: Largest rice producer worldwide**
- **China: Second-largest producer**

State-wise production leaders:

As per the Economic Survey (Statistical Appendix) 2023–24, the top rice-producing states were:

- **Telangana: 16.63 MT (around 12.17% of national output)**
- **Uttar Pradesh: 15.72 MT (around 11.50%)**
- **West Bengal: 15.12 MT (around 11.06%)**

Geographical factors shaping rice production in India:

- **Climatic suitability: Rice requires warm and humid conditions, leading to its concentration in eastern, southern, and north-eastern parts of the country.**
- **Water availability: Major rice-growing regions are located in river floodplains and deltas—such as the Ganga–Brahmaputra plains and the Krishna, Godavari, and Cauvery deltas—where fertile alluvial soils and abundant water support paddy cultivation.**
- **Irrigation-led growth: In areas with lower rainfall, rice cultivation relies heavily on canals and tube-wells. While this boosts productivity, it also raises concerns about groundwater depletion and water stress.**
- **Adaptation to terrain: In hilly regions, rice is cultivated using terraced farming, which allows efficient water management on slopes.**

Significance:

India's top position strengthens its standing as a food-secure, surplus grain economy. Sustained high production levels support rice exports and help stabilise global rice markets, particularly for countries that depend on imports.

1000 YEARS SURVIVAL OF SOMNATH TEMPLE

CONTEXT

The Prime Minister of India highlighted the Somnath Temple's thousand-year survival, marking 1,000 years since the 1026 attack by Mahmud of Ghazni.

Thousand Years of the Somnath Temple's Survival

The Somnath Temple is one of the twelve Jyotirlingas of Lord Shiva, holding immense religious significance in Hindu tradition. Often described as the "Eternal Shrine," it symbolises spiritual continuity through centuries of destruction and reconstruction.

Location:

- **Located at Prabhas Patan, near Veraval in Gujarat's Saurashtra region**
- **Situated along the Arabian Sea coast, at the sacred Triveni Sangam—the confluence of the Kapila, Hiran, and Saraswati rivers.**

Historical background:

- **Ancient roots: References in texts such as the Shiva Purana and early inscriptions indicate that the site has been a centre of Shiva worship since ancient times, with several reconstructions even before the medieval period.**
- **1026 CE: The temple was attacked and looted by Mahmud of Ghazni, an event often cited as a major historical turning point.**

- **Medieval era: The shrine was rebuilt multiple times by rulers including Kumarapala in the 12th century and the Chudasama dynasty, only to face repeated destruction during Sultanate invasions.**
- **Cycle of destruction and renewal: Historical accounts suggest the temple was destroyed six times, each followed by reconstruction—cementing its image as a symbol of resilience and faith.**

Architectural characteristics:

- **Constructed in the Chaulukya (Solanki) architectural style**
- **Noted for its towering shikhara, elaborate stone carvings, and a sanctum housing the Jyotirlinga**
- **An inscription claims that no land lies between the temple's southern axis and the South Pole, reflecting ideas of cosmic alignment.**

Modern reconstruction:

- **Post-Independence revival (1947–1951): Championed by Sardar Vallabhbhai Patel, who regarded the rebuilding as a civilisational responsibility**
- **Designed by architect Prabhashankar Sompura, employing traditional temple-building techniques**
- **Inaugurated on 11 May 1951 by President Rajendra Prasad, despite differing political views at the time**
- **Today, the temple is administered by the Somnath Trust, chaired by the Prime Minister of India**

LUCKNOW IS SET TO HOST INDIA'S FIRST URBAN NIGHT SAFARI AT THE KUKRAIL FOREST AREA.

CONTEXT

India's first urban night safari is set to come up at Lucknow's Kukrail Forest Area, blending conservation with city-based tourism.

What it is:

India's first urban night safari—a carefully regulated nocturnal wildlife experience within city limits. The initiative is designed to focus on education, conservation awareness, and low-impact eco-tourism, rather than entertainment-centric wildlife displays.

