THE RISE

Special Report

AUGUST 2026

India and China in the Indo-Pacific Deep-Sea:

Technology, Law, and Strategy

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A SARVODAY THERISE FOUNDATION PUBLICATION

First published in August 2026
By Sarvoday TheRise Foundation

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Please cite the work as follows:
Warrier, A., Yadav, S. (2026). ‘India and China in the Indo-Pacific Deep-Sea: Technology, Law, and Strategy’. *TheRise*. 0826(1)-2-53

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Executive Summary

The Indo-Pacific has emerged as a principal arena of strategic competition, with the focus of maritime power shifting from the ocean surface to the seabed. The seabed is fast becoming a strategic battlespace where science, law, and security converge. India and China have emerged as the two most consequential Asian powers shaping the future of the Indo-Pacific seabed. This report examines how technological capabilities, international maritime law, and strategic actions are shaping the contest in the Indo-Pacific deep-sea.

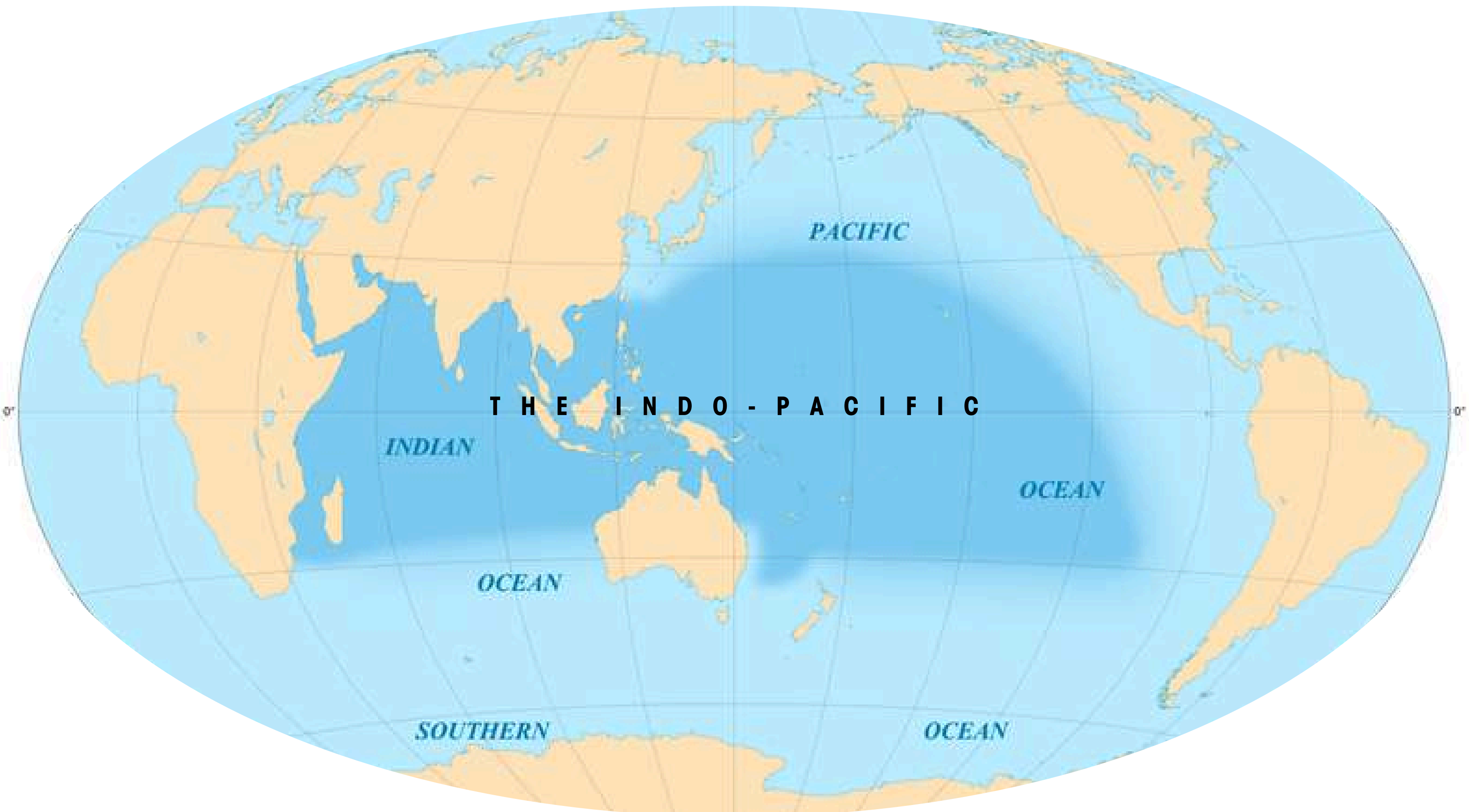
The report does a comparative analysis of the technological capabilities of India and China in the deep-sea. These technologies include Autonomous Underwater Vehicles (AUVs), submarines, anti-submarine warfare systems, deep-sea observatories, and underwater surveillance infrastructure.

Further, the report also explores the role of universities, government research institutions, defence organisations, and private industry in advancing the national deep-sea technological capabilities of India vis-à-vis China.

The analysis finds that through sustained investments in deep-sea research, innovation, and military-civil fusion since the 1970s, China has matured its deep-sea technologies. India, by contrast, has accelerated its investments more recently through initiatives such as the Deep Ocean Mission, indigenous AUV and submarine development, and encouraging private industry's participation in this domain. Despite India's commitment to strengthening its deep-sea technological capabilities, gaps still remain in technological self-reliance, manufacturing capacity, and the pace of implementation.

The report further examines that although the United Nations Convention on the Law of the Sea (UNCLOS) provides the legal framework governing maritime activities, ambiguities surrounding military surveys, marine scientific research, and activities within the deep-sea zone have led to competing interpretations by States. The Chinese government has leveraged these gaps and used grey-zone tactics to expand its influence in the region. India, in contrast, has focused on building a rules-based order in the Indo-Pacific, maritime capacity-building, and strategic partnerships through groups such as the Quad.

Finally, the report concludes by observing that the ability to effectively integrate technological innovation, legal preparedness, industrial capacity, and strategic partnerships into a coherent maritime strategy will shape the future balance of power in the Indo-Pacific as strategic competition extends into the deep-sea.



Introduction

The Indo-Pacific refers to the interconnected maritime space stretching from the Indian Ocean to the western and central Pacific Ocean, linking the eastern coast of Africa, South Asia, Southeast Asia, and East Asia. It is this maritime connectivity that has made it the world's new economic and strategic centre of gravity[1]. Home to some of the busiest shipping routes, critical chokepoints, growing naval deployments, and contested maritime claims, the region has become central to 21st-century power competition. Major powers, such as India, China, Japan, Australia, Russia, and the United States, are all trying to build assets and allies within this strategic hotspot.

However, the strategic importance of the Indo-Pacific is no longer confined to its surface waters. It is also being shaped by what lies beneath it. The seabed is no longer merely the ocean floor; it is fast becoming a strategic battlespace where science, law, and security converge. Submarine navigation, underwater domain awareness, seabed mapping, and the protection of undersea cables have all made the seabed an important part of contemporary Indo-Pacific competition. Within this context, India and China have emerged as the two most consequential Asian powers shaping the future of the Indo-Pacific seabed[2].

On the one hand, China has expanded its capabilities through deep-sea submersibles such as *Fendouzhe*, an extensive fleet of research and survey vessels, multiple International Seabed Authority (ISA) exploration contracts across different oceanic zones, and a model of military-civil fusion that often blurs the line between scientific research and strategic intent[3].

India, on the other hand, has also started to expand its deep-sea initiatives through the Deep Ocean Mission launched in 2021, and the development of its first manned deep-sea submersible, *Matsya 6000*, which is expected to be deployed by 2027.

At the same time, both countries are engaging with the seabed through the framework of the international maritime legal order, anchored by the United Nations Convention on the Law of the Sea (UNCLOS), which lays down a comprehensive regime governing the world's oceans by establishing rules on States; rights and jurisdiction in maritime spaces, ensuring peaceful use of the oceans, and the sustainable management of marine resources[4]. UNCLOS also established the International Seabed Authority (ISA), which is responsible for "*organizing and controlling activities in the maritime area to promote the orderly, safe and responsible management and development of the resources it contains for the benefit of humankind.*"

While China has come up with a series of laws consistent with the provisions of the UNCLOS, its broader maritime strategy seems to focus more on establishing an 'influence-based' order, where strategic presence and economic dependence reinforce its regional position. This can be seen in the Belt and Road Initiative (BRI), its overseas naval facility in Djibouti, and reports of expanding strategic access to Sri Lanka, Pakistan, the Maldives, and Myanmar. This behaviour is described through the "String of Pearls" theory, which states that China is developing a network of strategic ports and logistical facilities throughout the Indian Ocean in order to protect its maritime trade routes and expand its influence in the Indo-Pacific region.

India, on the other hand, has consistently sought to promote a "rules-based maritime order" and has been championing the idea of the Free and Open Indo-Pacific (FOIP).

In line with this idea, India launched its vision of Security and Growth for All in the Region (SAGAR) in 2015[5], which prioritises "*inclusive multilateral cooperation, encompassing maritime security, economic collaboration, regional connectivity, sustainable development, and disaster relief.*"

Another key pillar of India's Indo-Pacific strategy has been the Quadrilateral Security Dialogue (Quad). Comprising the United States, Japan, Australia, and India, the Quad provides a platform for cooperation on maritime security, resilient supply chains, critical technologies, and maritime domain awareness. It also enables India to contribute to discussions on emerging issues, such as deep-sea mining, undersea cables, and security infrastructure[6].

