UDA FRAMEWORK

for
Strategic Security Architecture
&
Atmanirbharta

WORKSHOP REPORT

Date | Location
15-19 April 2024 | **MCCIA, Pune**

We extend our heartfelt gratitude towards our partners for their support in making this workshop a success.

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Executive Summary

The broad aim of the workshop series was to sensitize the armed forces, para-military forces, policymakers, stakeholders, practitioners, academia, researchers, and young India about the unique concept of Underwater Domain Awareness (UDA) and its framework for strategic security. To achieve the same, the Maritime Research Center (MRC) conducted a five-day workshop/high-level dialogue in collaboration with the Nirdhwani Technologies Pvt. Ltd. (NDT) and the Indo-Swiss Centre of Excellence (ISCE) from 15th April to 19th April 20224. The five-day workshop was supported by Bharat Electronics Limited (BEL) and Larsen and Toubro (L&T). During the span of the five-day workshop on "Underwater Domain Awareness (UDA) Framework for Strategic Security Architecture and Atmanirbharta," the conversations revolved around major initiatives by India and its key stakeholders in the Indo-Pacific region and the Indian Ocean Region (IOR) to harness the potential of these regions and the importance of the underwater domain awareness amidst all this. This workshop was in continuation to MRC's previous workshop entitled "Institutionalized Skilling Ecosystem for Enhanced Realization of the SAGAR Vision," which was held in March 2023 and aimed to sensitize the concerned stakeholders and deliberate on the objective of institutionalizing the skilling ecosystem.

It is worth noting that the Indo-Pacific region is home to some of the world's most populous and economically dynamic countries, including India, China, Japan, Australia, and Indonesia. This economic and political power concentration makes it a critical center of global geopolitics. The tropical littoral waters of the Indian Ocean region (IOR) present a unique set of challenges and opportunities that demand a tailored, local indigenous-driven approach. Previous attempts at importing technology and knowledge from the West have fallen miserably. Notably, there is a significant potential for resources and opportunities in marine and freshwater underwater ecosystems waiting to be utilized. Still, these areas require specialized expertise and cannot be viewed as a mere extension of the maritime surface.

The SAGAR vision, initiated by the Prime Minister in 2015, marks a significant departure in India's approach to global affairs and domestic issues. The international community now views the Indo-Pacific region as a crucial focal point in geopolitics and geostrategy. While the Indo-Pacific framework primarily concerns maritime affairs, it necessitates a deep understanding of the unique tropical conditions. SAGAR outlines both security challenges and economic opportunities in the maritime domain. India historically leaned towards a continental mindset in policymaking, but now recognizes the need for substantial capacity and capability building across various fronts to revive its maritime consciousness. Geopolitically, India strategically positions itself to gain credibility among global powers across different platforms. Internally, there's a need for synchronization with our global aspirations. Ambitious initiatives have been introduced to support the SAGAR vision and national missions to complement these large-scale projects. The workshop highlighted the need for a comprehensive underwater PM Gati Shakti plan to enhance economic UDA.

Some of the notable speakers during the workshop included Dr. Ajay Kumar, Former Defence Secretary of India; Ambassador Anup Kumar Mudgal, India's Former High Commissioner to Mauritius and Chair of FICCI's Blue Economy Task Force; Ambassador Gautam Bambawale, Former Indian Ambassador to China and Pakistan; Shri A.T. Ramachandani, Executive Vice President and Head of L&T Precision Engineering and Systems IC; and Cmde R S Vasan (Retd), Director General Chennai Centre for China Studies. The workshop also provided a platform for QUAD nations, including India, Australia, Japan, and the US, to discuss the Indo-Pacific region. There were representatives from each of the four QUAD nations who represented their countries and shared their thoughts on maritime affairs between these nations and why the Indo-Pacific region is of great relevance.

