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School of Research Based Learning & Competition

Current Affairs - 29 July 2026

ZOONOTIC OUTBREAKS AND GLOBAL PREPAREDNESS: LESSONS FROM EBOLA, HANTAVIRUS AND NIPAH

Recent episodes involving Ebola, hantavirus, and Nipah virus show that dangerous zoonotic infections are no longer rare, isolated events.

Understanding the Three Viruses

- **Ebola Virus Disease**
 - Causes severe illness and death, with an average **case-fatality rate of around 50%**.
 - Transmits human-to-human through infected body fluids.
- **Hantavirus**
 - Named after the **Hantaan River region in South Korea**; mainly rodent-borne.
 - Causes kidney disease or **hantavirus pulmonary syndrome** — a severe lung illness that can rapidly progress to respiratory failure and shock.
- **Nipah Virus**
 - Carried mainly by **fruit bats**; causes respiratory illness and encephalitis.
 - Case-fatality rates estimated at **40–75%**.
 - Spreads through close household or healthcare contact.

The Vaccine Gap

- A licensed vaccine exists for only one major Ebola virus species.
- No licensed human vaccines currently exist for Bundibugyo Ebola, Nipah virus, or hantavirus infections.

Building Preparedness: From Research to Vaccine

- **Step 1 — Basic research:** Understanding pathogen biology — how it enters cells, causes disease, and which proteins trigger immunity — largely happens in publicly funded universities and national laboratories.

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- **Step 2 — Industrial translation:** Converting research into usable vaccines requires industrial-scale capacity: process development, formulation, quality control, regulatory documentation, clinical trials, manufacturing, and cold-chain planning.
- **Role of new technology:** AI tools can now help identify vaccine targets, predict immune responses, compare candidates, and improve manufacturing — though conventional biological validation, safety testing, and regulatory review remain essential.

Why Vaccine Development Lags for These Viruses?

- **COVID-19** proved vaccine design, testing, and scale-up can move far faster than previously believed — but these platforms aren't freely available to all researchers, as many depend on patents, proprietary know-how, and specialised manufacturing controls.
- **Testing challenges:** Outbreaks of Ebola, hantavirus, and Nipah are often unpredictable, making conventional large clinical trials difficult. This may require emergency trial designs, ring-vaccination studies, adaptive protocols, and regional trial networks.
- **Economic disincentive:** International vaccine companies may find limited financial attraction in developing vaccines for diseases with small, uncertain outbreaks in poorer regions — despite enormous public-health value.

The Way Forward

- **Academia-industry partnerships:** Academic institutions provide immunology expertise, animal models, and early vaccine concepts; industry provides scale-up, formulation, quality assurance, and distribution.
- **Shared-risk financing model:** Since standard profit models fail to reward epidemic vaccine development, the solution may lie in public funding, advance purchase commitments, technology transfer, regional manufacturing capacity, and fair global stockpiles.
- **Addressing vaccine hesitancy:** Fear, misinformation, and distrust during outbreaks can prevent people from accepting vaccines or cooperating with contact tracing and isolation measures. Trust must be built before emergencies arise, through honest communication, local leadership, and transparent risk communication.

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THE URBAN NIGHTMARE — A FIRE WITH NO ESCAPE

- **Recurring fire tragedies** in Lucknow, Delhi, Bhiwadi, and Virudhunagar expose a deep crisis in India's urban governance.
- These disasters are largely preventable and result from illegal construction, weak enforcement, political interference, corruption, and **poor institutional accountability**.
- India possesses adequate laws and modern technology, yet ineffective implementation continues to endanger citizens.
- The challenge is not the absence of regulations but the **failure to enforce** them.

Root Causes of India's Urban Governance Crisis

- **Weak Regulatory Enforcement**
 - Illegal establishments continue functioning because violations often attract little or no punishment and enforcement remains inconsistent.
- **Political Interference and Patronage**
 - Political patronage, vote-bank politics, and administrative pressure frequently protect illegal constructions. Regulatory decisions are sometimes reversed.
- **Corruption in Urban Administration**
 - Corruption allows unauthorised buildings, encroachments, and unsafe commercial activities to flourish.
- **Fragmented Institutional Structure**
 - Urban responsibilities are divided among municipal corporations, development authorities, public works departments, fire services, and other agencies.
 - This fragmented governance creates **an accountability vacuum**, where responsibility for failures becomes diffused.
- **Failure of Accountability Mechanisms**
 - Urban disasters are often followed by inquiry committees, investigations, and suspension of junior officials. However, systemic reforms remain rare, while higher administrative and political accountability is seldom established.

