STRENGTHENING NEARCOAST SEARCH AND RESCUE:
A WHOLE-OF-SOCIETY APPROACH

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ABSTRACT

Coastal States are required to establish, operate and maintain effective Search and Rescue (SAR) services. India's responsibilities for such services, which begins from its coast, extends over an expansive region, and necessitates the use and coordination of all available national resources, including military resources. Collated data from over two years is indicative of the significant contributions of the community to locate and rescue people in distress at sea, especially nearshore. Therefore, strengthening SAR services nearshore could benefit from a 'whole-of-society' approach.

Introduction

The International Convention of Maritime Search and Rescue Convention, 1979 (SAR 1979) defines 'search' as an "an operation, normally coordinated by a rescue co-ordination centre or rescue sub-centre, using available personnel and facilities to locate persons in distress."[1] Distress at sea, could be the result of medical emergencies, bad weather, equipment failure, material damage, sabotage, criminal activities, etc.[2] Importantly, the notion of 'distress at sea' also includes persons in need of assistance who have found refuge on a coast in a remote location.[3] The convention also defines 'rescue' as an "operation to retrieve persons in distress, provide for their initial medical or other needs, and deliver them to a place of safety."[4] SAR, therefore includes both, locating persons in distress and bringing them to safety once located, including in coastal areas.

SAR missions, depending on the location of the distress, could need to be undertaken on the coast, nearshore, offshore, or in distant waters. The search to locate missing Malaysian Airlines MH 370 (2014) in the vast oceanic spaces in the South China Sea/ Indian Ocean, search of a missing Indian Air Force AN 32 transport aircraft over the Bay of Bengal (2016), SAR efforts for rescue of an Indian sailor in the Southern Indian Ocean at a distance of over 2,500 nm (2018),

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[1] 1979 International Convention On Maritime Search And Rescue, Annex 1.3.1.
[2] Prabhakaran Paleri, *Role of the Coast Guard in the Maritime Security of India*, 168.
[3] 1979 International Convention On Maritime Search And Rescue, Annex 2.1.1.
[4] 1979 International Convention On Maritime Search And Rescue, Annex 1.3.2 and 1.3.7.

search for missing Indonesian submarine KRI *Nanggala* in the Bali Sea (2021), and SAR efforts off the western coast and in the western Offshore Development Area (ODA) consequent to Cyclone *Tauktae* (2021), are notable examples of complexity of certain SAR missions, including in bad weather, and the need for specialised capabilities, including military capabilities, which may be required for SAR missions.[5] This article will however focus on nearshore, or coastal missions.

An analysis of the Information Fusion Centre-Indian Ocean Region (IFC-IOR) monthly reports— *Monthly Maritime Security Update* (MMSU)—from 2020 onwards shows that other than the Indian Navy and Coast Guard, the principal maritime agencies, a host of government agencies, private players, and individual citizens have contributed to SAR efforts as 'first responders,' especially nearshore.[6] These, amongst others include, the National Disaster Response Force (NDRF), the State Marine Police (SMP), merchant ships, offshore vessels, port authorities, fire services, forest department, several unnamed 'coastal/ national authorities,' fishers, life guards, social clubs, and locals. In particular, the IFC-IOR reports also bring out that in 2020 and 2021 the SMPs of the states of Andhra Pradesh, Maharashtra, Karnataka, and West Bengal were engaged in such missions.

Overall, the evidence clearly points to the SMP and the 'wider maritime community' having contributed robustly to the nearshore SAR activities, particularly those relating to boats and craft. The institution of a SAR award for 'ashore unit' category, in addition to the government-owned unit, merchant vessel, and fisher's categories of SAR awards, ostensibly since 2018-19 is also reflective of the greater engagement of coastal agencies in nearshore SAR.[7] The national SAR awards under the 'ashore unit' in the last three years have been awarded to the Tamil Nadu Coastal Security Group (CSG), Marine Police (Mandva, Maharashtra), and the Forest Department(Andaman & Nicobar).[8] A press release of the Ministry of Defence (MoD) in December 2021 highlighted the SAR award to a fisher and the Forest Department from Andaman and Nicobar validated 'the collaborative structures of SAR in the islands.'[9] It is these very 'collaborative structures' that need to be replicated across the country.

