MARITIME AIDS TO NAVIGATION IN INDIA: STRENGTHENING MARITIME DOMAIN AWARENESS AND SECURITY

Captain Himadri Das

Introduction

On 02 March 2021, Prime Minister Narendra Modi, while inaugurating the Maritime India Summit 2021, highlighted the government's plan to develop tourism around lighthouses.[1] Later that month, during his monthly interaction with the nation – "Mann ki Baat" – he spoke about lighthouses and highlighted the government's plan.[2] On 09 April 2021, the Directorate General of Lighthouses and Lightships (DGLL) issued an Expression of Interest (EoI) for the development of 65 lighthouse tourism projects through Public–Private Partnership (PPP).[3] This is in addition to eight lighthouses that were earlier identified for promotion of tourism through the PPP mode in 2018.[4] On 27 July 2021, the Parliament passed the Marine Aids to Navigation Bill, 2021, which repealed the 90-year-old Lighthouse Act, 1927.[5] The Bill inter alia provides for the development, maintenance and management of Aids to Navigation (AtoN) in India; training and certification of marine AtoN operators; and fulfilment of India's international obligation.[6]

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) has defined AtoN as "a device, system or service, external to vessels, designed and operated to enhance safe and efficient navigation of individual vessels and/or vessel traffic."[7] The Marine Aids to Navigation Act, 2021, while replicating the IALA definition, specifies that definition in the Act "shall not be construed to include a reference to vessel traffic services, unless otherwise

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[1] "PM's address at the inauguration of Maritime India Summit 2021," PMINDIA, https://www.pmindia.gov.in/en/news_updates/pms-address-at-the-inauguration-of-maritime-india-summit-2021/, accessed 16 Sep 2021.

[2] "PM's address in the 75th Episode of 'Mann ki Baat'," PMINDIA, https://www.pmindia.gov.in/en/news_updates/pms-address-in-the-75thepisode-of-mann-ki-baat/, accessed 15 May 2021. "Mann ki Baat" (inner thoughts) is a monthly radio programme hosted by Prime Minister Modi; the first episode was aired on 03 October 2014 and the 77th episode was aired on 30 May 2021.

[3] DGLL, "Expression of Interest for 65 Lighthouse Sites for Development of Lighthouse Tourism Projects on Public Private Partnership Mode," April 2021, http://sagarmala.gov.in/sites/default/files/EOI_65_Lighthouse_Sites.pdf, accessed 21 September 2021.

[4] Ministry of Ports, Shipping and Waterways (MoPS&W), "Beautification of Lighthouses," Press Information Bureau, 8 February 2018. https://pib.gov.in/Pressreleaseshare.aspx?PRID=1519897.

[5] MoPS&W, "Parliament passes landmark 'Marine Aids to Navigation Bill 2021' to repeal and replace the Lighthouse Act 1927," Press Information Bureau, 27 July 2021. https://pib.gov.in/PressReleasePage.aspx?PRID=1739608, accessed 10 September 2021.

[6] "The Marine Aids to Navigation Bill, 2021," PRS Legislative Research, https://prsindia.org/billtrack/the-marine-aids-to-navigation-bill-2021, accessed 15 May 2021.

[7] IALA, "S1070 Information Services," https://www.iala-aism.org/product/s1070-information-services/, accessed 21 September 2021.

specified".[8] Broadly, AtoN include visual aids, such as buoys, beacons and lighthouses; audible aids, such as fog signals; radio aids, such as radar beacons; and electronic navigation services, such as Differential Global Positioning System (DGPS), Automatic Identification System (AIS) and Vessel Traffic Service (VTS).[9] AtoN serve a number of important functions, such as navigational safety, port and coastal traffic management and marine environmental protection, and have increasingly found security applications, especially by contributing to developing Maritime Domain Awareness (MDA). With increasing global maritime traffic and related concerns about shipping safety and security, it has been assessed that the global requirement for AtoN services are likely to increase.[10] From a maritime governance perspective, development of AtoN infrastructure is considered an essential element of the maritime safety function.[11]