The existing literature on the Indo-Pacific tends to be fragmented, often treating technology, maritime security, and international law regarding the Indo-Pacific seabed as separate domains. Thus, this report aims to address these gaps by analysing the intersection of technological capabilities, legal ambiguities, and the strategic competition between India and China, thereby filling the information deficit in an area that remains crucial to future maritime strategies.

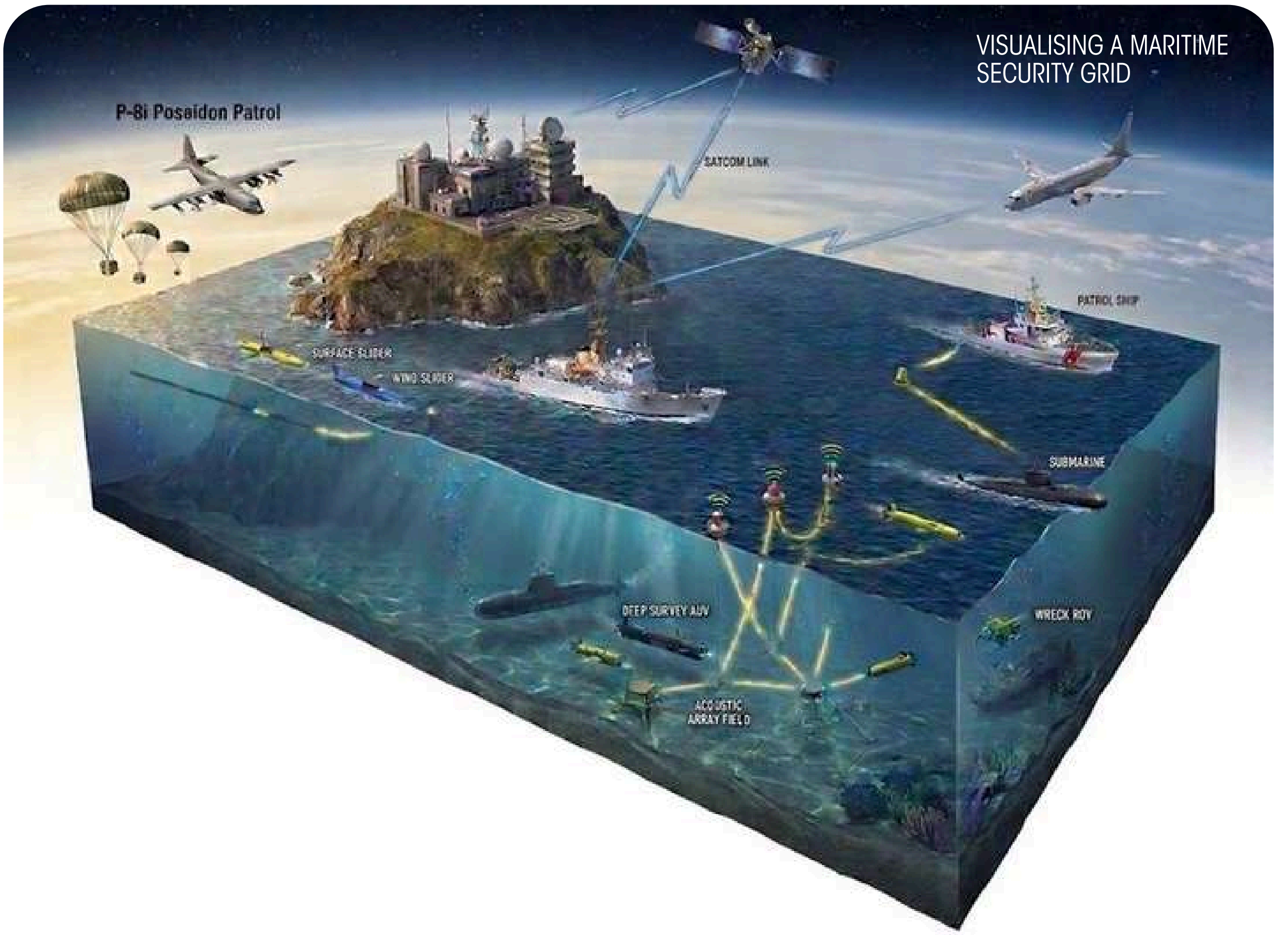
Chapter 1
Technology and Capability Race in the Deep-Sea

Technological capabilities are rapidly transforming the nature of maritime strategy and power. This shift occurred in the deep-sea domain during the First World War, where German U-boats, a type of submarine, targeted and sank merchant vessels belonging to the Allied powers. This “submarine” war went on throughout most of the First World War, and gained renewed prominence during the Second World War and the Cold War. Consequently, deep-sea technologies such as anti-submarine warfare, torpedoes, and deep-sea stations have become an indispensable part of the military and economic capability of a nation state.

This competition is driving investments in maritime and underwater domain awareness, with countries seeking to protect critical subsea infrastructure from sabotage and espionage. The underwater battlespace is highly challenging, easy to attack but difficult to defend due to poor visibility, complex hydrological conditions, and acoustic variability. Also, the operational space is vast, encompassing both vertical domains (shallow to deep water, seabed, and associated air, space, cyber, and electromagnetic spaces) and horizontal domains (near-shore, offshore, and the open ocean)[9] [75].

Developing deep-sea capabilities also requires countries to bear financial risks and high capital expenditures in the case of deep-sea exploration, naval asset deployment and subsea infrastructure. While the initial costs of these maritime activities would be high, nations would also have to endure the economic fallout that could occur by not protecting these subsea networks. Thus, nations that attain expertise in technological leadership may secure “first-mover advantage” and so gain a strategic advantage, whereas delayed investment risks creating long-term asymmetry of power.

Beyond individual technologies, maritime competitiveness also depends upon an innovation ecosystem[10]. Hence, developing a robust innovation ecosystem that encourages research and development in deep-sea technologies is a critical prerequisite for maritime power projection. This is especially true because deep-sea operations involve systematic, multi-domain operations, supported by networked information systems and engagement across multiple services and maritime forces.



Thus, the first stepping stone for a nation seeking to establish its presence in the subsea domain is setting up an independent shipyard capacity and other underwater platforms. These platforms include submarines, Autonomous Underwater Vehicles (AUVs), deep-sea observatories, and more. Equally important is building an industrial base capable of manufacturing high-strength hulls that can withstand immense water pressures at various sea levels, along with developing nuclear propulsion expertise for the manufacture of nuclear-powered submarines.

Another facet that is imperative to a nation's subsea and deep-sea capability is to set up underwater surveillance infrastructure. This is done to monitor submarine activities of other nations, maritime traffic, and seabed infrastructure, which include deep-sea cables and pipelines. Key detection technologies include the Sound Navigation and Ranging System (SONAR), which is the primary detection technology; non-acoustic detection technologies, which involve detecting and identifying objects using physical characteristics rather than sound waves; and deep-sea stations and observatories, which collect acoustic data, water pressure-related data, seismic data, and underwater imagery. Such surveillance is done to provide situational awareness, which in turn helps to strengthen maritime security and safeguard maritime assets. The incorporation of Artificial Intelligence (AI) has further expanded the operational capabilities of these underwater assets, enabling autonomy and precision in carrying out exploratory, surveillance, and naval exercises.

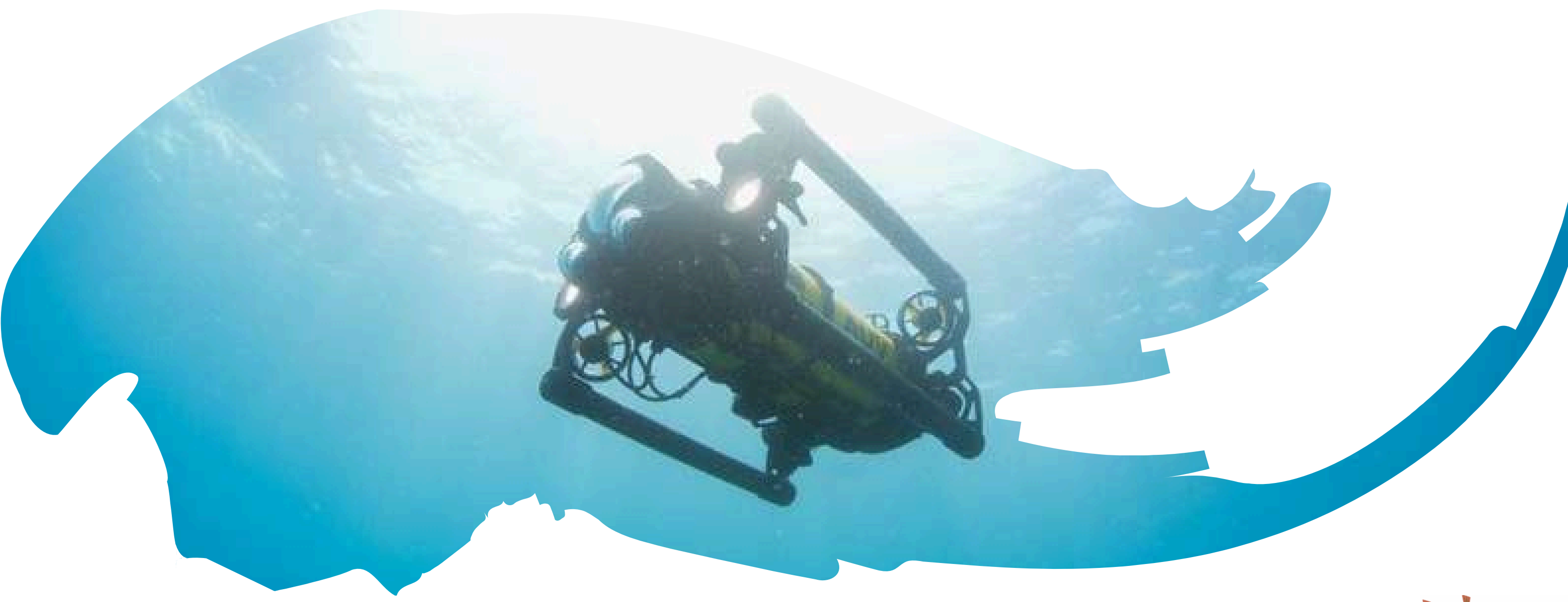
It was during the Cold War that undersea warfare emerged as a central component of the strategic competition between the United States and the erstwhile Soviet Union. The strategic centre of gravity at the time lay with Europe and the American continent, thus making the Atlantic Ocean an extremely important theatre of military operation. However, with the end of the Cold War after the collapse of the Soviet Union, the Atlantic Ocean gradually lost its strategic importance. Instead, the economic and strategic gravity shifted towards the Indo-Pacific, with the rise of nations like India, Japan, Singapore, and China. Over the past couple of decades in the Indo-Pacific, China has emerged as a major global power, driven by its manufacturing dominance, economic growth, and expanding geopolitical influence. Other key players, such as India, Japan, Indonesia, and the Philippines, have also become vital stakeholders in this region.