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[5] In 2018, the Indian Navy launched '*Operation Raksham*' to rescue the injured officer by deploying the Long-Range Maritime Reconnaissance Aircraft P8I to the Southern Indian Ocean— about 2700 nm (approx 5020 kilometers) from Kanyakumari— to rescue Commander Abhilash Tomy who had suffered a serious back injury. The Australian Rescue Coordination Centre at Canberra coordinated the rescue mission in conjunction with many agencies including the Australian Defence Department and the Indian Navy [Press Information Bureau: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1548810]

[6] The reports include a section on 'Maritime Incidents' which provide an overview of SAR efforts. However, specific details are not available.

[7] Indian Coast Guard (@IndianCoastGuard), "Shri Pradeep Singh Kharola, Secretary (Civil Aviation), GoI gave away 'SAR Award for best ashore unit' 2018-19 to Coastal Security Group Tamil Nadu during XVIII NMSARB meeting at Vigyan Bhawan today," Twitter, 18 December 2019, 5:32 PM, https://twitter.com/IndiaCoastGuard/status/1207269787228766210, accessed 18 March 2021.

[8] Indian Coast Guard, Press Release (nd), "Indian Coast Guard holds 19th National Maritime Search & Rescue Board Meeting," https://indiancoastguard.gov.in/WriteReadData/Tender/202111250217462790657NMSAR_Press_Brief_2021.pdf, accessed 06 April 2022.

[9] Ministry of Defence, 'Andaman & Nicobar Islands Fisherman and Forest Department awarded for saving precious lives at sea," Press Information Bureau, 02 December 2021, https://pib.gov.in/Pressreleaseshare.aspx?PRID=1777374, accessed 07 April 2022.

Broadly, maritime security and maritime safety are concerned with the prevention of, and response to, intentional damage and accidental damage respectively.[10] While 'safety,' in a maritime context, is a broad term encompassing specific issues in maritime sectors aimed at preventing accidental damage, the SAR organisation focuses on the safety of lives at sea.[11] The concept of maritime security has linkages with multiple concepts and dimensions, including those of marine safety and human security.[12] The desired ends of both, safety and security at sea include the protection of lives, and operationally both concepts employ the same (or similar) agents, and similar approaches. The concept of <u>coastal security</u>, which is considered as a sub-set of the wider concept of maritime security, therefore, also gets linked to the concept of maritime safety, especially in nearshore waters.

The chapeau to SAR 1979 notes the importance attached to establishment of adequate and effective arrangements for 'coast watching' and for SAR services by coastal states in several conventions.[13] The 1982 UNCLOS in particular requires that "coastal state shall promote the establishment, operation and maintenance of an adequate and effective search and rescue service regarding safety on and over the sea."[14] This article focuses on the dynamics of coastal or nearshore SAR and endeavours to explore measures at further strengthening existing mechanisms. [15]

Maritime SAR in India: History, Overview and Plans

India is a contracting state to SAR 1979, and deposited its instrument of accession on 17 May 2001.[16] SAR 1979 was subsequently revised in 1988 and 2004.[17] The Coast Guard was raised in 1977, and the Coast Guard Act, 1978 lists "measures for the safety of life and property at sea" as one of the duties and functions of the Coast Guard.[18] However, pending the 'buildup' of the Coast Guard, SAR was the responsibility of the Indian Navy till 1998 when the MoD

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[10] "Risk Prevention and Maritime Security," African Maritime Safety and Security Agency, http://www.amssa.net/intelligence/risk-prevention-and-maritime-security.aspx, accessed 18 March 2021.

[11] Prabhakaran Paleri, *Role of the Coast Guard in the Maritime Security of India* (Knowledge World: New Delhi, 2007), 168.

[12] Christian Bueger, "What is maritime security?," ScienceDirect, https://www.sciencedirect.com/science/article/pii/S0308597X14003327, accessed 18 March 2021.

