



Daily Current Affairs



To The Point by Dhananjay Gautam

Table Of Content **30 Dec 2024**

1. India's Deep Ocean Exploration Mission
2. Household Consumption Expenditure Survey (HCES) 2023-24: Key Insights and Trends
3. Health Breakthroughs in 2025
4. How Sea Otters are Reviving Coastal Ecosystems
5. Rupee Experiences Sharpest Depreciation in Two Years
6. Parker Solar Probe

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1 India's Deep Ocean Exploration Mission: A Vision for 2026

Context: India is set to embark on a groundbreaking journey into the depths of the ocean with its ambitious **Deep Ocean Mission (DOM)**, aiming to send a human into the deep sea by 2026. This initiative complements India's first human space mission, marking a significant stride in technological advancements and ocean exploration.



Deep Ocean Mission (DOM):

The **Deep Ocean Mission** is spearheaded by the **Ministry of Earth Sciences (MoES)** and was launched in 2021 with an investment of **4,077 crore**, spread over five years.

Key Pillars of the Mission:

- Deep-Sea Mining and Manned Submersible:**
 - Development of technology to mine resources from ocean depths.
 - Creation of a submersible capable of carrying three individuals to a depth of **6,000 meters**.
- Ocean Climate Advisory Services:** Establishing models and observations to predict ocean-linked climate changes.
- Biodiversity Conservation:** Innovative technologies to explore and conserve deep-sea ecosystems.
- Survey and Mineral Exploration:** Identification of polymetallic sulphides along the mid-oceanic ridges in the **Indian Ocean**.
- Ocean Energy and Freshwater Utilization:** Research into harnessing energy and freshwater from the ocean.
- Marine Station for Ocean Biology:** Creation of a hub to nurture talent in **blue biotechnology** and ocean biology research.

Developments under DOM:

Samudrayaan Mission:

Part of DOM, the **Samudrayaan Mission** was initiated in 2021 to send humans to the ocean bed at depths of **6,000 meters** in the **Central Indian Ocean** using the submersible **Matsya6000**.

Matsya6000: India's Deep-Sea Submersible

- Designed to carry **three aquanauts** to the ocean depths.
- Equipped with scientific tools for observation, sample collection, and video/audio recording.
- Built using **titanium alloy** to withstand pressures up to **6,000 bars**.
- Travels at a speed of **5.5 km/hr** with advanced underwater thrusters.

Significance of DOM:

- Blue Economy:** Aligned with the '**New India 2030**' vision, the mission boosts India's efforts to develop a sustainable **blue economy**.
- Global Leadership:** India joins an elite group of nations investing in **deep-sea exploration**, marking it as a leader in **ocean science**.
- Resource Extraction:** Sustainable extraction of valuable minerals like **polymetallic nodules and sulphides**.



4. **United Nations Decade of Ocean Science:** Contributing to the global initiative (2021–2030) to enhance ocean research.

Challenges Ahead:

1. **Extreme Ocean Pressure:** Equipment must endure immense pressures at great depths.
2. **Soft Ocean Bed:** Landing on the muddy seabed presents technical hurdles.
3. **Power Requirements:** Extracting minerals to the surface demands significant energy.
4. **Low Visibility:** The absence of natural light at deep-sea levels complicates operations.

Conclusion:

The **Deep Ocean Mission** is a transformative step toward harnessing the untapped potential of the seas. With the **Matsya6000** leading the charge, India is poised to become the **6th nation** to achieve such a feat, unlocking new opportunities in science, innovation, and sustainable resource management. This mission reinforces India's commitment to exploring the mysteries of the deep and driving economic growth through the **blue economy**.



2

Household Consumption Expenditure Survey (HCES) 2023-24: Key Insights and Trends

Context: The Ministry of Statistics and Programme Implementation (MoSPI) initiated consecutive Household Consumption Expenditure Surveys (HCES) for 2022-23 and 2023-24. These surveys provide critical data on consumption patterns across India, aiding policy formulation and economic planning.



