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Samudra Manthan Scheme: National Offshore Exploration Mission to Strengthen India's Energy Security and Deepwater Hydrocarbon Potential

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Recent Developments:

- The **Union Cabinet** has approved the **National Offshore Exploration Scheme (NOES)**, titled **Samudra Manthan**, with a total outlay of **₹84,084 crore** for implementation up to **FY 2030-31**.
- The scheme aims to accelerate **offshore oil and natural gas exploration**, particularly in **deepwater** and **ultra-deepwater** basins, while reducing import dependence and strengthening India's long-term **energy security**.

Need for the National Offshore Exploration Scheme:

India's Energy Import Dependence:

- **India** is the **third-largest consumer of crude oil** globally and one of the largest consumers of **natural gas**.
- More than **88%** of India's **crude oil** requirement is met through imports, while nearly **50%** of **natural gas** demand depends on imported supplies.
- Domestic **oil and gas production** has remained largely stagnant, whereas mature producing fields experience an annual natural production decline of nearly **6–7%**.
- Geopolitical disruptions, particularly in **West Asia**, expose India to supply interruptions and international price volatility.
- The scheme seeks to reduce these vulnerabilities by expanding domestic **offshore hydrocarbon exploration** and increasing indigenous production.

Key Components of Samudra Manthan:

Deepwater, Ultra-Deepwater Exploratory Drilling:

- A financial allocation of **₹43,200 crore** has been provided for drilling **60 exploratory wells** in deepwater and ultra-deepwater offshore areas.
- Government assistance will cover up to **50%** of the eligible drilling expenditure or **₹675 crore per well**, whichever is lower.
- The component is designed to reduce financial risks associated with capital-intensive and uncertain offshore exploration.

Offshore Data Acquisition:

- An allocation of **₹28,534 crore** has been earmarked for large-scale acquisition, processing and interpretation of high-quality **seismic data**.
- The programme includes **scientific drilling** in frontier sedimentary basins to minimise geological uncertainty and improve exploration success rates.

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- The initiative also supports a **data-driven exploration ecosystem**, enabling multiple operators to interpret geological information and accelerate discoveries.

Common Offshore Infrastructure:

- An investment of **₹10,000 crore** has been approved for developing common offshore production, processing and evacuation infrastructure.
- Shared infrastructure is expected to improve commercial viability by reducing development costs for discovered hydrocarbon fields.

Oil and Gas Manufacturing, Services Zones:

- An allocation of **₹2,000 crore** has been approved for establishing integrated manufacturing and service hubs.
- The component seeks to promote domestic manufacturing, localisation of critical offshore equipment and development of indigenous technological capabilities.

Major Objectives:

Resource Augmentation, Production Enhancement:

- The scheme aims to add more than **600 Million Metric Tonnes of Oil Equivalent (MMTOE)** to India's hydrocarbon reserves.
- Domestic hydrocarbon production is targeted to increase from nearly **62 MTOE** to around **80 MTOE annually**, subject to successful exploration outcomes.
- India's estimated hydrocarbon resource base is expected to expand from nearly **1,600 MTOE** to around **2,200 MTOE**.

Energy Security, Economic Growth:

- Annual crude oil imports may decline by nearly **₹1 lakh crore**, resulting in substantial foreign exchange savings.
- The scheme seeks to attract significant investments across the **Exploration and Production (E&P)** value chain.
- It also aims to stimulate technological innovation, employment generation and industrial growth in the upstream petroleum sector.

Priority Exploration Areas and Need for Government Support:

Priority Offshore Basins:

- The scheme prioritises exploration in frontier offshore sedimentary basins, including:
 - **Krishna-Godavari Basin.**
 - **Cauvery Basin.**
 - **Mahanadi Basin.**
 - **Andaman Offshore Region.**
- These basins possess significant untapped hydrocarbon potential but require advanced exploration technologies and large capital investments.