The participants came from the strategic security community, including the Armed Forces, Paramilitary Forces, Coastal Police, Defence Industry, Think Tanks, and more. Senior officers came from the Border Security Force (BSF), Andaman and Nicobar Command, Indian Navy, Indian Army, Maharashtra Coastal Police, Indian Coast Guard, and Sri Lankan Navy (online). The workshop was a significant morale booster for MRC on the relevance of their effort to the ecosystem and the specific stakeholders. The feedback session at the end of the workshop was overwhelming for all present. These stakeholders are convinced on three counts: the immense possibilities in the underwater domain, the urgent need for capacity and capability building, and the credibility of MRC in bridging that gap.

The Underwater Domain Awareness (UDA) framework, proposed by the Maritime Research Center (MRC), is designed to address the challenges and opportunities in the tropical waters of the Indo-Pacific strategic space. India has a huge opportunity to lead in the ongoing global order. The SAGAR vision is well aligned to equip India to be a global player in the ongoing geopolitical and geostrategic reality. The policy & technology intervention, acoustic capacity & capability building driven by the UDA framework can address multiple challenges and opportunities in tropical littoral waters. The science & technology-driven UDA framework will ensure the true realization of AtmaNirbhar Bharat.

Introduction

The Maritime Research Center (MRC) and M/S NirDhwani Technology Pvt Ltd (NDT), in collaboration with the IndoSwiss Center of Excellence (ISCE) and HT Parekh Foundation, held a four-workshop series entitled "Institutionalised Skilling Workshop Series for Enhanced of SAGAR Vision" in March 2023. The broad aim of the workshop series was to sensitize policymakers, stakeholders, practitioners, academia, researchers, and young Indian professionals to achieve the desired objective of institutionalizing the skilling ecosystem. It highlighted that the demographic bulge in India needs to be channelized to ensure that young people are ready for future opportunities. The synergy among the varied entities involved in the skilling and knowledge ecosystems is critical. It is worth noting that the current workshop (which was held in April 2024) is in continuation to the previous UDA Framework which was held in March 2023.

The three workshops concentrated on one particular aspect of the ecosystem-building initiative.

(a) Policy Intervention: This was hosted to build on the entire spectrum of policy formulation. Both regional and national aspects were deliberated and a roadmap for the future was devised. A clear emphasis on skilling for livelihood enhancement was also emphasized. Participants from diverse backgrounds, viz. humanities and liberal arts gathered to deliberate on the larger social engineering aspects and community-level interventions from an institutionalization standpoint. Key decision-makers were presented to identify gaps in policy interventions. The five-day workshop was divided into the following facets:
- The geopolitics and the geostrategic perspective
- The traditional knowledge and opportunities for scaling
- The governance mechanisms and required intervention
- The capacity & capability building
- The structured institutionalized framework

(b) Technology Intervention: This was hosted to explore science and technology's role as a livelihood enhancement catalyst. The emphasis was to build sustainable development interventions to augment traditional knowledge, rather than replacing traditional practices with modern tools. The key objective was to leverage technology tools to improve governance and increase efficiency. The five-day workshop was divided into the following aspects:
- The Digital Ocean Framework.
- The Sustainable Development Goals.
- The Data Science Framework.
- The infrastructure gaps.
- The multi-disciplinary and multi-functional structure.
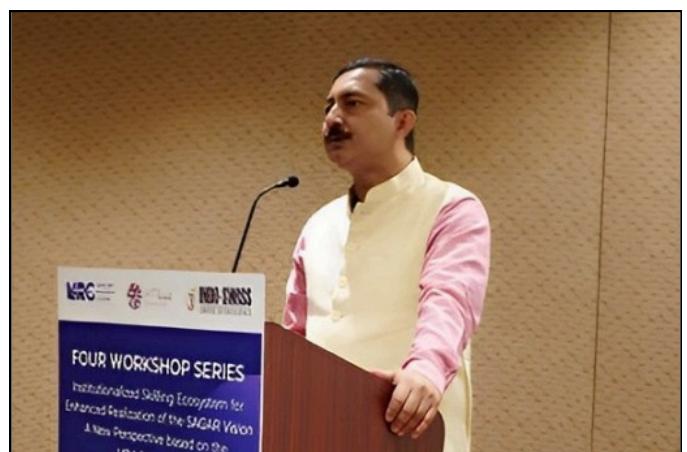
(c) Grassroots Community Engagement: This initiative was hosted on the Konkan coast and involved collaboration with multiple government and private partners to engage with coastal communities. Representatives from various grassroots communities, such as aquaculture, pisciculture, diving, shipbuilding, and more, were convened in their respective community establishments for hands-on exposure.

