

1. Exploring India's Deep Ocean Mission: A Gaganyaan for the Seas

Introduction

The Deep Ocean Mission (DOM) is India's ambitious endeavor to explore and harness the depths of the ocean, akin to a "Gaganyaan Mission to explore moon." DOM, approved by the Union Cabinet in 2021, is a comprehensive program with six pillars that aim to push the boundaries of underwater exploration and sustainable resource utilization.



DOM: A Multifaceted Mission

The Ministry of Earth Sciences (MoES) is playing a central role in the implementation of DOM. The mission is allocated nearly ₹4,077 crore over a five-year period, emphasizing phased development. Its six pillars encompass:

Development of Deep-Sea Mining Technologies and Submersible: This pillar involves the creation of an indigenous submersible that can carry a three-member crew to a depth of 6,000 meters in the ocean. The submersible will be equipped with a suite of scientific sensors, tools and an integrated system for mining polymetallic nodules from the central Indian Ocean.

Ocean Climate Change Advisory Services: A critical component of DOM, this pillar focuses on ocean observations and models to understand and predict future climate changes.

Technological Innovations for Deep-Sea Biodiversity: This aspect of the mission involves the exploration and conservation of deep-sea biodiversity through innovative technologies.

Deep-Ocean Survey and Exploration: DOM is aimed at identifying potential sites of multi-metal hydrothermal sulfides mineralization along the Indian Ocean mid-oceanic ridges.

Energy and Freshwater from the Ocean: The mission looks at harnessing energy and freshwater resources from the ocean to meet India's growing needs.

Advanced Marine Station for Ocean Biology: The establishment of an advanced marine station to nurture talent and drive opportunities in ocean biology and blue biotechnology.

The United Nations has declared 2021-2030 as the "Decade of Ocean Science," and Prime Minister Narendra Modi has emphasized the importance of harnessing the ocean's potential for India's growth, aligning with the "New India 2030" objectives.

DOM in the Context of Blue Economy

DOM is one of nine missions under the Prime Minister's Science, Technology, and Innovation Advisory Council (PMSTIAC). It is crucial for supporting India's blue economy and blue manufacturing sectors.

Progress in Deep-Sea Mining and Submersible Development

The National Institute of Ocean Technology (NIOT), an autonomous institute under MoES, is spearheading the development of indigenous technologies for deep-sea mining and a crewed submersible. As a part of DOM, India's flagship deep ocean mission, 'Samudrayaan', was initiated in 2021 by the Minister of Earth Sciences.

As part of 'Samudrayaan', India is developing 'Matsya6000,' a deep-ocean submersible designed for a crew of three. It boasts an operational endurance of 12 hours, extendable to 96 hours in emergencies. The submersible's design is now complete, and testing and experimentation will commence at a depth of 500 meters in the coming year, with a goal to reach the full 6,000-meter depth capability in two to three years.

Additionally, work is underway on an integrated system to mine precious polymetallic nodules from the central Indian Ocean bed, including metals like copper, manganese, nickel, and cobalt.

Strategic Depth Selection

India's decision to target a depth of 6,000 meters for DOM is strategically significant. It aligns with the exploration of valuable resources such as polymetallic nodules and polymetallic sulphides. The International Seabed Authority (ISA) has allocated a significant area to India in the central Indian Ocean for resource extraction. These resources, located at depths between 3,000 and 5,500 meters, make the 6,000-meter capability essential for effective resource extraction.

Challenges of Deep-Ocean Exploration

Exploring the depths of the oceans poses unique challenges compared to space exploration. The primary distinction lies in the high-pressure environment of the deep oceans. While space is a near-perfect vacuum, the deep oceans exert extreme pressure on equipment and materials. Operating under such conditions requires meticulously designed, pressure-resistant equipment.

Furthermore, landing on the ocean bed, with its soft and muddy surface, is a complex task. Extracting materials from these depths demands substantial power and energy. Unlike space, where electromagnetic wave propagation aids remote operations, the absence of such propagation in the deep oceans makes remotely operated vehicles less effective.

The challenges are further compounded by factors like temperature variations, corrosion, and limited visibility due to the absence of natural light beyond a few tens of meters beneath the surface.

Matsya6000: India's Flagship Submersible

The Matsya6000 submersible is India's flagship deep-ocean human submersible designed for a 6,000-meter dive. It accommodates a crew of three and is equipped with scientific tools for observations, sample collection, video recording, and experimentation.

Matsya6000 combines the best features of remote-operated vehicles (ROVs) and autonomous remote vehicles (AUVs). Its spherical chamber is constructed from a titanium alloy, engineered to withstand extreme pressures of up to 6,000 bar.

With this technology, India joins a select group of nations that have achieved successful deep-ocean crewed missions, emphasizing the country's commitment to indigenous technology development. The U.S.A., Russia, China, France, and Japan have already achieved successful deep-ocean crewed missions.

2. Yemeni Houthi Attack on Israel: Implications and Background

Who Are the Houthis?

The Houthis are a Yemeni clan belonging to the Zaidi Shia sect, and their movement, officially known as Ansar Allah, emerged in the 1990s in opposition to the Yemeni government at the time. They control territory in Yemen's west and northwest, including the capital, Sana'a. They are backed by Iran and are part of the "Axis of Resistance," which opposes Israel and Western powers. This group includes Hezbollah and Hamas, and they are currently in conflict with the internationally recognized Yemeni government supported by Saudi Arabia and the UAE.



Why Have the Houthis Attacked Israel?

The Houthi attack on Israel is part of a broader pattern of attacks by groups within the Axis of Resistance against Israel and the United States, Israel's ally. The Iranian-backed militias in Iraq and Hezbollah have also been involved in confrontations with US and Israeli forces. The Houthis have a long-standing anti-Israel and anti-Western stance. They blame Israel for instability in the Middle East and have expressed their intention to continue attacks until what they perceive as Israeli aggression ceases.