Need for Government Support:

- Deepwater drilling generally costs between **US\$100–250 million** per exploration well.
- Commercial production usually requires a long gestation period of nearly **5–10 years**.
- Exploration involves substantial geological uncertainty, and commercially viable discoveries cannot be guaranteed.

- Government-backed **risk-sharing** is expected to encourage greater participation by both public and private upstream companies.

Expected Benefits:

Energy Security, Strategic Gains:

- Reduced dependence on imported crude oil and natural gas.
- Greater resilience against global energy supply disruptions and international price shocks.
- Improved long-term strategic energy security.

Economic Benefits:

- Potential annual foreign exchange savings of nearly **₹1 lakh crore** through lower crude oil imports.
- Increased domestic and foreign investment across the hydrocarbon exploration value chain.
- Large-scale employment generation in exploration, offshore engineering, manufacturing and specialised petroleum services.

Industrial Development:

- Development of a domestic manufacturing ecosystem for offshore equipment and specialised services.
- Enhanced localisation of critical technologies under the **Atmanirbhar Bharat** initiative.
- Reduced dependence on imported offshore exploration equipment.

Technology, Capacity Building:

- Adoption of advanced **seismic imaging, digital programme management, deepwater drilling** and reservoir evaluation technologies.
- Strengthening India's scientific, engineering and technological capabilities in offshore hydrocarbon exploration.

Challenges and Associated Reforms:

Major Challenges:

- High geological uncertainty and significant exploration failure risks.
- Extremely capital-intensive nature of offshore exploration and drilling.
- Requirement of sophisticated technology, specialised manpower and advanced offshore infrastructure.
- Environmental concerns relating to offshore drilling operations and marine ecosystems.
- Commercial viability of discovered hydrocarbon reserves remains uncertain even after successful exploration.

Expert Assessment:

- Extensive **seismic surveys** and scientific exploratory drilling can substantially reduce geological uncertainty.
- Improved geological information is expected to enhance investor confidence and encourage greater private participation.
- Incremental domestic production may reduce India's oil and gas import dependence by approximately **3–5%** over time.

Recent Government Reforms Supporting the Scheme:

- Opening nearly the entire offshore exploration acreage for hydrocarbon exploration.

- Modernisation of the legislative, regulatory and contractual framework governing upstream petroleum activities.
- Strengthening the **National Data Repository (NDR)** to improve accessibility and quality of exploration data.
- Promotion of advanced exploration technologies, digital programme management and data-driven decision-making.
- The concept of **Samudra Manthan** was first articulated by the **Prime Minister** during the **2025 Independence Day Address**, highlighting the need to unlock India's offshore energy potential through modern exploration initiatives.

Conclusion:

Strategic Significance:

- **Samudra Manthan** represents a major strategic shift towards unlocking India's offshore hydrocarbon resources through public investment, risk-sharing mechanisms, advanced technology and common infrastructure development.
- Although offshore exploration involves significant geological and commercial uncertainty, successful implementation can substantially strengthen **energy security**, reduce import dependence, promote **Atmanirbhar Bharat**, enhance domestic manufacturing capabilities and improve India's long-term energy resilience.

Value Addition for UPSC:

Important Organisations:

- **Ministry of Petroleum and Natural Gas (MoPNG).**
- **Directorate General of Hydrocarbons (DGH).**
- **Oil and Natural Gas Corporation (ONGC).**
- **Oil India Limited (OIL).**
- **National Data Repository (NDR).**

Key Concepts:

- **Offshore Exploration:** Exploration of hydrocarbon resources beneath the seabed.
- **Deepwater Exploration:** Exploration in water depths generally exceeding **500 metres**.
- **Ultra-Deepwater Exploration:** Exploration conducted in water depths generally exceeding **1,500 metres**.
- **MMTOE (Million Metric Tonnes of Oil Equivalent):** Standard unit used to compare different energy resources on a common energy-equivalent basis.
- **Seismic Survey:** A geophysical technique using reflected seismic waves to identify underground hydrocarbon-bearing geological structures