Location:

- **Lucknow, Uttar Pradesh**
- **Situated in the Kukrail Forest Area, along the Kukrail River on the city's northern fringe**

Objectives:

- **To promote urban eco-tourism while deepening public awareness of wildlife conservation**
- **To allow city residents, families, and students to observe nocturnal animal behaviour without the need to travel to remote forest areas**
- **To create a sustainable urban model that blends conservation, education, and recreation**

Key features of the Kukrail Night Safari project:

- **Designated nocturnal safari routes with restricted access and low-intensity lighting to minimise disturbance to wildlife**
- **Enhancement of existing conservation facilities for crocodiles, gharials, and turtles, rather than replacing them**
- **Eco-friendly infrastructure, including bamboo cottages, nature trails, and interpretation centres**
- **Guided educational initiatives, such as night ecology walks, birdwatching programmes, and school outreach activities**

Significance:

- **Urban conservation innovation: Marks India's first effort to integrate structured nocturnal wildlife education into a city ecosystem**
- **Sustainable urban planning model: Demonstrates how biodiversity conservation can coexist with responsible urban recreation and leisure**

GRASSLANDS AND CLIMATE CHANGE 2026

CONTEXT

The United Nations has designated 2026 as the International Year of Rangelands and Pastoralists, renewing global focus on grasslands. However, recent climate negotiations have continued to prioritise forests, sparking debate over the need to incorporate grasslands into national climate strategies and NDCs.

What are grasslands?

Grasslands are open ecosystems dominated by grasses, with few or no trees. They occur across savannahs, steppes, prairies, and rangelands. Covering roughly 40% of Earth's land area, they sustain pastoral livelihoods, wildlife, and play a critical role in soil-based carbon storage.

Why grasslands matter for climate action?

- **Stable carbon sinks via underground storage**
  - **Nearly 90% of grassland carbon is stored below ground in deep root systems, making it less vulnerable to surface disturbances compared with forests.**
  - **Example: A 2025 Stanford study found grassland soils increased carbon uptake by 8% under elevated CO_2, whereas forest soils showed no comparable gain.**

- **Fire resilience and carbon permanence**
  - **Unlike forests, where fires release most stored carbon, grassland fires leave soil carbon intact, allowing rapid ecological recovery.**
  - **Example: Western US prairie studies (2024–25) show grasslands remain net carbon sinks even with frequent fires.**
- **Climate cooling through albedo effect**
  - **Grasslands reflect more sunlight than dense forest canopies, reducing local heat absorption and surface warming.**
  - **Example: The IPBES Land Report (2025) highlights their cooling effect in semi-arid regions.**
- **Hydrological regulation and drought buffering**
  - **Dense grass roots improve groundwater recharge, reduce runoff, and mitigate extreme rainfall impacts.**
  - **Example: Senegal's Ferlo Reserve (2025) restored 2 million hectares of grasslands to buffer drought–flood cycles.**

Global policy bias toward forests

- **Forest-centric climate finance: Global climate funds largely target forests, sidelining grasslands despite their equal mitigation potential.**
  - **Example: COP30 (Belém, Brazil) heavily focused on forests via the Tropical Forest Forever Facility (TFFF).**
- **Institutional fragmentation: Climate (UNFCCC), biodiversity (CBD), and desertification (UNCCD) conventions operate separately, weakening grassland governance.**
  - **Example: Grasslands receive better recognition under UNCCD COP16 (Saudi Arabia) than UNFCCC negotiations.**

- **Exclusion from NDCs: Most countries mention forests explicitly in their NDCs while omitting grasslands.**
  - **Example: India's NDC targets 2.5–3 billion tonnes CO_2 via forests, ignoring grasslands.**
- **Misclassification as "wastelands": Productive grasslands are often labelled degraded, legitimising conversion.**
  - **Example: India's Wasteland Atlas historically included grazing commons and savannahs under wastelands.**

Implications of declining grasslands

- **Biodiversity loss: Tree plantations in grasslands threaten open-habitat species.**
  - **Example: Brazil's Cerrado loses grassland area twice as fast as the Amazon, endangering endemic fauna.**
- **Weakened climate resilience: Degraded grasslands exacerbate desertification and flood-drought cycles.**
  - **Example: Australia's desert rangelands (2024–25) show increased climate volatility due to invasive buffel grass.**
- **Loss of pollination services: Grasslands support pollinators critical for agriculture.**
  - **Example: FAO estimates grassland-dependent pollinators contribute to ~35% of global crop production.**
- **Displacement of pastoral and indigenous communities: Land conversion limits mobility and traditional livelihoods.**
  - **Example: Charanka Solar Park, Gujarat (2025) displaced semi-nomadic herders by fencing grassland commons.**

