



# CSB IAS ACADEMY

THE ROAD MAP TO MUSSORRIE...

MAINS Impact- 2025 – 03/02/2025

## BLUE ECONOMY OF INDIA

### SYLLABUS:

GS 3 > Economic Development >> Marine Resources

### REFERENCE NEWS:

India's ambitious mission to send scientists to explore the depths of the ocean in specially designed submersible **Samudrayaan** got a boost with Finance Minister Nirmala Sitharaman allocating Rs 600 crore for the **Deep Ocean Mission**. Samudrayaan is aimed at **sending three personnel to 6000-metre depth** in a vehicle called 'MATSYA 6000' for the exploration of deep-sea resources like minerals. There has been an announcement for a new **Maritime Development Fund**.

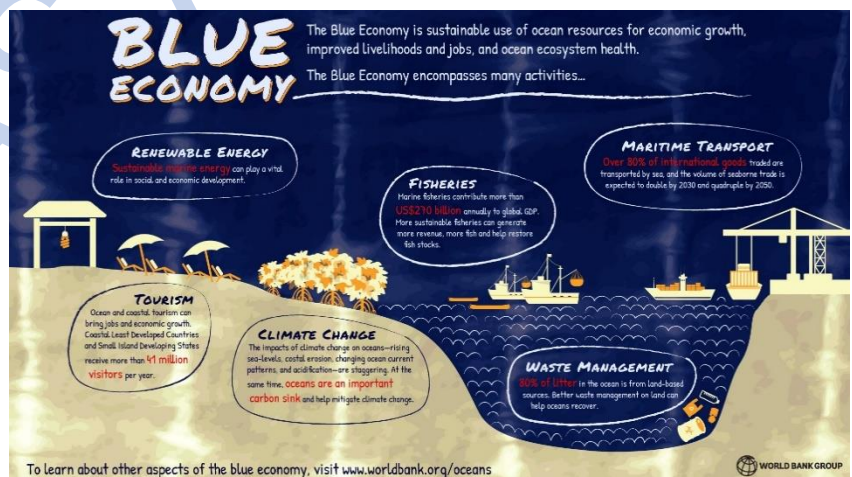
It also involves exploration of **deep-sea mining** for **sustainable utilisation of deep-sea bioresources** and developing engineering designs for **offshore thermal energy-driven desalination plants**.

### BLUE ECONOMY OF INDIA:

Oceans contribute to around **3-5% of Global GDP** and over 80% of international goods transportation. The Government of India's Vision of New India by 2030 enunciated in February 2019 highlighted the **Blue Economy as one of the ten core dimensions of growth**.

### Fisheries and Aquaculture:

- Fisheries contribute **1.07%** to India's **GDP** and **6.72%** to the agricultural GVA.
- India is the **3<sup>rd</sup>** largest fish producing and **2<sup>nd</sup>** largest aquaculture producing nation in the world.
- Over **28 million people** depend on fisheries and allied activities.
- It contributes to around **7%** of global fish production.
- **Major producing states** are Andhra Pradesh, West Bengal, Gujarat, Kerala, Tamil Nadu.



### Deep-Sea Mining and Marine Resources:

- **Potential Reserves** like **Polymetallic Nodules (PMN)** in the **Central Indian Ocean Basin (CIOB)** contain **380 million tonnes** of minerals (Nickel, Copper, Cobalt, Manganese)

- **Hydrothermal Sulphides** deposits in the Indian Ocean ridges are rich in **gold, silver, and rare earth elements**.

#### Shipping, Ports, and Maritime Trade:

- **India's Trade Dependency on Oceans** is **95% of India's trade by volume and 70% by value** is carried via sea.
- **Sagarmala Programme** aims to reduce logistics costs and boost **port-led development** and is expected to create **10 million direct and indirect jobs**.
- **Inland Waterways**, the **Jal Marg Vikas Project (JMVP)** aims to develop **111 National Waterways** for cargo movement.

#### Coastal and Marine Tourism:

- Provides **40 million jobs** in coastal states.
- India ranked **6th in Asia** for international tourist arrivals, with significant potential in **eco-tourism, cruise tourism, and adventure tourism**.
- **Cruise Tourism Policy** to promote luxury cruise industry.

**DEEP OCEAN MISSION:** aims to explore and harness oceanic resources in a sustainable manner by developing deep-sea technologies, promoting marine biodiversity research, and supporting India's **Blue Economy** initiatives. It focuses on leveraging ocean resources for food, energy, minerals, and climate research, ensuring long-term benefits for India's economy and environmental sustainability.