The relationship between the lighthouse administration and the Indian Navy is a long-standing one. In 1956, a contingent from *INS Tir* presented a Guard of Honour at a ceremony marking the transfer of Minicoy Island lighthouse from the British government to the Government of India.[12] In the 1971 India–Pakistan War, *MV Sagardeep,* a lighthouse tender requisitioned by the Indian Navy, was part of the Western Fleet.[13] During this conflict, the War Watching Organisation (WWO) instituted by the Indian Navy for the defence of Mumbai also included watchers at lighthouses.[14] Further, in 1973–74, *Sagardeep* took part in survey operations for delineation of the deep-water channel in the Gulf of Kutch for movement of very large crude carriers to refineries in Gujarat.[15] Besides this, at other times, the Indian Navy has provided assistance to the DGLL for supporting lighthouse maintenance activities. The DGLL has a particularly enduring relationship with the Naval Hydrographic Office (NHO) for issuance of information and alerts related to AtoN along the Indian coast. The Chief Hydrographer is also a member of the Central Advisory Committee for Lighthouses (CACL).[16] In 2015, the *Indian Maritime Security Strategy* recognised the DGLL as a key stakeholder in the coastal security

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[8] Section 2(1)(b) of the Marine Aids to Navigation Act, 2021 states: "'aid to navigation' means a device, system or service, external to vessels, designed and operated to enhance safe and efficient navigation of individual vessels and vessel traffic…". See MoPS&W, https://shipmin.gov.in/sites/default/files/Marine%20Aids%20to%20Navigation%20Act%202021as%20Notified.pdf.

[9] The VTSs are shore-side systems which range from the provision of simple information messages to ships, such as position of other traffic or meteorological hazard warnings, to extensive management of traffic within a port or waterway. International Maritime Organization (IMO), "Vessel Traffic Services," https://www.imo.org/en/OurWork/Safety/Pages/VesselTrafficServices.aspx, accessed 15 May 2021.

[10] "AtoN management and monitoring system market study for 2020 to 2027 providing information on key players, growth drivers and industry challenges," Cole of Duty, https://coleofduty.com/military-news/2020/05/30/aton-management-and-monitoring-system-market-study-for-2020-to-2027-providing-information-on-key-players-growth-drivers-and-industry-challenges/, accessed 10 September 2021.

[11] United States (US) Government, *Maritime Security Sector Guide* (2010), 8. https://2009-2017.state.gov/documents/organization/154082.pdf.

[12] R.K. Bhanti, *Indian Lighthouses: An Overview* (2000), n/n (web version). http://www.dgll.nic.in/WriteReadData/Publication/Publication_Pdf_File/LighthousesofIndia(2).pdf.

[13] Integrated Headquarters of Ministry of Defence (Navy), *Transition to Triumph: History of the Indian Navy 1965–75*, n/n (web version). https://www.indiannavy.nic.in/sites/default/files/Transition-to-Triumph-07Apr16.pdf.

[14] Integrated Headquarters of Ministry of Defence (Navy), *Transition to Triumph: History of the Indian Navy 1965–75*,

[15] Integrated Headquarters of Ministry of Defence (Navy), *Transition to Triumph: History of the Indian Navy 1965–75*,

[16] DGLL, "Minutes of the 85th Meeting of the Central Advisory Committee for Lighthouses (CACL) held on the 18th May, 2012 at 1500 Hrs at Transport Bhavan, New Delhi," http://www.dgll.nic.in/content/331_3_MinuetsofMeetingof85thCACL.aspx, accessed 17 May 2021.

construct developed after the November 2008 Mumbai attacks.[17] Progressively, the DGLL has also established linkages with other maritime security agencies as part of the overall coastal security construct. Earlier this year, the Coast Guard evacuated two DGLL personnel from Vengurla Rock lighthouse that had sustained damage during Cyclone Tauktae.[18]

This article aims to examine the contribution of AtoN in strengthening MDA and maritime security in India and possibilities of further consolidation, including at the regional level.

AtoN in India

The DGLL – a subordinate office under the Ministry of Ports, Shipping and Waterways (MoPS&W) – is responsible for the establishment and maintenance of AtoN along the Indian coastline.[19] At the time of independence, India had 17 lighthouses. In the 75 years since independence, there has been a significant expansion of AtoN in India to meet the growing needs of the shipping industry, as well as to keep abreast with technological developments.[20] Presently, the DGLL is responsible for the maintenance of 195 lighthouses, one lightship, 23 DGPS stations, 64 radar beacons, 21 deep-sea lighted buoys, one VTS (Gulf of Kutch), three lighthouse tender vessels, 87 National AIS (NAIS) physical shore stations and 16 Navigational Telex (NAVTEX) chain stations. In 2021–22, DGLL has planned to set up five additional lighthouses, and a VTS at Port Blair.[21]