The way forward

- **Recognise grasslands as Open Natural Ecosystems (ONEs): Shift policy language from "wastelands" to ecologically valuable systems.**
  - **Example: India (2026) is adopting ONE classification in land-use planning.**

- **Integrate grasslands into NDCs: Inclusion unlocks climate finance and policy focus.**
  - **Example: Brazilian researchers (2025) urged including Cerrado grasslands in national NDC updates.**
- **Adopt ecosystem-based climate planning: Balance forests, grasslands, wetlands, and mangroves in mitigation strategies.**
  - **Example: WWF–IUCN report (COP30) recommended cross-biome carbon accounting.**
- **Secure community land rights and governance: Indigenous stewardship enhances ecological outcomes.**
  - **Example: Indigenous Desert Alliance (Australia) uses cultural burning to protect desert grasslands.**
- **Incentivise sustainable grazing and PES models: Reward pastoral practices that improve soil carbon.**
  - **Example: India's proposed National Rangeland Utilisation Policy (2025–26) aims to restore 120 million hectares.**

Conclusion

Grasslands are climate-critical ecosystems, storing carbon, sustaining biodiversity, and supporting livelihoods. A forest-only climate strategy is scientifically incomplete and socially unjust. Integrating grasslands into NDCs and climate finance is essential for credible, resilient, and inclusive climate action.

MPEMBA EFFECT

CONTEXT

Indian scientists have created the first supercomputer-based simulation that accurately reproduces the Mpemba effect, solving the long-standing puzzle of why hot water can freeze faster than cold water.

What is Mpemba Effect?

The Mpemba effect is a counterintuitive phenomenon in which hot water can freeze faster than cold water under certain conditions. It is named after Erasto Mpemba, a Tanzanian student who formally reported it in 1969, although it had been observed earlier by thinkers like Aristotle, Francis Bacon, and Descartes.

How it works?

The effect arises because water's freezing behavior depends on more than just its temperature. Several factors can influence why hot water sometimes freezes faster than cold:

- **Evaporation: Heating causes water to lose some mass as vapor, leaving less to freeze, which accelerates freezing.**

- **Dissolved gases: Heating expels dissolved gases, subtly altering the water's freezing properties.**
- **Convection currents: Temperature differences create internal circulation in hot water, promoting faster heat loss.**
- **Supercooling: Hot water may begin freezing at a higher temperature than cold water, allowing it to solidify sooner.**
- **Environmental effects: Hot containers can affect their surroundings, improving overall cooling efficiency.**

Because these factors depend on experimental conditions, no single mechanism universally explains the effect, and different processes may dominate in different situations.

Applications:

- **Enhances understanding of non-equilibrium physics and phase transitions**
- **Supports climate and cryosphere modeling, including ice formation processes**
- **Relevant in industrial freezing, food processing, and materials science**
- **Highlights the power of supercomputing in solving long-standing scientific paradoxes**

CENTRE ISSUES NOTIFICATION FOR FIRST PHASE OF CENSUS OF INDIA 2027

CONTEXT

The Centre has released the notification for the first phase of the Census of India 2027, officially launching the country's largest statistical exercise after over a decade.

What is it?

The Census of India 2027 will be the 16th national Census and the 8th since Independence, conducted under the Census Act, 1948 and Census Rules, 1990. The exercise will be conducted in two phases:

1. **Houselisting and Housing Census (HLHC): April–September 2026**
2. **Population Enumeration (PE): February 2027**
3. **(Special arrangements for Ladakh and snow-bound regions)**

The Census is administered by the Ministry of Home Affairs, through the Office of the Registrar General & Census Commissioner of India.

Brief History of Indian Census:

- **1872: First non-synchronous census under British rule**
- **1881: First synchronous all-India Census**
- **1951: First Census after Independence**

Conducted every 10 years, the Census forms the backbone of India's demographic and socio-economic database, providing village- and ward-level granularity unmatched by any other survey.

