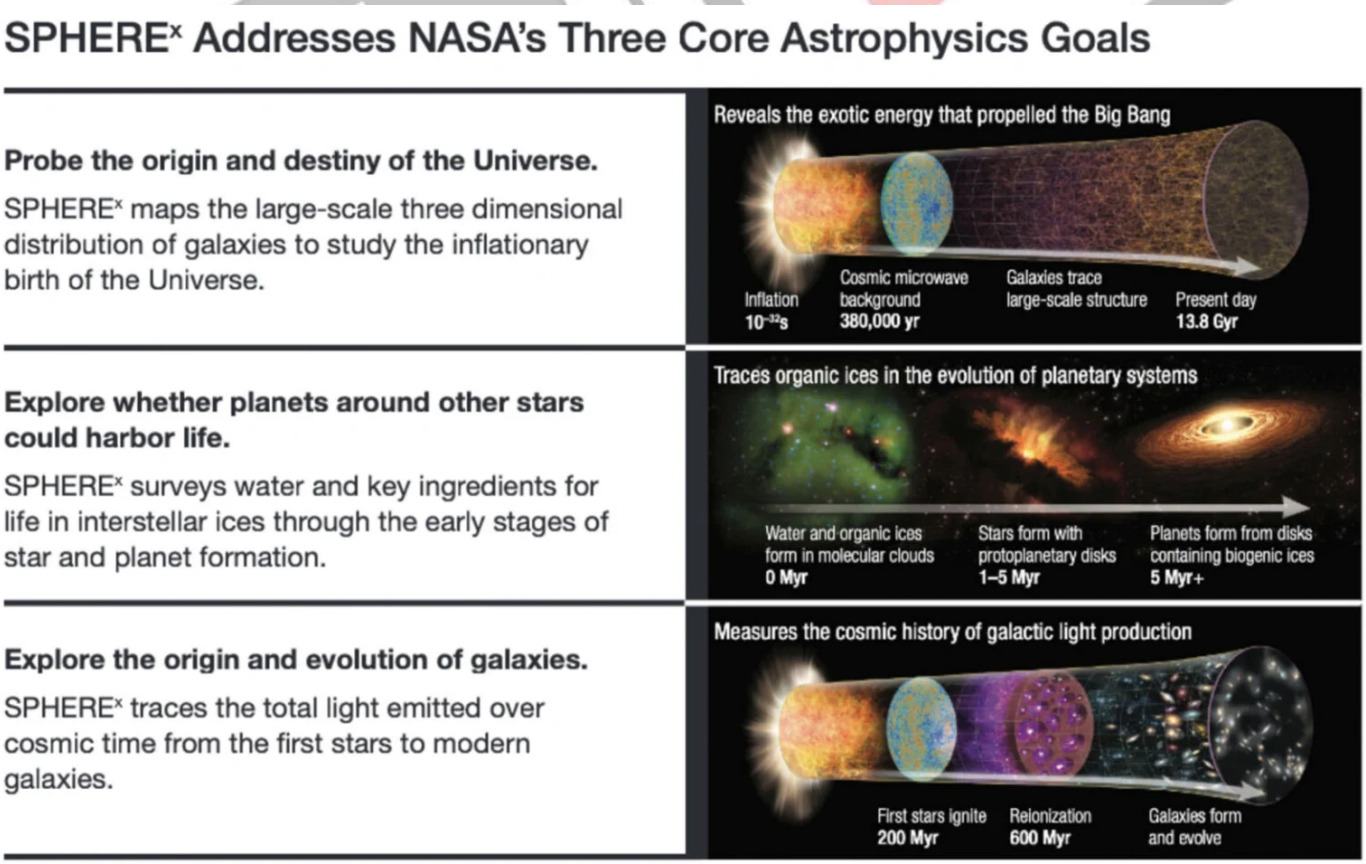
SPHEREx Mission

Source: TH

NASA is set to launch **SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer)** **space telescope** to study the early universe, explore the **universe's origins** and **trace the formation of life.**

SPHEREx Mission

- SPHEREx will map **450 million galaxies** over 2 years, creating a **3D sky map in 102 color bands (wavelengths of light)** using **spectroscopy**.
    - **Spectroscopy** is the study of the **absorption and emission of light** and **other radiation** by matter.
- It will study **cosmic inflation**, the rapid expansion of the universe after the **Big Bang (13.8 billion years ago)**, and analyze **molecular clouds** to detect **water, carbon dioxide, and carbon monoxide**.
- It will measure the **collective glow of light** from intergalactic space to identify unknown cosmic phenomena.
- The **Big Bang Theory** explains the universe's origin as a singular, hot, and dense point that expanded around **13.8 billion years ago**, leading to its continuous expansion.



