

Issue

Brief

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Indian Ocean Seabed Defence: Lessons from Europe

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Abstract

Contemporary seabed warfare in Europe should be viewed as a warning for Indian Ocean littoral states, especially sophisticated regional maritime powers such as India and Australia. The Ukraine–Russia conflict has brought seabed warfare to the fore, as seabed critical infrastructure is once again the target of international conflict. This brief surveys European seabed warfare developments since 2021, how various European actors are responding, and examines the Indian Ocean region’s expanding seabed infrastructure networks and offers recommendations relevant to India and Australia. Using news coverage, government strategies, and insights from interactions with experts, this brief delves into the challenge of protecting civilian seabed critical infrastructure. It explores the rapidly evolving seabed threat, to both inform and warn decision-makers, as well as to examine emerging responses which could be adapted for the Indian Ocean region.

The Ukraine–Russia conflict in Europe has brought seabed warfare^a to the fore, as seabed critical infrastructure has once again become the target of international conflict. Seabed warfare developments in Europe should be viewed as a warning for Indian Ocean littoral nations, as they have time to learn from the European case study, acquire the required capabilities, and develop robust strategies. This brief outlines lessons for India and Australia, as the two most influential resident Indian Ocean littoral nations both possessing sophisticated maritime capabilities.

Carr et al. (2018) define ‘seabed warfare’ as “operations that involve undersea networks and systems capable of operating on the seabed, interacting with seabed systems, and taking actions against other systems.”¹ Essentially, seabed warfare refers to operations incorporating the sea floor, targeting cables (data and power), sensors and energy transmission, and extraction infrastructure. Seabed warfare and targeting seabed critical infrastructure is not a new threat. The first commercial telegraph cable was laid across the English Channel in 1850 and the first trans-Atlantic cable became operational in 1858. During the First World War, the German light cruiser, the *SMS Emden*, targeted and destroyed a cable landing station on Cocos Island to cut British and Australian communications; in the Cold War, the United States (US) tapped a Soviet cable in the Sea of Okhotsk as part of Operation Ivy Bells. Further, the Snowden Wikileaks revelations in 2013 illuminated how submarine cable traffic is monitored and intercepted by intelligence agencies.²

According to Christian Bueger and Tobias Liebetrau (2021), submarine cables suffer from a “triple invisibility” problem: first, invisible as infrastructure; second, invisible due to their existence “under the surface;” and third, invisible traversing vast distances “out to sea.”³ This triple invisibility has resulted in a lack of research and understanding into best-practice governance, law enforcement, and emergency management, as well as how actors interact in different regions.⁴ Seabed security, especially in the Indian Ocean context, has received little scholarly or policy attention, alarmingly so due to the vulnerability facing many littoral nations.

a The terms ‘seabed defence’ and ‘seabed warfare’ will be used interchangeably throughout this Issue Brief.

Introduction

Due to the contemporary nature of seabed warfare, this brief relies on news reports, government strategies, and interactions with various experts to draw insights and formulate recommendations. Further, due to the opacity of military seabed submarine detection equipment and associated infrastructure, this brief limits its analysis to civilian seabed critical infrastructure, including submarine telecommunication cables, seabed electricity cables, offshore renewable energy, and seabed gas pipelines. While several examples analyse Russian activity, it should be noted that all sides are playing offence. As this area of research is dynamic and opaque, the available information is limited. Despite that, this brief outlines a cautionary tale, and seeks to explore the threat that has rapidly evolved since 2021. The aim is to both inform and warn decision-makers, as well as analyse emerging responses which could be adapted and modified for the Indian Ocean region.

“Indian Ocean littoral states have time to learn from the European case study, acquire the required capabilities, and develop robust strategies.”

Seabed Warfare in Europe

Since 2021, attacks on Europe’s critical seabed infrastructure have caused alarm in many regional capitals, including Moscow. This section outlines recent developments related to Europe’s seabed infrastructure.