About HCES:

The National Sample Survey Office (NSSO), under MoSPI, has conducted Consumer Expenditure Surveys since 1972.

Objective:

- To gather data on household consumption of goods and services.
- To estimate **Monthly Per Capita Consumption Expenditure (MPCE)** for rural and urban sectors.

Key Focus Areas:

- Consumption patterns of **food, non-food, and durable goods**.
- Inclusion of items received free of cost through **social welfare programs**.

Methodology:

- The survey uses **three questionnaires** focusing on:
 1. Food items
 2. Consumables and services
 3. Durable goods
- Increased item coverage from **347 to 405**.
- Multiple visits for data collection replaced the earlier **single-visit method**.

Highlights of 2023-24 Survey:

Average Monthly Spending::

- **Rural MPCE** rose by **9.2%** to 4,122.
- **Urban MPCE** grew by **8.3%** to 6,996.

Spending Patterns:

- **Rural Areas:**
 - **Non-food items** accounted for **53%** of spending.
 - Major expenditures included **clothing, bedding, and footwear**.
- **Urban Areas:**
 - **Non-food items** comprised **60%** of spending, dominated by **entertainment, clothing, and education**.
 - **Food categories** like **beverages, processed foods, and dairy products** contributed **31.5%** to spending growth.



Key Trends and Insights:

Rural-Urban Gap:

- The gap between rural and urban spending reduced from **84% in 2011-12** to **70% in 2023-24**.
- Rural households now spend **69.7%** of urban households' expenditure.

Consumption Inequality:

- Declined significantly in both rural and urban areas.
- **Gini Coefficient** dropped from **0.266 to 0.237** (rural) and **0.314 to 0.284** (urban), signaling reduced inequality.

Regional Patterns:

- **High Spending States:** Maharashtra, Punjab, Tamil Nadu, and Kerala.
- **Low Spending States:** West Bengal, Bihar, Uttar Pradesh, and Odisha.
- **Sikkim** reported the **highest MPCE** (9,377 in rural areas and 13,927 in urban areas).
- **Chhattisgarh** recorded the **lowest MPCE**.

Future Outlook:

- The survey highlights the **narrowing rural-urban consumption gap** and a decline in **inequality**, showcasing the positive impact of government policies.
- **Regional disparities** in consumption still exist, necessitating **targeted interventions**.
- Policymakers can leverage these insights to foster **sustainable economic growth** and ensure **inclusive development**.

By addressing consumption patterns and regional disparities, India moves closer to **bridging economic gaps** and achieving **equitable progress**.

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3

Health Breakthroughs in 2025: A Future of Hope and Innovation

Context: As 2025 approaches, revolutionary advancements in healthcare are transforming possibilities in **weight management, cancer treatment, neurological disorders, and genetic therapies**. These innovations from 2024 signal a future brimming with **hope and promise** for patients worldwide.



Transformative Weight-Loss Treatments:

Glucagon-like peptide-1 (GLP-1) receptor agonists have emerged as a game-changer in combating **obesity, diabetes, and related health issues**.

- Breakthrough medications like **Zepbound, Ozempic, and Wegovy** are delivering unprecedented results in **weight loss and metabolic health improvement**.

Revolutionizing Cancer Treatment:

1. Immunotherapy Advances:

- CAR-T Cell Therapy:** Harnessing the immune system to destroy cancer cells, India's launch of **NexCAR19**, its first homegrown CAR-T therapy, is a significant achievement.
- Personalized Cancer Vaccines:** In the UK, the **Cancer Vaccine Launch Pad (CVLP)** is pioneering **mRNA-based vaccines**, customized to target individual patients' cancers.

2. Preventive Milestones:

- HPV Vaccination Campaign in India:** The nationwide rollout of **human papillomavirus (HPV) vaccines** in 2025 is a critical move toward reducing cancer prevalence, particularly **cervical cancer**.

