

# Oceanic domain awareness an imperative environmental sciences essay

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Modern naval scheme is basically based on assorted agencies to turn up possible enemy forces across the oceans, a job complicated by the enormousness of the maritime environment, the immense figure of legitimate users, and the broad assortment of agencies by which an enemy can work the oceans to his advantage. The oceans are complex mediums whose nature provides ample chance for an enemy to avoid detection-weather, sea provinces, and coastal land masses all present considerable challenges to modern detectors. Peacetime economic usage of the seas complicates this job tremendously. The oceans are the universe 's foremost ( and arguably most unregulated ) main road, place to a huge and broad assortment of international impersonal transportation that possess no evident menace. Determining the enemy in such a crowded and complex environment is hard during conventional war, during an asymmetric struggle such as the planetary war on panic ( GWOT ) , it is a formidable undertaking.

It is the asymmetric nature of GWOT that forms the nucleus of Maritime Domain Awareness ( MDA ) . In conventional naval war the enemy is comparatively good defined and about universally a battler. In GWOT, where literally any vas could be a possible enemy or arm bearer, or when any nautical event can hold an impact on the security of India, demands a much higher degree of consciousness than that usually required in a conventional naval struggle. This is recognised by the formal definition of MDA as articulated by the US authorities vide their document National Security Presidential Directive 41, 2004: -

Maritime Domain Awareness is `` the effectual apprehension of anything associated with the planetary maritime environment that could impact the  
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security, safety, economic system or environment of U. S. This is accomplished through the integrating of intelligence, surveillance, observation, and pilotage systems into one common running image ( COP ) that is accessible throughout the U. S. Government.

Unlike traditional naval operations, it is evident that the end of MDA is far more than merely looking for possible maritime enemies poised to assail India. The deductions of `` Anything associated '' with the maritime environment that can impact the security, safety, economic system or environment go far beyond a authoritative maritime menace. As per the US reading, these include smuggling of people or unsafe loadings, buccaneering, proliferation of Weapons of Mass Destruction ( WMD ) , designation and protection of critical maritime substructure, oil spills, conditions, and environmental concerns among other events.

Nautical events that could potentially impact India are non the lone wide-ranging component of MDA it is besides indispensable that menaces be identified as early and far from the seashore as possible. The planetary nature of MDA activities happening overseas and in foreign ports is really much a portion of MDA. For illustration, if a lading is loaded in Aden and its ultimate finish is India ( via several other international ports ) , the burden, conveyance, security, and all affairs associated with that container would be portion of MDA. MDA must hence be exercised over all oceans worldwide, and potentially cover all nautical involvements that finally impact India. Putting in topographic point an effectual MDA is a powerful undertaking sing the scope of possible security challenges and tremendous geographic

country represented by the maritime sphere. In India a overplus of bureaus possessing a broad scope of operational and intelligence capablenesss would necessitate information merger under the over-arching MDA.

Although many factors are considered in MDA, its nucleus procedure is finally the monitoring of vass and the vass ' lading, crews, and riders to quickly bring forth geo-locating information on vass of involvement. This is an analytical procedure that includes trailing, informations base hunts for unknown linkages and anomaly sensing. Cardinal to this is the sensing, monitoring, tracking of vass. This tracking procedure is comprised of five elements designed to concentrate on a narrow country of tactical dimension where menaces can be identified and isolated viz. ; Maritime surveillance, Detection, Tracking, Classification & A ; Identification and aiming. Targeting involves construing sensing and designation information fused with intelligence to screen vessel purposes and determine hazard.

MDA 's nucleus is using the vas tracking procedure to a superimposed defense mechanism theoretical account centred on the coastline of India, the ultimate end of which is to observe possible menaces early and as far off from the Indian coastline as possible. As there is no individual high value unit to protect MDA `` beds " are expanded to include an full coastline with the overall end of co-ordinated surveillance. Not all countries in these `` beds " are considered every bit, but instead extra attending is given to countries that are possible marks for the terrorist/enemy.