Nord Stream sabotage

The Nord Stream 1 and 2 sabotage in September 2022 represented a return to the familiar—where seabed infrastructure is destroyed during wartime. Nord Stream was a series of offshore natural gas pipelines in the Baltic Sea, which connected Russia and Germany directly and supplied other Western European nations with energy. Nord Stream had been opposed by the United States (US) since its inception, but supported by Germany. Three explosions were reported on 26 September 2022, which destroyed three of the four pipelines, and methane was released into the Baltic Sea. Nord Stream is currently not operating, exacerbating Europe’s energy crisis. Due to the sophistication of the attacks, the perpetrators were most likely a state-based group.⁵ The attack demonstrated a willingness of the warring parties to target seabed infrastructure to achieve military, political, and economic aims. The incident proved to regional governments that seabed infrastructure is a legitimate target, and its over-reliance should be carefully considered.

While the perpetrators of the Nord Stream pipeline attacks are yet to be identified, certain Western media outlets claim that the US Central Intelligence Agency (CIA) knew of a Ukrainian plan to destroy the pipeline and warned against the attack.⁶ Even though this theory is yet to be confirmed, it remains plausible at the time of writing. In response to these accusations of US complicity, in June 2023, Russia’s Deputy Head of the Security Council Dmitry Medvedev, said, “We [Russia] have no constraints—even moral—left to prevent us from destroying the ocean floor cable communications of our enemies.”⁷ The Nord Stream pipeline sabotage has raised tensions between Russia, Ukraine, and Europe, worsened Europe’s energy crisis, and demonstrated that seabed critical infrastructure is again now in the crosshairs.

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Russia's suspected seabed surveys

Russian ships have been actively surveying seabed critical infrastructure in recent years across Europe. For instance, Russia's *Yantar* survey ship was tracked loitering off Ireland's coast in August 2021. *Yantar* is suspected of conducting intelligence missions, including laying cable taps, removing foreign taps from Russian cables (known as delousing), and cable cutting.⁸ In August 2021, *Yantar* loitered around the route of the future Celtic Norse cable (which will connect Ireland and Norway) as well as AECConnect-1, which links Ireland to the US.⁹ Despite this, the Irish Naval Service noted that it was aware of the *Yantar*'s location within Ireland's exclusive economic zone (EEZ), but that the vessel's presence did not contravene the United Nations Convention on the Law of the Sea and the rights to traverse international waters.¹⁰

In November 2022, Russia's 147.8-metre-long Expeditionary Oceanographic Ship *Admiral Vladimirskiy* was observed loitering around offshore wind farms in Denmark and the United Kingdom (UK), seeming to be investigating undersea infrastructure.¹¹ Over the month of November, the vessel loitered around Moray, Beatrice, and Seagreen wind farms off Scotland before moving to England's Greater Gabbard Wind Farm and London Array Wind Farm. The *Admiral Vladimirskiy* then sailed back past Scottish wind farms and onto the site of Denmark's planned Hesselø Wind Farm via Denmark's Siri and Nini East oil fields. When approached by journalists at sea, masked men appeared on deck with Russian-style rifles and bullet-proof vests.¹²

The Dutch are particularly vocal in their fears of Russian sabotage against their seabed critical infrastructure. In response, a representative of the Dutch Military Intelligence and Security Service noted in February 2023 that "Russia is mapping how our wind parks in the North Sea function. They are very interested in how they could sabotage the energy infrastructure."¹³ According to a March 2023 report jointly prepared by the Netherlands' General Intelligence and Security Service and the Netherlands Defence Intelligence and Security Service, "The Dutch critical maritime infrastructure in the North Sea, which includes internet cables, gas pipes and windmill parks, could be vulnerable to sabotage. The Russian Federation is covertly mapping out this infrastructure and is undertaking activities that indicate espionage and preparatory actions for disruption and sabotage."¹⁴

Seabed Warfare in Europe

In May 2023, NATO's intelligence chief David Cattler warned that "there are heightened concerns that Russia may target undersea cables and other critical infrastructure in an effort to disrupt Western life, to gain leverage against those nations that are providing security to Ukraine;" he added that "the Russians are more active than we have seen them in years in this domain."¹⁵ Also in May, another NATO official expressed "strong suspicions" that Russia had mined European seabed infrastructure, adding that "somewhere in Moscow there are people sitting and thinking of the best ways they can to blow up our pipelines or cut our cables."¹⁶