Progress in Alzheimer's Treatment:

Alzheimer's, a condition affecting **millions globally**, including **5.3 million in India**, is seeing promising advancements:

- Leqembi (lecanemab)** and **Kisunla (donanemab-azbt)** are therapies designed to eliminate **amyloid beta plaques**, a key factor in cognitive decline.

Gene Editing: A New Frontier

Gene editing is poised to revolutionize the treatment of **genetic disorders**, offering hope to countless patients.

1. Sickle Cell Disease (SCD):

- Casgevy and Lyfgenia**, approved in 2023, are groundbreaking therapies providing a potential cure for **sickle cell disease** in patients aged 12 and older.

2. Cholesterol and Cardiovascular Disease:

- In 2024, **VERVE-101** and **VERVE-102** by Verve Therapeutics introduced innovative gene therapies targeting the **PCSK9 gene**, offering a permanent solution for conditions like **heterozygous familial hypercholesterolemia (HeFH)** and **atherosclerotic cardiovascular disease (ASCVD)**.

Conclusion: Charting the Path to 2025 and Beyond:

While these advancements offer immense promise, **India's healthcare system** must focus on:

- Strengthening healthcare infrastructure.**
- Expanding health insurance coverage.**
- Investing in research and accessibility initiatives** to ensure these life-changing treatments reach those who need them the most.

By embracing these innovations, India can lead the way in transforming global healthcare and ensuring a **brighter, healthier future for all**.

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Page No

6

4 How Sea Otters are Reviving Coastal Ecosystems

Context: The resurgence of **sea otter populations** in California, particularly in the **Elkhorn Slough National Estuarine Research Reserve**, is transforming coastal ecosystems by controlling the spread of the invasive **green crab**.

Sea Otters: Guardians of the Coast:

A History of Decline and Recovery:

- **Hunted extensively** in the 18th and 19th centuries for their dense, soft fur, sea otters were nearly wiped out.
- They gained **full protection in California** in 1913, but challenges like oil spills and habitat degradation persisted.
- In 1977, sea otters were listed as **threatened and federally protected**, paving the way for population recovery.

Key Traits and Diet:

- Unlike other marine mammals, sea otters rely on their **high metabolism**, not blubber, to stay warm in cold waters.
- They are **voracious predators**, consuming approximately **25% of their body weight daily** to maintain energy levels.
- Their diet includes a wide range of marine life, making them essential in regulating species like the **green crab**.

The Battle Against Green Crabs:

Sea Otters' Role:

- Sea otters consume **50,000 to 120,000 green crabs annually**, providing an effective natural solution to the invasive species problem on the **U.S. West Coast**.

Green Crab: A Global Threat:

Overview of the Invasive Species:

- Known globally as the **shore crab** or **green shore crab**, this species is one of the “**world’s worst invasive species**”.
- Native to the **Atlantic Ocean** and **Baltic Sea**, green crabs have spread to regions like **Australia, South America, and South Africa**.

Physical Characteristics:

- Adult crabs feature a carapace width of about **90 mm**.
- Colors range from green to brown, grey, and red, with red crabs being more aggressive due to **delayed moulting**.

Diet and Impact:

- **Diet:** Small crustaceans, mollusks, and worms.
- **Ecosystem Damage:**
 - Destroying **seagrass beds**, which are vital marine habitats.
 - Overhunting prey species, leading to imbalances in the food chain.
 - Outcompeting native species for food and habitat.

Conclusion:

The return of sea otters is a shining example of how species restoration can benefit ecosystems. By curbing the spread of the **invasive green crab**, sea otters are not just **preserving biodiversity** but also **protecting coastal habitats**. Their story underscores the power of nature’s balance and the importance of conservation efforts.

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Page No

7



5

Rupee Experiences Sharpest Depreciation in Two Years

Context: The Indian rupee recently breached the **85 mark against the US dollar**, marking its most significant depreciation in the last two years.

Exchange Rate: The exchange rate reflects the value of one currency relative to another, essentially acting as the "price" of one currency in terms of another.