The US has the 2000nm bound of the Maritime sensing and Identification zone MDIZ it is based on the legislated 96 hr presentment demand for

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foreign vessels coming in U. S. ports. A vessel going 20kts will get at its finish in approximately 96 hours. MDIZ 's purpose is to garner more timely information on the vessel as it approaches closer to the U. S. seashore. When coming in the MDIZ, updates every four hours are the norm while in territorial Waters the end is to obtain positional information every 3 hours. There are many systems that could supply a high grade of surveillance and tracking information, but the existent merger of this information remains a job in progress. In order to deduce a comprehensive MDA image, information demands to be fused, correlated, and analysed and for it to be relevant to national security it must be designed to run cohesively at tactical, regional and strategic degrees.

### Strategic MDA

On the national degree, nautical scheme is critical for long term planning, operational penetration, and supplying national determination shapers with support to set up precedences, determine schemes of mutualist administrations, allocate national resources, and determine degree of overall maritime menace This is a hard procedure during normal peacetime operations and is peculiarly ambitious in the invariably altering asymmetric maritime environment that MDA is designed to turn to. MDA 's ultimate end is to obtain a sense of planetary consciousness that reaches beyond the confines of the tactical and regional degrees. If MDA was merely a defensive scheme against a known military or terrorist menace, it could be obtained by organizing defensive beds around India. But as an informational/awareness system, its ends are far broader, seeking to understand all possible maritime

menaces to India, many of which could arise overseas in an unoffending mode. Strategic MDA requires a wide position and capablenesss at the highest degrees of analysis, intelligence, and policy. It requires the realignment of bureaucratism and the re-tasking of national assets toward the overall end of planetary consciousness. A Centre for strategic MDA must hold experience in multi-organisation operations and processs that can exceed the spread between the armed forces, jurisprudence enforcement, and regulative bureaus that are portion of MDA. In the maritime sphere, this is possible through enlargement of bing substructure, specifically developing such a fusion/analysis point. Two countries of detector engineerings that have peculiar pertinence to strategic MDA are a orbiter based feeling capableness and a net work of submerged surveillance detectors.

## **Structure of the Indian MDA**

The 26 Nov 2008 onslaught on Mumbai has been analysed and security spreads addressed to explicate the MDA. The cardinal rule for the MDA has been the application of informations blending to acquire actionable intelligence inputs to mensurate, comparison and place and prosecute and forestall sea-borne condemnable activities. The figure of different bureaus at cardinal and province degree involved is 13, and hence effectual coordination is an issue. Some of the enterprises include: -

- Launch of GSAT7 orbiter in geosynchronous orbit by ISRO, with Rukmani terminuss ( ex Israel ) placed on Major war vessels for instantaneous informations transportation to run into the demands of the Navy. ISRO is besides likely to set in topographic point by 2013 the Indian Regional

Navigation Seven Satellite System ( IRNSS ) which would supply informations within 1000 stat mis of India.

- Putting up of The National Command Control Communication and Intelligence web ( NC3IN ) .

- The putting up of a radio detection and ranging concatenation ( X band AIS receiving system VHF and Electro-Optics ) of 46 detector Stations being linked with the AIS inputs ( Covering the full Indian seashore ) , and LRIT and Vessel Traffic Management Systems. Coastal secret plans are maintained by the ICG Regional HQs to back up the Joint Operations Centres ( JOCs ) set up following to naval nautical operations suites ( MORS ) in all naval bids and at New Delhi.

- Putting up of Multi Agency Centres ( MAC ) for intelligence inputs and studies.

- Registration of fishing vass by provinces, and proviso of battery operated Distress Action Terminals ( DATs ) for vass below 300 dozens. DG Shipping would supply smaller fishing boats with AIS transponders which has enforced ISPS codification for Port security with port security programs. Supplying Biometric /recognition individuality cards for fishermen which can be identified on a machine on board surveillance platforms.

- Putting up of a Marine Police force with 73 Coastal constabulary Stations across 9 provinces and provided with 5 and 10 ton trade which can police inshore Waters.