In October 2020, the Minister of Shipping launched the development of an indigenous software for VTS aligned with the vision of 'Aatmanirbhar Bharat' (self-reliant India).[22] The indigenous software, being developed by National Technology Centre for Ports, Waterways and Coasts (NTCPWC), is envisaged to generate significant financial savings to the exchequer, as well as facilitate export of VTS systems to friendly countries.[23] The software will also potentially contribute to the implementation of the National MDA (NMDA) project of the Indian Navy and the National Coastal VTS (NCVTS) project of the DGLL.[24]

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[17] Indian Navy, *Ensuring Secure Seas: Indian Maritime Security Strategy* (New Delhi: Integrated Headquarters of Ministry of Defence (Navy), 2015), 109.
[18] "Goa Coast Guard rescues 2 from Vengurla lighthouse," *The Goan Everyday*, 19 May 2021. https://www.thegoan.net/goa-news/goa-coast-guard-rescues-2-from-vengurla-lighthouse/69563.html. See also Bhanti, *Indian Lighthouses: An Overview*.
[19] Ministry of Shipping, *Annual Report 2019–20*, 58. http://shipmin.gov.in/sites/default/files/Shipping%20Annual%20Report%20English_compressed.pdf; MoPS&W, "Parliament passes landmark 'Marine Aids to Navigation Bill 2021' to repeal and replace the Lighthouse Act 1927."
[20] MoPS&W, "Parliament passes landmark 'Marine Aids to Navigation Bill 2021' to repeal and replace the Lighthouse Act 1927."
[21] Rajya Sabha, *Two Hundred Ninetieth Report: Demands for Grants (2021–22) of Ministry of Ports, Shipping and Waterways* (March 2021), 47. https://rajyasabha.nic.in/rsnew/Committee_site/Committee_File/ReportFile/20/148/290_2021_3_12.pdf.
[22] MoPS&W, "Shri Mansukh Mandaviya launches 'Development of Indigenous Software solution for VTS and VTMS'," Press Information Bureau, 20 October 2020. https://pib.gov.in/PressReleasePage.aspx?PRID=1666070.
[23] NTCPWC, as a technology arm for the SAGARMALA programme, plays a key role in providing applied research (https://ntcpwc.iitm.ac.in/New/).
[24] The NMDA is envisaged to be the national-level MDA system fusing information from all available national sensors and databases into one system; and the NCVTS is as a real-time, interactive AtoN focused on coastal shipping.

The DGLL is also the designated authority on matters related to training on AtoN and VTS. The Marine Navigation Training Institute (MNTI) at Kolkata is responsible for training of AtoN managers and VTS personnel, not only from India but also from regional countries.[25] IALA has nominated India as the single point of contact for capacity building on AtoN training needs for North Indian Ocean Rim (NIOR) countries, as well as for three countries in Southeast Asia (Indonesia, Singapore and Malaysia).[26] The institute has also entered a memorandum of agreement with IALA World Wide Academy (IALA WWA) for assistance in the conduct of training courses at the MNTI.[27]

AtoN: Security Dimensions

From a security perspective, one of the transformative initiatives of the DGLL has been the setting up of the NAIS chain. The network of 87 stations has been integrated with the NC3I network. The NAIS, in addition to its primary AtoN function, also facilitates development of MDA and marine accident/incident investigations by the Directorate General of Shipping (DG Shipping).[28] The DGLL's contribution to the Coastal Surveillance Network (CSN) project has been significant, wherein coastal radars have also been set up within lighthouse premises.[29] Under Phase I of the CSN project, 46 coastal radar stations have been set up; and in Phase II, 38 additional radars stations, along with four mobile surveillance systems, are being set up.[30]

One of the highlights of the Marine Aids to Navigation Act, 2021 is the inclusion of provisions for VTS management.[31] While traditional passive AtoN systems, such as buoys and lighthouses, were focused essentially on safety, contemporary interactive systems, such as the AIS and VTS, have facilitated security uses, particularly in the development of MDA.[32] The VTSs are designed to promote "safety of life at sea, safety, and efficiency of navigation and protection of the marine environment", and are essentially interactive shore-based maritime traffic management systems (akin to air traffic services) within a port, fairway or designated VTS areas.[33] The complexity of such systems can vary significantly from just basic communication systems to complex systems integrating radars, AIS, cameras, communication systems, etc. From a security perspective, VTS, by closely monitoring and controlling shipping traffic, contributes to port security and in the development of MDA at ports, designated VTS areas, as well as adjoining coastal areas.