Talking specifically about China's and India's positions, the technological advancements in the maritime domain play a central role in shaping their maritime strategies within the domain of the Indo-Pacific. Both countries have significantly invested in subsea infrastructure, though the scale and capabilities diverge vastly across the two countries.

AUTONOMOUS UNDERWATER VEHICLES (AUVS)

An Autonomous Underwater Vehicle (AUV), or Uncrewed Underwater Vehicle (UUV), is an underwater vehicle that operates without human intervention (see the image below)[12]. They are used for pre-programmed subsurface survey missions. They can collect a large amount of visual and deep-sea data through photomosaicing, depending on the sensors they carry.

Strategically, AUVs are important components of a state's maritime capabilities since they enable surveillance, intelligence gathering, communication, and geological and oceanographic research with limited human intervention. They also require minimal supporting infrastructure and can be deployed rapidly. The growing strategic importance of AUVs reflects the changing nature of competition in the Indo-Pacific.



As the region witnesses increasing naval deployments, expanding undersea communication networks, and greater reliance on subsea infrastructure, both India and China have accelerated investments in autonomous underwater technologies, although their approaches differ in terms of technological maturity, industrial capacity, and strategic objectives, and their long-term vision of the Indo-Pacific.

China

For these reasons, the Chinese government has been investing heavily in the development of AUVs since the 1990s. This investment is a reflection of President Xi Jinping's vision of the "three deeps" - deep space, deep earth, and deep ocean[15]. In a 2025 Defence White Paper[16], one of the strategic priorities of the Chinese government included "safeguarding national territorial integrity and maritime rights and interests," putting it on the same pedestal as other core priorities such as maintaining the Party's ruling status and preserving the socialist system. In this regard, China is looking to build technology that serves a dual purpose, with both civilian and military applications. Thus, marine science and ocean technology have become a pillar of the country's geopolitical strategy[15].

Accordingly, AUVs are one of the areas that the government has prioritised, beginning with the setting up of dedicated research institutes to design and build prototypes in the 1970s, followed by the development and construction of working AUVs in the 2000s. The first AUV developed was called the '*Explorer*' and had a maximum diving depth of 1,000 metres[17]. Today, the two broad categories of AUVs are the *HSU-001* class of UUVs and the newer *XLUUV (Extra-Large UUV)* and *XXLUUV (Extra-Extra Large UUV)* classes of vehicles.

The three government-sponsored research institutions that form the backbone of AUV development in China[18] are:

- **Shenyang Institute of Automation (SIA) -** Shenyang Institute is a leading institution for the research, development, and application of AUVs. Since the late 1970s, its research has achieved several firsts within China, including the development of underwater robots, an AUV capable of diving up to 6000m, and underwater gliders. Currently, Shenyang Institute is in the process of developing models such as the *Sea-Whale 2000* and the *Qianlong* series AUVs, and the *Haiyi* series autonomous undersea gliders[8].
- **China State Shipbuilding Corporation (CSSC) -** The CSSC is the key workhorse of Chinese shipbuilding activities and the People's Liberation Army Navy's (PLAN) maritime ambitions, especially after the absorption of China Shipbuilding Industry Corporation (CSIC) into it. It has successively developed vessels such as the *Changzheng 18* submarine, the 10,000-ton-class destroyer *Dalian*, the amphibious assault ship *Hainan*, and the 10,000-ton-class large maritime patrol vessel *Haixun 09*. It is also responsible for developing the *Haishen* series of AUVs, which can dive up to 6,000 meters.

- **Harbin Engineering University (HEU) -** This University has gradually expanded AUV testing in the South China Sea. It also has the '*Smart Water*' series (*Zhishui*), which currently consists of five variants of AUVs, in different sizes. HEU has developed additional AUV models for undersea surveying and mapping, such as the *Weilong (Microdragon) 1, 2, and 3*. The University is also home to China's State Key Laboratory of Underwater Vehicle Technology, which specializes in developing human-occupied, remotely operated, and autonomous surface and deep-sea vehicles.

Beyond China's three major AUV design centers, a growing number of research institutes and private enterprises are entering the Chinese AUV market.

A document published in 2019 by the Chinese Society of Naval Architecture lists 159 undersea vehicle research projects[19] under development at more than 40 Chinese universities — a significant increase over the 15 major universities that had constructed undersea vehicle research teams just four years earlier.

The Chinese Communist Party's military-civil fusion development strategy[19] has further accelerated the growth of China's private-sector AUV industry. By promoting resource and information sharing between the military and private technology companies, China has decentralised the production and application of such unmanned underwater vehicles. Several private firms are also exploring commercial applications of these autonomous underwater technologies.

According to the People's Liberation Army Navy (PLAN), the expansion of its AUV fleet serves three principal purposes[18]:

- **Surveillance -** Between 2016 and 2019, China developed the "Blue Ocean Information Network", a marine information and surveillance system incorporating space, air, shore, surface and submarine-based systems. Its objective is to build a "military-civilian integrated, open, shared, autonomous, and controllable marine information infrastructure." Although officially presented as an environmental monitoring network, its potential military applications are significant. Recent research indicates that PLAN intends to incorporate small and medium-sized AUVs for this purpose, along with submarines, underwater observatories, hydroacoustic sensors, and gliders.

- **Seabed Operations -** China has been using AUVs for marine scientific research and ocean exploration in the South China Sea and the Indian Ocean. Fishermen of many countries, including Taiwan, Indonesia, and the Philippines, have reportedly recovered Chinese underwater gliders and unmanned vehicles, which can be attributed to the maritime expeditions and underwater surveys conducted for both scientific and military purposes. China, however, maintains that these activities are conducted for ocean observation and scientific research.
- **Undersea Cable Inspection -** There have been many reports since 2019 of subsea cables being damaged in the Indo-Pacific region, raising concerns over possible deliberate interference. Although China's direct involvement has not been established, reports indicated that in March 2025 China had developed a deep-sea cable cutting device capable of operating at depths of up to 4000 meters. Such systems can also be integrated with AUVs for activities described as 'underwater engineering investigation and maintenance'. This way, technologies developed for civilian purposes can also have strategic or military applications.

IREPRESENTATIONAL IMAGE OF A CHINESE AUV
CONDUCTING UNDERSEA CABLE OPERATIONS

*AI-GENERATED IMAGE

The development of these AUVs have come a long way. Early prototypes such as CSSC's *Haishen 100* and SIA's *Explorer* were capable of diving to depths of less than 1,000 meters. By contrast, *Haidou-1* reached the depth of 10,907 meters in the Mariana Trench in 2020[21]. The PLAN has also been expanding its fleet of AUVs to include a mix of small, medium, and large AUVs, the largest being the *UUV-300CB, an extra-large uncrewed underwater vehicle (XLUUV)*. China has also been spearheading the integration of Artificial Intelligence (AI) systems into its AUVs, in an effort to improve the efficiency of its unmanned vehicles. The AI would be trained to make its own decisions based on data collected, thus increasing the adaptability of AUVs to new situations[22].

India

With a coastline of approximately 11,098 kilometers, India faces issues related to coastal security, underwater surveillance, and the protection of critical maritime infrastructure. AUVs can therefore play an important role in mitigating these threats and strengthening maritime security.