In the same month, Russian warships monitoring its Black Sea gas pipelines came under attack by Ukraine. Russia's *Ivan Hurs* warship was unsuccessfully attacked in the Black Sea by Ukrainian uncrewed speedboats while monitoring the Turk Stream and Blue Stream gas pipelines.¹⁷ Both gas pipelines supply Turkey with Russian natural gas. The following month, Russia claimed that its warship *Priazovye* was attacked by six high-speed Ukrainian drone boats while monitoring the same Black Sea gas pipelines.¹⁸ Pro-Ukrainian groups subsequently distributed a video which purports to show that one explosively charged unmanned surface vehicle (USV) did reach the *Priazovye*, which ultimately escaped unharmed.¹⁹

The Russia-Ukraine conflict is ongoing at the time of writing, and seabed critical infrastructure targeting is causing alarm in various European capitals.

Regional cable disruptions

In addition to attacks associated with the Russia-Ukraine conflict, submarine cable sabotage is on the rise. In January 2022, saboteurs cut Norway's Svalbard cable, which links the Svalbard Satellite Station that connects satellite antennas and is the most northerly cable in existence.²⁰ While "human activity" is believed to have caused this damage, no party has yet been implicated.²¹ France also experienced several instances of cable sabotage in 2022. In April, a number of French cables were cut across multiple regions in a two-hour window, prompting an investigation by Paris's prosecutor's office.²² The Marseille-Lyon, Marseille-Milano, and Marseille-Barcelona cables were cut, and repairs were delayed while police conducted investigations.²³ While these cables were cut on land, the attack affected France's international internet connectivity. Although it is still uncertain who conducted the attack, it may have been caused by conspiratorial groups which are thought to have earlier been behind other attacks on French communications infrastructure.²⁴

Seabed Warfare in Europe

In October 2022, multiple French cables connecting Marseille were simultaneously sabotaged, causing severe disruptions.²⁵ The attack was described by Zscaler (which controls the network) CEO Jay Chaudhry as an “act of vandalism.”²⁶ It occurred at the same time as the Scottish Island of Shetland’s submarine cable was cut in two places while Russia’s *Boris Petrov* scientific research ship was in the vicinity.²⁷ The Shetland Islands are home to the RAF Saxa Vord radar station, which monitors Russian military activity in the airspace north of Britain and across the Norwegian Sea.²⁸ While some believe that Russia was behind the outage,²⁹ the consensus view is that the cables were damaged accidentally by a fishing vessel.³⁰ Nevertheless, the outage coinciding with France’s cable attack raised alarm in the region. France’s President Emmanuel Macron said in a televised address, “We have essential infrastructure which is beyond our territory: cables, satellites and oil and gas pipelines. We’ve been reinforcing their security since the start of the [Russia–Ukraine] war.”³¹

“In addition to attacks associated with the Russia - Ukraine conflict, submarine cable sabotage is also on the rise.”

Emerging Strategies and Acquisitions

In response to the threat from seabed attacks, several European nations and the UK are developing seabed warfare strategies and acquiring new capabilities. Russia's activity has spurred regional players to respond with new strategies and new naval acquisitions to safeguard seabed critical technology.

France

France is a leader in seabed defence strategy and in February 2022 publicly released its 'seabed warfare strategy.' The strategy aims to establish the seabed as a new domain (such as cyber and outer space), to better understand the seabed and monitor seabed activity down to depths of 6,000 metres.³² According to the comprehensive strategy, "the seabed is a discontinuous and complex environment that is hostile to man and difficult to reach."³³

To combat the seabed warfare threat, France's strategy articulated a roadmap, which includes the following:

1. Integrating seabed warfare into France's defence strategy (which includes definitions, frameworks, seabed knowledge, seabed monitoring, seabed operations and doctrines).
2. Defining governance of seabed warfare responses (includes creation of a permanent coordination organisation within the French Naval Staff to guarantee oversight and coherence).
3. Acquiring and developing required capabilities (including consolidating its Hydrographic and Oceanographic Capacity of the Future programme and its Maritime Mine Counter Measures of the Future programme, accelerating its Remotely Operated Underwater Vehicle and Autonomous Underwater Vehicle (AUV) programmes as well as developing France's defence technological and industrial base for seabed warfare).
4. Consolidating expertise in seabed warfare (includes human resources, skills, and partnership development).³⁴

Emerging Strategies and Acquisitions

This strategy is of particular note due to its public nature, in contrast to other nations which presumably have some sort of seabed strategy but is classified. Being a leader in seabed management is one of France’s ten strategic goals as articulated in its ‘France 2030’ investment plan. Noteworthy also is the fact that France holds extensive EEZ in the Indian Ocean,^b to which this plan will also apply.

The United Kingdom

Since 2021, the UK has responded publicly to seabed warfare and the threat to its seabed critical infrastructure. Britain’s 2021 ‘Defence in a Competitive Age’ report notes that “Russia is investing in and developing significant underwater capabilities, including deep-sea capabilities which can threaten undersea cables.”³⁵ Further, British leadership acknowledges that Russia is interested not just in the UK’s seabed infrastructure, but also those connecting the European continent.³⁶

As part of the UK’s investment in seabed warfare capabilities, it is acquiring two new multi-role ocean surveillance ships (MROSS) in 2023.³⁷ These MROSS were announced in 2021, and at the time of writing, only one has been delivered. While the exact capabilities of the ships are not disclosed, analyst Lee Willett understands that the MROSS programme will be dedicated to protecting cables and pipelines specifically, while deep-water mines will be managed separately.³⁸ Indeed, its procurement was fast-tracked in 2022 to respond to the imminent threat perceived by UK leaders. British Defence Secretary Ben Wallace said in January 2023 that “it is paramount at a time when we face Putin’s illegal invasion of Ukraine, that we prioritise capabilities that will protect our critical national infrastructure.”³⁹

Britain’s MROSS programme is managed by its Royal Fleet Auxiliary (RFA). Head of the RFA, Commodore David Eagles, in January 2023 upon receiving the first ship commented that “this is an entirely new mission for the Royal Fleet Auxiliary—and one we relish. We have been entrusted with supporting a key operation to safeguard the UK’s infrastructure, security and prosperity and that fills all of us in the RFA with pride. These are really exciting times.”⁴⁰

^b Réunion, Mayotte and the French southern and Antarctic lands.

Emerging Strategies and Acquisitions

NATO

Finally, at the behest of Germany and Norway, the North Atlantic Treaty Organization (NATO) has been examining its role in protecting seabed critical infrastructure.⁴¹ In reaction to the Nord Stream pipeline sabotage, both the European Union and NATO agreed in January 2023 to work in concert to protect critical seabed infrastructure. European Commission President Ursula von der Leyen accused Putin of “weaponising” energy.⁴² Subsequently, in February 2023, NATO both increased its North Sea and Baltic Sea patrols (both surface and air) in response to the heightened seabed warfare threat, and established a ‘Critical Undersea Infrastructure Protection Cell,’ which improves ties between government, experts, and the private sector.⁴³ The Cell, led by a former German military officer, intends to share best practices, “leverage innovative technologies,” and improve allied seabed infrastructure protection.⁴⁴ Little else is publicly known about the cell’s strategies, capabilities, or capacities.

“The threat of seabed attacks has spurred regional players to respond with new strategies and naval acquisitions to safeguard seabed critical technology.”

Indian Ocean Seabed Defence

There is no reason to believe that the seabed warfare trend currently taking place in Europe will not reach the Indian Ocean, should regional tensions heighten, especially with China. Despite these threats, the Indian Ocean's seabed is becoming a superhighway for cables and pipelines. Indian Ocean nations are currently at an advantage, having time to respond to the European experience to update capabilities and strategies.

