DAILY CURRENT AFFAIRS 18-04-2025

GS-3

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Kyasanur Forest Disease

Syllabus: GS-3: General Science – Diseases.

Context:

- As of April 2025, Kyasanur Forest Disease (KFD), which is also known as "monkey fever," is on the rise in Karnataka, especially in the Shivamogga and Chikkamagaluru districts.

What is Kyasanur Forest Disease (KFD)?

- **KFD** is a **viral hemorrhagic fever** caused by the **Kyasanur Forest Disease Virus (KFDV)**.
- KFDV belongs to the **Flaviviridae** family.
- First identified in **1957** in the **Kyasanur Forest** of **Karnataka**.
- **Primary vector:***Haemaphysalisspinigera* (a species of hard ticks).
- **Reservoir hosts:**Small mammals, monkeys, and ticks in forest ecosystems.
- **Humans are incidental hosts** and do not contribute to the virus transmission cycle.

Symptoms of KFD

Incubation Period

- **3 to 8 days** after exposure.

First Phase (lasts ~1 week)

- Sudden high fever with chills
- Severe headache
- Back and limb pain
- Nausea, vomiting, diarrhea
- Photophobia (light sensitivity)
- Bleeding symptoms: bleeding gums, nosebleeds, hematemesis (vomiting blood), or hematochezia (bloody stools)

Second Phase (in 10–20% of cases)

- Recurrence of fever
- Neurological symptoms: severe headache, mental confusion, tremors, vision issues
- Severe cases: seizures, loss of consciousness

- **Recovery**: May take weeks; long-term neurological complications reported in some cases.

2025 Outbreak in Karnataka

- Acute outbreak in **Malenadu region**: **Shivamogga and Chikkamagaluru** districts.
- Aggravating factors:
  - **Deforestation and land use change**
  - **Climate change**: Inadequate rains, extreme heat increasing tick population
- **Vaccine withdrawal** (due to loss of potency) has raised risk levels.

Transmission and Risk Factors

- **Main route**: Bite from infected hard ticks.
- **High-risk activities**:
  - Farming, firewood collection, hunting in forested areas.
- **No person-to-person transmission**.
- **Exposure to infected monkeys** is a risk factor.
- **Peak transmission period**: **November to June**.

Diagnosis and Treatment

- **Diagnosis**:
  - Polymerase Chain Reaction (PCR)
  - Virus isolation
  - Serological antibody detection
- **Treatment**: No specific antiviral.
  - Supportive care includes:
    - Fluid management
    - Oxygen support
    - Blood pressure stabilization
    - Treating secondary infections
- **Mortality Rate**: 3% to 5%
- Early intervention leads to full recovery in most cases.

Prevention Strategies

- **Personal protection**:

- Wear full-body clothing in forested areas.
- Apply insect repellents (e.g., DEET).
- Avoid contact with sick or dead animals, especially monkeys.
- Regular tick checks post-forest exposure.

- **Vaccination**:
  - Recommended in endemic regions.
  - **Current issues**: Temporary vaccine withdrawal due to reduced efficacy.
- **Public health measures**:
  - Awareness campaigns
  - Distribution of protective gear
  - Development of improved vaccines
  - Surveillance by health authorities

AI basics: How TPU is different from CPU and GPU

Syllabus: GS-3; Science & Technology

Context

- Google recently launched a new computer chip, called Ironwood. It is the company's seventh-generation TPU, or tensor processing unit, which has been designed to run artificial intelligence (AI) models.

What Are Processing Units?

- Processing units are the **"brains" of a computer**, responsible for executing instructions, performing calculations, and managing data flow—much like how the human brain processes thoughts and actions.

They come in different forms, each optimized for specific tasks:

- **CPU** (Central Processing Unit) → General-purpose computing
- **GPU** (Graphics Processing Unit) → Parallel processing (graphics, AI)
- **TPU** (Tensor Processing Unit) → AI/ML acceleration

CPU (Central Processing Unit) – The "Conductor" of Computing

- **Role:** Manages all basic operations (like opening apps, running the OS).
- **Cores:** Modern CPUs have **2–16 cores**, each handling one task at a time.
- **Strengths:**
  - Best for **sequential tasks** (e.g., browsing, document editing).
  - Low latency (quick response for single tasks).
- **Limitations:**
  - Not ideal for **massive parallel workloads** (e.g., AI training).

GPU (Graphics Processing Unit) – The "Parallel Workhorse"

- **Role:** Originally for **graphics rendering**, now crucial for **AI, gaming, and scientific computing**.
- **Cores:** Thousands of small cores (e.g., NVIDIA's **CUDA cores**) for **parallel processing**.
- **Strengths:**
  - **Faster than CPUs** for AI training (breaks tasks into smaller chunks).
  - Used in **deep learning, crypto mining, and video editing**.
- **Limitations:**
  - High power consumption.
  - Less efficient than **TPUs** for pure AI workloads.