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[25] MNTI, "Welcome to MNTI," https://dgllmnti.in/, accessed 15 May 2021.
[26] MNTI, "About Us," https://dgllmnti.in/about-us, accessed 09 June 2021.
[27] MNTI, "Activities," https://dgllmnti.in/activities, accessed 15 May 2021.
[28] DGLL, "National Automatic Identification System (AIS)," http://www.dgll.nic.in/content/73_1_NAIS.aspx, accessed 15 May 2021.
[29] Ministry of Defence, "Defence Minister AK Antony inaugurates Maharashtra Cluster of Coastal Surveillance System," Press Information Bureau, 25 August 2012. http://pibmumbai.gov.in/scripts/detail.asp?releaseId=E2012PR3797.
[30] "Interview with DGICG," *Sainik Samachar*, http://www.sainiksamachar.nic.in/englisharchives/2019/sep16-19/h8.htm, accessed 15 May 2021.
[31] MoPS&W, "Parliament passes landmark 'Marine Aids to Navigation Bill 2021' to repeal and replace the Lighthouse Act 1927."
[32] MDA has been defined by the International Maritime Organization (IMO) as ""the effective understanding of any activity associated with the maritime environment that could impact upon the security, safety, economy or environment."
[33] IMO, "Vessel Traffic Services."

Localised VTS sensor information can be integrated with other MDA systems to facilitate wide area sensor coverage/correlation. In India, VTS information from the Gulf of Khambhat and Gulf of Kutch are also planned for integration with the chain of coastal radars in India as part of the second phase of the CSN project.[34]

In India, the first VTS was installed in Mormugao Port (Goa) in 2001; and presently, India has VTSs installed in all major ports, and in the Gulf of Khambhat.[35] The Gulf of Kutch VTS was installed by DGLL in 2012. In 2016, DGLL issued an EoI for preparation of a detailed project report for the establishment of an NCVTS system for seamless VTS coverage along the entire Indian coast. The project, like any other VTS system, was envisaged with the aim of enhancing safety and security, managing traffic, and contributing to marine environmental protection. However, the project now appears to be linked to the development of indigenous VTS software.[36] Two key criteria for establishing a VTS are the volume of traffic and the degree of risk. Therefore, VTSs are widely considered appropriate in specific areas, such as port approaches, high-density traffic areas, narrow channels, or other special areas associated with navigational difficulties, movements of hazardous cargo and environmentally sensitive areas.[37] Considering the focus on developing ports, port-led development, coastal and inland waterways, multi-modal connectivity, fisheries, coastal tourism, etc., an increase in marine traffic is inevitable, necessitating increased attention to maritime traffic management along the Indian coast. A national VTS system could possibly be progressively developed by linking existing VTS systems, establishing VTS systems in identified high-risk areas, and leveraging the sensor suite available with the CSN. If executed, the project has significant potential to improve safety along the Indian coasts, and strengthen MDA, by facilitating single-point integration of all VTSs with the National Command, Control, Communication and Intelligence (NC3I) Network.[38]

A significant step has been the passing of the Marine Aids to Navigation Act, 2021. An important aspect of this Act is the introduction of provisions for offences and consequential penalties. The offences include intentionally or negligently obstructing, or destroying, AtoN or VTS, causing damage to heritage lighthouse, evading payment of dues, and non-compliance with directions of a VTS provider.[39] The penalties include imprisonment up to a year and fines up to Rs 5 lakh. These provisions complement the provisions of the Suppression of Unlawful Acts against Safety of Maritime Navigation and Fixed Platforms on Continental Shelf Act, 2002

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[34] Indian Coast Guard, "Coastal Security," https://www.indiancoastguard.gov.in/content/1727_3_CosstalSecurity.aspx, accessed 09 June 2021. The CSN is a network of coastal radars.

[35] DGLL, "Expression of Interest for Hiring of consultant for preparation of Detailed Project Report (DPR) on Establishment of National Coastal VTS," December 2016, http://www.dgll.nic.in/WriteReadData/Pdf/16cc467f-41f9-4e7f-964e-7d7ec716c5f4.pdf, accessed 21 September 2021. Some non-major ports reportedly have VTS/plans for VTS.

[36] MoPS&W, "Shri Mansukh Mandaviya launches 'Development of Indigenous Software solution for VTS and VTMS'."

[37] IMO, "Vessel Traffic Services."