The Indian Ocean is a conduit for submarine cables which both connect Indian Ocean nations and send data further afield. Just as global shipping is required to navigate Indian Ocean chokepoints, so too do submarine cables, which often follow sea lines of communication. Cables entering the Indian Ocean may transit the Cape of Good Hope, through the Gulf of Aden, via the Gulf of Oman, down the Strait of Malacca or via the Sunda Strait. Some cables traverse the ocean, such as the SAFE cable which connects South Africa and Mauritius to India and Malaysia, as well as the Oman–Australia Cable. While India is a hub for submarine cable landing sites (especially Mumbai and Chennai), which are also key vulnerabilities; Australia's Indian Ocean connections primarily land in Perth via the Sunda Strait from Singapore.

International subsea pipelines will also be of increasing importance in the Indian Ocean in the future, especially for India. Iran is considering extending its subsea natural gas pipeline from Oman to India, which would connect to Porbandar in Gujarat.⁴⁵ Further, a US\$5-billion undersea United Arab Emirates–India gas pipeline was proposed in May 2023, which would also connect to Gujarat. Proposed by international consortium, South Asia Gas Enterprise (SAGE), the 2,000-kilometre-long corridor would deliver 31 million metric standard cubic meters of gas per day to India under a 20-year contract.⁴⁶ Relatedly, India's Oil and Natural Gas Corporation (ONGC) off the country's west coast operates thousands of kilometres of subsea pipelines which connect major fields, including Mumbai High, Neelam and Heera, and Bassein.⁴⁷ Seabed mining exploration in the Indian Ocean is also taking place, where polymetallic nodules are in abundance.

In Australia, the government is prioritising establishing offshore renewable infrastructure, including offshore wind and solar farms, wave energy plants, and undersea interconnectors at various sites around the country's coast, including the Indian Ocean.⁴⁸ Earlier in 2023, Australia's first offshore wind zone in the Bass Strait was given government approval.⁴⁹ The country may also

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soon be exporting solar power to Singapore via the world's longest undersea high voltage direct current cable, the Sub Cable Australia–Asia PowerLink.⁵⁰ This cable, valued at over AU\$30 billion,^c would transmit solar-generated electricity via the Lombok Strait to Singapore, which currently relies on gas for the majority of its electricity generation. Lastly, Australia has extensive gas pipelines of its North West Shelf in the Indian Ocean connecting offshore extraction plans to the mainland.

These projects provide but a snapshot of existing and future seabed critical infrastructure projects associated with India and Australia in the Indian Ocean region.

Australia, India, and Seabed Defence

Australia's response to the emergence of seabed warfare has been mixed. In April 2023, Australia's Department of Defence announced the purchase of the 107-metre-long Norwegian flagged MV *Normand Jarl* to be renamed the Australian Defence Vessel (ADV) *Guidance*.⁵¹ Australia's Defence Department noted that the vessel will support “undersea surveillance systems trials, including the ability to deploy undersea crewed and uncrewed vehicles, and robotic and autonomous systems.”⁵² According to Australia's Deputy Secretary Naval Shipbuilding and Sustainment Tony Dalton, “[The Department of] Defence is demonstrating its commitment to providing a cutting-edge capability, which will expand the ADF's [Australian Defence Force] ability to deliver multiple undersea project outcomes.”

At the time of writing in 2023, the vessel is in Singapore for inspection and certification and will arrive in Australia later in 2023 bearing the Australian flag. Since announcing this acquisition, the exact role of the vessel is yet to be disclosed and statements have remained largely vague. Australia has not announced any seabed defence strategies, and its 2021 ‘Australian Government Civil Maritime Security Strategy,’ prepared by its Department of Home Affairs, does not attempt to deal with the unique challenges associated with protecting seabed critical infrastructure.⁵³ Australia's 2023 ‘Defence Strategic Review’ does engage with “undersea warfare,” but consideration seems limited to the Defence Department's role in anti-submarine warfare (AWS) rather than seabed critical infrastructure.⁵⁴

^c While the company behind Sun Cable entered into voluntary administration in January 2023, by mid-2023, the project was purchased and revived by Mike Cannon-Brookes, co-founder of Atlassian, a software company.

