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SOLAR FLARE

- A solar flare is a **tremendous explosion on the Sun** that happens when energy stored in 'twisted' magnetic fields (usually above sunspots) is suddenly released.
- A flare appears as a sudden, intense brightening of a region on the Sun**, lasting several minutes to hours.**
- Flares occur when intense magnetic fields on the Sun become too tangled.
- In a **matter of just a few minutes**, they heat the material to many millions of degrees and produce a burst of **radiation across the electromagnetic spectrum**, including from radio waves to x-rays and gamma rays.
- The biggest flares occur in association with large sunspots that have sharp magnetic gradients and large currents, which are the source of the flare energy.

There are five different classes of solar flares**: A, B, C, M, and X**;

  - **X-class flares:** These **are the biggest;** they are major events that can trigger radio blackouts around the whole world and long-lasting radiation storms in the upper atmosphere.
  - **M-class flares:** These are medium-sized; they **generally cause brief radio blackouts** that affect Earth's Polar Regions. Minor radiation storms sometimes follow an M-class flare.
  - **C-class flares:** These are small with few noticeable consequences here on Earth. At its peak, a C-class flare is ten times less powerful than an M-class flare.
  - **B-class flares:** These are ten times smaller or weaker than C-class flares.
  - **A-class flares:** These are at least ten times less intense than B-class flares, with no noticeable consequences on Earth.

- **Effect of Solar Flare on Earth:**

- The intense radiation emitted during a solar flare **can affect satellite communications,** disrupt radio signals, and even pose a risk to astronauts in space.
- Additionally, the increased solar **radiation can lead to geomagnetic storms,** which may impact power grids and cause auroras (northern and southern lights) at lower latitudes.

HANGING GLACIERS

Recent study published in Nature magazine has found that there are as many as 219 hanging glaciers in the Alaknanda basin of the Garhwal Himalayas.

- Hanging glaciers are **ice masses perched on steep slopes** that can detach and trigger massive avalanches.
- **Formation:**
  - They occur when a **major valley glacier system retreats and thins**, leaving the tributary glaciers in smaller valleys high above the shrunken central glacier surface. If the entire system has melted and disappeared, the empty high valleys are called hanging valleys.
- **Impact of Hanging Glaciers:**
  - Hanging glaciers pose a significant risk of break-offs.
  - The break-offs from hanging glaciers **can also trigger secondary hazards** such as glacial lake outburst floods (GLOFs).
  - Glaciers in high-elevation alpine environments are **highly sensitive to climate variability** and warming.
  - This sensitivity is **particularly pronounced in the Himalaya,** where warming over the past two decades has exceeded the global average, resulting in accelerated glacier retreat.

INTEGRATED FERTILIZER MANAGEMENT SYSTEM

Recently, the Ministry of Chemicals and Fertilizers said that the Integrated Fertilizer Management System (iFMS) has entered a new phase with the introduction of a series of digital initiatives.

- It is the digital platform for **fertilizer management in India.**
- It is developed and technically supported by **the National Informatics Centre** (NIC) for the **Department of Fertilizers.**
- **Features:**
  - It offers a range of online services related to **fertilizer distribution and management.**
  - It includes **dealer registration, stock availability tracking,** dealer search, and access to Management Information System and Direct Benefit Transfer (DBT) reports.
  - iFMS connects **key stages of the fertilizer ecosystem,** including production, imports, movement, stock availability, retail sale and subsidy processing.
  - The new dashboards and analytical tools have been developed to provide officials with a **consolidated view of fertilizer production**, imports, dispatches, movement, stocks and retail sales.
  - These tools enable monitoring at the **national, State, district and retailer levels**, helping identify unusual trends and emerging supply situations at an early stage.
- **Significance:** iFMS enhances transparency, efficiency, and real-time monitoring in fertilizer supply, supporting farmers and stakeholders in ensuring timely availability of quality fertilizers.

AI AND FINANCIAL CYBERSECURITY: REGULATORS TIGHTEN THE VIGIL

- AI is transforming the nature of financial fraud. **Deepfake voices** are being used to bypass KYC norms, while more complex scams are infiltrating critical financial institutions.
- Several banks have already faced cybersecurity breaches in 2026.
- Unlike traditional threats built around identifiable vulnerabilities and periodic assessments, AI dramatically increases the speed, scale and sophistication of attacks — from automated vulnerability discovery to autonomous cyberattacks.

