7. Short News

INCOIS Expands Coastal Flood Monitoring for 'Kallakkadal' Surges

Context - Indian National Centre for Ocean Information Services (INCOIS) has installed a second Coastal Flood Monitoring System (CFMS) to improve forecasting of dangerous 'Kallakkadal' swell surges.

What is 'Kallakkadal'?

1. 'Kallakkadal' refers to sudden and powerful swell surges that cause unexpected coastal flooding, especially along parts of the Indian coastline, especially Kerala.
    1. These swell surges, with periods ranging from 30 to 300 seconds, can substantially elevate coastal water levels.
2. Meaning of Kallakkadal - The term 'Kallakkadal' comes from Malayalam words Kallan (thief) and Kadal (sea), describing sudden "thief-like" sea waves that unexpectedly strike coastal areas.
3. Cause - The phenomenon is mainly triggered by long-period ocean swells generated by distant storms in the southern Indian Ocean.
4. Long-Distance Travel - These swells can travel nearly 10,000 kilometres before reaching the Indian coastline.
5. Seasonality - Kallakkadal events are most common during the pre-monsoon season, particularly along the Kerala coast.
6. Impact - The surges pose serious threats to fishing communities, coastal infrastructure, harbours and low-lying coastal regions.
7. Scientific Cause - Scientists have linked Kallakkadal events to infragravity waves and wave shoaling processes in shallow coastal waters.
    1. Infragravity Waves - Infragravity waves are low-frequency ocean waves generated through interactions among shorter surface waves in the open ocean.
    2. Wave Shoaling - Wave shoaling is the process in which wave height increases as ocean waves move from deep waters to shallow coastal regions.
    3. Coastal bathymetry, or underwater topography, further amplifies these surges and contributes to sudden coastal flooding

Difference Between Tsunami and Kallakkadal

1. Nature of Waves - Tsunamis are seismic sea waves with massive destructive energy, while Kallakkadal consists of swell surges and infragravity waves.
2. Origin - Tsunamis originate from tectonic disturbances (underwater earthquakes, or volcanic eruptions) beneath the ocean floor, whereas Kallakkadal waves are generated by meteorological systems in distant oceans.
3. Impact Scale - Tsunamis can affect entire ocean basins and multiple countries, while Kallakkadal mainly affects coastal regions along southwest India, especially Kerala.
4. Frequency - Kallakkadal events occur more frequently during the pre-monsoon season, whereas tsunamis are relatively rare events.
5. Destructive Capacity - Tsunamis generally cause far greater destruction and casualties compared to Kallakkadal surges, which mainly lead to coastal flooding and erosion.

About Coastal Flood Monitoring Systems (CFMS)

1. INCOIS has installed its second CFMS near Kollam Harbour in Kerala after the first successful deployment at Vizhinjam.
2. Objective - The system aims to improve accuracy of swell surge forecasts and strengthen coastal early warning systems.
3. Technical Components - The Coastal Flood Monitoring System includes -
    1. A coastal automatic weather station
    2. Four high-frequency pressure sensors installed in shallow waters

4. Function - The system monitors wave transformation processes and collects real-time coastal data for forecasting.
5. Why Kollam Was Chosen - Kollam, Kerala experiences frequent swell surge events and is highly vulnerable to sudden coastal flooding.
    1. The location helps scientists' better study nearshore wave behaviour and improve forecast models.

Kalam & Kavach 3.0

Context - The Ministry of Defence is organising the third edition of Kalam & Kavach to promote defence modernisation, indigenous capability development, innovation and strategic partnerships.

About Kalam & Kavach 3.0

1. Kalam & Kavach 3.0 is a high-level strategic defence conference being held at the Manekshaw Centre in New Delhi.
2. It serves as a platform bringing together policymakers, military leaders, defence industries, start-ups, academia, diplomats and strategic experts.
3. Theme - "Taking JAI Forward With I²"
    1. JAI - Jointness, Aatmanirbharta and Innovation
    2. I² - Indigenisation and International Collaboration
4. Objective - The objective is to strengthen India's defence ecosystem through integrated military capability development, indigenous manufacturing and global partnerships.
    1. The conference aims to accelerate defence production scalability to achieve the vision of Viksit Bharat@2047.
5. Key Areas of Discussion - The conference will focus on emerging defence technologies such as -
    1. Artificial Intelligence (AI)-enabled warfare
    2. Autonomous systems and drones
    3. Hypersonic technologies
    4. Quantum-enabled defence systems
    5. Advanced C4ISR capabilities
6. Space & Cyber Security - Threats from space and Low-Earth Orbit (LEO) domains and the need for integrated security preparedness.
7. Tri-Service Integration - Emphasis will be placed on joint military operations and integrated defence planning among the Army, Navy and Air Force.

Wyspa Jana Zabawy-Wroblewskiego Island

Context - Poland has created an artificial island called Wyspa Jana Zabawy-Wroblewskiego to protect rare birds and restore wetland biodiversity.