Read More: Space Missions in 2024

Narwhals

Source: DTE

Scientists have recorded **narwhals (often referred as Sea unicorns)** using their **tusks for hunting** for the first time, offering key behavioral insights and adaptation in a **warming Arctic.**

- **About Narwhals (*Monodon monoceros*):** They are **medium-sized toothed whales** found in the **deep Arctic waters**.
    - **Physical Features:** Males have long, spiral **tusk (up to 3m)**, which is an **elongated upper left tooth.**
        - It is **different** from all other toothed **whales** in that it has **no teeth in its mouth.**
        - Some narwhals have up to **two tusks**, while others have **none**.
        - They use their tusks to **stun and manipulate prey**, especially **Arctic char,** and competition for mates.
    - **IUCN Status:** Least Concern.
    - **Social Behavior:** Highly **social species**, found in **pods of 2-25 individuals.**
    - **Migration:** Unlike some whales, **narwhals do not migrate long distances.**
    - **Diet:** Feed on **Greenland halibut, Arctic and polar cod, squid, and shrimp.**

Read More: Arctic Warming

Blue Ghost Mission 1

Source: TH

A US company, **Firefly Aerospace**, successfully landed its **Blue Ghost Mission 1** on the Moon, marking the **2nd private lunar landing** and the **1st to land upright.**

- The mission is nicknamed **“Ghost Riders in the Sky”,** and was launched in **January, 2025**, aboard a **SpaceX Falcon 9 rocket**.
- It landed (lander name: **Golden**) near **Mons Latreille**, a volcanic formation on the Moon’s **northeastern near side**.
- It is part of NASA's collaboration with industry to **reduce costs and support the Artemis Program,** the mission to return **astronauts to the Moon**.
- **Upcoming Lunar Missions:**
    - **IM-2 mission:** Intuitive Machines’ IM-2 mission, featuring its lander **Athena**, will be launched in **March 2025.**
        - In February 2024, Intuitive Machines became the **first private company** to achieve a **soft lunar landing** and the first US landing since **Apollo 17 in 1972.**
    - **NASA’s CLPS Program:** The US aims to establish **routine private lunar missions** through NASA’s USD **Commercial Lunar Payload Services (CLPS) program.**

Read More: [Challenges in Lunar Landing Missions]

India's Path to a High-Income Economy

For Prelims: [World Bank], [Female labor force participation], [Gross Domestic Product] [Middle-Income Trap]

For Mains: India’s path to becoming a high-income economy, Middle-income trap and its implications for India

Source: IE

Why in News?

A **World Bank** report titled ***“Becoming a High-Income Economy in a Generation”*** highlights that India must achieve an average annual growth **rate of 7.8% over the next 22 years to reach high-income country (HIC) status by 2047.**

- The report stresses that ambitious reforms and their effective implementation will be necessary to meet this goal.

What are the Key Highlights of the Report on Becoming a High-Income Economy?

- **India’s Economic Journey:** India's share in the **global economy has doubled** from **1.6% in 2000 to 3.4% in 2023**, making it the **5th largest economy** in the world.
  - For two decades before the pandemic, India's economy grew at an **average annual rate of 6.7%**, second only to China among major economies.
- **2047 High-Income Economy Goal:** India aspires to become a **HIC by 2047**.
  - To achieve this, its **gross national income (GNI) per capita** would have to increase by nearly **8 times from USD 2,540 in 2023** (currently India is in lower-middle-income category).
    - In 2023, the World Bank classified countries with **GNI per capita above USD 14,005** as **high income** and those between **USD 4,516– USD 14,005** as **upper middle income**.
- **Growth Scenarios:** The report outlines three possible scenarios for India’s growth trajectory.

Scenario	Growth Rate (Real GDP)	Outcome
Slow Reforms	Below 6%	India remains upper-middle income, falls short of HIC.
Business as Usual	6.60%	India improves but does not reach high-income status.
Accelerated Reforms	7.80%	India will become a high-income country by 2047.

- However, only few countries (Chile, Romania, Poland, Czech Republic, and Slovakia) have transitioned to **high-income status within 20 years,** while nations like **Brazil, Mexico, and Turkey** remain stuck in the **upper-middle-income category,** making this an ambitious but achievable target.