[13] 1979 International Convention on Maritime Search And Rescue, Centre for International Law, National University of Singapore, Chapeau, https://cil.nus.edu.sg/wp-content/uploads/2019/02/1979-International-Convention-on-Maritime-Search-and-Rescue-1.pdf, accessed 18 March 2021.

[14] Article 92 (Duty to Render Assistance).

[15] 'Coastal waters' as per the Indian Maritime Security Strategy extends till 24 nm from the coast or the International Maritime Boundary Line (IMBL) whichever is closer; Coastal SAR, for the purposes of this article, pertains to SAR on the coast and nearshore.

[16] International Maritime Organisation, *Status of IMO Treaties* (02 March 2021), 430, https://wwwcdn.imo.org/localresources/en/About/Conventions/StatusOfConventions/Status%20-%202021.pdf, accessed 18 March 2021.

[17] "SAR Convention," International Maritime Organisation, https://www.imo.org/en/OurWork/Safety/Pages/SARConvention.aspx, accessed 18 March 2021.

[18] *The Coast Guard Act, 1978*, Section 14, India Code, https://www.indiacode.nic.in/bitstream/123456789/1734/1/197830.pdf, accessed 18 March 2021.

transferred the responsibility for SAR coordination to the Coast Guard.[19] However, SAR continues to be a mission under the benign role of the Indian Navy, and is undertaken so long as it does not interfere with military missions.[20] The nature of certain events also necessitate the deployment of specific military capabilities available with defence forces.

In 1987 a joint working group was constituted under the Nautical Adviser in the Directorate General of Shipping (DG Shipping) to give impetus to a dedicated maritime SAR organisation in India.[21] The group recommended the setting-up of a national board, and subsequently, in 2002, a government resolution established the National Search and Rescue Board (NSARB), with the Director General Coast Guard as the chairperson.[22] The National SAR Contingency Plan was also formulated the same year.[23] In 2003, the Indian Search and Rescue (INDSAR) reporting system was also established and the National Maritime SAR Manual (NMSAR) formulated.[24]

India is responsible for executing /coordinating SAR missions in the Indian Search and Rescue Region (ISRR).[25] The ISRR encompasses a 4.6 million square km area in the Indian Ocean, an area which is more than double the Indian Exclusive Economic Zone. The ISRR is divided into three areas, and Maritime Rescue Coordination Centres (MRCCs) located at Mumbai, Chennai and Port Blair oversee SAR coordination in allocated areas.[26] Notably, the MRCC at Mumbai is also a focal point for piracy and armed robbery. The MRCCs are supported by13 Maritime Rescue Sub-Centres (MRSCs) that are collocated with District Headquarters of the Coast Guard.[27] Currently, the NMSAR-2020 and the National Maritime SAR Plan (2013) are the guiding documents for maritime SAR in India.[28] In June 2021, the Government of India, accorded approval-in-principle for setting up 29 MRSCs to augment SAR services in India.[29]

The Director General Coast Guard is the National Maritime Search and Rescue Coordinating Authority (NMSARCA) and is also the chairperson of the NSARB.[30] The board meets annually to discuss policies, formulate guidelines and to assess the efficiency of the national maritime SAR

