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Current affairs summary for prelims

13 April, 2024

Volcanic Vortex Rings

Context: *For the past week, Mount Etna, Europe's largest volcano and one of the most active and renowned worldwide, has been emitting nearly flawless rings of smoke into the atmosphere.*

- These rare formations, resembling smoke rings, occur when gas, mainly water vapor, is rapidly released through a vent in the volcano's crater.
- The circular shape of the rings above Mount Etna, observed since April 2, is attributed to the almost perfectly circular vent opening.
- First documented in 1724 at Etna and Vesuvius in Italy, volcanic vortex rings have been observed at various volcanoes worldwide, including Redoubt in Alaska, Stromboli in Italy, and Yasur in Vanuatu.

Definition of Vortex Rings:

- Vortex rings, also known as toroidal vortexes, are torus-shaped regions within a fluid where the majority of the fluid spins around an imaginary axis forming a closed loop.
- While abundant in turbulent flows of liquids and gases, vortex rings are typically unnoticed unless revealed by suspended particles, such as smoke rings produced by smokers or fiery vortex rings created by fire eaters.

Occurrence and Characteristics:

- Vortex rings can be observed in various phenomena, including certain artillery firing, mushroom clouds, microbursts, and occasionally in volcanic eruptions.
- These rings tend to move perpendicular to their plane, with the inner edge moving faster forward than the outer edge.
- Within a stationary body of fluid, a vortex ring can travel significant distances, carrying the spinning fluid with it due to its poloidal flow which lessens friction between the core and the surrounding fluid.

Structure and Behaviour:

- In a typical vortex ring, fluid particles move in circular paths around an imaginary core that is perpendicular to these paths.
- The velocity of the fluid is relatively constant except near the core, where the angular velocity increases, concentrating most of the vorticity and energy dissipation.
- Similar to a rotating wheel reducing friction between a car and the ground, the poloidal flow of the vortex reduces friction between the core and the surrounding fluid, allowing it to travel long distances with minimal loss of mass and kinetic energy.

Etna's Production of Vortex Rings:

- Mount Etna is renowned for its prolific production of these rings, with reports of "dozens of gas rings every day" as observed by volcanologist Boris Behncke.
- The activity of producing vortex rings is not unique to Mount Etna, but it is exceptionally abundant here compared to other volcanoes globally.

Article 371

Context: *A recent public rally in Rajasthan stirred controversy when Congress president Mallikarjun Kharge mentioned Article 371.*

Quasi-Federalism:

- India adopted quasi-federalism to accommodate diverse identities, religions, and languages, ensuring harmony between the Union and State governments.
- The Constitution distributes powers between the Union and States while maintaining a degree of interdependence, with residual powers vested in the Centre.

Asymmetry in Indian Federalism:

- Not all States in India are equal; there exists notable asymmetry in the functioning of Indian federalism.
- A prime example of this asymmetry was Article 370, which granted special status to the State of Jammu and Kashmir before its revocation in 2019.

Article 371:

- Article 371 provides special powers to 12 other States, including Arunachal Pradesh, Gujarat, Maharashtra, Manipur, Nagaland, and Sikkim.
- These provisions, listed under Articles 371 (A-J) in Part XXI of the Constitution, were incorporated through subsequent amendments.

Key Provisions Under Article 371:

- Article 371(A) and (B) focus on Maharashtra and Gujarat, respectively, mandating the establishment of separate development boards for specific regions within these States.

Face to Face Centres

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- Article 371(A) was added in 1962, granting special provisions to Nagaland, including autonomy over religious and social practices, customary laws, and land ownership.
- Article 371(B) addresses Assam's tribal areas, later forming the basis for the creation of the State of Meghalaya.
- Article 371(C) applies to Manipur, involving the constitution of a legislative committee for the Hill Areas and granting the Governor special responsibilities.
- Articles 371(D) and (E) include special provisions for Andhra Pradesh, focusing on equitable opportunities in employment and education, establishment of an Administrative Tribunal, and the creation of local cadres.
- Article 371(F) grants protection to Sikkim's existing laws post-merger with India, ensuring social and economic advancement for its residents.
- Article 371(G) preserves the religious and social practices of Mizos in Mizoram.
- Article 371(H) confers special responsibilities on the Governor of Arunachal Pradesh regarding law and order.
- Article 371(I) pertains to Goa, mandating a minimum number of members in its Legislative Assembly.
- Article 371(J) accords special status to the Hyderabad-Karnataka Region, ensuring equal opportunities in development, education, and employment.