India's journey into AUV technology began with the development of indigenous vehicles such as *Maya* in the early 2010s[23]. *Maya* was developed for conducting scientific experiments underwater. Experience gained in building autonomous vehicles, such as *Maya* and *Matangi*, helped to further improve India's indigenous AUV capabilities. Some major milestones in the journey of Indian AUV development include:

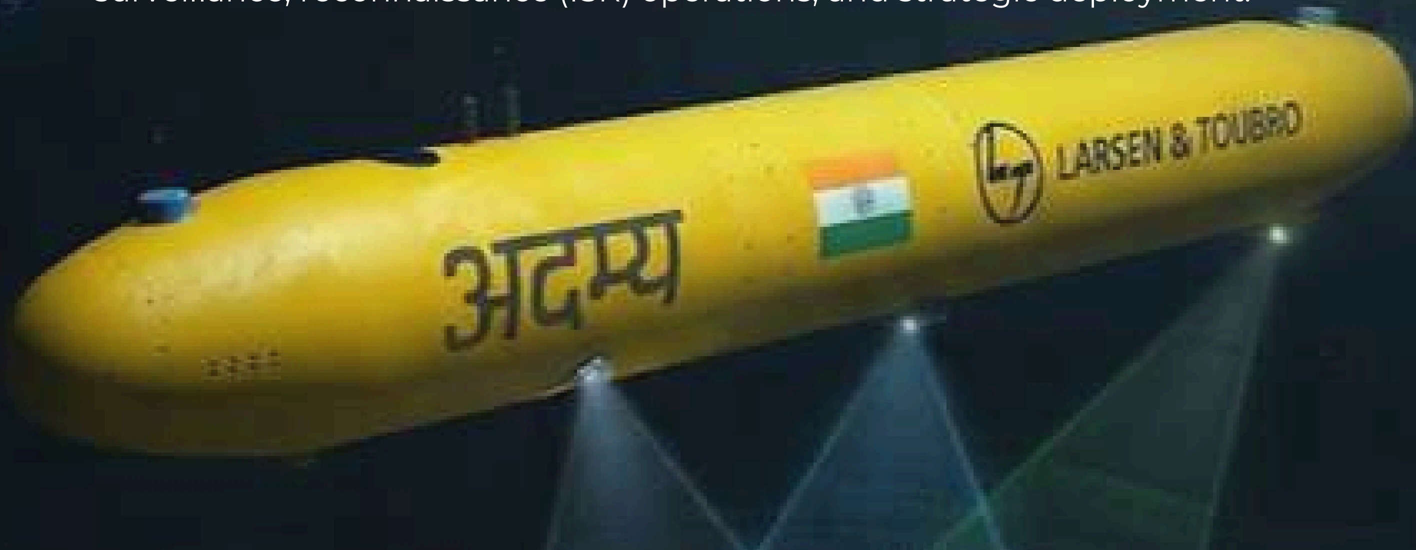
- **Neerakshi –** It was designed for mine detection, search and rescue missions, and underwater surveys. It is also capable of supporting anti-submarine warfare operations. This vehicle can dive up to a depth of 300 meters. It was developed jointly by Garden Reach Shipbuilders and Engineers (GRSE) and Aerospace Engineers Private Limited (AEPL)[23] [24].

- **High Endurance Autonomous Underwater Vehicle (HEAUV) -** Developed by DRDO, the maiden surface trials of this vehicle were carried out in March 2024, followed by successful lake trials in March 2025, during which the vehicle dynamics, sonar systems, and communications system were proven in both surface and submerged conditions. The HEAUV can dive up to a depth of 300 meters. Its chief purpose is to strengthen India's naval capabilities. In the future, it is expected to become "an effective tool for extending the reach of the mother ship into inaccessible or contested waters without putting human life and high-value assets at risk."[25]

India is significantly expanding its use of Autonomous Underwater Vehicles (AUVs) for various applications, including marine research, defence, and offshore oil and gas exploration. The country's growing maritime interests and expanding defence capabilities are driving the development and deployment of AUVs equipped with advanced sensors and navigation systems[27].

In the future, AUVs are expected to be equipped with more sophisticated sensors, including sonar, cameras, and other instruments, along with advanced navigation systems, for accurate underwater positioning and mapping. Advanced communication systems, including acoustic communication, UHF, C-Band, and satellite communication (SATCOM), are also being developed to ensure reliable data transmission in diverse underwater environments. Artificial Intelligence (AI) and machine learning tools are expected to play an important role in autonomous navigation, object detection, and decision-making. For example, India's Defense Research and Development Organisation (DRDO) has developed a new generation of AI-enabled AUVs capable of detecting and classifying naval mines[81].

The key players in India's AUV ecosystem include the Defence Research and Development Organisation (DRDO), private sector companies such as Larsen & Toubro (L&T), Krishna Defence and Allied Industries, and start-ups such as EyeRov, Planys Tech, and Sagar Defence Engineering. Krishna Defence and Allied Industries has begun constructing *Jalkapi,* which is expected to be the country's largest and most advanced Autonomous Underwater Vehicle (AUV) designed for the Indian Navy[28]. This next-generation unmanned underwater platform is designed to operate at depths exceeding 300 metres with an endurance of up to 45 days, enabling critical long-duration intelligence, surveillance, reconnaissance (ISR) operations, and strategic deployment.



While India seeks to manufacture its AUVs domestically, keeping in line with the vision of "*Atmanirbhar Bharat in Defence*", complete self-reliance is difficult to achieve in the short run due to the high dependence on imports of various components[82], including inertial navigation systems, marine version Doppler Velocity Logs (DVLs), and lithium-ion battery systems[84]. India is also looking to incorporate AI technologies into its naval systems. In January 2022, a workshop on '*Leveraging Artificial Intelligence (AI) for Indian Navy*' was organised by the INS Valsura to identify the opportunities for integrating advanced AI technologies into naval operations[29].

REPRESENTATIONAL IMAGE OF INDIA'S INDIGENOUS AUV *ADAMYA* CONDUCTING ISR OPERATIONS

*AI-GENERATED IMAGE

SUBMARINES

A submarine is a naval vessel that is able to propel itself independently underwater as well as on the surface on the water. This way, its design differs from conventional surface vessels because it must withstand immense underwater pressure while remaining stealthy and self-sustaining. Submarines gained strategic importance for the first time during World War I, when German submarines, known as U-boats, targeted merchant vessels. Since then, every major conflict has reinforced the importance of submarines as indispensable assets, making them central to a nation's maritime capability[7].

Their ability to operate undetected over long periods makes them indispensable for strategic deterrence, anti-submarine warfare, and the protection of critical maritime infrastructure. Consequently, the size, sophistication, and industrial capacity to build submarines have become important indicators of a country's maritime power. Within the Indo-Pacific, China and India have both prioritised submarine modernisation, although their approaches, production capacities, and strategic objectives differ to a large extent.

China

The People's Liberation Army Navy (PLAN) is modernising its underwater forces by integrating both UUVs and submarines as part of its '*Near Seas Defense, Far Seas Protection*' naval strategy. While the '*Near Seas Defense*' component focuses on protecting China's territorial sovereignty and maritime rights and interests, including conducting "informatised" wars with the island chains. The '*Far Seas Protection*' component is concerned with both peacetime and wartime elements. During peacetime, it includes non-war military operations such as international peacekeeping, providing humanitarian assistance and disaster relief, and joint exercises. During wartime, the emphasis shifts towards long-range strike capability and sustained maritime operations[34].

Firstly, the People's Liberation Army Navy (PLAN) of China has the following types of submarines:

- **Ballistic Missile Submarines (SSBN)** - A ballistic missile submarine is a strategic naval vessel equipped to deploy submarine-launched ballistic missiles, typically armed with nuclear warheads. The PLAN currently operates three generations of SSBNs - the *Xia-class (Type-092)* SSBN, which has since been retired because of its high acoustic signature and operational limitations; the *Jin-class (Type-094)* submarines replaced the *Type-092* submarines; and the *Type-096* submarine, which is currently under development, with two new boats under construction.
- **Nuclear-powered attack submarines (SSN)** - The PLAN's SSN fleet includes the *Shang I-class (Type-093A)*, the *Shang II-class (Type-093B)* submarines, and the first *Type-095* submarine, which was launched earlier this year, although details about its missile systems and sonar capabilities remain limited.

In addition, PLAN also operates 48 traditional diesel-electric attack submarines (SSKs). Over the past decade, emphasis has been placed on strengthening PLAN's Anti-Submarine Warfare Systems (ASW), which is a branch of military operations designed to detect, track, and neutralise enemy submarines. These capabilities include torpedoes, sea mines, and anti-submarine helicopters. Recognizing ASW as an essential element of modern naval warfare, the PLAN has introduced the *Yu series* of torpedoes, ranging from *Yu-01* to *Yu-11*[38], and the *Type-055* large destroyer with ASW capabilities.

CHINA'S *TYPE-094 JIN-CLASS* SSBN

SOURCE: WEIBO

India

Turning to India's submarine capabilities, the Indian Navy has three indigenously built nuclear-powered ballistic missile submarines (SSBNs): the *INS Arihant* (commissioned in 2016), *INS Arighaat* (commissioned in 2024), and *INS Aridhaman* (commissioned on 3rd April, 2026)[42]. A fourth SSBN, referred to as *S4**, is currently undergoing sea trials[43].

India also operates approximately 17 diesel-electric attack submarines (SSKs) with the fleet divided across three active classes - the *Sindhughosh class,* the *Shishumar class,* and the *Kalvari class*. The *Sindhughosh class* submarines were procured under contracts with the Russian defense exporter Rosoboronexport and the Indian Navy. Some of these submarines, such as the *INS Sindhughosh*, the lead submarine of the class, were decommissioned on 19 December, 2025.

Project 75, India's "naval modernisation" programme [44], was approved in 1999 with the objective of constructing 24 submarines in 30 years to replace the aging fleet of submarines that would soon be retired, to establish two lines of production, and to achieve self-sufficiency in production and manufacturing of submarines by 2029. However, despite more than two decades of implementation, India has only managed to induct 6 submarines, while the remaining projects continue to face procurement delays or remain at the planning stage.

The next-generation program, *Project 76*, aims to develop India's first fully indigenous conventional diesel-electric submarine, with a long-term objective of constructing 12 submarines, which are touted to be traditional diesel-electric attack submarines with air-independent propulsion systems, indigenous Weapon Control systems, and other advanced technologies. The construction of the first prototype is expected to commence by 2028[45].

Submarines are among the most technologically complex defence platforms, requiring advanced shipbuilding capabilities, nuclear propulsion expertise, sophisticated electronics and highly integrated supply chains. India's continued dependence on imported designs, propulsion systems, and critical components has slowed the pace of indigenous submarine production. At a time when the Indian Ocean is becoming more and more contested, these delays have widened the capability gap between India and China.