#### Objectives:

- 1. Development of Deep-Sea Mining Technologies and Manned Submersible:**
  - Develop a **manned submersible** to explore depths of up to **6000 meters** with scientific tools and sensors.
  - Create an **Integrated Mining System** for **Polymetallic Nodule** extraction, which contains valuable metals like copper, nickel, cobalt, and manganese.
- 2. Ocean Climate Change Advisory Services:**
  - Develop observation models to predict ocean **climate variables** on seasonal to decadal time scales.
  - Assist in **coastal tourism planning** by providing accurate climate data.
- 3. Technological Innovations for Deep-Sea Biodiversity Exploration & Conservation:**
  - Conduct **bio-prospecting** of deep-sea organisms, including microbes, for sustainable **biotechnology applications**.
  - Support **marine fisheries** and conservation efforts.
- 4. Deep Ocean Survey and Exploration:**
  - Identify and explore potential sites for **multi-metal hydrothermal sulphides** along **mid-ocean ridges** in the Indian Ocean.
  - Strengthen deep-sea **resource exploration capabilities**.
- 5. Energy and Freshwater from Oceans:**
  - Develop **Ocean Thermal Energy Conversion (OTEC)** technology for **offshore energy generation**.
  - Design **desalination plants** to produce freshwater from ocean resources.

#### 6. **Advanced Marine Station for Ocean Biology:**

- Establish a **research and business incubation facility** to promote marine biotechnology and **blue trade**.
- Support **marine biology research** for industrial applications.

#### **Marine Energy (Offshore Wind, Tidal & Ocean Thermal Energy):**

- **Offshore Wind Energy Potential of 195 GW** in Gujarat and Tamil Nadu.
- **Tidal Energy** identified sites in the **Gulf of Khambhat, Gulf of Kutch, and Sundarbans**.
- **Ocean Thermal Energy Conversion (OTEC)** of which **NITI Aayog** is assessing feasibility for India's first OTEC plant in **Lakshadweep**.

#### **Marine Biotechnology and Pharmaceuticals:**

- **Deep-sea bio-prospecting** for new antibiotics, anti-cancer drugs, and enzymes.
- **Advanced Marine Station for Ocean Biology (AMOB)** under **Deep Ocean Mission** aims for research & commercialization.

#### **Coastal Infrastructure and Disaster Resilience**

- **Coastal Regulation Zones (CRZ) 2019** aim to balance development and conservation.
- **Integrated Coastal Zone Management (ICZM)** promotes **sustainable infrastructure**.
- **Disaster Preparedness** like early warning systems for tsunamis & cyclones. **Mangrove restoration projects** in Sundarbans and Gujarat to reduce coastal erosion.

#### **SIGNIFICANCE OF BLUE ECONOMY OF INDIA:**

- **Sustainable utilization of ecosystem services:** Blue economy provides enables the sustainable utilization of services provided by the natural ecosystem:
  - **Provisioning services:** fisheries, building materials, food etc.
  - **Regulating services:** carbon sink and carbon sequestration, erosion prevention, extreme event moderation
  - **Cultural services:** tourism, recreational, aesthetic, and spiritual benefits.
  - **Supporting services:** life-cycle maintenance for both fauna and local, element and nutrient cycling
- **Employment and livelihood:** Fishing sector in India provides livelihood support to **about 2.8 crore people** at the primary level and almost twice the number along the value chain (Source: the National Fisheries Development Board). Coastal and Maritime Tourism is **expected to generate job opportunities for approximately 8.5 million people by 2030**.
- **Leverage India's natural advantage:** India has a unique maritime position with a **7517 km long coastline**, which is home to **nine coastal states and 1,382 islands**. This enables India to play an **important role in developing globally acceptable principles and regulations** on Blue Economy.

- **Enhance mineral security:** It has been estimated that **380 million metric tonnes of polymetallic nodules** are available at the bottom of the seas in the **Central Indian Ocean**. Utilizing these deposits can help supplement the depleting land-based mineral reserves of India for the next few decades.
- **Promote Industrial growth:** Besides fisheries, tourism and shipping, rapidly growing **ocean-based industries like wind energy, offshore aquaculture, seabed mining and marine genetic biotechnology** are poised to be the future growth drivers of the global south.
- **Shipping:** Shipbuilding and shipping are also important aspects of the blue economy in India. For instance, the modal share of **coastal shipping has the potential to increase to 33% by 2035**, up from roughly 6% presently. (Source: IBEF). India has 200 ports, **with 12 major ports** handling 541.76 million tonnes of cargo in FY21, indicating the sector's growth potential.
- **Clean energy:** Oceans are **popular sites for renewable energy:** offshore wind energy, hydropower and tidal energy. Tapping these would be crucial in reducing energy poverty and attaining the goals of Paris climate deal.
- **Combating climate change:** **Oceans absorb almost a third of the carbon dioxide emitted annually.** Phyto-planktons and sea grass play an important role in blue carbon sequestration.