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Challenges in Effective Implementation of Urban Governance

- **Technology Exists but Governance Does Not**
 - India has advanced technologies such as Satellite Imagery, GIS, Drones, Artificial Intelligence, digital property databases, and real-time monitoring systems capable of detecting illegal constructions and land-use violations.
 - The principal challenge is the lack of **political and administrative commitment** to use these tools for strict enforcement.
- **Structural Weaknesses in Urban Local Governance**
 - Although the 74th Constitutional Amendment aimed to strengthen Urban Local Bodies (ULBs), implementation remains incomplete.
 - Municipal bodies continue to face **limited financial autonomy**, inadequate professional capacity, and excessive dependence on State governments, restricting effective urban management.

Way Forward

- **Strengthen** Urban Local Bodies through greater administrative, financial, and functional autonomy.
- **Establish** clear accountability for regulatory failures at both administrative and political levels.
- Recruit qualified urban planners, engineers, and fire safety professionals to improve professional urban management.
- Use technology-driven **compliance** through AI, GIS, drones, and digital property records.
- Strengthen anti-corruption measures through transparent approvals, audits, and independent inspections.
- Improve inter-agency **coordination** by integrating urban governance institutions.
- Conduct regular fire safety audits, disaster preparedness exercises, and risk-based inspections.
- Promote citizen participation in reporting violations and monitoring civic services.

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CO-EXISTING WITH TIGERS OUTSIDE RESERVES

- India's tiger conservation programme is one of the world's greatest wildlife success stories.
- Since the launch of **Project Tiger (1973)**, sustained political commitment, scientific management, and habitat protection have increased the tiger population from 1,411 (2006) to 3,682 (2022), making India home to over 70% of the world's wild tigers.
- However, this achievement has created a new challenge as nearly 35–40% of tigers now live outside Tiger Reserves, increasing human-tiger conflict.
- The **Tigers Outside Tiger Reserves (TOTR) initiative** seeks to promote safe coexistence through a landscape-based conservation approach.

India's Remarkable Tiger Conservation Success

- India's protected area network has expanded from **9** Tiger Reserves covering 18,278 sq km to **58** reserves spanning 84,488 sq km, accounting for about 2.6% of the country's land area.
- This success is attributed to Project Tiger, the National Tiger Conservation Authority (NTCA), stronger anti-poaching measures, scientific monitoring, **and improved habitat management**.
- Healthy breeding populations and connected wildlife corridors have enabled the steady recovery of the species.

Emerging Challenge: Tigers Beyond Protected Areas

- As territorial carnivores, tigers require large home ranges. Habitat saturation within reserves has encouraged dispersal into reserve forests, villages, agricultural fields, and other human-dominated landscapes.
- This has **increased livestock depredation**, accidental encounters, rescue operations, and public anxiety.
- Conservation outside protected areas has become essential for ensuring both ecological stability and human safety.

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Tigers Outside Tiger Reserves (TOTR): A New Conservation Paradigm

- The TOTR initiative, launched by the Ministry of Environment, Forest and Climate Change, shifts conservation from protected-area management to a broader **landscape-based model**.
- It aims to conserve tigers outside reserves, minimise conflict, protect livelihoods, and strengthen science-based governance.
- Implemented initially as a pilot project, it covers 40 forest divisions across nine States selected through the All India Tiger Estimation (2022).

Role of Technology in Modern Conservation

- TOTR encourages the use of camera traps, GPS-enabled monitoring, drones, and Artificial Intelligence (AI) for surveillance, monitoring tiger movement, conflict prediction, and evidence-based decision-making.
- However, technology must be **supported by efficient institutions** and trained personnel for effective implementation.

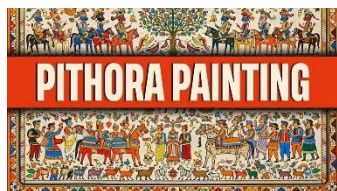
Way Forward

- India should strengthen wildlife corridors, expand community-based conservation, ensure prompt compensation. India should build institutional capacity, integrate modern technology with local knowledge, improve inter-state coordination, and promote adaptive management based on scientific monitoring.
- Conservation policies must recognise that humans and tigers increasingly **share the same landscapes**.