INS SINDHUVIJAY,
A SINDHUGHOSH-CLASS SUBMARINE

SOURCE: WIKIMEDIA COMMMONS

INDIAN AND CHINESE SUBMARINE ACQUISITION TIMELINE

Key programmes and delivery schedules

Programme	Country	Conceived / Approved	Contract / Construction Start	First Unit Delivered	Turnaround
Project 75 (Kalvari-class)	India	Approved in 2005	Construction from 2009	First Unit Commissioned 2017; Last Unit 2025	~12 years to first boat; ~20 years to sixth
Project 75(I)	India	Acceptance of Necessity accorded in August 2010, RFP re-cleared in 2021 at Rs 43,000 crore	Contract finalisation ongoing as of 2026	First boat expected around 2033-34	~23-24 years (projected)
Project 76 (Fully Indigenous SSK)	India	Indigenous programme initiated ~2024-25	Prototype construction expected by 2028	Not yet delivered	Undetermined (first prototype in 3-4 years from approval)
Project 77 (SSN)	India	CCS Cleared the project for 2 boats	Construction pending	Commissioning planned for 2036	~10+ years from clearance
Advanced Technology Vessel (ATV) Project (SSBN)	India	Launched in 1990s. First public confirmation in 1998	Not disclosed	INS Arihant commissioned 2016; INS Arighaat 2024; INS Aridhaman 2026	~18+ years to first boat; ~28+ years to third
Type 095 SSN	China	Development ongoing, limited public disclosure	Not disclosed	Launched 2026; Commissioning expected by 2028	Not independently verifiable
Type 096 SSBN	China	Under development	Two boats under construction	Not delivered	Not independently verifiable

Notes:

- The 'Turnaround' column calculates the approximate time from the programme's conception/approval to the delivery of the first unit.
- Data for Chinese programmes is based on available public information and may be subject to change or limited verification.
- Project 75(I) has seen significant delays in the RFP and contract finalisation stages.
- Project 76 and Project 77 are in earlier stages of development, and their timelines are subject to considerable uncertainty.
- The SSBN (Arihant class) programme for India represents a long-term strategic development.

The comparison table makes visible a pattern. The Indian submarine programmes consistently take 18- 24 years from initial approval to first delivery (Arihant: ~18 years; Project 75: ~12-20 years, and so on), because of the sequential approve-negotiate-reapprove cycle. China's equivalent turnaround cannot be verified from open sources as Beijing does not publish procurement timelines the way India does, but the scale of its shipbuilding base points to materially shorter construction cycles even where design and approval timelines are opaque.

However, in recent years, India has also been making major strides in the ASW sector to reduce the capability gap. The Indian Navy has been investing heavily in anti-submarine warfare capabilities, including shallow-water aircraft, frigates and destroyers, and helicopters[46]. There are currently two classes of Anti-Submarine Warfare Shallow Water Craft (ASW-SWC) - the *Arnala* and *Mahe* class vessels[47]. *INS Arnala* measures 77.6 meters in length and 10.5 meters in width, and has a diesel engine-waterjet combination, making it incredibly agile and execute tight turns. It has a top speed of 25 knots and an operating range of 1,800 nautical miles. It also has anti-submarine rockets of the RBU-6000 variety and two triple lightweight torpedo launchers[50]. *INS Mahe* measures 78 meters in length, and uses a diesel engine-waterjet combination. It has a top speed of 25 knots and an operating range of 1,800 nautical miles[51]. The ASW-SWC programme comprises 16 vessels, with the first eight being built by GRSE and L&T, and the remaining eight being built by Cochin Shipyard Limited (CSL) [52]. Further, *Varunastra*, a heavyweight torpedo capable of targeting submarines operating in both shallow and deep waters, with a maximum operating depth of 600 metres, was inducted into the Navy. *Varunastra* incorporates the latest technologies such as high-speed, long-endurance propulsion, software-driven intelligence, conformal array acoustic homing with wide look angle, and advanced digital signal processing[53].

TECHNICAL COMPARISON OF INDIAN AND CHINESE TORPEDOES

Parameter	Advanced Light-Weight Torpedo (ALWT - 2nd Gen *Shyena*) (India)	Varunastra (India)	Yu-7 and Yu-11 Series (China)	Yu-6 and Yu-10 Series (China)
Weight type	Lightweight	Heavyweight	Lightweight	Heavyweight
Range	Dual-speed capability - at high speeds, has a range of 12 kms, and at lower speeds, a range of 25 kms	40 kms[54]	Approximately 18 kms[56]	Estimates suggest a range of at least 50 kms[38]
Maximum speed (knots)	33 knots, but can be pushed to 47 knots due to dual-speed capability[56]	40+ knots[54]	40+ knots[56]	50+ knots[56]
Propulsion	Electric motors powered by silver-zinc batteries[54]	Electric propulsion system with multiple silver-oxide zinc batteries[57]	Thermal power propulsion system using Advanced Otto Fuel	Thermal power propulsion system using Advanced Otto Fuel
Warhead capacity	50 kgs[54]	250 kgs	45 kgs	250 - 300 kgs

DEEP-SEA OBSERVATORIES

Deep-sea observatories have emerged as a critical component of modern underwater infrastructure. These observatories provide long-term monitoring of the seabed, communication cables, and are equipped with AUV docking systems, and other ocean observation technologies. While they are primarily established for scientific research, environmental monitoring, and disaster prediction, they also possess significant strategic value. The ability to monitor underwater activity in real time enhances underwater domain awareness (UDA), supports submarine operations, improves seabed mapping, and can assist in protecting critical infrastructure such as subsea cables and offshore energy assets. Consequently, both India and China are increasingly investing in permanent deep-sea observation systems, albeit at different scales and strategic priorities.

China

China launched, in March 2026, a “deep-sea all-weather floating research facility” in Shanghai (see the image below). It has been built to operate in harsh offshore conditions and support long-term research at sea. Formally called “Open-sea Floating Island,” it is the world’s first ultra-large marine research facility of its kind[58]. The facility is made up of three parts: a central floating platform, ship-based laboratories, and shore-based support systems. It has been built to withstand strong winds, extreme weather, and rough seas, while also supporting the testing of deep-sea equipment weighing hundreds of tonnes[59]. Apart from this observatory, China has also established nearly two dozen government-run ocean science research laboratories, primarily led by the Chinese Academy of Sciences’s (CAS) Institute of Deep-Sea Science and Engineering and the Laoshan Laboratory (formerly the Qingdao National Laboratory for Marine Science and Technology). China’s 14th Five-Year Plan (2021-2025) has also prioritised deep-sea exploration and marine technology innovation. However, there is international concern that these laboratories and observatories possess dual-use potential, as the oceanographic, bathymetric, and acoustic data they collect could also support military intelligence, submarine operations, and underwater surveillance[15].

CHINA’S DEEP-SEA ALL-WEATHER FLOATING RESEARCH FACILITY NEAR SHANGHAI

SOURCE: SCMP

India

India has also been expanding its ocean observation infrastructure. In 2019, the National Institute of Ocean Technology (NIOT) deployed a network of six moored buoys equipped with sensors to collect data on a real-time basis for oceanographic purposes[60]. India launched the Deep Ocean Mission in 2021, which focuses on sustainable harnessing of ocean wealth, while strengthening India's Blue Economy. Its major objectives include the development of technologies for deep-sea mining, technological innovations for exploration and conservation of marine biodiversity, deep ocean survey and exploration. Under this mission, the *Samudrayaan Project* focuses on deep-sea exploration. The mission is centred on the development of the *Matsya 6000* self-propelled submersible (see the image below) that is designed to transport three personnel to depths of up to 6,000 meters. As of 2026, the submersible is undergoing final stages of testing ahead of its planned deployment[31].

DEEP-SEA MANNED SUBMERSIBLE *MATSYA-6000* BEING LOWERED FOR WET TRIALS

SOURCE: NIOT

COMPARISON OF INDIAN AND CHINESE DEEP-SEA ECOSYSTEM

Capability	India	China
Research infrastructure	A network of deep-sea research institutions: National Institute of Ocean Technology (NIOT), National Institute of Oceanography (NIO), National Centre for Polar and Ocean Research (NCPOR), IIT Madras' Department of Ocean Engineering. Relies on ~14 research vessels such *ORV Sagar Nidhi, ORV Sagar Kanya, ORV Sagar Manjusha, ORV Sagar Tara, ORV Sagar Anveshika, INS Sagardhwani*[62].	Labs are mostly led by Chinese Academy of Sciences's (CAS) Institute of Deep-Sea Science and Engineering, the Laoshan Laboratory (formerly the Qingdao National Laboratory for Marine Science and Technology), the Shenyang Institute of Automation (SIA), the Harbin Engineering University[15]. Owns a fleet of 64+ active research vessels like *Xiang Yang Hong Class research ships, Shiyan 06, Hai Yang Shi You 760.*
Deep-sea manned submersible	India's first manned submersible '*Matsya 6000*' is being developed under the *Samudrayaan Project*. It will be a self-propelled vehicle capable of transporting three people to depths of up to 6,000 meters by 2027 (or early 2028).	The Chinese Academy of Sciences (CAS) has developed three deep-sea manned submersibles - *Fendouzhe, Shenhai Yongshi*, and *Jiaolong*, which have completed a combined total of 1,746 dives as of December 24, 2025. The *Fendouzhe* successfully reached the Mariana Trench, the deepest point on earth[63].
Permanent deep-sea observatory	Does not have a permanent deep-sea laboratory currently. But, plans to build the world's deepest underwater lab at 6,000 meters, and launch it in 2047 are underway[61].	There are plans for constructing the world's first manned seafloor laboratory, with plans to begin operations by 2030. It is designed to support a crew of six and would operate at a depth of 2,000 meters, for a duration of thirty days at a time[15].
Integrated seabed monitoring	The National Institute of Ocean Technology (NIOT), in 2019, deployed six moored buoys attached with sensors to collect data on a real-time basis for oceanographic purposes.	Beijing has deployed a number of sensors to build a network to build the "Underwater Great Wall"[64].