#### CHALLENGES OF BLUE ECONOMY OF INDIA:

- **Marine pollution:** Oceans are polluted due to poor waste management, oil spills, surface runoffs and ocean bed mining among others. **Acidification, pollution, ocean warming, eutrophication, formation of dead zones and fishery collapse** are some of the consequences of the severe marine pollution.
  - About **11 million tonnes of plastic currently enter the ocean every year** and without an effective response, it will triple in the next 20 years.
- **Financial barrier:** While an estimated USD 174.52 billion per year is needed to fund SDG 14, barely USD 25.05 billion is spent annually. Developing a Blue Economy requires a stable economy and long-term financial plans. However, **high levels of external debt, obstacles due to the pandemic, limited support from global financial institutions and failure of climate financing** hinders the transition to a bluer economy.
- **Capacity barriers:** Lack of capacity and technology hinders the progress of blue economy.
  - For instance, despite the potential, lack of developed port infrastructure, higher costs of installing turbines, subsea cabling, development of transmission infrastructure and coastal security etc. have been major **reasons hindering the development of offshore wind energy in India.**
- **Lack of interest from private sector:** Recent survey by KPMG identifies the **SDG 14: Life Below Water, as one of the least prioritised SDGs** from the perspective of the private sector, with only 18 percent of companies prioritising it.

- **Research and development:** Blue Economy requires research and innovations in multiple fields within ocean science and therefore needs intersectoral expertise. However, **oceanic research in India are underdeveloped**, particularly in emerging fields like blue carbon sequestration and marine biotechnology.
- **Climate Change: Rising sea levels, variations in Indian Ocean dipole and other impacts of climate change** can pose risks to coastal communities and have negative impacts on the blue economy.
- **Boundary disputes:** Developing a Blue Economy requires countries to cooperate in elaborating inclusive policies, respectful of every parties Exclusive Economic Zones (EEZ) in the ocean and their economic activities. However, maritime boundary disputes are a major hinderance to this cooperation.
- **Unregulated High seas:** Despite accounting for almost half of the Earth's surface, these areas are hardly regulated and also least understood or explored for its biodiversity. Only 1% of these areas are under protection.

#### **WAY FORWARD:**

- **Strengthening Marine Governance & Policy Framework:** Implement a **National Blue Economy Policy** integrating **fisheries, ports, renewable energy, marine biodiversity, and deep-sea mining**.
  - Adopt an **Integrated Ocean Management Approach** to coordinate efforts across **ministries and sectors**. **Draft Blue Economy Policy (2021)** by MoES outlines India's long-term marine economic strategy.
  - **Norway's Integrated Ocean Management Plan** promotes sustainable fisheries, offshore energy, and marine conservation.
- **Sustainable Fisheries & Aquaculture Development:** Promote **eco-friendly aquaculture** using **biofloc and cage farming** to reduce environmental impact. Enforce **fishing quotas and seasonal bans** to prevent overfishing. Enhance **value-added seafood processing** to boost exports.
  - **Pradhan Mantri Matsya Sampada Yojana (PMMSY)** targets a **22 million tonnes fish production by 2025**.
  - **Iceland's Sustainable Fisheries Management** enforces strict quotas and ecosystem-based management.
- **Green Ports & Sustainable Shipping:** Promote **LNG and hydrogen-powered vessels** to reduce carbon emissions. Improve **port waste management** and encourage **shore power systems** to minimize pollution. Develop **smart ports** with **AI-based logistics and digital tracking systems**.
  - **Sagarmala Programme** aims to develop **energy-efficient and smart ports**.
  - **Harit Sagar Guidelines (2023)** focus on **zero-emission ports**.
  - **Singapore's Green Port Program** reduces emissions by promoting cleaner fuel alternatives.
- **Harnessing Offshore Renewable Energy:** Accelerate **offshore wind energy projects** in Tamil Nadu and Gujarat, with a potential of **195 GW**. Develop **Ocean Thermal Energy Conversion**