Concerns and Implications

While the Houthi attacks on Israel may not pose a direct military threat due to the geographical distance, they have the potential to escalate the conflict in the Middle East. The danger lies in the possibility that these attacks could lead to a broader war in the region, particularly involving Saudi Arabia, which is in a delicate position. The flight path of drones or missiles launched from Yemen crosses over western Saudi Arabia. Saudi Arabia, while hesitant to be seen as taking sides, could be pushed to escalate the situation, potentially leading to a wider Middle East conflict.

Relevance: GS Prelims & Mains Paper II; International Relations

Source: The Indian Express

3. Pakistan's Deportation of Afghan Migrants: Reasons and Impact

Why the Deportation Order?

The Pakistani government has ordered the deportation of undocumented migrants, with a primary focus on Afghan refugees. Over 4 million Afghans reside in Pakistan, and an estimated 1.7 million of them lack proper documentation. The deadline for departure was October 31, after which arrest and expulsion awaited those who remained. Even before the deadline, authorities began apprehending undocumented individuals and, in some cases, demolishing homes to enforce the order.

Reasons Behind Deportation

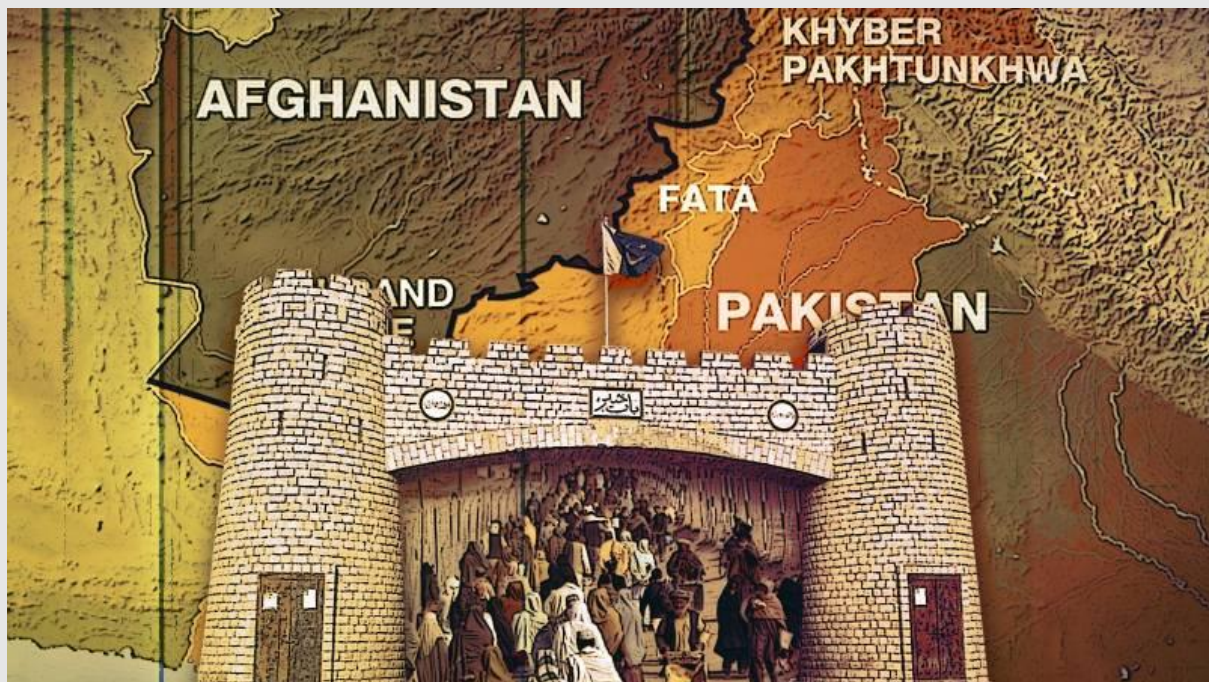
The Pakistani government has decided to proceed with the deportations despite objections from the United Nations, rights organizations, and Western embassies. The returning Afghans face an uncertain future due to the dire conditions in Afghanistan, including a collapsed economy, earthquakes, food insecurity, and human rights abuses under the Taliban regime. Women and girls returning may be denied education and job opportunities.

Historical Background

Many of these Afghan migrants fled their homeland during the Soviet war in the 1970s and have limited ties to or prospects in Afghanistan. Some were even born in Pakistan. Document acquisition has proven challenging due to bureaucratic processes.

Pakistan's Perspective

Pakistan argues that it must safeguard its economic interests and national security. The country faces economic difficulties and considers undocumented migrants, who do not pay taxes, as a burden on its limited resources. Furthermore, Pakistani authorities accuse Afghan migrants of involvement in various criminal activities, including terrorism, street crimes, and drug trafficking.



Deportation Timing

Several factors contribute to the timing of this decision. Pakistan's economy is struggling, and it has faced terror attacks by Tehreek-e-Taliban Pakistan. Additionally, Pakistan currently operates under a caretaker government ahead of the upcoming General Elections in February, which insulates it from potential political or electoral consequences of the deportations.

Taliban's Response

The Taliban has criticized the deportations and requested more time to prepare for the returnees. Authorities in Afghanistan are establishing temporary camps for those returning, providing food, shelter, healthcare, and SIM cards. The Taliban has also committed to assisting returnees in finding employment. However, the timing of the deportations, amidst an earthquake and approaching winter, presents challenges for Afghanistan's fragile situation.

Relevance: GS Prelims & Mains Paper II; International Relations

Source: The Hindu and The Indian Express