India’s Blue Economy Potential

This editorial is based on “Plumbing the depths to scale the heights” which was published in Economics Times on 12/07/2024. The article highlights India's initiatives in deep-sea exploration through the Deep Ocean Mission for sustainable use of marine resources, while balancing ecological conservation and geopolitical competition.

For Prelims: Deep Ocean Mission, Blue Economy, Pradhan Mantri Matsya Sampada Yojana, Sagarmala, Recycling of Ships Act, 2019, Low Temperature Thermal Desalination, Sundarbans, Cyclone Amphan, Microplastics, Great Nicobar Island transshipment port project, National Cyclone Risk Mitigation Project.

For Mains: Major Opportunities Related to the Blue Economy for India, Major Challenges Related to the Blue Economy for India.

As pressure on land-based resources mounts, India is setting its sights on the vast potential of the ocean. The Deep Ocean Mission, or **Samudrayaan**, signifies a multi-pronged approach to tapping the Blue Economy. This includes exploring and utilizing both living (biodiversity) and non-living (minerals) resources in a sustainable manner. The mission encompasses crucial areas like developing tools for climate change **prediction, exploring renewable energy generation possibilities,** and establishing underwater research labs to understand and utilize marine life responsibly.

However, venturing into the deep blue comes with its own set of challenges. The **fragile ocean ecosystem, with** vast swathes still unknown, demands a cautious approach. Additionally, the potential for resource extraction raises concerns about the **impact on communities dependent on the sea for their livelihoods.** India must navigate these challenges by prioritizing sustainable practices and ensuring responsible development of the Blue Economy.

What are the Major Opportunities Related to the Blue Economy for India?

- **Sustainable Fisheries and Aquaculture:** India's coastline and extensive inland water resources present significant opportunities for sustainable fisheries and aquaculture development.
    - The Pradhan Mantri Matsya Sampada Yojana **(PMMSY**) is revolutionizing the sector by promoting technology-driven, sustainable practices.
- **Ocean Energy:** India's coastline offers immense potential for harnessing ocean energy, including tidal, wave, and offshore wind power.
    - **IIT Madras** deployed a wave energy generator off **Tamil Nadu** coast is a significant step forward.
    - The government's target of installing 30GW of offshore wind capacity by 2030 underscores the sector's potential.
- **Marine Biotechnology**: The exploration of India's marine biodiversity for biotechnological applications presents a frontier of immense potential.

    - This sector offers opportunities for developing **novel drugs, nutraceuticals, cosmeceuticals, and biofuels.**
    - By investing in marine biotechnology, India can position itself as a leader in this emerging field, driving innovation and creating high-value products.
- **Seabed Mining**: Government of India currently holds two contracts for exploration in the Indian Ocean.
    - The first is for exploration for polymetallic nodules in the **Central Indian Ocean Basin.** The second is for the exploration for **polymetallic sulfides** in the **Indian Ocean Ridge**
    - This presents a significant opportunity to secure critical minerals like **copper, nickel, cobalt, and manganese**, essential for emerging technologies and renewable energy systems.
- Coastal and Cruise Tourism: The development of coastal and cruise tourism offers substantial economic benefits for India's coastal regions.
    - The Sagarmala programme's plans for developing cruise terminals at major ports like Mumbaiand Cochin aim to tap into the growing global cruise market.
    - This sector can create diverse employment opportunities, from hospitality to local handicrafts, while also promoting cultural exchange.
- **Shipbuilding and Ship Recycling**: India's **₹4,000 crore subsidy scheme** to promote shipbuilding presents opportunities not only in new ship construction but also in developing environmentally friendly ship recycling practices.
    - The Recycling of Ships Act, 2019, positions India to become a global leader in sustainable ship recycling.
    - This sector can generate significant employment, boost exports, and contribute to the development of ancillary industries.
- **Desalination Technologies** With growing water scarcity issues, India's focus on developing cost-effective desalination technologies is timely.
    - The Low Temperature Thermal Desalination (LTTD) **plant in Lakshadweep**, developed by NIOT, showcases India's capability in indigenous desalination technology.
    - This sector offers opportunities for addressing domestic water needs, especially in coastal and island regions, while also positioning India as an exporter of desalination technology to other water-stressed nations.
- **Marine Spatial Planning** Implementing comprehensive marine spatial planning is crucial for balancing economic activities with conservation efforts in India's maritime zones.
    - The Blue Flag certification program, under which many Indian beaches like **Shivrajpur (Dwarka, Gujarat), Ghoghla (Diu)** are certified, exemplifies efforts towards sustainable coastal development.
- **Deep Sea Exploration and Research:** The Deep Ocean Mission, launched in 2021, marks India's ambitious foray into deep-sea exploration.
    - The development of a manned submersible vehicle MATSYA 6000, capable of reaching 6,000 meters depth, will significantly enhance India's deep-sea research capabilities.

What are the Major Challenges Related to the Blue Economy for India?

- **Environmental Degradation and Biodiversity Loss:** India's marine ecosystems are under severe stress due to **pollution and unsustainable development.**
    - Over **65% of the** coral reefs **in the Indian Ocean** and the Middle East are under stress by local threats
    - The Sundarbans, the world's largest mangrove forest, is losing about **16 sq km annually** due to sea-level rise and coastal erosion.
    - This biodiversity loss threatens not only ecosystems but also the livelihoods of millions dependent on marine resources.
        - **Example:** The **2020 oil spill from MV Wakashio near Mauritius** highlights the vulnerability of marine ecosystems to human activities.
- **Overfishing and Unsustainable Fishing Practices:** India's fisheries sector, while crucial for food security and employment, faces the challenge of overfishing.
    - According to a 2022 study by the **ICAR-Central Marine Fisheries Research Institute (CMFRI), 8.2%** of India's 135 assessed fish stocks were overfished, while **4.4%** were subject to overfishing.
    - Destructive fishing practices like **bottom trawling** further exacerbate the problem.