The two-day classroom interaction encompassed policy and technology interventions, acoustic capacity, and capability building. Feedback from participants was solicited during this phase. The three-day field visit encompassed the following sectors:

- Aquaculture.
- Pisciculture.
- Underwater diving.

The last day consisted of a debrief and a feedback session for the three-day workshop, including interaction with authentic community representatives.

The Maritime Research Centre hosted the five-day workshop on the Underwater Domain Awareness (UDA) Framework for Strategic Security and Atmanirbharta to promote the narrative of UDA's importance in the current strategic security game. Both workshops, held one year apart, aimed to create awareness and engagement opportunities among significant stakeholders of the MRC's UDA Framework.

MRC's Strategic Advisory Board

Lt. Gen DB Shekatkar is the former Chairman of the Shekatkar Committee. The committee recommended measures to enhance combat capability and rebalance defence expenditure of the armed forces. He always emphasizes the significance of UDA at the national and international levels.


Dr. Ajay Kumar is the former Indian Defence Secretary and is currently an advisor for electronics development projects. He recently advocated establishing the underwater PM Gati Shakti Project at a national level.

Ambassador Anup Kumar Mudgal is a former Indian Diplomat, who served as the Indian High Commissioner to Mauritius. He serves as Chair- Blue Economy at FICCI's Blue Economy Task Force. He has always advocated for protecting the oceans and expediting underwater research to harness its capabilities.

Shri Amitabh Kumar is the former Director General of Shipping and represented India at the International Maritime Organization (IMO). He stresses upon the need to foster academic partnerships with leading global maritime Universities and skill enhancement of Indian maritime institutes to global standards to achieve the goals of Maritime Vision 2030.

Vice Admiral DSP Varma is a former Director General of the Advanced Technology Vessel Programme (which produced India's first nuclear submarine) and a former Chief of Material of the Indian Navy. He is a Post Graduate in Radar and Communications from the Indian Institute of Technology, Delhi.
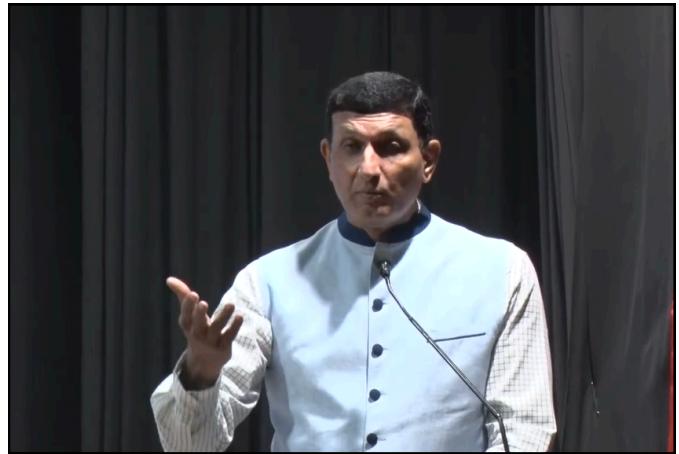
Vice Admiral AR Karve, AVSM is a retired Naval Officer who took charge as the Flag Officer Commanding-in-Chief of the Southern Naval Command (SNC) from Vice Admiral Girish Luthra, AVSM, VSM in 2016. He has advocated for the cause of underwater domain awareness and various facets associated with this concept.