What are the Key Challenges in Achieving HIC Status?

- **Declining Investment Rate:** Investment-to-**Gross Domestic Product (GDP)** peaked at **35.8% in 2008** but fell to **27.5% in 2024**.
- **FDI Challenges:** India’s **FDI-to-GDP ratio is just 1.6%**, far lower than **Vietnam (5%) and China (3.1%)**.
- **Declining Labor Force Participation:** India’s **labor force participation rate (LFPR) is 55% in 2023**, lower than most emerging economies (China 65.8% in 2023).
- **Women in Workforce: Female labor force participation (FLFP)** has improved to **41.7% in 2023-24 (**global benchmarks is over 50%).
- **Issues in Job Creation: 45% of India’s workforce is still in agriculture** (disguised

unemployment), a sector with low productivity.
    - In contrast, the **share of manufacturing in total employment was around 11%** and modern market services accounted for only 7%, much lower than in East Asian economies.
    - In 2023-24, 73% of India's workforce is in **informal jobs**, compared to just **32.7% in other emerging economies**.
- **Declining Trade Openness:** India's **exports and imports make up 46% of GDP (2023), down from 56% in 2012**.
- **Low Global Value Chain (GVC) Participation:** India has made **significant gains in mobile phone exports**, but **high tariffs and non-tariff barriers** are limiting broader trade expansion.
    - **India's services sector (IT & BPO) is strong,** but manufacturing lags.

What are the Key Reforms Needed for Achieving HIC Status?

- **Boosting Investment:** Increase **investment rate from 33.5% to 40% of GDP** by 2035. Strengthen **financial sector regulations** for better credit flow. Improve **Micro, Small and Medium Enterprises (MSME) access to formal credit**.
    - Strengthen mechanisms for **bankruptcy resolution** and **bad debt recovery**.
- **Creating More and Better Jobs:** Raise **labor force participation** closer to economies like Vietnam (**73%**) and the Philippines (**60%**).
    - Encourage private sector investment in **job-rich sectors** like **agro-processing, hospitality, transportation, and care economy**.
    - Expand **skilled workforce** and improve **access to finance**. Strengthen **modern manufacturing and high-value services**.
- **Boosting Global Trade Competitiveness:** Invest in **export-oriented sectors** and **integrate into GVCs**.
- **Formalizing the Workforce:** Simplify labor laws to **reduce informal employment** and promote **better wage conditions**.
- **Strengthening Human Capital and Innovation:** Enhance **secondary school enrollment** and **vocational training** to match industry needs.
    - Expand R&D investments in key sectors like **Artificial Intelligence, Biotechnology, and clean energy.**

Middle-income Trap

- **About:** The **Middle-Income Trap**, coined by the **World Bank (2007)**, refers to economies that grow rapidly but **fail to reach high-income status**. It applies to countries with a **GNI per capita between USD 1,000 - USD 12,000 (2011 prices)**.
    - Countries in the **middle-income trap** struggle with **rising labor costs, weak innovation, income inequality, demographic challenges and overreliance on specific industries** further hinder growth
- **India's Risks of Falling into the Trap:** India is among the **most unequal countries in the world,** with the top 10% of the population holding 57% of the total national income respectively. The **share of the bottom 50% has gone down to 13%.**
    - High GST and corporate tax cuts benefit the wealthy, further widening the gap.
    - In India, **stagnant or declining wages,** coupled with inflation, high household debt, and low savings, make the country vulnerable to the middle-income trap.

Drishti Mains Question:

What key reforms are required for India to transition to a high-income economy?

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. India's ranking in the 'Ease of Doing Business Index' is sometimes seen in the news. Which of the following has declared that ranking? (2016)

(a) Organization for Economic Cooperation and Development (OECD)
(b) World Economic Forum
(c) World Bank
(d) World Trade Organization (WTO)

Ans: (c)

Q. Increase in absolute and per capita real GNP do not connote a higher level of economic development, if: (2018)

(a) Industrial output fails to keep pace with agricultural output.

(b) Agricultural output fails to keep pace with industrial output.

(c) Poverty and unemployment increase.

(d) Imports grow faster than exports.