TPU (Tensor Processing Unit) – Google's "AI Specialist"

- **Role:** Custom-built **only for AI/ML tasks** (optimized for **TensorFlow/PyTorch**).
- **Design:** Uses **tensor cores** (for matrix math in neural networks).
- **Strengths:**
  - **10x faster than GPUs** for AI training.
  - Extremely **power-efficient** for large-scale AI.
- **Limitations:**
  - Only available via **Google Cloud** (not sold as consumer hardware).
  - Can't run non-AI tasks.

Key Differences at a Glance

Feature	CPU	GPU	TPU
Purpose	General computing	Graphics & AI	AI/ML only
Cores	Few (2–16)	Thousands (parallel)	Hundreds (tensor-optimized)
Speed (AI Tasks)	Slow	Fast	Fastest
Power Efficiency	Moderate	High (but power-hungry)	Very High
Availability	Every computer	Sold separately (NVIDIA/AMD)	Google Cloud only

Which One Should You Use?

- **Daily tasks (browsing, Office apps) → CPU**
- **Gaming, AI training, video editing → GPU**
- **Large-scale AI model training → TPU (via Google Cloud)**

ESA's Biomass Mission

Syllabus: GS-3: Environment – Forest Conservation Efforts

Context:

- ESA's Biomass Mission - satellite is scheduled to lift off on April 29, 2025 aboard a Vega C rocket from the ESA's Korou spaceport in French Guiana.

European Space Agency's (ESA) Biomass Mission

Overview

- **Mission Name:** Biomass Mission
- **Agency:** European Space Agency (ESA)
- **Launch Date:** Scheduled for April 29
- **Launch Vehicle:** Vega C rocket
- **Launch Site:** ESA's Korou Spaceport, French Guiana
- **Orbit Type:** Sun-synchronous orbit (~666 km altitude)

Key Objectives

- To **map global forests** and provide **comprehensive measurements of forest biomass**.
- To improve understanding of **forests' role in the carbon cycle**.
- To assess how forests are changing due to **deforestation and climate change**.
- To generate **3D images** of forests, from canopy to roots.
- To support climate models by providing data on **carbon storage and movement**.

Why the Mission is Important

- Forests are **vital carbon sinks**, absorbing **~16 billion metric tonnes of CO_2 annually**.
- Current forest biomass data are **inadequate at a global scale**, hindering climate studies.
- Forest biomass is essential to understand the **carbon cycle**, which regulates Earth's climate.
- In 2023, **3.7 million hectares** of tropical forests were lost → **~6% of global CO_2 emissions**.
- Mission will help determine the **carbon balance** and **climate impacts of forest loss**.

Technological Features

- Uses **Synthetic Aperture Radar (SAR)** with a **12-meter antenna**.
- First satellite to employ **long-wave P-band SAR** from space.
- **P-band SAR** can penetrate dense vegetation, reaching forest floor and branches.
    - *Note:* Longer wavelengths like P-band penetrate better than shorter ones.

Additional Capabilities

- **Monitors ice sheet movements** in Antarctica.
- Produces **digital terrain models** under dense vegetation.

Scientific Significance

- Allows for estimation of **forest weight** and **carbon content**.
- Tracks how **carbon distribution** is shifting over time.
- Helps measure **carbon exchange** between forests and the atmosphere.
- Supports **policy-making** on climate change, deforestation, and biodiversity conservation.

BatEchoMon

Syllabus: GS-3: Wildlife Conservation – Use of Modern Technology.

Context:

BatEchoMon, India's first automated bat monitoring, detection system.

BatEchoMon: India's First Automated Bat Monitoring and Detection System

Developed by:

- **Indian Institute for Human Settlements (IIHS), Bengaluru**
- Developed by **Kadambari Deshpande** (bat biologist) &**Vedant Barje** (engineer)
- Under guidance of **Jagdish Krishnaswamy**

Meaning:

- **BatEchoMon** = *Bat Echolocation Monitoring*

Objective:

- **Automated**, **real-time** detection, recording, analysis, and classification of **bat echolocation calls**

How It Works:

Component	Function
Ultrasonic Microphone	Uses **modified AudioMoth device** to detect bat calls

Component	Function
Raspberry Pi	Microprocessor to process and classify audio
Power Source	**Solar-powered battery**
Data Transmission	Via **Wi-Fi unit**
Activation	Automatically begins at **sunset**, runs through the **night**
Algorithm	**CNN (Convolutional Neural Network)** to identify and classify bat calls

Outputs:

- **Spectrograms**: Visual time-frequency plots of bat calls
- **Audio files**: Actual echolocation recordings
- **Statistical Data**: Species-wise frequency and timing of calls

Part of:

- **Long-Term Urban Ecological Observatory (LTUEO)**
- At the **School of Environment and Sustainability**, IIHS, Bengaluru

Significance:

- **Revolutionizes bat research**: Automates tasks that earlier took **months**
- **Conservation & Biodiversity**: Aids in tracking urban biodiversity and ecosystem health
- **Urban Ecology Tool**: Useful in assessing impact of urbanisation on bat populations