Mr. Mukesh Malhotra is the Chairman of the Governing Board of the Indo-Swiss Centre of Excellence. He is also the Chairman of Weikfield Products Corporation LLP. He has been the founder trustee of Pune International Centre and the former president of the Mahratta Chamber of Commerce, Industries and Agriculture (MCCIA), Pune, Maharashtra.
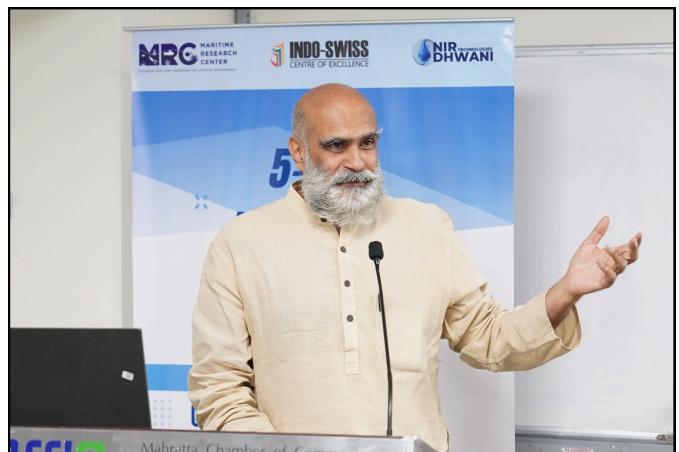
Shri Praful Talera is the Director of Dynamic Logistics Pvt Ltd and Advisor to MRC on Blue Economy. He has been associated with MRC since beginning, providing guidance on its decisions of strategy and innovation. He is a dedicated advocate of maritime advancement and brings valuable expertise, illuminating india's historical oversight of its oceans.

MRC's Outreach for conducting the workshop

The five-day workshop, "Underwater Domain Awareness (UDA) Framework for Strategic Security Architecture and Atmanirbharta, " was hosted at the MCCIA auditorium from 15 April 2024 onwards. The participants came from the strategic security community, ranging from the Armed Forces, Paramilitary Forces, Coastal Police, Defence Industry, Think Tanks, and more. Senior officers came from the Border Security Force (BSF), Andaman and Nicobar Command, Indian Navy, Indian Army, Maharashtra Coastal Police, Indian Coast Guard and Sri Lankan Navy (online).

The workshop showcased the width and depth of the UDA framework and the participants, even including those from the Indian Navy acknowledged their limited knowledge of the underwater domain. The possibilities of the UDA framework were emphatically acknowledged by the participants from a cross-section of strategic security establishments. The UDA framework driven by the MRC was recognized as comprehensive, structured, and inclusive. The depth of research & innovation particularly for managing the challenges and opportunities of the tropical waters in the Indian Ocean Region (IOR), was deeply appreciated by the participants and the resource persons. Everyone accepted that the capacity & capability building driven by the UDA framework needs to be prioritized across varied stakeholders and decision-makers. MRCs preparedness to lead in driving the UDA framework was well recognized, not just for the national requirement but for the tropical waters of the Indo-Pacific strategic space.

Lt Gen D B Shekatkar, Chairman of the Shekatkar Committee for restructuring the Armed Forces to minimize tooth-to-tail ratio, wrote to every possible stakeholder personally. He wrote in his capacity as the Chairman of the Strategic Advisory Committee of the Indo-Swiss Center of Excellence on UDA. A letterhead was designed to establish the branding and all the communication was done using that letterhead. Lt Gen D B Shekatkar wrote to the following:

- Vice Chief of the Indian Navy (He has now been announced as the Chief of the Indian Navy).
- Army Commander Southern Army Command.
- Commander-in-Chief (CinC) Andaman and Nicobar Command.
- Commander-in-Chief (CinC) Southern Navy Command (He is also in charge of Training in the Indian Navy.
- Director Generals of all the Paramilitary Forces, including BSF, CISF, CRPF, and Indian Coast Guard.
- Director General of Police of all the nine Coastal States.
- CMDs of all the Defence PSUs and Heads of Defence Industries.
- Heads of Training Establishments in the Armed Forces, including NDA, CDM, etc.