- **Climate Change and Sea-Level Rise**: Rising sea levels and increasing frequency of extreme weather events pose significant threats to India's coastal regions.
    - The **Ministry of Earth Sciences** predicts that a 3 cm sea level rise could cause the sea to intrude inland by about **17 meters**
        - This threatens coastal infrastructure, agriculture, and livelihoods.
    - **Example:** Cyclone Amphan in 2020 caused damages worth **USD 13.5 billion** showcasing the vulnerability of coastal areas to climate-induced disasters.
- **Marine Debris:** Marine pollution, particularly plastic waste, is a major challenge. India generates about **9.46 million tonnes of plastic waste annually**, of which a significant portion ends up in the oceans.
    - Microplastics are now found in marine food chains, posing risks to both marine life and human health.
- **Balancing Economic Development with Conservation**: Striking a balance between exploiting marine resources for economic gain and conserving marine ecosystems is a significant challenge.
    - **Example:** The proposed Great Nicobar Island transshipment port project has faced criticism for its potential impact on pristine rainforests and coral reefs.
- **Maritime Security and Piracy**: Ensuring maritime security in the Indian Ocean Region (IOR) is crucial for the blue economy. Piracy and transnational crimes pose significant challenges to this.
    - The IMB annual report recorded **120 incidents of maritime piracy** and armed robbery against ships in 2023 highlighting the persistent security challenges.
- **Limited Research and Development**: Despite having several **oceanographic research institutions,** India's investment in marine R&D remains limited compared to other maritime nations.
    - This affects the country's ability to innovate in areas like marine biotechnology and ocean energy.
    - **Example:** India's expenditure on **research is less than 1%** of its total R&D budget, significantly lower than countries like China and the US.

What Actions can India Take to Foster a Sustainable Blue Economy?

- **Sustainable Fisheries and Aquaculture Management:** India must implement a **comprehensive fisheries management plan** to address overfishing and promote sustainable practices.
    - This should include **strict enforcement of fishing quotas and seasonal bans**, promotion of sustainable aquaculture techniques like **recirculating aquaculture systems (RAS)**, and introduction of traceability systems for fish products.
    - The **success of the Marine Stewardship Council (MSC)** certification for the **Ashtamudi short-necked clam fishery in Kerala** demonstrates the potential for sustainable fishing practices in India.
- **Integrated Coastal Zone Management:** A holistic approach to coastal management is essential, balancing development needs with environmental conservation.
    - This involves implementing **strict regulations on coastal construction** and pollution, promoting **nature-based solutions** for coastal protection such as **mangrove restoration, and engaging local communities in conservation efforts** through eco-tourism and alternative livelihood programs.
    - The **Integrated** Coastal Zone Management Project (ICZMP) **in states like Gujarat and Odisha** has shown success in this area and can serve as a model for nationwide implementation.
- **Marine Pollution Control and Waste Management:** Combating marine pollution requires a multi-pronged strategy focusing on both prevention and cleanup.
    - This includes enforcing **strict regulations on industrial effluent discharge**, improving urban wastewater treatment infrastructure in coastal cities, and implementing extended producer responsibility **(EPR) for plastic packaging.**
    - Promoting circular economy initiatives for marine plastic waste, such as the **Ocean Recovery Alliance's Plastics Disclosure Project,** can significantly reduce pollution while creating economic opportunities.
- **Advanced Maritime Security and Surveillance:** Enhancing maritime security is crucial for protecting India's blue economy interests.
    - This involves upgrading coastal surveillance systems with AI-powered drones and satellite

monitoring to combat illegal fishing, piracy, and transboundary crimes.
    - **Strengthening the capabilities of the Indian Coast Guard and Navy,** and improving coordination among various maritime agencies is essential.
        - The **Information Fusion Centre – Indian Ocean Region (IFC-IOR**) is a step in the right direction for enhancing maritime domain awareness.
- **Skill Development and Capacity Building in Maritime Sectors:** Addressing the skill gap in maritime sectors is vital for India's blue economy ambitions.
    - Launching a comprehensive skill development program targeting various blue economy sectors, including **offshore energy, marine biotechnology, and sustainable fisheries**, is necessary.
    - The **Sagarmala programme's component on coastal community development** provides a framework that can be expanded for nationwide skill development initiatives.
- **Research and Innovation in Marine Technology:** Boosting research and innovation in marine technology is essential for India to compete globally in the blue economy sector.
    - This requires **increased investment in oceanographic research institutions**, promoting collaboration between academia and industry, and establishing innovation hubs in coastal cities.
    - The **Technology and Innovation in Exploration and Mining of Deep-sea Resources (TEM) programme** by the Ministry of Earth Sciences is a step in this direction that can be further expanded.
- **Coastal Disaster Risk Reduction and Resilience Building:** Enhancing coastal resilience to **natural disasters and climate change** impacts is essential for protecting lives and livelihoods in coastal areas.
    - This involves developing comprehensive **coastal hazard maps,** implementing nature-based solutions for coastal protection such as **mangrove restoration, and strengthening early warning systems** for extreme weather events.
    - The National Cyclone Risk Mitigation Project provides a framework that can be expanded to address a broader range of coastal hazards and climate change impacts.

Drishti Mains Question:

Discuss the importance of the blue economy for India and outline the key measures the government can adopt to ensure its sustainable development.

UPSC Civil Services Examination, Previous Year's Question (PYQs)

Mains

Q. Defining blue revolution, explain the problems and strategies for pisciculture development in India. **(2018)**