About the Wyspa Jana Zabawy-Wroblewskiego Island

1. Formation - Wyspa Jana Zabawy-Wroblewskiego is an artificial island created using dredged sand from a shipping channel deepening project.
2. Location - Wyspa Jana Zabawy-Wroblewskiego is located in the Szczecin Lagoon on the Baltic coast of Poland.
3. Purpose - The island was developed as a protected sanctuary for rare birds, migratory species and fragile wetland ecosystems instead of tourism or commercial use.
4. Ecological Succession - Scientists are studying ecological succession on the island, including the gradual development of vegetation, soil, insects and bird colonies on newly formed land.
5. Biodiversity - The island has become an important nesting and resting habitat for gulls, terns and other migratory water birds in the Baltic region.
6. Significance - The project is considered a successful example of integrating environmental conservation and biodiversity restoration with large infrastructure and dredging activities.

7. Naming Controversy - Although officially named after Jan "Zabawa" Wroblewski, many locals continue to refer to the island informally as "Brysna".

Cancer Immunotherapy

Context - A recent study published in the journal 'Cancer Discovery' has shown that PD-1 inhibitors, a major class of cancer immunotherapy drugs, may alter the blood-brain barrier (BBB).

About Cancer Immunotherapy

1. Cancer immunotherapy is a treatment approach that uses the body's immune system to identify and destroy cancer cells.

About PD-1 Inhibitors

1. Type of Immunotherapy - PD-1 inhibitors are immune checkpoint inhibitors (ICIs) used in cancer treatment.
    1. Immune Checkpoint Inhibitors (ICIs) - Drugs that remove inhibitory signals on immune cells to enhance anti-cancer immunity.
2. Mechanism - They block PD-1 signals that suppress immune cells, enabling stronger anti-tumour immune responses.
    1. PD-1 (Programmed Cell Death-1) - A protein on T-cells that normally reduces immune activity to prevent overreaction.
    2. T-cells - White blood cells that identify and destroy infected or cancerous cells.
3. Use in Brain Metastases - PD-1 inhibitors can activate circulating immune cells that cross the BBB and attack tumour cells in the brain.
    1. Brain Metastases - Spread of cancer cells from another body part to the brain.

About Blood-Brain Barrier (BBB)

1. BBB - A selective protective barrier formed by tightly packed brain blood vessels.
2. Protective Function - They regulates movement of substances from blood into brain tissue.
3. Therapeutic Challenge - Many anti-cancer drugs cannot cross BBB, limiting treatment of brain tumours.
4. Immune Access - Immune cells can cross BBB and target tumour cells in the brain.

Key Findings of the Study

1. BBB Leakage - Anti-PD-1 therapy weakened BBB proteins and increased immune-cell entry into the brain.
    1. BBB Leakage - Increased permeability of the blood-brain barrier allowing substances to enter the brain more easily.
2. Increased Brain Metastasis - Treated mice showed greater brain metastasis due to compromised BBB integrity.
    1. BBB Integrity - Ability of the BBB to maintain its protective barrier function.
    2. Metastasis - Spread of cancer cells from the original site to other body parts.
3. Role of DKK1 - DKK1 protein was identified as a key mediator causing BBB disruption.
    1. DKK1 (Dickkopf-1) - A protein involved in cell-signalling pathways linked to tissue regulation and disease progression.
4. Clinical Correlation - Higher DKK1 levels were linked to increased brain metastases and faster disease progression.
5. Variable Responses - Patients showed outcomes ranging from remission to rapid disease progression.
    1. Remission - Reduction or disappearance of signs and symptoms of cancer.
6. Discordant Outcomes - Tumours outside the brain may respond while new brain lesions continue to appear.

High-Powered Committee for Court Modernisation

Context - The Supreme Court has constituted a high-powered "Judicial Infrastructure Advisory Committee" to prepare a blueprint for modernising courts across India and seek government funding of ₹40,000–50,000 crore.

About the Judicial Infrastructure Advisory Committee

1. Chairperson - Justice Aravind Kumar, judge of the Supreme Court.
2. Mandate of the Committee - Prepare a comprehensive blueprint for judicial infrastructure modernisation.
    1. Assess funding requirements for upgrading courts nationwide.
    2. Submit recommendations by 31 August 2026.

Focus Areas

3. Identifying systemic constraints
4. Improving facilities for litigants and lawyers
5. Implementing cutting-edge technology to accelerate case disposal
6. Strengthening the e-Courts initiative
7. Bridging the digital divide
8. Construction of modern 21st-century court complexes

About the e-Courts Project

1. Nature - A mission-mode project under the National e-Governance Plan.
2. Implementing Agencies - Implemented by the Department of Justice in association with the e-Committee of the Supreme Court of India.
3. Objective - Aims to digitise court processes and improve judicial service delivery.