Thus, the deep ocean has transformed into a highly-sophisticated geopolitical race staged on multiple domains. The development and establishment of long-endurance AUVs, stealthy submarines, and deep-sea observatories has reshaped the definition of maritime security. Major powers in the Indo-Pacific region have been investing heavily in these technologies to secure their maritime interests and to tip the scales of power in their favour.

To do this, having the right foundations in place, such as data collection capacity, research and development facilities, technical design capability and supportive government policies in place is of utmost importance. While China has been prioritising the development of this subsea architecture since the 1970s, India has been making leaps and strides in this domain to lessen the technological gap to safeguard the existing rules-based order in the Indo-Pacific region.

IMAGINING A DEEP-SEA CONTESTATION

*AI-GENERATED IMAGE

Chapter 2
Strategy and Power Projection in the Indo-Pacific Deep-Sea

Technology alone does not determine maritime power. In the Indo-Pacific, legal frameworks and strategic choices shape how States exercise influence, assert maritime claims, and protect their interests beneath the sea. The region has consequently emerged as a theatre where international law, power projection, and geopolitical competition intersect. In the case of both India and China, the race to achieve this dominance is increasingly shifting from the surface to the seabed, with diplomacy, legal interpretation, economic influence and military capabilities becoming important instruments for securing strategic advantage.

However, these activities are governed by international maritime law, where several legal ambiguities continue to persist. These grey areas have created scope for competing interpretations, allowing States to advance their strategic interests within the existing legal framework.

This chapter examines the legal grey areas, especially in the context of China and India, and analyses how both countries interpret and utilise them to advance their strategic interests in the Indo-Pacific region. While China, on the one hand, focuses on expanding its maritime footprint across the Indian Ocean Region, India emphasises a rules-based Indo-Pacific while strengthening its own strategic position in the region.

The major governing law for marine and maritime activities is the United Nations Convention on the Law of the Sea (UNCLOS)[65]. It is an international treaty that was established in 1982 and enforced in 1994, and is widely referred to as the 'Constitution of the Sea.'

Although UNCLOS provides the principal institutional and legal framework, evolving technological development, strategic competition, and lack of enforcement leave room for competing interpretations of the law.

LEGAL AMBIGUITIES UNDER UNCLOS AND THEIR STRATEGIC IMPLICATIONS

Despite providing the principal legal framework governing maritime affairs, several provisions of UNCLOS have remained open to interpretation, particularly with respect to military activities, marine scientific research, deep-sea resource exploration and seabed infrastructure.

Moreover, due to a lack of central enforcement authority, disputes remain merely managed rather than conclusively resolved. States are also not obliged to participate in the arbitration process and accept its outcomes. For instance, in 2013, the Philippines brought a case against China regarding China's activities in the South China Sea. China claimed 'historic rights' over the islands and other maritime features in the South China Sea. The Philippines contested these claims on the ground that they are incompatible with the 1982 Convention on the Law of the Sea and initiated arbitration under Annex VII of UNCLOS. In its 2016 award, the tribunal rejected China's 'historic rights' claims under UNCLOS; however, China refused to recognise the ruling.

Military Activities within Various UNCLOS-defined Maritime Zones

UNCLOS does permit the conduct of military activities beyond the territorial sea of another nation, since most participating nations agree that "military operations, exercises and activities have always been regarded as internationally lawful uses of the sea" and so States will enjoy the right to conduct such activities. Nevertheless, UNCLOS does provide coastal State authority over certain foreign military activities, but this limitation is not extended to EEZs[69].

Submarine Cables, Undersea Pipelines and Seabed Infrastructure

Foreign States are also allowed to lay submarine cables and undersea pipelines on the seabed of the coastal States' EEZ, while ensuring that the foreign State does not infringe on the sovereignty or previously established pipelines and cables on the seabed. However, there is a growing trend among coastal states to overstep their jurisdictional limits as recognised by UNCLOS, meaning coastal nations are stretching their authority to control things in their EEZ that UNCLOS originally said they had no right to – in this case, the cables and pipelines. This is done by demanding permits and forcing expensive studies that act as an underhanded way to regulate these projects. At the same time, these cables and pipelines are subjected to interference and damage inflicted by rival states.

Deep-Sea Mining and Resource Exploration

A major legal ambiguity under UNCLOS concerns the blurry line between exploration and mining. The actual text of UNCLOS groups all such deep-seabed operations under the umbrella of "Activities in the Area", as defined in Part XI, without distinguishing various stages of deep-sea mining. In practice, exploratory activities involve technologies and environmental impacts that resemble early-stage extraction.

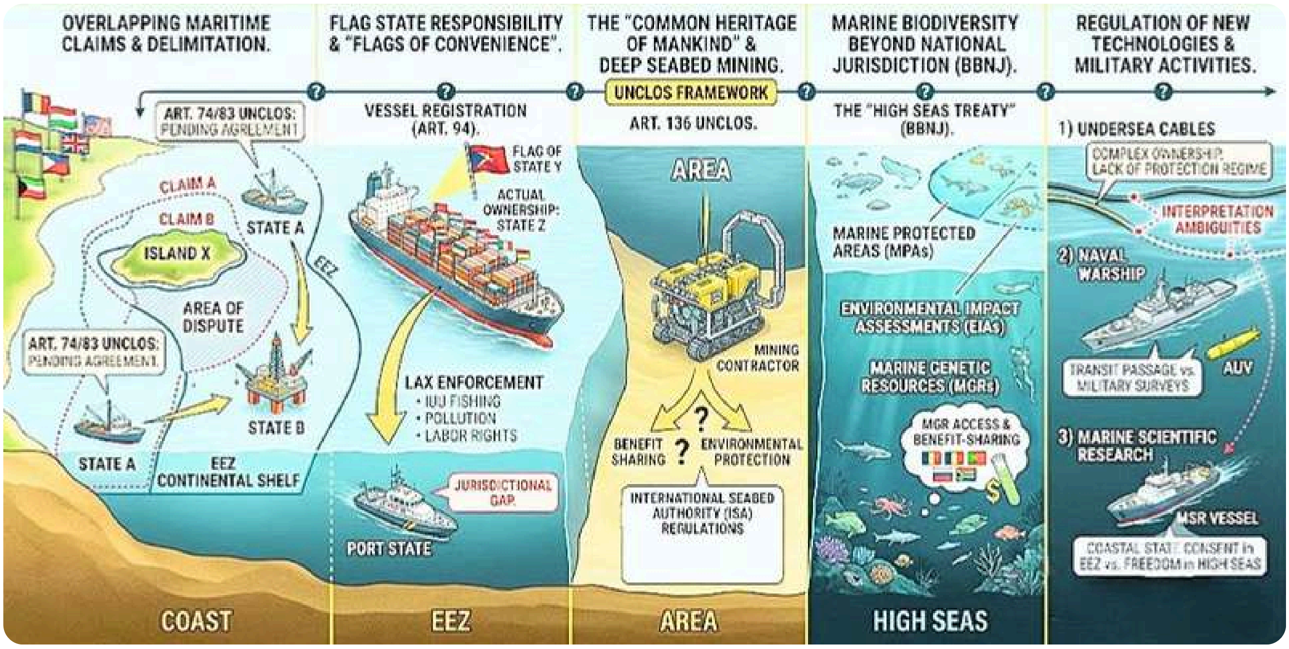
Under UNCLOS, a regulatory body for mineral-resource-related activities was established, called the International Seabed Authority (ISA). It has the mandate to "ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed-related activities"[66]. A major legal ambiguity concerns deep-sea mining in areas beyond national jurisdiction. The majority of critical minerals, such as lithium, cobalt, rare earths like scandium, cerium, europium, and polymetallic nodules, are found in the deep-seabed, i.e., the region that lies beyond a country's EEZ. These minerals are essential for the functioning of wind turbines, electric vehicles, cell phones, and missile systems.

The supply of such minerals on land is shrinking, and so many countries and companies are looking to explore deep-sea mining to extract the ores, which are found over millions of square kilometers.

Marine Scientific Research versus Military Surveys

UNCLOS also requires the coastal State's consent for marine scientific research in areas under its national jurisdiction and EEZ. But the distinction between what constitutes "research" and what constitutes "military survey" is never defined in UNCLOS. Nor does it clarify whether military vessels undertaking scientific data collection fall within these provisions or not.

LEGAL AMBIGUITIES IN MARITIME GOVERNANCE UNDER UNCLOS



Due to these legal ambiguities, countries like China have taken advantage of these gaps to pursue their own objectives. For instance, China often adopts a selective interpretation of UNCLOS. It supports broad navigational freedoms when they facilitate Chinese maritime activities, but advocates restrictive interpretations when it comes to foreign militaries operate near the South China Sea.

For example, China routinely conducts reconnaissance and surveillance missions across the Indo-Pacific, including in the South China Sea, the Taiwan Strait, and the waters surrounding Indonesia and the Philippines[72]. However, China adopts a markedly different position when similar activities are conducted by foreign States near its own coast, such as on 8 March 2009, when five Chinese vessels surrounded the *USNS Impeccable* approximately 75 miles south of Hainan Island in the South China Sea. The vessel, operated by the U.S. Military Sealift Command, maintained that it was conducting lawful hydrographic surveys in international waters. China argued that such surveillance activities threatened its national security and therefore required prior permission[73].