- A uninterrupted outline of record of transporting with World Customs Organisation has been enforced and MARSEC security degrees are exercised and coastal villagers educated on demand to be argus-eyed by the IN and ICG.
- The Indian Navy has instituted Marine Commandos Rapid Reaction Forces and a Sagar Prahari Bal ( SPB ) of 100 mariners who are being equipped with 80 fast interceptor trade ( FICs ) for protection of naval bases, VAs and VPs. UAVs and Aerostats are besides planned for initiation.
- Coordinated coastal and seaward plus patrolling has been strengthened by the IN and the ICG.
- All stairss for MDA are networked with the Indian Navy 's fleet of ships, pigboats and MR aircraft.

The Government of India has put in topographic point a formidable program for MDA, and the single systems are being setup prior to concluding integrating and fusing of informations. It is expected that the MDA would be to the full functional by 2015.

However, in close hereafter it can be presumed that Indian Navy would draw a bead on to get formidable sea denial and sea control capablenesss. It is opined that the footings Sea watch/denial/ control are likely to spread out and transform in to 'Oceanic infinite watch/ denial/control ' . The term Oceanic infinite denial/control would encompass a cylindrical infinite in 3D+ dimensions ; that is the sea surface, the atmospheric volume above, the outer infinite at least up to low Earth revolving satellite highs, the H2O

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volume up to the sea bed, the sea bed itself and besides security of the deep sea mining assets in the EEZ. ( Opinion of the writer ) .

The above premiss implies that a broader pelagic skyline is in fact inclusive of non merely extended and broader spacial operating sphere, but besides much wider and broader raid in to the verticals below the surface to the sea bed and above up to fringe of the ambiance. Unless deductions of this nature are anticipated and factored in, technological prognosiss themselves would drag behind the rapid progressing gait of engineering and the synergisms being achieved due to harmonization and version inter and intra scientific Fieldss. Therefore it is imperative that holistic positions into the information consciousness sphere include the pelagic sphere consciousness every bit good as it 's connect with India 's security and MDA.

### Oceanic Domain Awareness

Scientific survey of the oceans originated in U. S. basically as a map of national security. Probes that focused on the tactical and operational impacts of the fluid, geophysical, chemical and biological Marine environment upon U. S. Navy operations successfully addressed many disputing naval demands ; but oceanographic enquiry in support of naval demands besides triggered unexpected consequences. In many cases the cognition of the oceans that was acquired through directed surveies - and through complementary lines of enquiry that were enabled by tools developed for naval oceanographic research - farther wedged national security in ways that were non anticipated and which transcended tactical and operational significance and could be considered of more strategic effect.

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The primary drift to the rapid development of oceanology during its twentieth century years as a scientific discipline is without a doubt the pigboat and the cardinal alterations that occurred when naval warfare became genuinely 3-dimensional. Prosecuting pigboats was executable chiefly through the transmittal of submerged sound, actively by echo sounder to echo-locate marks and passively by listening hydrophones and triangulation. The range of oceanographic attempts in the chase of the pigboat opened all of the oceanographic subjects ( physical, chemical, biological, and geological oceanology ) to increased investing, research attempt and - significantly - to integrating. Twentieth-century oceanology was basically a security-based enterprise to cut down the opacity of the oceans to antisubmarine warfare in WWI, WWII and the Cold War, and harness that opacity for violative pigboat operations, along with a host of other security based naval concerns.

In the ocean scientific disciplines, new engineering necessarily leads to new finds and to cardinal progresss in basic cognition. In the old ages following World War II, the first global-scale function and sampling of the seafloor by oceanographic research vass led straight to the find of seafloor spreading and the development of the theory of home base tectonics which has since revolutionised thoughts of Earth construction and development. A decenary subsequently, the first geographic expedition of mid-ocean ridges utilizing deep-towed vehicles and manned submersibles resulted in the singular find of deep-sea hydrothermal blowhole communities with antecedently unknown signifiers of life and a huge, still mostly undiscovered microbial biosphere below the seafloor. Over the past two decennaries, ocean physicists,

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chemists, life scientists, and geologists have used a assortment of tools, from instrumented buoys to deep-sea boring, to redefine their apprehension of the ocean 's function in commanding conditions and longer-term climate alteration.