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[19] GM Hiranandani, *Transition to Guardianship: The Indian Navy 1991-2000* (Lancer: New Delhi, 2009), 32.
[20] National Maritime Search and Rescue Board, *National Maritime Search and Rescue Plan* (2013), 3, Indian Coast Guard, https://www.indiancoastguard.gov.in/WriteReadData/bookpdf/201512280637460050661SARPLAN2013.pdf, accessed 18 March 2021.
[21] Prabhakaran Paleri, *Role of the Coast Guard in the Maritime Security of India*, 170.
[22] Prabhakaran Paleri, *Role of the Coast Guard in the Maritime Security of India,* 171.
[23] Prabhakaran Paleri, *Role of the Coast Guard in the Maritime Security of India,* 175.
[24] Anup Singh, *Blue Waters Ahoy: The Indian Navy 2001-2010* (Harper Collins: Noida, 2018), 286.
[25] "National Maritime Search and Rescue Coordinating Authority," Indian Coast Guard, https://www.indiancoastguard.gov.in/content/447_3_NMSARCA.aspx, accessed 18 March 2021.
[26] "National Maritime Search and Rescue Coordinating Authority," Indian Coast Guard.
[27] National Maritime Search and Rescue Board, *National Maritime Search and Rescue Manual* (2020),18. https://indiancoastguard.gov.in/WriteReadData/bookpdf/202112240654491871725SAR.pdf.
[28] NMSAR-2020 superseded NMSAR-2010 in September 2020; "SAR Manuals," Coast Guard https://www.indiancoastguard.gov.in/content/448_3_Publications.aspx. accessed 18 March 2021.
[29] Ministry of Defence, "Year End Review – 2021 of Ministry of Defence," Press Information Bureau, 31 Dec 21, https://pib.gov.in/PressReleasePage.aspx?PRID=1786640, accessed 05 April 2022.
[30] "Search and Rescue," Indian Coast Guard, https://www.indiancoastguard.gov.in/content/329_3_SearchAndRescue.aspx, accessed 18 March 2021.

plan.[31] The Board has progressively been expanded and now comprises 31 members, representing the principal maritime stakeholders.[32] Four states/ union territories viz. Daman, Goa, Lakshadweep and Minicoy, and West Bengal are represented in the board by the police/ police department.[33] In addition to meetings of the NSARB, the Coast Guard also conducts beacon exercises, a biennial national exercises, and annual 'regional' exercises, workshops, and other training activities.[34] SAR Communication Exercises (SARCOMEX) are also conducted with neighbouring MRCCs. Towards fostering international cooperation, the Coast Guard has been designated as the Indian implementing agency for SAR in Indian Ocean Rim Ocean Association (IORA).[35] For the promotion of safety and security awareness, including SAR, the Indian Naval Hydrographic Office (INHO) has also published a free downloadable *Indian Maritime Safety and Security Chart* which depicts the ISRR and all adjoining SRRs across the Indian Ocean.[36]

As the MRCCs and MRSCs are also offices of the Coast Guard, these centres are also interfaced with over 200 coastal police stations manned by the SMP under the 'hub-and-spoke' model for coastal security, and to 20 naval stations of the Indian Navy through the National Command Control Communication and Intelligence (NC3I) network for information sharing.[37] In effect, the coastal security construct has helped in furthering inter-agency coordination, and there can be little doubt that the construct has also contributed to strengthening the underlying measures for SAR in India.

Strengthening Nearshore/ Coastal SAR

Having discussed the unique dynamics of nearshore SAR as has emerged from reports over the past two years, and the contours of the development of the SAR organisation in India, this section discusses possible ways for further strengthening existing mechanisms nearshore/ coastal SAR.

Strengthening Local Capacities. The SMP was raised on the recommendation of the Report of the Group of Ministers on National Security (2001) for security of coastal borders and is present in more locations than other maritime security agencies combined. About the same time, Indian acceded to the SAR 1979 and the national SAR organisation began taking shape.

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[31] Indian Coast Guard, Press Release (nd), "Indian Coast Guard holds 19th National Maritime Search & Rescue Board Meeting."
[32] "NMSAR Board Members," Indian Coast Guard, https://www.indiancoastguard.gov.in/content/1675_3_BoardMembers.aspx, accessed 18 March 2021; Indian Coast Guard, Press Release (nd), "Indian Coast Guard holds 19th National Maritime Search & Rescue Board Meeting."
[33] "NMSAR Board Members," Indian Coast Guard.
[34] Beacon exercises are undertaken to check efficacy of satellite-based SAR beacons, and SAR Communication Exercise (SARCOMEX) are exercises to coordinate with other MRCCs. 'Regional' is perhaps indicative of Coast Guard Regions and does not have an international context.
[35] Indian Coast Guard, Press Release (nd), "Indian Coast Guard holds 19th National Maritime Search & Rescue Board Meeting."
[36] The chart is available on the website of the Indian Naval Hydrographic Office at https://hydrobharat.gov.in/wp-content/uploads/2019/07/5010.pdf.
[37] The NC3I Network links 20 naval and 31 coast guard nodes.