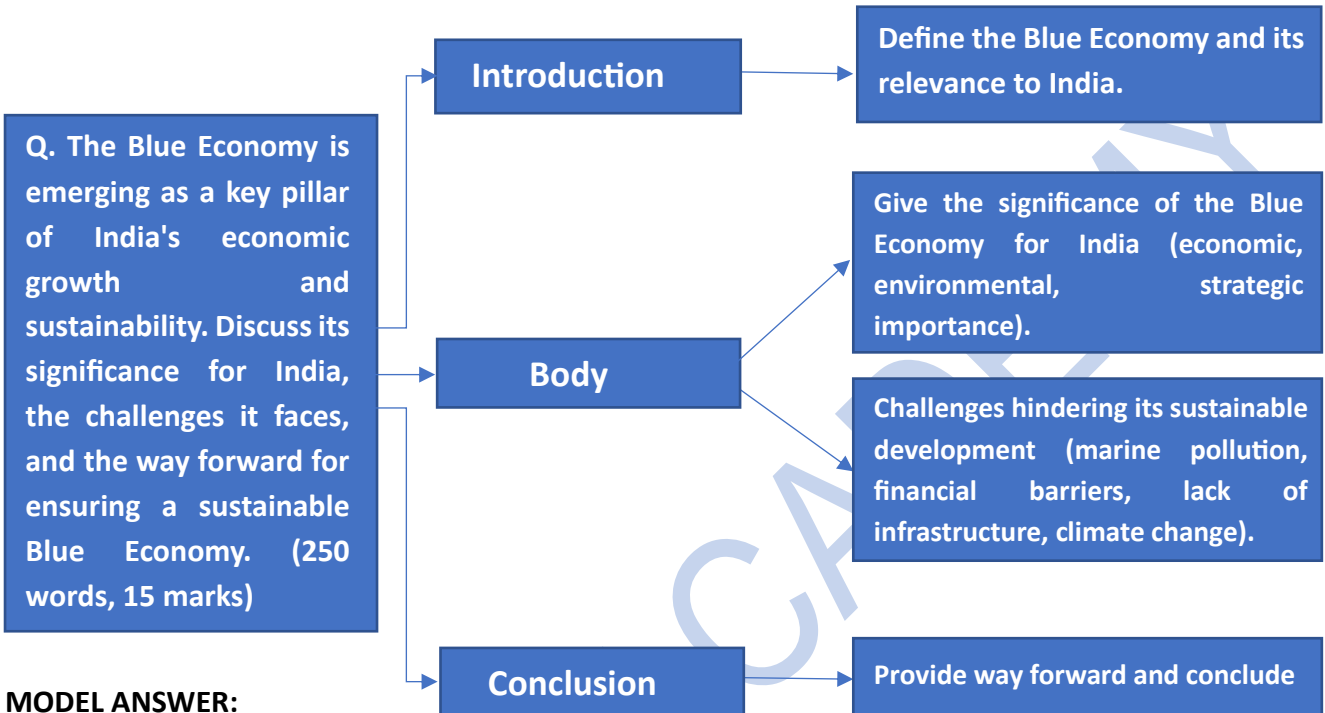


(OTEC) for islands like Lakshadweep. Support **tidal energy projects** in the Gulf of Kutch and Sundarbans.

- **National Offshore Wind Energy Policy** aims for **30 GW capacity by 2030**.
- **Denmark's Offshore Wind Leadership** has set up **successful floating wind farms** to harness ocean energy.
- **Deep-Sea Mining with Environmental Safeguards:** Conduct **Environmental Impact Assessments (EIA)** before deep-sea mining activities. Develop **eco-friendly mining technologies** to minimize ocean ecosystem disruption. Collaborate with the **International Seabed Authority (ISA)** for sustainable deep-sea resource extraction.
  - **Deep Ocean Mission (DOM)** is developing **indigenous deep-sea mining technology**.
  - **Japan's Deep-Sea Mining Regulations** ensure responsible extraction of seabed minerals.
- **Coastal & Marine Tourism with Sustainability:** Promote **eco-tourism, cruise tourism, and marine heritage sites** while ensuring conservation. Implement **strict waste management and anti-plastic regulations** in coastal areas. Develop **Blue Flag-certified beaches** to boost sustainable tourism.
  - India now has **12 Blue Flag beaches**, recognized for clean and sustainable tourism.
  - **Australia's Great Barrier Reef Eco-Tourism Model** balances tourism with conservation.
- **Enhancing Marine Biodiversity & Conservation:** Expand **Marine Protected Areas (MPAs)** and create **no-fishing zones** to protect coral reefs and marine species. Restore **mangroves and seagrass ecosystems** for carbon sequestration and coastal resilience. Strengthen **ocean pollution control laws** and ban deep-sea plastic dumping.
  - **Integrated Coastal Zone Management (ICZM)** for habitat conservation and climate resilience.
  - **USA's National Marine Sanctuary Program** protects critical marine ecosystems.
- **Investing in Blue Economy Research & Innovation:** Establish **Marine Innovation Hubs** to support startups in **marine biotechnology, fisheries, and ocean energy**. Develop **ocean data centres** to monitor climate change, sea-level rise, and marine pollution. Train **fishermen, coastal communities, and entrepreneurs** in blue economy skills.
  - **National Institute of Ocean Technology (NIOT)** is leading ocean research & capacity building.
  - **European Union's Horizon 2020 Blue Growth Strategy** funds marine innovation & research.
- **Global Partnerships for Sustainable Blue Economy:** Strengthen cooperation with **Indian Ocean Rim Association (IORA)** for marine resource sharing. Collaborate with **UNESCO's Ocean Decade (2021-2030)** for ocean sustainability. Participate in the **Global Ocean Treaty (2023)** to protect international waters.
  - **Indo-Pacific Oceans Initiative (IPOI)** enhances regional collaboration in maritime security & sustainability.
  - **China's Maritime Silk Road Initiative** promotes international blue economy partnerships.