SEBI's IT Resilience Index (ITRI)

- SEBI has introduced an IT Resilience Index for Market Infrastructure Institutions (MIIs) — entities like clearing corporations and exchanges that enable trading.
- Key features:
    - Quantifies cyber readiness across **nine parameters.**
    - **Availability and security**: 20% weightage each.
    - **Integrity, governance, reliability and monitoring, modularity and flexibility, business continuity**: 10% weightage each.
    - **Scalability** and **miscellaneous ("others")**: 5% weightage each.
    - MIIs must compute ITRI **half-yearly**, submit comparative analysis within 60 days, and outline corrective action.
    - Framework takes effect from **early 2027.**
    - Includes an "early warning system" for continuous risk monitoring.

Standardised Incident Reporting: The FIRE Format

- SEBI has aligned its cyber incident reporting portal with a standardised "Format for Incident Reporting Exchange" (FIRE).
- This enables staged reporting — from initial disclosure through intermediate updates to final closure — while accommodating incomplete information at the time of first reporting.

RBI's Cybersecurity Framework

- The RBI released a comprehensive cybersecurity framework for banks and financial institutions, mandating:
    - Board-level ownership of cyber risks.
    - Dedicated committees to monitor IT risks.
    - A strict six-hour window for reporting cyber incidents.
    - A revised fraud compensation mechanism (June 2026) expanding victim eligibility and covering newer digital scams.

The "Kill Switch" Mechanism

- Both regulators are exploring a "kill switch":
    - **RBI**: Would allow users to halt all financial transactions during fraud
    - **SEBI**: Evaluating a similar mechanism as part of upcoming AI guidelines

SEBI's Forthcoming AI Guidelines

- SEBI plans to "shortly" issue guidelines for the responsible use of AI and machine learning in markets.
- It already uses AI to flag suspicious trading patterns and has constituted a dedicated team to extend AI-based surveillance to corporate investigations, including scrutiny of quarterly filings.

Expert Recommendations

- Legal experts suggest regulators should focus on:
    - AI-specific threat modelling
    - Continuous (not periodic) testing
    - Third-party and cloud concentration risks
    - Model and data integrity
    - Deepfake-enabled fraud and supply-chain vulnerabilities
    - Clear human accountability where AI influences critical decisions
    - **Technology-neutral accountability** backed by technology-specific safeguards, rather than an overly prescriptive code

ADOPT POLICIES FOR REUSE OF TREATED WATER

- India is facing an increasingly **serious water crisis,** driven by rapid urbanisation, population growth, industrial expansion, agricultural demand, and climate change.
- Every summer, several parts of the country experience acute water shortages, while excessive dependence on **groundwater extraction** continues to worsen the situation.
- In this context, the recently notified treated wastewater reuse policies of Uttar Pradesh and Uttarakhand offer an important model of contextualised policymaking.

Hidden Opportunities

- **Treated Wastewater as a Reliable Resource**
    - Treated wastewater represents one of **India's most underutilised resources**.
    - Unlike rainfall-dependent freshwater sources, it can provide a relatively reliable and drought-proof supply.
    - Its reuse can reduce pressure on rivers, lakes, reservoirs, and groundwater.
    - Agriculture, industry, urban landscaping, construction, and ecological restoration can all benefit from treated water.
    - India's future water security may therefore depend not only on finding new sources of freshwater but also on using existing water resources more efficiently through recycling and reuse.

Role of the National Framework

- The National Framework on Safe Reuse of Treated Water **(SRTW), 2022** provides an important foundation for this transition.
- By encouraging States to formulate their own wastewater reuse policies, it recognises that national objectives must be translated into local strategies.
- Several States have begun **setting reuse targets** and measurable milestones. However, many others still lack a comprehensive approach.
- The challenge now is to move from policy announcements to effective implementation.