World Cybercrime Index

Context: *An international team of researchers (PLOS ONE) have compiled the first ever 'World Cybercrime Index', which identifies key crime hotspots by ranking the most significant sources of cybercrime across the globe.*

- A team of international researchers compiled the 'World Cybercrime Index' ranking around 100 countries based on various cybercrime categories.
- The index suggested that cybercriminal threats originated from a small number of countries, with China, Russia, Ukraine, the US, Romania, and Nigeria consistently ranking high.
- 97 countries were named as hubs for specific cybercrime categories.

➢ **Rankings:**

- Russia ranked first in cybercrime, followed by Ukraine, China, the US, Nigeria, and Romania.
- North Korea, the UK, and Brazil held the seventh, eighth, and ninth positions, respectively.
- India secured the tenth spot in cybercrime rankings.

➢ **Categories of Cybercrime:**

- Researchers identified major categories of cybercrime, including technical products and services, attacks and extortion, data and identity theft, scams, and money laundering.
- Countries specialized in different categories of cybercrime.

➢ **Country Specializations:**

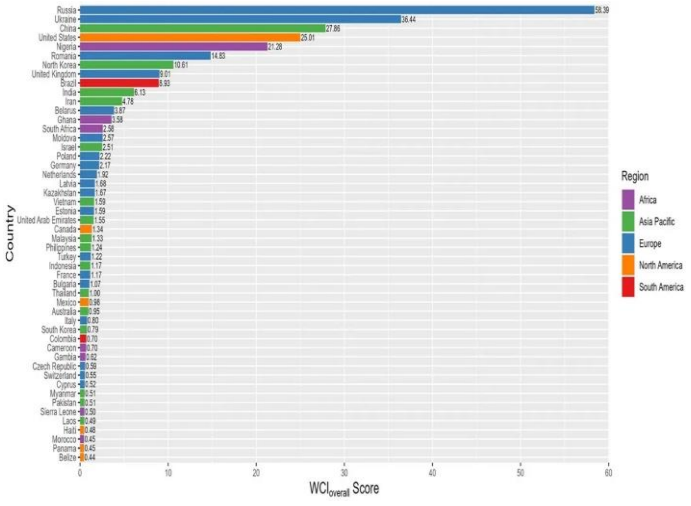
- Russia and Ukraine specialized in technical cybercrime, while Nigerian cybercriminals engaged in less technical forms.
- India specialized in scams, with Romania and the US being balanced hubs for both high-tech and low-tech crimes.

➢ **Cybercrime Costs:**

- Estimated cybercrime costs were $9.22 trillion in 2024, projected to rise to $13.82 trillion by 2028.
- Difficulty in locating cybercriminals due to methods used to block their locations.

➢ **India's Score:**

- India received a score of 7.90 for impact, 6.60 for professionalism of cybercriminals, and 6.65 for technical skills.
- China and the US scored higher overall, with Russia and Ukraine holding the top positions.



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NEWS IN BETWEEN THE LINES

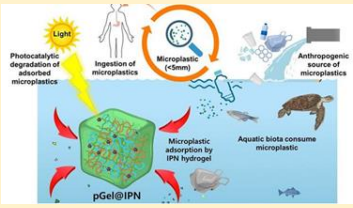
Wayanad Wildlife Sanctuary

Recently, a devastating fire engulfed close to 100 hectares of forest in the Sulthan Bathery forest range within the Wayanad Wildlife Sanctuary (WWS).

About Wayanad Wildlife Sanctuary:

- The Wayanad Wildlife Sanctuary was **established in 1973** and is located in **Kerala's** Wayanad district.
- The sanctuary is a component of the **Nilgiri Biosphere Reserve** (UNESCO-designated area) and of the **Elephant Reserve No. 7 of South India**.
- It covers the Wayanad Plateau, situated at the confluence of three biologically distinct and diverse regions- the main **Western Ghat Mountains**, **the Nilgiri Hills** and the **Deccan Plateau.**
- Kabini river, a tributary of the **Kaveri River flows through the sanctuary**.
- **Flora:** The flora consists of moist **deciduous forests, West coast semi-evergreen forests** and **teak**, **eucalyptus** and Grewelia plantations.
- **Fauna:** The fauna includes **Elephant**, Gaur, **Tiger**, **Panther**, Sambar, **Spotted deer**, Barking deer, Wild boar, Sloth bear, **Nilgiri langur**, etc.

Hydrogel



Recently, the researchers at the Indian Institute of Science (IISc) have designed a sustainable hydrogel to remove microplastics from water.