Extensive social media outreach and PR were undertaken for the workshop to promote the event across multiple platforms. A massive response was received worldwide. The hybrid mode also allowed outreach beyond national boundaries. The event was also streamed live on YouTube, and the recordings were made available for future access to stakeholders across the spectrum.

Key Outcomes
Highlights from our Lead Speakers

Lt. Gen. D B Shekatkar (Retd),
Chairman, MRC Strategic Advisory Board

Lt. Gen. DB Shekatkar (Rtd), who chairs the MRC Strategic Advisory Board, made a very pertinent statement that if any nation in the world does not protect its sea, it is bound to be doomed one day or the other. Lt Gen Shekatkar (Retd), was one of the guests for the inauguration ceremony of the five-day workshop on 'Underwater Domain Awareness (UDA) framework for Strategic Security Architecture and AtmaNirbharta,' organized by the Maritime Research Centre in collaboration with Nirdhwani Technology Pvt. Ltd. (NDT) and the Indo-Swiss Centre of Excellence (ISCE) at Navamal Firodia Seminar Hall, MCCIA, Pune.

Underlining the importance of maritime strategy, Lt Gen Shekatkar said, *"90 percent of the world trade is passing through the ocean. It is only 10 percent which goes by land route or by air. Everything is revolving around the sea domain. And any threat, any nation, normally comes from the sea routes."*

He said workshops like these are essential to prepare the country for the future. "Where the Marathas fought, no land invader came to India. The invasion of India started through the sea routes. The Dutch, Portuguese, and British came through sea routes. They not only ruled us but also destroyed us. So, the lesson to be learned is, if any nation in the world does not protect its sea, it is bound to be doomed one day or the other."

▶ Watch full address- here

Dr. Ajay Kumar,
Former Defence Secretary of India

During his plenary session on 'Strategic Security Innovations,' Dr. Ajay Kumar noted that India needs to pay attention to underwater domain awareness to take advantage of the high seas' economic and strategic advantages. This plenary session was held on Day 3 of MRC's workshop on 'UDA Framework for Strategic Security Architecture and Atmanirbharta.' Talking about UDA in a strategic security framework, Dr Kumar said that any nation exploiting the resources under the sea is poised to get consistent economic returns in the future. Explaining the possibilities that life underwater offers, Dr. Kumar said that only 4% of the work contributes to our GDP. Dr. Kumar highlighted the need for a comprehensive underwater PM Gati Shakti plan to enhance economic UDA.

Our lead speaker further noted that 94% of life underwater and oceans is critical to managing greenhouse gases, which is very important today. Greenhouse gases will determine if life is going to continue on the planet or not. To manage it, we need to know how to manage our oceans. In India, our maritime area encompasses the same geographical expansion as our territories. It holds nearly 80% of our total resources, with the same land mass, but contributes only 4% to our GDP. This is the contrast of under-exploitation that we need to move ahead with. Through this opportunity underwater has the potential to generate millions of jobs, and trillions in revenue, in diverse sectors such as fisheries, aquaculture tourism, shipping, and energy, by leveraging our maritime resources. He asserted that any nation that moves first, will have the advantage over the others.

"When we look at the underwater domain, it is not merely our own maritime area. We are also looking at the High Sea which has huge strategic and economic implications. Nations can fish or mine in the High Sea and benefit from the highly-priced resources. We can benefit from the large amount of genetic material we find to discover new medicines and treatments for some incurable diseases. High sea also offers millions of tons of poly-metallic nodules, sulfides, copper, gold, etc. Technological advancement is reaching the tipping point in many of these areas. It is now becoming possible to exploit these huge resources in an environmentally sustainable manner," he said.