Accordingly, the National Maritime SAR Plan (2003) did not specifically reflect the SMP as a 'participating agency.'[38] Subsequently, the first phase of the Ministry of Home Affairs Coastal Security Scheme (CSS)—which led to the creation of the SMP— commenced in 2005 and was completed in 2011. While the duties of the SMP remain largely remained focused on security and law and order, the 2013 revision of the National Maritime SAR Plan included the SMP as a 'participating agency,' with the role of providing assistance when requested by the coordinating agency.[39] Progressively, the engagement of SMP in SAR efforts have expanded. As brought out earlier, the SMP in some coastal states have also coordinated local SAR efforts with partner agencies and local communities. In addition to their operational roles in SAR, some states are now represented by the SMP in the national SAR board, and the SMP have also been integrated into SAR exercises.[40] The recognition of the Maharashtra and Tamil Nadu SMP for their contribution to SAR as best 'ashore unit' is a testament to the contribution of the SMP in SAR.

A capable SMP is essential not for security, but as trends indicate, also for safety at sea. However, concerns have been raised about the overall effectiveness of the SMP as a seagoing force.[41] Further, while the present capacity of the SMP is limited to surface assets, maritime capacities also include aerial surveillance, and the ability to operate effectively by night. Therefore, capability building and capacity enhancement of the SMP are essential prerequisites. As the model for development of coastal policing entails support from the MHA to coastal states, both the centre and states have to partner towards ensuring that the several gains from coastal policing, such as for strengthening SAR response mechanisms, are progressively consolidated. This is even more so as maritime activities in India are poised to grow substantially considering the increasing focus on the blue economy and maritime connectivity. The wide presence of the SMP in over 200 locations makes it also well suited to coordinate nearshore SAR efforts in areas where the Coast Guard may not be present.

Former DG Coast Guard, Prabhakaran Paleri, noting the need for precision and speed in coordination in SAR missions, highlighted the need for "contingency plans at various levels with the national plan at the apex, and resource agency plans subordinate to it."[42] NMSAR-2020 also focuses on the need for local contingency plans for mass rescue operations.[43] Consequently, the role of the SMP, and other agencies that may be involved in coastal SAR such as the NDRF/ State Disaster Response Force (SDRF), fire services, forest department, lifeguards, etc could be reflected/ expanded in local SAR plans (and other documentation across levels of governance).

[38] National Maritime Search and Rescue Board, *National Maritime Search and Rescue Manual* (2010),181-82, Indian Coast Guard, https://www.indiancoastguard.gov.in/WriteReadData/bookpdf/201603180305291474292NMSAR_MANUA-2010.pdf, accessed 18 March 2021.
[39] Himadri Das, *Coastal Security: Policy Imperatives for India* (National Maritime Foundation: New Delhi, 2019), 93-94; National Maritime Search and Rescue Board, *National Maritime Search and Rescue Plan* (2013), 6.
[40] Special Correspondent, "Coast Guard simulates search and rescue," *The Hindu*, 31 December 2020, https://www.thehindu.com/news/cities/Mangalore/coast-guard-simulates-search-and-rescue/article33458363.ece, accessed 18 March 2021.
[41] Yogesh Naik, "The bold men & the sea," *Mumbai Mirror*, 31 January 2021, https://mumbaimirror.indiatimes.com/mumbai/cover-story/the-bold-men-the-sea/articleshow/80608006.cms, accessed 18 March 2021.
[42] Prabhakaran Paleri, *Role of the Coast Guard in the Maritime Security of India*, 172.
[43] National Maritime Search and Rescue Board, *National Maritime Search and Rescue Manual* (2020), 214.