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India's response to seabed critical infrastructure protection has likewise been underwhelming, although various capabilities are under development. In March 2022, India announced that a contract to build two multipurpose vessels for the Indian Navy had been inked.⁵⁵ However, according to public statements, it is unclear whether this platform will be utilised in furtherance of seabed defence. These vessels are scheduled to be delivered in May 2025. India is also actively pursuing unmanned underwater vehicle projects, including an extra-large unmanned underwater vehicle (XLUUV) development project, which would see twelve XLUUVs delivered, each up to 50 metres long.⁵⁶

Assuming the prototype clears trials, the XLUUVs will be tasked with intelligence, surveillance, and reconnaissance, anti-submarine warfare (ASW), anti-surface warfare plus mine warfare, and may be armed with torpedoes, mines, and ten tonnes of externally mounted armaments.⁵⁷ Further, the capability of high endurance autonomous underwater vehicles (HEAUV) is also being pursued, which would engage in ASW and mine countermeasure operations, with a two-week endurance.⁵⁸ In July 2023, India's state-owned Garden Reach Shipbuilders and Engineers (GRSE) launched an Indian indigenous AUV which can be used for operations, including mine detection and disposal, and underwater surveys.⁵⁹ Smaller AUVs are also under development.

Despite these developments and acquisitions, India is not engaging with the unique threats of seabed warfare. Observer Research Foundation Senior Fellow Abhijit Singh noted in 2023 that "submarine communications cables landing in India have yet to be integrated into the country's critical information infrastructure system. More worryingly, no specialised agency has yet been tasked with safeguarding India's underwater infrastructure."⁶⁰ India's current thinking on seabed defence is primarily concerned with ASW, rather than the state and non-state threat to seabed-critical infrastructure.

Incorporating seabed warfare into national defence strategies

Due to the proliferation of seabed critical infrastructure, seabed defence is now a matter of public, not just military, concern. Thinking and debate on seabed defence should not remain security classified. At the very least, seabed warfare should be integrated into respective Australian and Indian defence strategies. More robust strategies would emulate the French model, and include elements

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such as defining governance arrangements for seabed warfare responses, outlining acquisition requirements as well as articulating how human resources and partnerships in seabed warfare should be developed.

Such a strategy would consider seabed warfare applicable to respective maritime approaches, territorial seas, EEZs, and areas of interest in the high seas. However, as seabed warfare is a new and still developing capability for India and Australia, strategies should focus on building capabilities, before capabilities can be incorporated into respective doctrines. By bringing the seabed and its protection out from the shadows, capabilities can be acquired, industries bolstered, and human resources trained.

“Seabed warfare should be integrated into respective Australian and Indian defence strategies.”

Unlike Europe, the Indian Ocean comprises various littoral and island nations, many of which do not possess sophisticated navies or coast guards, and none have an overarching military umbrella such as NATO. As littoral Indian Ocean states with sophisticated navies and coast guards, Australia and India should coordinate with these smaller nations in the region to monitor seabed infrastructure.

In May 2023, the Quadrilateral Security Dialogue (Quad) announced plans to create a 'Quad Partnership for Cable Connectivity and Resilience,' through which Australia will establish an 'Indo-Pacific Cable Connectivity and Resilience Program.'⁶¹ The US agreed to provide capacity building and technical assistance on submarine cable security systems through its 'CABLES programme,' which is worth US\$5 million.⁶² However, at the time of writing, it is uncertain whether these recently announced programmes will engage with the threats of seabed warfare, or whether activities will be limited to technical and best practice advice pertaining to submarine communication cables. These initiatives should engage with the wider subject of seabed warfare, and not be limited to cable protection and advising on new networks. While the Quad could be an avenue for cooperation, as Australia and India are the only Indian Ocean resident powers, the onus should be assumed by these two nations (and perhaps also France) to protect less technologically advanced neighbours.

Australia, India, and Indian Ocean nations must take note of the European seabed warfare threat. The Russia–Ukraine war has demonstrated that seabed infrastructure is again a legitimate war-time target for state and non-state actors alike. While seabed warfare is not a new phenomenon, the scale of new seabed infrastructure, and society's unprecedented reliance on said networks, means the threat is high and consequences are severe. The seabed domain deserves renewed attention, public contestation, and incorporation into national defence strategies. 

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