Similarly, China has capitalized on the regulatory uncertainty surrounding deep-sea mining for rare-earth minerals; China currently holds the largest number of International Seabed Authority (ISA) exploration licenses (five), which allows it to conduct geological surveys and environmental studies. Although commercial mining has not yet commenced, China is heavily investing in mining technology such as deep-sea robotics, AUVs and submersibles, thereby positioning itself to gain first-mover advantage once international regulations are finalised[74][76].

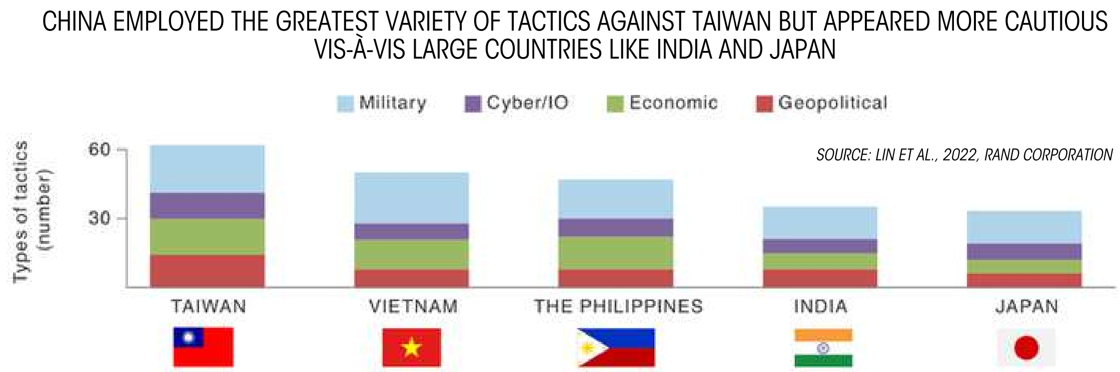
DEEP-SEA MANNED SUBMERSIBLE *JIAOLONG* BEING LOWERED INTO THE SEA

SOURCE: CGTN

Moreover, China has also exploited the ambiguity surrounding marine scientific research under the UNCLOS. Since the convention does not clearly distinguish scientific research from military surveys, China has employed research vessels for "dual civilian-military seabed mapping". For instance, Australian authorities reportedly described a survey by China's Xiang Yang Hong 01 near Christmas Island as intended to study the routes of Australian submarines travelling to and from the South China Sea. [15] [77].

FROM LEGAL AMBIGUITY TO GREY-ZONE COMPETITION

While the use of legal ambiguity forms only one component of China's broader grey-zone strategy, it is also employing legal, technological, economic and coercive diplomacy to gradually alter the regional status quo while remaining below the threshold of armed conflict[79].



Some of these tactics include:

- **Little Blue Men -** The Chinese government uses civilian fishing fleets that are actually in coordination with the state and the PLAN. These vessels are then used to collect and report maritime intelligence, along with being used for coercive missions, some of which include swarming disputed waters, obstructing foreign ships, monitoring other countries' naval movements, and reinforcing territorial claims over islands like the Spratly Islands or Scarborough Shoal, and increasingly Taiwan[80][86].

- **Dual-use Infrastructure -** China has built or invested in over 115 ports overseas as part of its Belt and Road Initiative[98]. Officially, these function as commercial shipping hubs and logistic centres, as well as to help support Chinese diplomatic efforts in Africa, as well as to assist Chinese citizens in Africa. However, there is a high possibility that these ports possess potential military utility as they provide China with a strategic foothold across multiple regions. Djibouti base of China being one of the examples of a commercial port that also serves military purposes. This base reflects a growing emphasis on maritime military interests of the Chinese equities in Africa, keeping in line with Beijing declaring the protection of "overseas interests" to be a foreign policy priority. China also has potential naval bases in Sri-Lanka, Pakistan, Tanzania, Mauritius, Maldives and Myanmar, where a significant Chinese diaspora lives[85].
- **Underwater surveillance -** These include projects such as the Blue Ocean Information Network, which involve building a "wall" of sensors, underwater communication systems and AUVs. While this network is officially being built to monitor the environment and for scientific observation, it can also be used for submarine detection and maritime domain awareness[88].
- **Maritime Salami-Slicing -** China has been constructing artificial islands on disputed maritime features. Reefs that are actually claimed by other countries, such as Vietnam, the Philippines, and Taiwan, have been dredged and turned into artificial islands. These artificial islands have runways, ports, and military bases, and act as outposts that help China extend its reach, coverage, and also support sustained military presence in the South China Sea. China maintains that these islands are only for defense purposes, but most countries view them as offensive bases, creating a security dilemma[88].

This security dilemma has a high chance of increasing friction in the South China Sea, as China's presence shifts from sporadic episodes to more calculated and continuous operations.

These developments have prompted greater coast guard deployment, maritime surveillance missions and naval patrols by regional states, increasing the risk of naval stand-offs and broader regional confrontations.

GREY-ZONE TACTICS LIKE WATER CANNONS BEING EMPLOYED BY CHINA AGAINST PHILIPPINE VESSELS

SOURCE: REUTERS

One such example is India. Earlier, India was cautious of 'provoking' China, so much so that India was initially reluctant to embrace the Indo-Pacific concept when it was conceived in the early 2000s. A key reason for this was the Indian perception that this concept might be aimed at 'containing' China, and so India sought to carefully balance relationships with both the West and China.

However, as China's economic and political involvement in South Asia kept on increasing and the tensions along the Line of Actual Control (LAC) escalated in 2020, India embraced the concept and has since undertaken many initiatives to strengthen and consolidate its position in the Indo-Pacific region. India has also interpreted the ambiguities present in UNCLOS from a more defensive approach, mainly to restrict foreign military activity within its EEZ, while continuing its own surveillance and anti-submarine activities across the Indo-Pacific, as part of its broader goal of strengthening maritime domain awareness. While India's actions are largely regarded as defensive, China's actions are increasingly being associated with expansionism and power projection[78].

INDIA'S APPROACH TO THE INDO-PACIFIC

India’s approach to the Indo-Pacific has consistently been guided by the principles of inclusiveness, cooperation and a rules-based maritime order. This approach centers on “boosting economic ties, building strategic partnerships, and fostering cultural exchanges, particularly with Association of Southeast Asian Nations (ASEAN) countries.” Through initiatives such as the Act East Policy, Security and Growth for All in the Region (SAGAR), and the Indo-Pacific Oceans Initiative (IPOI), India aims to promote a rules-based international order.

SAGAR represents India’s vision for the Indian Ocean region, that is all-inclusive of security cooperation, trade and economic integration, capacity building and disaster management, sustainable marine resource management, and connectivity and infrastructure development. The Act East Policy adopts a more proactive approach, and recognises that mere economic participation is not sufficient. Instead, it emphasizes stronger connectivity, cultural engagement and strategic partnerships. In this regard, India has also entered into an alliance with Japan, which allows it to enhance its strategic maritime presence and balance China’s growing influence in the Indo-Pacific region[89].

At a strategic level, India has also been looking to build collaborative alliances. Its foreign policy has stressed autonomy, positioning itself as a regional leader. India’s participation in ASEAN and the Quad - the Quadrilateral Security Dialogue, which comprises the United States, Japan, India, and Australia reflects its growing role in regional maritime security. They have undertaken military exercises such as the annual Malabar Exercise, which sends a clear strategic implication[89]. Beyond ASEAN and Quad, India has launched the Forum for India-Pacific Islands Cooperation (FIPIC) in 2014, which is a multinational grouping between India and 14 Pacific island nations. India has also launched the Indo-Pacific Oceans Initiative (IPOI), a framework that promotes a free, open, and stable maritime domain.

Apart from the Malabar exercise, Quad has also operationalised its agenda to secure the subsea domain. It has undertaken initiatives such as "*The Quad Partnership for Cable Connectivity and Resilience*", where the Quad seeks to improve the region's connectivity via the development of resilient infrastructure, specifically submarine cables, as they are a key type of information infrastructure. They hope to achieve this by drawing on the Quad countries' "expertise in manufacturing, delivering and maintaining cable infrastructure". Quad also launched the "*Quad Critical Minerals Framework*" to strengthen economic security and collective resilience by collaborating to "secure and diversify critical minerals supply chains".

India has also strengthened its strategic presence across the Indian Ocean through what is often described by strategic analysts as the 'Necklace of Diamonds' - a network of partnerships and access arrangements with key ports such as Changi Naval Base in Singapore, Sabang Port in Indonesia, Chabahar Port in Iran and Duqm Port in Oman. Although it is not an officially declared strategy, it reflects India's efforts to enhance its operational reach in the Indian Ocean region.