Further, in addition to national-level meetings, regular institutional meetings between stakeholders at the state/ district levels, like in other areas of coordination, such as for intelligence sharing, countering drug trafficking, coastal security, etc, could also contribute to strengthening overall SAR effort. Regular training, exercises, workshops, including at the local levels, are also continuing imperatives. Public awareness could also be enhanced through contemporary approaches such as through the use of social media, and the internet.[44]

Technology Infusion-Maritime Domain Awareness. Some incidents in 2020 and 2021 reflect the increasing relevance of technology for SAR, including coastal SAR. On 26 November 2020, seven fishers on board a sinking boat were rescued off the Maharashtra coast after fishers from a nearby boat alerted the owner as well as the Maharashtra SMP through a satellite-based communication system.[45] Reportedly, in 2020, this was the third rescue effort at sea using the proprietary technology.[46] On 05 January 2021, in a mission coordinated by the Kerala SMP, a student helped rescue officials in locating four fishers marooned at sea off the coast of Thrissur using a drone.[47] Based on the rescue, the Kerala Fishing Boat Operator's Association was planning to submit a proposal to the state fisheries department for deploying drones for SAR.[48] Increasing use of technologies for SAR is therefore imperative, including for coastal SAR.

In addition to international systems for SAR, such as the COSPAS-SARSAT satellite system and the Global Maritime Distress and Safety System (GMDSS), multiple Indian agencies have developed several indigenous solutions for promoting safety and security at sea for fishers. These include, the Indian Space and Research Organisation (ISRO) satellite-based systems, such as the Distress Alert Transponder (DAT) designed specifically for providing SAR assistance at sea for smaller vessels; a transponder system for tracking of fishing vessels; and, the NavIC Messaging Receiver (NMR) which facilitates one-way alerts to fishers at sea through a mobile phone.[49] These devices are progressively being fitted on fishing vessels.[50] Earlier in 2016, Indian National Centre for Ocean Information Services (INCOIS) had developed a Search and Rescue

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[44] See, Himadri Das, "Community Outreach for Maritime Security in India: Need for a Contemporary Approach," National Maritime Foundation, https://maritimeindia.org/community-outreach-for-maritime-security-in-india-need-for-a-contemporary-approach/.

[45] Special Correspondent, "Technology comes to the aid of seven fishermen onboard sinking vessel", *The Hindu,* 03 December 2020. https://www.thehindu.com/news/cities/Mangalore/technology-comes-to-the-aid-of-seven-fishermen-onboard-sinking-vessel/article33235296.ece; See, Himadri Das, "Community Outreach for Maritime Security in India; Need for a Contemporary Approach," National Maritime Foundation. https://maritimeindia.org/community-outreach-for-maritime-security-in-india-need-for-a-contemporary-approach/

[46] Zach Winn, "Connecting machines in remote regions," Massachusetts Institute of Technology, 29 January 2021, https://news.mit.edu/2021/skylo-satellite-0129, accessed 18 March 18, 2021.

[47] Ramesh Babu, "Armed with drone, 19-year-old rescues 4 drowning fishermen off Kerala coast" *Hindustan Times*, 06 January 2020. https://www.hindustantimes.com/india-news/armed-with-drone-19-year-old-rescues-4-drowning-fishermen-off-kerala-coast/story-nvCNgclVlaxfuuG4Q4HuPP.html; See, Himadri Das, "Community Outreach for Maritime Security in India; Need for a Contemporary Approach,"

[48] Ramesh Babu, "Armed with drone, 19-year-old rescues 4 drowning fishermen off Kerala coast." Hindustan Times, 06 January 2021, https://www.hindustantimes.com/india-news/armed-with-drone-19-year-old-rescues-4-drowning-fishermen-off-kerala-coast/story-nvCNgclVlaxfuuG4Q4HuPP.html, accessed 18 March 2021.