New Features in Census 2027:

- **First fully digital Census: Data will be collected via mobile applications (Android & iOS) instead of paper schedules.**
- **Self-enumeration: Citizens can submit details online 15 days before field enumeration.**
- **Census Management & Monitoring System (CMMS): Real-time digital monitoring of enumeration and supervision.**
- **GIS-based House Listing Block (HLB) Creator: Web-mapping application for precise geo-referencing of census blocks.**
- **Caste enumeration: For the first time since 1931, caste data will be collected electronically during the Population Enumeration phase.**
- **Census-as-a-Service (CaaS): Provides clean, machine-readable datasets for Ministries to enable faster, evidence-based policymaking.**

Significance:

- **Policy formulation: Provides foundational data for welfare schemes, reservations, delimitation, and fiscal transfers.**
- **Digital governance: Improves accuracy, speed, transparency, and usability of census data.**
- **Social justice: Caste enumeration will aid targeted social and economic interventions.**

INDIA BECOMES FIRST COUNTRY TO COMMERCIALLY PRODUCE BIO-BITUMEN

CONTEXT

India has become the first country in the world to commercially produce bio-bitumen for road construction, achieving a global milestone in sustainable infrastructure.

What is bio-bitumen?

Bio-bitumen is a bio-based alternative to conventional petroleum bitumen, used as a binder in road construction. It is primarily produced from agricultural residues, especially rice straw, and can partially replace fossil-fuel-derived bitumen without affecting road performance.

Organisations Involved

- **Council of Scientific and Industrial Research (CSIR)**
- **CSIR-Central Road Research Institute (CSIR-CRRI), New Delhi**
- **CSIR-Indian Institute of Petroleum (CSIR-IIP), Dehradun.**

Key Features of Bio-Bitumen

- **Partial fossil replacement: 20–30% of conventional bitumen can safely be replaced.**
- **Performance assured: Successfully tested for rutting, cracking, moisture damage, rheology, and durability.**
- **Environment-friendly: Reduces emissions from crop residue burning and lowers the lifecycle carbon footprint.**

- **Cost-efficient: Roads using bio-bitumen are cheaper to construct and have a longer service life.**
- **Field-validated: A 100-metre trial stretch on the Jorabat–Shillong Expressway (NH-40), Meghalaya demonstrated real-world feasibility.**

Manufacturing Process (Bio-bitumen via Pyrolysis)

1. **Collection of farm residue: Post-harvest rice straw is collected and pelletised for uniform size, easy handling, and efficient thermal processing.**
2. **Pyrolysis: Biomass pellets are heated at high temperatures in the absence of oxygen, breaking them down into bio-oil, combustible gases, and bio-char.**
3. **Bio-oil extraction: The bio-oil fraction, with strong adhesive and binding properties, is separated and refined for use as a road binder.**
4. **Blending: Bio-oil is blended with conventional bitumen (typically 20–30%) to produce bio-bitumen suitable for asphalt.**
5. **Quality validation: The final product undergoes physical, chemical, rheological, and mechanical tests to ensure compliance with national highway standards.**

Significance

- **Promotes clean and green highways by reducing fossil fuel dependence and air pollution.**
- **Converts agricultural waste into high-value infrastructure material, addressing the problem of stubble burning.**
- **Potential to replace ₹25,000–30,000 crore worth of imported bitumen annually.**

UIDAI LAUNCHES AADHAAR MASCOT UDAI

CONTEXT

UIDAI has introduced 'Udai (उदय)', the official Aadhaar mascot, aimed at presenting Aadhaar-related information in a more relatable and user-friendly manner.

What is it?

Udai (उदय) is a resident-facing mascot introduced by UIDAI to serve as a communication companion, simplifying public understanding of Aadhaar services such as updates, authentication, offline verification, selective data sharing, and responsible usage.

Organisation Involved:

- **Unique Identification Authority of India (UIDAI)**

Aim:

- **To simplify, humanise, and standardise Aadhaar communication**
- **To enhance citizen trust through participatory engagement**
- **To improve accessibility of Aadhaar services for over one billion residents**

Key Features:

- **People-centric communication: A friendly mascot explains complex Aadhaar processes in a relatable way.**
- **Wide service coverage: Supports updates, authentication, offline verification, selective sharing, and adoption of new technology.**
- **Participatory creation: Chosen through a national contest with 875 entries, evaluated across multiple stages.**
- **Inclusive outreach: Designed to improve understanding across languages, literacy levels, and digital access conditions.**

Significance:

- **Trust & acceptance: Reinforces the principle that citizen participation strengthens confidence in Aadhaar.**
- **Better service delivery: Reduces information gaps and usage errors.**
- **Digital public goods: Promotes engagement around a foundational Digital Public Infrastructure (DPI).**