[38] The NC3I network links all Indian Navy and Indian Coast Guard stations and generates a common multi-sensor fused plot for all nodes of the system.

[39] See Sections 38–43 of the Marine Aids to Navigation Act, 2021.

related to destruction or damage to maritime navigational facilities and wilful communication of false information in relation to a ship.[40]

Strengthening Maritime Security

A report of the Department-related Parliamentary Standing Committee on Transport, Tourism and Culture in March 2021 recognised the "pivotal role played by the Lighthouses as they meet the country's commercial and security needs" and recommended that development and maintenance of AtoN must be given top priority.[41] The Committee also desired that an action plan be developed in this regard, and that technologies be adopted to facilitate tracking and surveillance for strengthening search and rescue (SAR) capabilities and coastal security.[42] Some of the possible areas for strengthening the security dimensions of the AtoN resources are enumerated in succeeding paragraphs.

Expanding the NAIS Network

India presently has 195 lighthouses, of which the NAIS chain's physical shore stations are located at less than half of the total number of lighthouses (87 locations). The range of AIS systems depends on several factors, such as the height of antenna and propagation conditions. Typically, the range is of the order of 20 nautical miles (37 kilometres) but practically, it could be several times higher.[43] While the NAIS has been designed to cover the entire Indian coast, and also caters for redundancies at each station, theoretically increasing the number of NAIS physical shore stations (including at new lighthouses), or installing additional AIS repeaters, could increase the overall area under AIS coverage, enhance redundancy, support the development of NCVTS and reduce gaps in coverage, especially at the extremities of sensor coverage of each station.[44] However, this would need to be examined based on practical performance parameters.

Expanding VTS Coverage and Capacity Building

As new ports are developed, and existing ports progressively expand their operational capacities for traffic/cargo handling, installation of additional VTSs (and the NCVTS) would also merit consideration.[45] The indigenous VTS software under development, which aims to facilitate interoperability with other port-related systems, would also need to be interoperable with security systems, such as the NC3I network. Further, like the indigenous coastal radar system that has been exported to several friendly foreign countries, the indigenous VTS software/system, when developed, could also be exported to friendly countries, and support the Indo-Pacific Oceans' Initiative (IPOI).

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[40] The Suppression of Unlawful Acts against Safety of Maritime Navigation and Fixed Platforms on Continental Shelf Act, 2002, Sections 3(e) and 3(f), India Code, https://www.indiacode.nic.in/bitstream/123456789/2009/1/A2002-69.pdf, accessed 17 May 2021.
[41] Rajya Sabha, *Two Hundred Ninetieth Report*, 79.
[42] Rajya Sabha, *Two Hundred Ninetieth Report,* 48.
[43] Navigation Centre, US Coast Guard, "How AIS Works," https://www.navcen.uscg.gov/?pageName=AISworks, accessed 10 September 2021.
[44] Naval Hydrographic Office, *Special Notice to Mariners* (2020), 103. https://hydrobharat.gov.in/wp-content/uploads/2019/07/Special-Edition-2016.pdf; Navigation Centre, US Coast Guard, "How AIS Works."
[45] Six new ports are envisaged under the SAGARMALA.

International Information Sharing

The IALA-NET is an Internet-based near real-time global AIS data exchange service between national competent authorities.[46] However, India is presently not sourcing data from the system.[47] The Indian Navy already shares white shipping information with over 20 countries on a reciprocal basis and operates the International Fusion Centre-Indian Ocean Region (IFC-IOR) with information-sharing linkages with about 50 partners.[48] Integrating the NAIS with the IALA-NET, and sourcing data from the IALA-NET, could facilitate a better understanding of wider maritime areas and promote regional maritime safety and security in line with the government's wider vision of regional cooperation for maritime security.

Training Collaboration

The MNTI conducts training programmes for AtoN managers and VTS personnel from India and is also a regional focal point for AtoN training. Interactions with maritime security agencies during such programmes could facilitate a better understanding and appreciation of maritime security issues and MDA requirements amongst VTS personnel, as well as foster mutual understanding and cooperation, both nationally and regionally. The Information Management and Analysis Centre (IMAC)/IFC-IOR, Joint Operations Centres (JOCs) and the Maritime Rescue Coordination Centres (MRCCs) are suitably placed for such interactions at the MNTI. Further, personnel manning naval movement control and naval training establishments engaged in AtoN-related training, such as the Navigation and Direction School, could also benefit from the operational/technical expertise available at MNTI on marine traffic management/AtoN. Such engagements could also be institutionalised.