[49] NavIC: Navigation with Indian Constellation; NavIC is an indigenous regional navigation satellite system with seven satellites

[50] SV Krishna Chaitanya, "Govt to fit transponders on 5K fishing vessels", *The New Indian Express*, 16 February 2020. https://www.newindianexpress.com/states/tamil-nadu/2020/feb/16/govt-to-fit-transponders-on-5k-fishing-vessels-2104026.html

Tool (SARAT) a software tool for identifying the most probable area for search operations at sea.[51]

The PRADHAN MANTRI MATSYA SAMPADA YOJANA, a flagship programme of the Department of Fisheries (DoF), launched in 2020, caters for the provision or safety kits, including Global Positioning System (GPS) and Navigation with Indian Constellation (NAVIC) receivers, SAR beacons, Distress Alert Transmitters (DATs), Automatic Identification System (AIS), and other lifesaving equipment, such as lifejackets, to fishers.[52] As of February 2022, Rs 5899.36 lakh had been sanctioned for providing 14,120 communication/ tracking devices and 1351 safety kits to fishers.[53] Considering the number of registered fishing vessels is around 2.5 lakh, there could be a need for encouraging fishers to benefit from the scheme. In 2018, a parliamentary committee recommended the use of all the satellite-based technologies, as well as voice communication systems, for improving safety of fishers at sea.[54] The PMMSY *inter alia* aims to establish linkages and convergence with other schemes, including for satellite-based communication/ tracking devices such as transponders for the fisheries sector.[55] Considering the availability of diverse technologies for improving safety of fishers (and small vessel operators) overall there is a need for harmonisation (and integration) of effort for optimal utilisation of the systems. Notably, regarding fishing vessels, NMSAR-2020, highlights that 'quick and concerted efforts' are needed to address the specific challenges and to minimise delay for SAR operations.[56]

Maritime Domain Awareness. INDSAR is a reporting system for coordinating SAR in the ISRR. The system is voluntary for foreign vessels, and mandatory for certain classes of Indian-flagged vessel.[57] At the time of institution, in 2003, INDSAR was the only solution to enhance domain awareness. In addition to INDSAR, the Indian Navy, along with DG Shipping, operates the Indian Ship Position and Information Reporting System (INSPIRES) and International Maritime Organisation-mandated Pre-Arrival Notification for Security (PANS) is mandatory for ships calling on Indian ports.[58] With the rise of piracy, merchantmen are also required to

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[51] "INCOIS developed SARAT- The Search And Rescue Aid Tool to save life and property at Sea," ESSO - Indian National Centre for Ocean Information Services, https://incois.gov.in/portal/osf/sarat.jsp, accessed 18 March 2021.

[52] Ministry of Defence, "Starred Question No. 155: Joint Study on Safety of Ships," 11 February 2022, Lok Sabha, http://164.100.47.193/Loksabha/questions/QResult15.aspx?qref=34143&lsno=17.

[53] Ministry of Defence, "Starred Question No. 155: Joint Study on Safety of Ships."

[54] Department-Related Parliamentary Standing Committee on Home Affairs, *Two Hundred Eleventh Report: The Cyclone Ockhi-Its Impact on Fishermen and damage caused by it*, 28, Rajya Sabha, https://rajyasabha.nic.in/rsnew/Committee_site/Committee_File/ReportFile/15/101/211_2018_7_11.pdf, accessed 18 March 2021.

[55] Department of Fisheries, *Pradhan Mantri Matsya Sampada Yojana*, 9-10. http://dof.gov.in/sites/default/files/2020-07/Book_PMMSY_Framework_0.pdf

[56] National Maritime Search and Rescue Board, *National Maritime Search and Rescue Manual* (2020), 176.

[57] Naval Hydrographic Office, *Indian Notice to Mariners Special Edition 2020*, 80-93, https://hydrobharat.gov.in/wp-content/uploads/2019/07/Special-Edition-2016.pdf, accessed 18 March 2021.

[58] Integrated Headquarters Ministry of Defence (N), *Ensuring Secure Seas" India's Maritime Security Strategy* (2015), 111; Coordinated by the Indian Navy, INSPIRES is used by Indian vessels above 100 GRT and on a voluntary basis by foreign vessels operating in the Arabian Sea/ Bay of Bengal; Coordinated by port authorities, PANS applies to all vessels intending to enter Indian ports.

voluntary report their position to other international centres as well. To reduce the reporting burden on seafarers, there is perhaps a need to harmonise these systems.