The ocean scientific disciplines are now on the threshold of another major technological progress as the scientific community begins to set up a planetary, long-run presence in the oceans in order to understand the temporal variability of ocean systems on a graduated time scale ranging from seconds to decades or longer. This change arises from the meeting of a number of emerging new technological capabilities, including: -

- Telecommunication engineering ( e. g. , orbiters, fiber-optic piggyback overseas telegrams ) that makes possible real-time telemetry of huge measures of information to shore every bit good as real-time synergistic control of instruments in even the most distant parts of the deep sea ;
- Telecommunication overseas telegrams that enable important degrees of power to run instruments from the sea surface to the deep seafloor ;
- New detectors that make possible in situ measurements of physical, chemical, and biological processes ;
- Computational and modeling capabilities to construct more realistic, multidisciplinary, and prognostic theoretical accounts of ocean phenomena ;
- Data archival systems that can store away, pull strings, and recover immense volumes of information from arrays of detectors ; and

- Computer webs that can convey real-time informations to the desktop, which could potentially immensely increase engagement of research workers, pupils, pedagogues and the general populace in ocean research and find.

An illustration of a double usage observatory is the Sound Surveillance System ( SOSUS ) , a classified system developed by the U. S. Navy in the late fifties to observe, path, and sort Russian pigboats utilizing arrays of submerged hydrophones. SOSUS is a web of acoustic arrays in which hydrophones are connected to a shore station by a pigboat overseas telegram. Research workers with security clearances have used the system for productive surveies of mid-ocean ridge volcanic-hydrothermal systems, marine mammals, and acoustic thermometry. SOSUS has besides provided the research community with technology know-how that will be relevant to any cabled web of ocean observatories. One lesson from the U. S. Navy 's SOSUS type of arrays is that the acquisition and public distribution of acoustic and other geophysical informations in some parts along a state 's coastline poses a important national security hazard.

Technologies ( e. g. , robust detectors and substructure, independent vehicles ) must be developed to heighten informations aggregation in all conditions conditions to back up high-spatial declaration and near-real-time prediction throughout the Open Ocean and coastal zone. Supplying accurate and comprehensive environmental information will necessitate spread outing experimental webs to supervise, record, and present real-time, surface-monitoring informations ( e. g. , high-frequency, coastal-based radio

detection and rangings ) . This enlargement will necessitate progressing detector and engineering development, peculiarly for independent and relentless observations, every bit good as for long-run detecting systems ; spread outing real-time or near-real-time informations aggregation on environmental variables by integrating experimental capablenesss of ships of chance ( e. g. , fishing, lading, and rider vass ) ; and heightening automated and independent bottom-mapping capablenesss for alteration sensing to better rapid, all-out study programming.

Datas collected by the detecting systems must be accessible through a comprehensive national information web, either through a individual system or a distributed web. Developing this information web will necessitate new methodological analysiss that address spreads in informations aggregation, sharing, and interoperability of engineerings, and should allow integrating of bing research into operational systems ( e. g. , systems supplying real-time pilotage informations to vass ) . This information web should be able to associate with other databases, such as those concentrating on ecosystem informations, and developed in conformity with international criterions for informations exchange. The national information web will besides supply the informations needed for theoretical accounts imitating multiple scenarios to better understand possible impacts, conditions events or semisynthetic breaks on Marine operations, and to back up operations Restoration programs.

The seashore and unfastened ocean are critical spheres for the security of a state with sea as boundaries, both at place and abroad. National-security

operations in the ocean take topographic point globally and frequently require uninterrupted, near-real-time monitoring of environmental conditions utilizing tools such as independent detectors, targeted observations, and adaptative modeling. These capablenesss, combined with improved apprehension of the ocean environment enabled by other ocean scientific discipline research activities, will back up accurate ocean-state appraisals and let hereafter forces to carry on joint and combined operations in near shore and deep-ocean operating environments, anyplace and at anytime.

In position of the treatment above it has been brought out that the MDA needs to be integrated within pelagic sphere consciousness for completeness of maritime cognition, the deficiency of which can take to serious effects as has been brought out in a recent appraisal of naval exercisings and arm fires in the US, where it was found that over 90 % of them were affected adversely due to amiss assessed or small known environmental factors. In an existent struggle, these would hold led to mission failures. This lone underpins the fact that Oceanic Domain Awareness is an enabler for the hereafter and an jussive mood for a state like India.