An Economic and Environmental Opportunity

- Treated wastewater should be understood not merely as a sanitation issue but as an economic opportunity.
- **Its reuse can reduce dependence** on expensive freshwater supplies, support industrial growth, strengthen urban development, and contribute to low-carbon development.
- It can also improve drought preparedness and reduce the environmental stress caused by excessive groundwater extraction.
- However, governments and planners must clearly understand the **economic value of reuse.**
- Policies are unlikely to succeed unless wastewater reuse becomes financially attractive.
- Pricing signals, incentives, and innovative financing mechanisms can encourage industries and urban institutions to adopt recycled water.

The Way Forward: Need for Awareness and Public Trust

- Public perception remains another major challenge. Many people continue to associate treated wastewater with contamination and danger.
- **Building confidence** in its safety is therefore essential.
- The use of the term Apna Jal, meaning our water, by the National SRTW Framework and the policies of Uttar Pradesh and Uttarakhand reflects an important psychological shift.
- Water reuse requires not only new infrastructure but also **a change in public attitudes.**
- Awareness campaigns, transparent quality monitoring, and strong safety standards can help build public trust.

Conclusion

- **Continued groundwater depletion** and growing competition among agriculture, industry, and cities make the existing model increasingly unsustainable.
- Treated wastewater offers a practical solution by transforming a perceived burden into a productive resource.
- India must move towards a future based on **circular water management**, where every available drop is treated, reused, and valued.

NEPAL'S AGONY, THE HIMALAYAN WARNING TO INDIA

- The recent disaster in Nepal is a serious warning for India and the entire Himalayan region. The Himalaya cannot be understood as separate geographical units divided by political borders.
- From the **Hindu Kush** and Pakistan to India, Nepal, Bhutan and Tibet-China, the mountain system forms one interconnected and geologically active region.
- Earthquakes, **glacial disturbances**, landslides and floods in one area can produce consequences far beyond national boundaries.

The Himalaya: One Living and Dangerous System

- The Himalaya are a vast, interconnected and constantly changing geological system.
- Beneath their majestic appearance lie immense **seismic pressures**, shifting glaciers and unpredictable geological processes.
- Their dangers cannot be precisely forecast in terms of time, location or intensity.
- History offers painful reminders. The **Nepal-Bihar earthquake of 1934** and the **Assam earthquake of 1950** revealed the catastrophic potential of Himalayan seismic activity.
- Scientists have repeatedly warned about the possibility of a major earthquake affecting northern India. Since prediction remains difficult, **preparedness** must become the most important defence against disasters.

Whatever Happened, India Must Learn

- The disaster in Nepal offers several urgent lessons for India.
    - First, the Himalaya must be recognised as a region of continuing **natural hazards**. Their sacred and cultural significance should not obscure their geological fragility.
    - Second, information about earthquakes, GLOFs, landslides and floods must be communicated clearly and rapidly to vulnerable populations.
    - Third, communities should become part of a comprehensive system of **early warning**, evacuation planning and emergency response.

- Fourth, India must address dangers that extend beyond its borders. The proposed **Medog hydropower project** near the great bend of the Brahmaputra in Tibet raises serious concerns.

Rethinking Development in High-Risk Zones

- India must critically examine infrastructure located in environmentally fragile and seismically vulnerable regions.
- **Dams**, reactors and large commercial projects should not be assessed only in terms of economic benefits.
- Their potential consequences during earthquakes, floods and landslides must also be considered.
- Some development projects can become dangerous **built hazards**. A comprehensive review of infrastructure in high-risk zones is therefore necessary.
- Where risks exceed benefits, governments must be prepared to modify or even dismantle hazardous structures.
- Another challenge is the increasing concentration of people in vulnerable areas. A planned and time-bound **decongestion of high-risk settlements**, supported by safer relocation and better infrastructure, may become necessary.
- Development without ecological responsibility can transform progress into **catastrophe**.

Conclusion

- Nepal's tragedy is a warning for the entire Himalayan region. India and its neighbours share the same fragile and restless geological environment.
- **Earthquakes**, glacier collapse, floods and landslides do not respect political boundaries.
- India must strengthen **scientific communication**, improve community preparedness, reassess hazardous infrastructure and promote regional cooperation.
- A great nation should be capable of learning from the experience of a smaller neighbour.
- The Himalaya are both a source of life and a source of danger. The real measure of wisdom lies not merely in responding after a disaster but in learning, preparing and acting before the next catastrophe strikes.