Since 2003 when the INDSAR system was developed, the concept of <u>Maritime Domain Awareness (MDA)</u>, driven by technology, such as Long-Range Identification and Tracking (LRIT) and AIS, has gained considerable traction; however, voluntary reporting still remains as one of the time-tested systems for developing MDA. The *Indian Maritime Doctrine* highlights that MDA enables more efficient coordination of maritime SAR.[59] While the NMSAR-2020 includes the multiple reporting and vessel identification system, a common operational picture developed by integrating all sources of information, such as through the NC3I Network is a *sine qua non* for operations at sea, including for SAR. Consequently, embracing MDA as an integrated concept, could further the aims of an effective national SAR organisation. The proposed National Maritime Domain Awareness (NMDA) is particularly important as it aims at developing a common picture across all maritime stakeholders using fused multiple-sensor information. Till the NMDA project fructifies, all efforts to integrate available sensors, databases, and agencies with the NC3I network must continue.

Information Dissemination. In 2017, Indian National for Ocean Information Services (INCOIS) with a private firm had developed an integrated message distribution system SAGAR VANI for dissemination of alerts to fishers using multiple channels of communication, include mobile telephony for nearshore fishers (SMS alerts).[60] In addition, the Coast Guard extensively employs multiple methods to warn fishers at sea at sea to developing extreme weather events. This includes deployment of ships and aircraft, warnings through shore-based communication, and systems such as the International Safety Net (ISN) and NAVTEX (Navigation Telex).[61] An integrated approach to information dissemination, including through the NMR and other indigenously developed satellite-based systems, could facilitate the widest distribution of alerts and maximise penetration of the message to the recipients. The Information Fusion Centre-Indian Ocean Region (IFC-IOR) could also be integrated with the overall information dissemination mechanism, especially for international information sharing.

Conclusion

The IFC-IOR monthly reports over the period 2020-2022 are indicative of the active involvement of the SMP, along with other agencies, and the community, in nearshore SAR. The progressive involvement of the SMP, and other shore-based agencies, in maritime SAR augurs well for overall safety at sea, and the institution of an award of best 'ashore unit' for SAR by the NSARB is a testament to the increasing role of 'ashore units.' The national capacities for SAR

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[59] Integrated Headquarters Ministry of Defence (Navy), *Indian Maritime Doctrine* (2015),74. https://indiannavy.nic.in/sites/default/files/Indian-Maritime-Doctrine-2009-Updated-12Feb16.pdf
[60] Ministry of Earth Sciences, "Dr. Harshvardhan launches "Sagar Vani" - An Integrated Information Dissemination System," 27 July 2017, https://pib.gov.in/newsite/printrelease.aspx?relid=169162, accessed 18 March 2021.
[61] Ministry of Defence, "Indian Coast Guard Efforts for Cyclone 'FANI'," Press Information Bureau, 01 May 2019, https://pib.gov.in/Pressreleaseshare.aspx?PRID=1571411, accessed 19 March 2021.

were strengthened in the early 2000s with the establishment of the NSARB, the formulation of national plan and manual, the establishment of the INDSAR, etc. Progressively, the plan and manual have also been revised and a range of activities instituted to develop capacities for SAR. After the November 2008 Mumbai attacks, the coastal security construct in India also began taking shape with the setting-up of mechanisms for improved inter-agency coordination, development of MDA, and community participation. The raising of the SMP, and further capacity buildup of maritime security agencies after the attacks, has surely also contributed to strengthening national SAR capacities. Some areas which could contribute to improve safety at sea, especially in coastal areas, include: renewed focus on capacity-building and capability-enhancement of the SMP; strengthening local-level coordination; maximizing engagement with the community and other stakeholders, such as lifeguards and lighthouse keepers, including through social media; adopting technological solutions and harmonizing/ integrating them; and, bolstering efforts at developing comprehensive national-level MDA for a common operational picture across stakeholders, etc. In short, the community has emerged as a significant contributor for nearshore SAR, and national SAR mechanisms could benefit from a 'whole-of-society' approach.

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