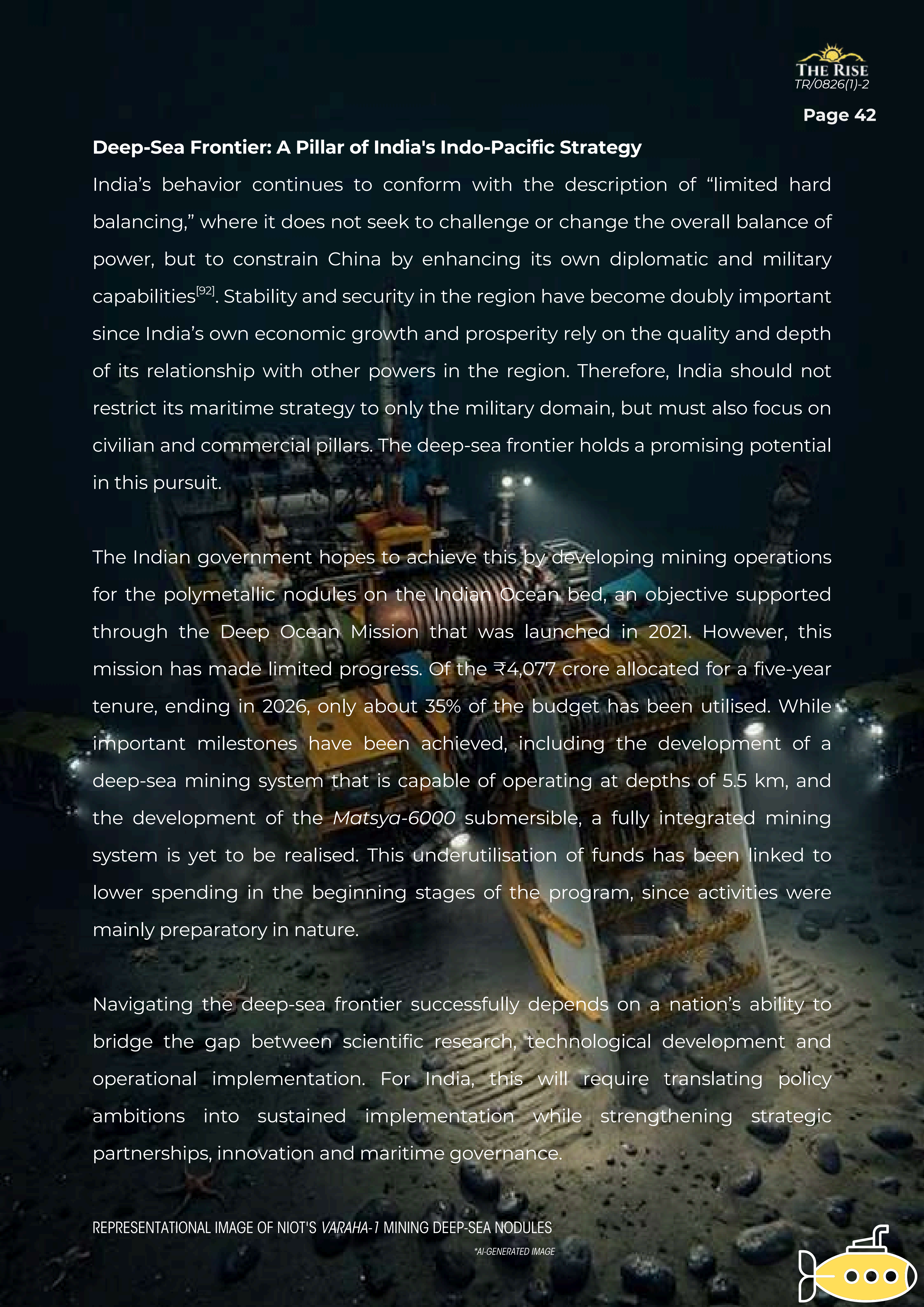
MALABAR EXERCISE 2020
SOURCE: AP

Deep-Sea Frontier: A Pillar of India's Indo-Pacific Strategy

India's behavior continues to conform with the description of "limited hard balancing," where it does not seek to challenge or change the overall balance of power, but to constrain China by enhancing its own diplomatic and military capabilities[92]. Stability and security in the region have become doubly important since India's own economic growth and prosperity rely on the quality and depth of its relationship with other powers in the region. Therefore, India should not restrict its maritime strategy to only the military domain, but must also focus on civilian and commercial pillars. The deep-sea frontier holds a promising potential in this pursuit.

The Indian government hopes to achieve this by developing mining operations for the polymetallic nodules on the Indian Ocean bed, an objective supported through the Deep Ocean Mission that was launched in 2021. However, this mission has made limited progress. Of the ₹4,077 crore allocated for a five-year tenure, ending in 2026, only about 35% of the budget has been utilised. While important milestones have been achieved, including the development of a deep-sea mining system that is capable of operating at depths of 5.5 km, and the development of the *Matsya-6000* submersible, a fully integrated mining system is yet to be realised. This underutilisation of funds has been linked to lower spending in the beginning stages of the program, since activities were mainly preparatory in nature.

Navigating the deep-sea frontier successfully depends on a nation's ability to bridge the gap between scientific research, technological development and operational implementation. For India, this will require translating policy ambitions into sustained implementation while strengthening strategic partnerships, innovation and maritime governance.



REPRESENTATIONAL IMAGE OF NIOT'S *VARAHA-1* MINING DEEP-SEA NODULES

*AI-GENERATED IMAGE

Key Findings

China and India are arguably two of the most important players currently in the Indo-Pacific domain. However, their approaches to this region vary widely – China operates as an assertive maritime power seeking to reshape the region's balance of power in its favour, while India positions itself as a "Voice of the Global South," as a stable, but key, actor that advocates for cooperation and open dialogue for nations focusing on preserving freedom of navigation, strengthening regional partnerships, and maintaining a favourable balance of power within the Indo-Pacific framework.

- The underwater battlespace is highly challenging, **easy to attack but difficult to defend** due to poor visibility, complex hydrological conditions, and acoustic variability. Also, the operational space is vast, encompassing both vertical domains (shallow to deep water, seabed, and associated air, space, cyber, and electromagnetic spaces) and horizontal domains (near-shore, offshore, and the open ocean).
- The Chinese government has been investing heavily in the development of AUVs since the 1990s. This investment is a reflection of President Xi Jinping's vision of the **"three deeps" - deep space, deep earth, and the deep ocean**. In a 2025 Defence White Paper, one of the strategic priorities of the Chinese government included "safeguarding national territorial integrity and maritime rights and interests," putting it on the same pedestal as other core priorities such as maintaining the Party's ruling status and preserving the socialist system. In this regard, China is looking to build technology that serves a dual-purpose, with both civilian and military applications.

- Project 75, India's "naval modernisation" programme, was approved in 1999 with the objective of constructing 24 submarines in 30 years to replace the aging fleet of submarines that would soon be retired, to establish two lines of production, and achieve self-sufficiency in the production and manufacturing of submarines by 2029. However, despite more than two decades of implementation, India has only managed to induct 6 submarines, while the remaining **projects continue to face procurement delays or remain at the planning stage**. The next-generation program, Project 76, aims to develop India's first fully indigenous conventional diesel-electric submarine, with a long-term objective of constructing 12 submarines, which are touted to be traditional diesel-electric attack submarines with air-independent propulsion systems
- China launched, in March 2026, a "deep-sea all-weather floating research facility" in Shanghai. It has been built to operate in harsh offshore conditions and support long-term research at sea. Formally called "Open-sea Floating Island," it is the world's first ultra-large marine research facility of its kind. While **India currently does not have a permanent deep-sea laboratory**, it is planning to build the world's deepest underwater lab at 6,000 meters, and aims to be launched in 2047.
- In the Indo-Pacific, legal frameworks and strategic choices shape how States exercise influence, assert maritime claims, and protect their interests beneath the sea. The region has consequently emerged as a theatre where international law, power projection, and geopolitical competition intersect. Despite providing the principal legal framework governing maritime affairs, **several provisions of UNCLOS have remained open to interpretation, particularly with respect to military activities, marine scientific research, deep-sea resource exploration, and seabed infrastructure**. Moreover, due to a lack of central enforcement authority, disputes remain merely managed rather than conclusively resolved. States are also not obliged to participate in the arbitration process and accept its outcomes.

- The overarching theme of Chinese strategy is to expand and deepen its economic, security, strategic, political, military, and technological influence in the Indo-Pacific region, while also reducing the standing and influence of the United States in the Indo-Pacific and regional rivals like India and Japan. This sentiment is evocative of Sun Tzu's assertion that "*The supreme art of war is to subdue the enemy without fighting*."

This analysis demonstrates that maritime competition is no longer determined solely by naval strength; investment in new technological capabilities, legal interpretation, infrastructure to support the maritime ecosystem, and diplomatic partnership have become equally important instruments of maritime influence. This is especially true in the context of deep-sea space emerging as the new frontier of strategic competition. Complex and fast-paced technological advancements, the challenging environment in deep-sea, contesting seabed claims, increasing dependence on critical minerals, lack of legal clarity on deep-sea resource benefit sharing, definitional ambiguities in exploration vis-á-vis exploitation, emergence of AI-enabled autonomous lethal systems, and the era of informatized warfare are all challenges that India must reckon with going forward to shape the balance of power in the Indo-Pacific deep sea.

Conclusion

The newest frontier for geopolitical competition and strategic might is now the deep-sea frontier. Most of the technologically advanced countries have already been making strides in enhancing their underwater capabilities, by building on deep-sea technologies and expanding naval assets to assert their maritime influence. In the Indo-Pacific region, China has emerged as a dominant player, who has been investing in building comprehensive underwater ecosystem to enhance its operational capacity and influence in the deep-sea domain.

India, too, has realised the importance of this emerging domain, and has been making steady advances in this regard. Through initiatives such as the Deep Ocean Mission, Project 75, Project 75(I) and investments in Defence Public Sector Undertakings (DPSUs), India is also making advances in research and development in technologies such as Autonomous Underwater Vehicles (AUVs), submarines, and anti-submarine warfare capabilities such as torpedoes. However, India's deep-sea ecosystem continues to rely on foreign technology and critical components, highlighting the gap that still exists between technological ambition and industrial capability.

Thus, as the competition increasingly extends beneath the sea, the future balance of power in the Indo-Pacific will depend not only on military strength, but also on sustained investments in innovation, institutional capacity, and the ability to translate long-term strategic vision into operational capability.

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