Conclusion

- India's tiger recovery demonstrates the effectiveness of scientific conservation, strong governance, and community support. The **TOTR** initiative marks a **significant shift** from reserve-centric protection to coexistence-based conservation.
- With **sustained commitment**, capable institutions, and active public participation, India can become a global model for balancing biodiversity conservation, human safety, and sustainable development.

WHAT IS PITHORA PAINTING?



PITHORA PAINTING

- It is a traditional **tribal wall art** that has originated in the **tribal regions of Gujarat**, mainly in Panchmahal and Chhota Udaipur.
- It is done by **tribes** such as the **Rathwa, Bhil, and Bhilala**, who hold a strong belief in nature, spirits, and divine powers.
- It holds a long history, and its existence **dates back** to around the **13th century**.
- It is named after **Pithora De**, who is their **tribal god** and is associated with marriage, prosperity, and the well-being of the tribe.
- Traditionally, Pithora paintings were **created on the walls of home**. The paintings were often **commissioned during significant life events**, such as **weddings, births, and festivals**, serving as a means of invoking blessings and protection from deities.
- **Artists**: Traditionally executed by **specialist ritual painters** known as **Lakharas**, under the **guidance of a priest called Badwa**.
- **Surface Preparation**: Traditionally, walls are prepared by **applying a mixture of cow dung and clay**.
- **Natural Colors**:
 - Artists **use natural pigments derived from minerals, plants, and other organic materials** to create the colors for their paintings.
 - **Common colors** include **red, yellow, green, and blue**, each derived from specific natural sources.
- **Painters** use a **combination of bamboo sticks, cotton and wooden stencils** to create their art.
- The paintings **show tribal and Hindu deities, horses, animals, and scenes from daily life** like farming, hunting, and dancing.

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- It plays a crucial role in **preserving tribal stories**, beliefs, and customs and helps to teach younger generations about their culture.
- Although it is traditionally practiced only as wall art, **today's generation** of pithora painters **use paper and canvas** that they sell **commercially**.
- It has been awarded a **Geographical Indication (GI)** tag in 2026.

MALVI CAMEL



- It is one of the nine recognised **camel breeds in India**.
- **Distribution:** It is primarily found in **Madhya Pradesh's Malwa region** and parts of **Rajasthan** such as Kota, Bundi, Jhalawar and Baran.
- It is also **valued for milk production**, with a female capable of **yielding around 4-5 kg of milk per cycle**.

Physical Appearance:

- It is known for its distinct white colour and is considered the **smallest among India's camel breeds**.
- Malvi camels are generally medium-sized with a robust build.
- They often have a **light brown to reddish-brown coat** and a well-developed hump.
- **Adaptability:** These camels are **well-adapted to both semi-arid and slightly more humid conditions**, as the Malwa region experiences a range of climatic conditions compared to the harsher desert environments of other camel breeds.
- **Endurance and Strength:** These are known for their endurance and strength, making them suitable for **carrying loads and performing work**, including transportation and agricultural tasks.

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ANDROMEDA GALAXY



- It is also known as M31, **comparable** in size to our Milky Way galaxy.
- It is a **large spiral galaxy** located approximately 2.5 million light years from Earth.
- It is named for its celestial location in the **constellation of Andromeda**.
- It is the **closest major galaxy to the Milky Way** and is visible to the naked eye.
- It is currently **transitioning to its 'middle age'**, away from being a vibrant, active galaxy and towards a quiescent state
- It is a barred spiral galaxy, so-called for the **bar-like structure formed by the stars** in its center.
- It is observed that this galaxy is moving towards the **Milky Way at approximately 110 km/s**.

Key Facts about Hubble Space Telescope

- It is named in honour of the trailblazing **astronomer Edwin Hubble** which was **launched by the NASA**.
- It is a large, **space-based observatory**, which has revolutionized astronomy since its launch and deployment by the space shuttle Discovery in 1990.
- Hubble's domain extends from **the ultraviolet through the visible** (which our eyes see) and **into the near infrared**.
- It is one of NASA's Great Observatories Programs.