Leveraging Existing Capabilities for Maritime Security and Safety

Despite the increasing focus on technical measures for surveillance, visual means continue to complement technical measures for surveillance. Lighthouse keepers are particularly familiar with the pattern of life around lighthouses, and have been an integral element of the Navy's WWO. They have also been integrated into the coastal security construct; this includes participation in exercises, such as Ex SEA VIGIL and Ex SAGAR KAVACH, as well as participation in coastal security training capsules in some states, such as Kerala.[49] Equipping lighthouse keepers with binoculars, night vision devices and communication systems, and periodic institutionalised engagements with maritime security agencies, are key to leveraging the human capital to meet security requirements. Specific lighthouses could also be designated as "Coastal Observation Posts" and be linked to local coastal police stations.[50] Manning of such

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[46] IALA, "Risk analysis and management," https://www.iala-aism.org/technical/risk-analysis-and-management/iala-net/, accessed 16 May 2021.

[47] IALA-NET, "Participants," https://www.iala-aism.org/wiki/ialanet/index.php/Welcome_to_IALA-NET, accessed 10 September 2021.

[48] Ministry of External Affairs, *Annual Report 2020–21* (February 2021), 184, http://www.mea.gov.in/Uploads/PublicationDocs/33569_MEA_annual_Report.pdf.

[49] Indian Navy, "SNC Conducts Coastal Security Seminar for Various Port Authorities," 11 October 2018, https://www.indiannavy.nic.in/node/21049, accessed 15 May 2021.

[50] Sri Lanka has close to 250 Coastal Observation Points (COPs). Rear Admiral Anand Guruge, "Maritime Challenges in Indian Ocean and MDA Capabilities – Sri Lankan Perspective," presentation at the ASEAN Regional Forum (ARF) Workshop on International Cooperation on Maritime Domain Awareness (MDA), 07 March 2018, https://aseanregionalforum.asean.org/wp-content/uploads/2019/02/ANNEX10-MDA-Workshop.pdf, accessed 21 September 2021.

posts could be augmented, when required, from voluntary organisations, such as Civil Defence/Home Guards/National Cadet Corps (NCC) and other volunteer organisations in respective states. Considering the presence of lighthouse keepers along the entire Indian coast, integrating DGLL into the SAR organisation/maritime environmental protection organisation also merits consideration. As mentioned earlier, a lighthouse tender vessel, which was government- owned, had participated in the 1971 conflict, and such vessels could be integrated with planned exercises, and could also add to "eyes and ears" at sea.

Cyber Security

One of the key facets of the Maritime Aids to Navigation Bill, 2021 is the provision of offences and penalties. In addition to the possibility of physical damage, systems such as the NAIS/VTS are susceptible to cyber security threats, and consequently there is a need to ensure robust mechanisms for cyber security as well. If considered essential, such systems need to be designated as a "protected system".[51] Likewise, other systems which contribute to developing MDA could also be considered for designation as "protected systems".

Conclusion

The AtoN infrastructure is a key element of maritime governance, particularly from the navigational safety perspective. In addition to improving navigational safety, AtoN in India have progressively contributed to maritime security, and are also envisaged to contribute to coastal community development by developing tourism around lighthouses under the SAGARMALA programme. The NAIS chain, CSN and VTS have emerged as critical building blocks for developing national-level MDA; and specific initiatives, such as the indigenous VTS software and the NCVTS, have the potential to promote MDA and maritime security in India. As a regional contact point for capacity building in AtoN, the DGLL can also expand India's regional maritime outreach in line with foreign policy initiatives, such as SAGAR, Act East and the IPOI. Capacity building, strengthening information sharing, enhancing training and operational exchanges, and developing field-level linkages are also some of the other possible ways to give effect to the Parliamentary Standing Committee recommendations to the DGLL for strengthening their contribution to safety and security in Indian waters.

About the Author

Captain Himadri Das is a serving Indian naval officer and is presently a Senior Fellow at the National Maritime Foundation (NMF). The views expressed are those of the author and do not reflect the official position of the Government of India or the Indian Navy. He can be reached at csmda.nmf@gmail.com.

[51] The Information Technology Act, 2000 provides for declaration of "any computer resource which directly or indirectly affects the facility of Critical Information Infrastructure" as a protected system, and also provides for stringent punishment for unauthorised access to such systems.