UPSC Daily Current Affairs| One Liners 17-04-2025

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Geography

Increased Activity at Mount Spurr

A recent surge of Mount Spurr over 50 earthquakes in a single week, monitored by the Alaska Volcano Observatory (AVO), signals magma movement beneath the surface.

• Mount Spurr, near Anchorage, Alaska, is experiencing heightened volcanic activity, causing concern among scientists and local populations.

• **Seismic Swarm Indicates Potential Eruption** – This significant increase in seismic events strongly suggests a potential volcanic eruption is possible. The observed magma movement is a key indicator of rising volcanic unrest and the potential for ash clouds and other hazardous events.

• **Anchorage Prepares for Volcanic Hazards** – In response to the escalating volcanic activity, the city of Anchorage is actively preparing for potential impacts. These preparations likely include strategies to mitigate the effects of ash fall and other hazards associated with a volcanic eruption.

• **Key Geographical Information** – Mount Spurr is the tallest volcano within the Aleutian Arc. It is situated approximately 130 kilometers west of Anchorage, Alaska, in proximity to Chakachamna Lake.

• **Volcano Type and Structure** – Classified as a stratovolcano (or stratocone), Mount Spurr features a prominent horseshoe-shaped caldera. This large caldera spans about 5 kilometers in width and opens towards the south.

Economy

RBI Maintains Accommodative Stance

Recently, the Reserve Bank of India (RBI) has decided to continue its accommodative stance in the latest Monetary Policy Committee (MPC) meeting. This aims to bolster economic recovery amidst easing inflation and weak growth indicators.

• **Defining Accommodative Monetary Policy** – An accommodative stance is a monetary policy approach where the central bank aims to stimulate economic activity. This typically involves maintaining low interest rates and ensuring sufficient liquidity within the financial system.

• **Conditions for Adoption** – This policy is generally implemented when economic growth is slow, inflation is under control, and there is a need to encourage consumption, investment, and job creation. It can also be used to counter financial shocks.

• **Key Objectives of the Stance** – The primary goals of an accommodative stance are to facilitate credit flow, encourage private investment, reduce borrowing costs to boost spending, revive overall demand in the economy, and provide liquidity support to struggling sectors.

• **RBI's Current Rationale** – The RBI's decision reflects its ongoing commitment to supporting economic recovery in the face of moderating inflation and signals of sluggish growth within the current economic landscape.

Agriculture

Punjab Bans Hybrid Paddy Seeds

Recently, Punjab government has prohibited the sale of hybrid paddy seeds in anticipation of the 2025 Kharif season. This decision comes after rice millers expressed their unwillingness to process hybrid rice due to concerns over milling efficiency and grain quality.

• **Understanding Hybrid Paddy** – Its varieties are crossbred rice developed from distinct parent lines. The aim is to enhance yield, improve water efficiency, and promote earlier maturity. These non-Basmati varieties are primarily cultivated for large-scale commercial farming.

• **Key Characteristics** – Hybrid paddy offers several advantages, including higher yields (35-40 quintals per acre, exceeding regular varieties), a shorter growth cycle (125-130 days, saving water), and reduced stubble production, which can help mitigate stubble burning issues.

• **Reasons for Government Ban** – The primary reasons behind the ban are the low milling efficiency (Out Turn Ratio of 60-63% compared to the FCI's 67% minimum) reported by millers and the high percentage of broken grains during processing. This leads to financial losses for millers.

• **Impact on Farmers and Millers** – The lower milling efficiency and increased broken grains result in lower procurement prices for farmers due to quality discrepancies. The ban aims to address these concerns and protect the interests of both farmers and rice millers in the state.

Environment

Lichens Thrive Under Simulated Martian Conditions

Recent groundbreaking research has demonstrated the remarkable resilience of certain lichen species to harsh Martian environments, challenging prior assumptions about the possibility of life on Mars.

• **Unique Symbiotic Nature of Lichens** – They are composite organisms, a symbiotic partnership between a fungus and either algae or cyanobacteria. This unique biological arrangement enables them to survive and flourish in extreme terrestrial habitats like deserts and polar region.

• **Experimental Setup: Simulating Mars** – Scientists conducted rigorous experiments utilizing a Mars simulation chamber. Two distinct lichen species, Diploschistes muscorum and Cetraria aculeata, were subjected to Martian atmospheric conditions, pressure, temperature fluctuations, and radiation levels for a five-hour duration.

• **Metabolic Activity Confirmed** – The study's key finding revealed that the tested lichens not only survived the simulated Martian conditions but also remained metabolically active throughout the exposure period, indicating a capacity for biological processes under such extreme stress.

Rare Golden Tiger Sighted in Kaziranga

Recently, a rare golden tiger, also known as a golden tabby tiger, has been recently observed and photographed in Kaziranga National Park, located in Assam. This remarkable sighting highlights the unique biodiversity of the region.

• **Understanding the Golden Tiger** – It is not a distinct subspecies but rather an uncommon color variation of the Bengal tiger. It's striking golden hue and tabby stripes make it a visually exceptional animal.

• **Exclusive Wild Habitat** – Notably, all known wild golden tigers reside exclusively in Kaziranga National Park in Assam. This limited geographic distribution underscores their rarity and the importance of this habitat for their survival.

• **Genetic Basis of the Golden Color** – The distinctive golden coloration is attributed to a genetic mutation in the wideband gene. This mutation leads to an increased production of pheomelanin, the reddish-yellow pigment responsible for their unique appearance.