About the Hydrogel:

- Hydrogel, also **known as aqua gel** is a **three-dimensional network of polymer chains** that can absorb and retain large amounts of water.
- It has a unique intertwined polymer network designed to bind and degrade **microplastic contaminants using UV light irradiation.**
- Unlike traditional filtering membranes, which can become clogged with microplastics, the hydrogel offers a sustainable solution for microplastic removal.
- It **consists of chitosan, polyvinyl alcohol and polyaniline layers** intertwined to form an interpenetrating polymer network (IPN) architecture.
- The hydrogel matrix is infused with **nanoclusters of a material called copper substitute polyoxometalate (Cu-POM)**, which act as catalysts for degrading microplastics under UV light.
- It demonstrates high efficacy, capable of removing approximately **95% and 93% of two types of microplastics from water.**

Coral Bleaching

Recently, new evidence from the Australian Marine Conservation Society revealed that the coral bleaching observed earlier this year in the southern part of the Great Barrier Reef is far worse than expected.

About Coral Bleaching:

- Coral bleaching is a **process that occurs when corals expel the algae that live inside their tissues**, **causing them to turn white.**
- The **algae, called zooxanthellae**, **provide nutrients** to the corals through photosynthesis and give them their characteristic colors.
- This happens when coral polyps experience a stress event, such as: **Extreme salinity**, **Pollution**, **Overfishing Sedimentation** and **Warmer water temperatures**.
- Coral bleaching can **lead to the loss of biodiversity**, **habitat degradation** and decreased resilience of coral reef ecosystems.
- It is a worldwide phenomenon affecting reefs in **tropical** and **subtropical regions**, including the **Great Barrier Reef, the largest coral reef system**.
- Australia's Great Barrier Reef, **spanning 2,300 km,** harbors **400 coral types**, shelters **1,500 fish species**, and **hosts 4,000 mollusk varieties**.

Whooping Cough

Recently, a global resurgence of whooping cough cases has been observed, notably in countries such as China, Australia and Spain.

About Whooping Cough:

- Whooping cough, also **known as pertussis**, is a **respiratory infection** caused by the bacteria **Bordetella pertussis** that affects the lungs and breathing tubes.
- The bacteria attach to the cilia in the upper respiratory system, **releasing toxins** that **damage the cilia and cause airways to swell.**
- It is very contagious and can affect anyone, but it's most dangerous for **babies younger than 6 months old** who aren't yet fully protected by immunizations.
- The first signs are similar to a cold, such as a **runny nose** and **sore throat**.

	▪ Outdoor air pollution, particularly **nitrogen dioxide (NO2)** and **ozone exposure**, is linked to increased pertussis incidences, especially affecting children's respiratory health. ▪ **China** has reported a significant increase in whooping cough cases, attributed to weakening vaccine effectiveness and production challenges. ▪ European nations, including **Spain** and the **Czech Republic** are witnessing significant whooping cough outbreaks, exacerbated by vaccination challenges, especially post-COVID-19 pandemic. ▪ According to the **World Health Organization (WHO)**, in 2022, **20.5 million children worldwide missed out** on one or more doses of their **DTP (Diphtheria, Tetanus and Pertussis) vaccines.**
Place in News **Palestine**	*Recently, the United Nations Security Council (UNSC) president has referred the Palestinian Authority's application to become a full member of the world body to the committee on the admission of new member.* **Palestine (Capital: Ramallah)** **Location:** Palestine**,** officially known as the State of Palestine is a country in the Levant region of West Asia. **Boundaries:** Palestine shares its borders with **Jordan** (East), **Israel** (West and North) and **Egypt** (Southwest). **Physical Features:** ▪ The highest point in Palestine is **Mount Gerizim,** located near the city of Nablus in the northern West Bank. ▪ Palestine lacks major perennial rivers, with only seasonal streams and wadis like **Jordan River**, **Wadi al-Far'a** and **Wadi Gaza** providing water flow during the rainy season. ▪ Palestine has limited mineral resources, with some deposits of **limestone**, **clay, gypsum** and possibly small reserves of natural gas and oil. ▪ Palestine generally experiences a Mediterranean climate. **Membership:** Palestine **holds observer status** in several international organizations, including the **United Nations (UN)**, and is a member of various regional bodies such as the **Arab League**, **the G77**, the International Olympic Committee and the Union for the Mediterranean.

POINTS TO PONDER

- What action did the Supreme Court take regarding Sections 3 and 5 of the Limitation Act, 1963, recently? **– Provided eight principles for harmonious construction of the sections**
- Under which program has the Jawaharlal Nehru Aluminium Research Development and Design Centre in Nagpur invited fresh proposals? **– S&T-PRISM**
- What type of attacks has Apple recently warned users in India and other countries about? **– Mercenary spyware attacks**
- In a recent joint statement, which two countries opposed any unilateral changes to the status quo of the Senkaku Islands by China? **– Japan and USA**
- Where was the Eurasian otter recently radio-tagged for the first time in India? **– Satpura Tiger Reserve in Madhya Pradesh**