Key Drivers of Rupee Depreciation

1. Strengthening US Dollar:

- The **US Federal Reserve's aggressive monetary tightening** has led to **capital outflows from emerging markets**, including India.
- Example: Significant **Foreign Portfolio Investment (FPI) outflows** have been observed.

2. Expanding Trade Deficit: The trade deficit has widened due to higher imports, particularly **crude oil**, which puts additional pressure on the rupee.

3. Domestic Inflation: Elevated **inflation rates in India** erode the purchasing power of the currency, further contributing to its depreciation.

Impact of the Rupee's Weakening:

Negative Consequences:

- 1. Increased Import Costs:** A weaker rupee makes imports, especially **crude oil**, more expensive, adding to the **trade deficit**.
- 2. Costlier Foreign Debt:** Companies and the government face higher costs in servicing foreign-denominated loans.
- 3. Inflationary Pressures:** Higher import costs can lead to **domestic inflation**, reducing purchasing power.

Positive Outcomes:

- 1. Boost to Exports:** Indian goods and services become more affordable in global markets, enhancing their **competitiveness**.
- 2. Increased Remittance Value:** **Non-Resident Indians (NRIs)** benefit as the value of money sent home increases in rupee terms.

Strategies to Stabilize the Rupee:

- 1. Direct Dollar Sales:** **RBI intervention** can increase the supply of US dollars in the forex market, providing support to the rupee.
- 2. Forex Swaps:** The Reserve Bank can employ **buy-sell swaps** to manage dollar liquidity without significantly depleting forex reserves.
- 3. Attracting Foreign Investments:** **Policy incentives** like tax benefits can encourage **Foreign Direct Investment (FDI)** and portfolio inflows, strengthening the rupee.

Conclusion: The rupee's depreciation reflects a combination of **global economic dynamics** and domestic challenges. While it brings certain benefits, such as improved export competitiveness, the broader implications on inflation and trade deficits call for **proactive measures** by policymakers and the central bank to stabilize the currency and support economic resilience.

6 Parker Solar Probe: Humanity's Closest Encounter with the Sun

Context: NASA's **Parker Solar Probe** has become the **first human-made object** to fly so close to the Sun, performing a solar flyby at its **perihelion**.

- **Perihelion:** The point in an orbit where a celestial body is closest to the Sun.
- Its opposite is **Aphelion**, the farthest point from the Sun.



During this record-breaking journey, the spacecraft achieved a staggering speed of **700,000 kilometers per hour**, making it the **fastest human-made object** ever.

Guided by Venus:

The probe used **gravitational assists from Venus** to adjust its trajectory, allowing it to approach the Sun's atmosphere more closely with each flyby.

About the Parker Solar Probe (Launched in 2018):

Mission Objective:

To explore the **outermost layer of the Sun's atmosphere**, known as the **corona**, and enhance our understanding of **solar wind**—a continuous flow of charged particles emitted by the Sun.

Key Scientific Tools:

- **FIELDS Experiment:** Measures electric and magnetic fields.
- **IS⁺IS** (Integrated Science Investigation of the Sun): Studies energetic particles in the solar environment.

Why Study Solar Activity?

1. Decoding Space Weather:

- Solar phenomena, such as **solar flares** and **coronal mass ejections (CMEs)**, can create **space weather events** capable of disrupting:
 - **Satellite communications**
 - **GPS systems**
 - Other space-based technologies

2. Safeguarding Technology and Infrastructure:

- **Geomagnetic storms** caused by solar activity can induce electric currents in power grids, leading to:
 - **Power blackouts**
 - **Damage to electrical equipment**

3. Astronaut Protection:

- Studying solar activity helps in devising protective measures for astronauts exposed to harmful solar radiation during space missions.

Conclusion:

The Parker Solar Probe's groundbreaking journey is transforming our understanding of the **Sun's mysteries**. By studying solar activity up close, it paves the way for better forecasting of space weather, protection of technological assets, and ensuring the safety of future space exploration missions.