• **Inheritance of the Trait** – For a golden tiger to be born, both parent tigers must carry the recessive mutated gene. This specific genetic requirement contributes to the rarity of this color variant in the wild.

Bat Echolocation Monitoring (BatEchoMon)

Recently, India's first automated bat monitoring system, BatEchoMon, utilizes real-time acoustic analysis for bat species detection and classification.

• **Introducing BatEchoMon** – It is an autonomous, AI-powered system for real-time detection, analysis, and classification of bat echolocation calls.

• **Developed by** – Indian Institute for Human Settlements (IIHS), Bengaluru.

• **Aim** – To simplify and accelerate bat data processing for enhanced ecological and biodiversity research with minimal manual effort_

• **Real-time Acoustic Analysis** – The device activates at sunset, employing a Raspberry Pi microprocessor to isolate and analyze bat calls in real time.

• **AI-Powered Species Identification** – BatEchoMon uses convolutional neural networks (CNN) to compare detected call structures with known bat species for accurate identification.

• **Visual and Statistical Output** – The system generates spectrograms and statistical data on bat activity across different species and time intervals.

Security

GPS Spoofing Targets IAF Aid Mission

Recently, Indian Air Force (IAF) aircraft involved in delivering aid to earthquake-stricken Myanmar under Operation Brahma reportedly encountered GPS spoofing attacks, highlighting significant airspace cybersecurity vulnerabilities.

• **Understanding GPS Spoofing** – It is a cyberattack that transmits counterfeit GPS signals to deceive receivers about their actual geographical position. This manipulation involves broadcasting stronger, fake signals that overpower genuine satellite signals, leading to inaccurate location readings.

• **How Spoofing Works** – GPS receivers determine location by processing signals from orbiting satellites. Spoofers exploit this by transmitting fabricated GPS signals. When these fake signals are stronger, the receiver locks onto them, generating false location data for the affected device.

• **Serious Implications of Spoofing** – GPS spoofing carries substantial risks. In aviation, it can misdirect aircraft, endangering flight safety. It can also disrupt logistics, compromise defense and surveillance operations, and negatively impact consumer applications relying on location services.

Science

Recognition by International Diabetes Federation (IDF)

Recently, IDF has officially acknowledged Type 5 diabetes as a distinct condition at the World Diabetes Congress in Bangkok.

• **Type 5 diabetes** – It is a form of malnutrition-related diabetes. It primarily affects lean, undernourished teenagers and young adults, particularly in low- and middle-income regions.

• **Global Prevalence** – An estimated 20 to 25 million people worldwide suffer from this condition. It is most prevalent in Asia and Africa, where malnutrition is more common.

• **Key Characteristics** – Unlike Type 1 and Type 2 diabetes, Type 5 diabetes is not caused by insulin resistance but by a severe defect in insulin secretion due to chronic undernutrition.

• **Historical Background** – First identified in Jamaica in 1955 as J-type diabetes, it was later reported across South Asia and Africa. WHO briefly recognized it in 1985 but withdrew support in 1999 due to limited research.

Maharashtra Partners with ROSATOM for Thorium SMR

Recently, Maharashtra has entered into a Memorandum of Understanding (MoU) with Russia's ROSATOM to collaboratively develop a thorium-based Small Modular Reactor (SMR). This marks a pioneering step for an Indian state in the nuclear energy sector.

• **Understanding Small Modular Reactors (SMRs)** – It is a compact and adaptable nuclear reactor engineered for secure, efficient, and versatile power generation. Thorium-based SMRs utilize Thorium-232, a fertile material that is transmuted into Uranium-233 to serve as nuclear fuel.

• **Key Players in the Initiative** – The primary institutions involved in this groundbreaking collaboration are MAHAGENCO (Maharashtra State Power Generation Company Ltd) from India and ROSATOM (Russia's State Atomic Energy Corporation), leveraging their respective expertise in energy generation and nuclear technology.

• **Advantages of Thorium SMR Technology** – Thorium-based SMRs offer several key benefits. They utilize thorium as fuel, which is converted to Uranium-233 for clean energy production. Their modular design allows for phased and economical deployment. Their compact size makes them suitable for remote areas, and they incorporate passive safety systems for automatic shutdown in emergencies.

• **Regulatory Framework and Safety** – The development and operation of this thorium-based SMR will adhere to stringent Indian nuclear safety regulations as mandated by the Atomic Energy Regulatory Board (AERB) and relevant central government guidelines, ensuring safe and responsible energy production.

Mirror Science Explained by IIT Physicist

Recently, an IIT Kanpur physicist elucidated the science behind mirrors using electron behavior and quantum mechanics, aligning with the International Year of Quantum Science and Technology 2025.

• A mirror is a smooth surface designed to reflect the majority of incident light, producing clear images through specular reflection, where light bounces off at an equal angle.

• **Material Composition of Mirrors** – Mirrors are typically constructed with a transparent glass front and a thin metallic backing, often made of silver or aluminum. The glass protects the reflective metal layer.

• **The Mechanism of Reflection** – Mirrors function based on the law of reflection. Free electrons within the metal layer uniformly interact with incoming light, causing specular reflection and forming a virtual image that appears behind the mirror.

• **Understanding Image Formation** – Mirrors generate a virtual image, a perception created by the way reflected light reaches our eyes. Contrary to common belief, mirrors reverse front and back, not left and right

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