Ans: (c)

Q. In a given year in India, official poverty lines are higher in some States than in others because: (2019)

(a) Poverty rates vary from State to State

(b) Price levels vary from State to State

(c) Gross State Product varies from State to State

(d) Quality of public distribution varies from State to State

Ans: (b)

Mains

Q.1 "Industrial growth rate has lagged behind in the overall growth of Gross-Domestic-Product(GDP) in the post-reform period" Give reasons. How far the recent changes in Industrial Policy capable of increasing the industrial growth rate? **(2017)**

Q.2 Normally countries shift from agriculture to industry and then later to services, but India shifted directly from agriculture to services. What are the reasons for the huge growth of services vis-a-vis the industry in the country? Can India become a developed country without a strong industrial base? **(2014)**

12th Regional 3R and Circular Economy Forum

Source: PIB

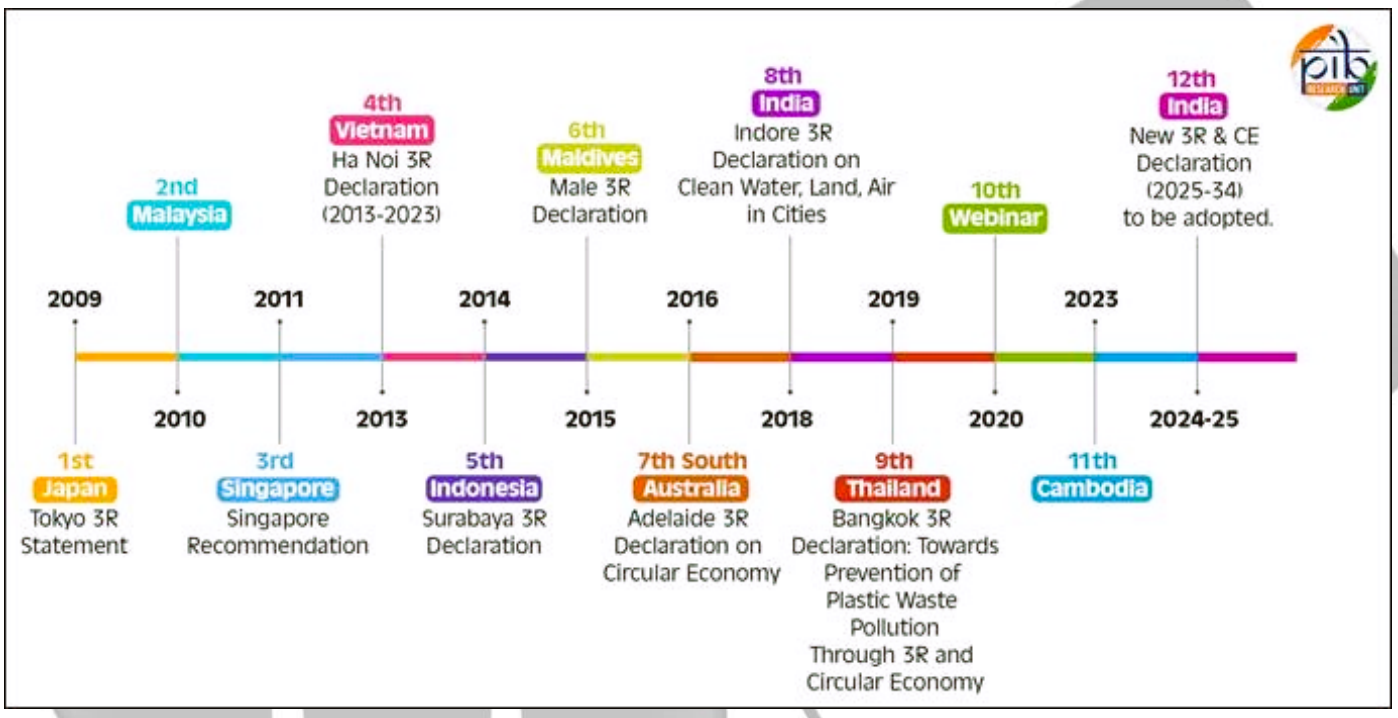
Why in News?

India (Jaipur, Rajasthan) hosted the **12th Regional 3R and Circular Economy Forum in Asia and the Pacific** emphasising on sustainable waste management and **circular economy.**

- A circular economy focuses on **durable, reusable, and recyclable products**, ensuring materials are continuously **repurposed, remanufactured, or used** for various purposes.

What are the Key Highlights of the 12th Regional Forum Meeting?