**PRACTICE QUESTION:**

**Q. The Blue Economy is emerging as a key pillar of India's economic growth and sustainability. Discuss its significance for India, the challenges it faces, and the way forward for ensuring a sustainable Blue Economy. (250 words, 15 marks)**

**APPROACH:****MODEL ANSWER:**

The **Blue Economy** refers to the sustainable use of ocean resources for economic growth, job creation, and environmental sustainability. India, with a **7517 km coastline, 1382 islands, and a 2.02 million sq. km Exclusive Economic Zone (EEZ)**, has immense potential to leverage marine resources for economic development.

**SIGNIFICANCE OF BLUE ECONOMY FOR INDIA:**

1. **Economic Contribution** – Contributes **3-5% of global GDP**; fisheries alone contribute **1.07% to India's GDP**.
2. **Employment Generation** – Over **40 million people** depend on coastal and marine industries.
3. **Fisheries and Aquaculture** – India is the **3rd largest fish producer** and **2nd largest aquaculture producer**, with an export value of **₹63,969 crore (\$8.09 billion) in 2022-23**.
4. **Maritime Trade** – **95% of India's trade by volume** is conducted via oceans; **Sagarmala Programme** is expected to create **10 million jobs**.
5. **Energy Security** – **195 GW offshore wind energy potential** in Gujarat and Tamil Nadu; potential for **Ocean Thermal Energy Conversion (OTEC)**.
6. **Climate Mitigation** – Mangroves, seagrass, and marine biodiversity play a key role in **carbon sequestration**.

**CHALLENGES HINDERING THE BLUE ECONOMY:**

1. **Marine Pollution** – 11 million tonnes of plastic enter oceans annually, leading to ecosystem degradation.
2. **Financial Barriers** – Only \$25.05 billion is spent annually on ocean-related SDG 14, far below the required \$174.52 billion.
3. **Lack of Infrastructure** – Poor port facilities, high offshore wind installation costs, and inadequate coastal security.
4. **Climate Change** – Rising sea levels and increasing cyclones threaten coastal communities and marine biodiversity.
5. **Lack of Private Sector Participation** – Only 18% of global companies prioritize SDG 14 (Life Below Water).
6. **Unregulated High Seas** – Only 1% of international waters are protected, leading to unmonitored exploitation.

**WAY FORWARD FOR A SUSTAINABLE BLUE ECONOMY:**

1. **Strengthening Governance & Policy Framework** – Implement National Blue Economy Policy and Integrated Ocean Management.
2. **Sustainable Fisheries & Aquaculture** – PM Matsya Sampada Yojana (PMMSY) targets 22 million tonnes fish production by 2025.
3. **Green Ports & Sustainable Shipping** – Harit Sagar Guidelines (2023) focus on zero-emission ports.
4. **Harnessing Renewable Energy** – National Offshore Wind Energy Policy targets 30 GW capacity by 2030.
5. **Deep-Sea Mining with Environmental Safeguards** – Deep Ocean Mission (DOM) developing eco-friendly mining technologies.
6. **Enhancing Marine Biodiversity & Coastal Resilience** – Integrated Coastal Zone Management (ICZM) for climate adaptation and disaster resilience.
7. **Global Collaborations** – Engage with Indian Ocean Rim Association (IORA), Global Ocean Treaty (2023), and UNESCO's Ocean Decade (2021-2030).

A well-managed **Blue Economy** can position India as a global leader in **marine trade, energy, fisheries, and innovation** while ensuring environmental sustainability. By integrating **policy reforms, technological advancements, and global best practices**, India can **unlock a \$1 trillion opportunity** while safeguarding marine ecosystems for future generations.