- **About:** It is a regional platform that promotes **3R (Reduce, Reuse, Recycle) principles** and **circular economy** practices across the **Asia-Pacific region.**
  - It brings together **policymakers, industry leaders, researchers, and partners** to advance resource efficiency strategies.
- **Historical Context:** It was **launched in 2009** to promote **3R principles** and resource efficiency.
  - The **Hanoi 3R Declaration (2013-2023)** set **33 voluntary goals** for a resource-efficient and circular economy.



- **Theme: Realizing Circular Societies Towards Achieving SDGs and Carbon Neutrality in Asia-Pacific.**
- **Objectives:** Discuss and agree a **voluntary, non-binding "3R and Circular Economy Declaration (2025-2034)"** for a resource-efficient, low-carbon, and resilient Asia-Pacific.
  - Discuss and pave way towards realization of a **Circular Economy Alliance Network (CEAN)** towards **Zero Waste Cities and Societies.**
  - Discuss circular economy strategies to achieve **net-zero targets and SDGs.**
- **Key Announcements:**
  - **P-3 (Pro Planet People) Approach:** India's PM advocated the **P-3 approach** for sustainable lifestyles and eco-friendly behavior.
  - **Cities Coalition for Circularity (C-3):** The C-3, a **global alliance** for city collaboration, knowledge-sharing, and private sector partnerships, was launched.
  - **CITIIS 2.0:** A key MoU for **CITIIS 2.0** (City Investments to Innovate, Integrate and Sustain) was signed that focuses on integrated **waste management and climate action.**

Click Here to Read: What is a Circular Economy?

India's Leadership in Circular Economy & 3R Policies

- **Swachh Bharat Mission-Urban (SBM-U):** Achieved **108.62%** of the household toilet construction target and successfully processed **80.29%** of solid waste.
- **GOBAR-Dhan Scheme: 1,008 biogas plants** are operational, covering **67.8%** of India's districts.
- **E-Waste Management Rules, 2022:** For **FY 2024-25**, **5,82,769 MT** of e-waste was collected, with **5,18,240 MT** successfully recycled.
- **Extended Producer Responsibility (EPR) for Plastic**: India banned single use plastic on 1st July 2022.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. In India, 'extend producer responsibility' was introduced as an important feature in which of the following? (2019)

(a) The Bio-medical Waste (Management and Handling) Rules, 1998

(b) The Recycled Plastic (Manufacturing and Usage) Rules, 1999

(c) The e-Waste (Management and Handling) Rules, 2011

(d) The Food Safety and Standard Regulations, 2011

Ans: (c)

Q. Due to improper/indiscriminate disposal of old and used computers or their parts, which of the following are released into the environment as e-waste? (2013)

1. Beryllium
2. Chromium
3. Cadmium
4. Heptachlor
5. Mercury
6. Lead
7. Plutonium

Select the correct answer using the codes given below:

(a) 1, 3, 4, 6 and 7 only

(b) 1, 2, 3, 5 and 6 only

(c) 2, 4, 5 and 7 only

(d) 1, 2, 3, 4, 5, 6 and 7

Ans: (b)

Crop Contingency Plan for Kashmir

Source: TH

The **Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST)** has devised a **Crop Contingency Plan** to tackle the **drought-like conditions** expected in Kashmir due to **an 80% rainfall deficit** in winter 2024.

- **Key Components of Crop Contingency Plan:**
  - **Alternative Crop Promotion**: Instead of water-intensive rice, SKUAST promotes **drought-resistant maize hybrids (SMC-8, SMH-5) and pulses**, which require less water.
    - Recommends heat-tolerant crops like **fava bean and cowpea**, which can withstand dry conditions.
  - **Water Conservation Strategies:**
    - **Mulching**: Covering topsoil with organic materials to **retain moisture and improve soil health**.
    - **Micro-Irrigation**: Encourages **drip irrigation and mist sprayers** for optimal water use.
      - Recommends **micro-sprinkler systems and organic soil amendments** to sustain vegetable farming.
    - **Anti-Transpirant Agents**: Applying chemicals to **reduce water loss from plants (Transpiration).**
  - **Resilient Farming Practices:** Recommends the use of **growth regulator sprays** to prevent early blooming and anti-transpirants in fruit crops to conserve moisture.
  - **Pest Control:** Rising temperatures have made pests like **aphids and leaf miner blotch** more invasive. SKUAST is **issuing advisories on chemical pest control measures.**

Read more: Climate Resilient Agriculture