Dr. Ajay Kumar noted that the nation which is the quickest to seize the opportunity in the High Sea is likely assert control over the area's resources and territory in the long run

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Ambassador Anup Kumar Mudgal,
Chair - FICCI Blue Economy Task Force;
Former Indian High Commissioner to Mauritius

On Day 2 of our workshop on the UDA Framework for Strategic Security, we were joined by Ambassador Anup Kumar Mudgal. Ambassador Mudgal is a former Indian Diplomat who served as the former Indian High Commissioner to Mauritius and is currently the Chair of the Blue Economy Task Force at the Federation of Indian Chamber of Commerce and Industry (FICCI). While addressing our five-day workshop, Ambassador Mudgal emphasized that oceans are crucial to the world and we must protect them.

Speaking on geopolitics and the SAGAR vision, Ambassador Mudgal said that Security and Growth for All in the Region (SAGAR) is an idea that is close to Indian mindsets. "SAGAR is neither limited to a region nor limited to a time. It is a perpetual thought. It has always lived in the Indian mindset and will live on further," he said. Mudgal said oceans are essential not only to prevent threats but also to facilitate the economy.

"Today, over 50 percent of Indian GDP is driven by the external sector, and a huge part of the external sector is driven by the maritime spaces. Can you say the ocean doesn't matter? The oceans are a huge resource in their own right. They are also a massive facilitator of other aspects of resources. You have food, energy, renewable energy, trade, transportation, biotechnology, pharmaceuticals, minerals, and seabed mining," he said. Ambassador Mudgal also said we can prevent or fuel global warming by treating our oceans. "Ocean is the single most important factor which will either contribute to building global warming or prevent it. It is up to us what we want it to do. If the oceans remain healthy, they will prevent as they are the single largest carbon sink in the world. If we mess up with the ocean, it will put back the carbon in the atmosphere. We can't live with the angry ocean."

"We need to protect the ocean and make a statement as our lives depend on it. The world cannot disrupt the oceans and we have to ensure that. This is where SAGAR is born," Mudgal said.

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Ambassador Gautam Bambawale,
India's Former Ambassador to China and Pakistan

Gautam Bambawale, India's Former Ambassador to China & Pakistan, said India needs to continue prioritizing growth and practice diplomacy at the world level as we have been. *"We may be the fifth largest economy in the world, but on the trajectory, we will be the third largest economy. India should not be taking sides. We should try to maneuver between the various powers, just like we have done on the issue of the Russia-Ukraine war, where we have kept our national interests at the forefront and done everything in our power to steer a course between both Russia and Ukraine, between the West and Russia also, so that our national interests are promoted and protected,"* Ambassador Bambawale said.

"If we can do that successfully, we need to focus our energies and attention, not only of the government of India, not only of the state governments, but also the people of India, domestically, internally," he added.

Ambassador Bambawale mentioned the various "shocks" that the world has been facing ever since the COVID-19 pandemic hit the globe. He mentioned in detail about the ongoing Russia-Ukraine war. He said that it was only when the war between these two nations started that many of us realized that India is heavily dependent on its imports of Sunflower oil from Ukraine and what adverse impact it could have had on our economy. He added that despite all such challenges, India's economy continued to bloom while others in Europe were severely impacted.

"We must keep our eyes on growth, and India's economy must grow at a rate of 10% per annum over the next 20-25 years. India must become the manufacturing hub and that is how we will be able to narrow the gap with the other big powers. That is how we will be able to establish a balance with the other two big powers in the world, namely, the USA and China," Ambassador Bambawale said while concluding his remarks.

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Shri A. T. Ramachandani, Executive Vice President & Head, L&T Precision Engineering and Systems IC

While delivering a keynote address at MRC's workshop on 'UDA Framework for Strategic Security and Armanirbharta,' L&T Executive Vice President, AT Ramchandani, said *"We cannot rely on western technology if we want to do substantial work in the field of Underwater Domain Awareness (UDA) in the nearest future. Apart from building the industrial ecosystem, the country should also focus on expanding it. There needs to be a full ecosystem for these capabilities. And it would be a combination of research organizations, think tanks, academics, researchers, coupled with industry people."*

Mr. Ramachandani mentioned MRC's previous workshop, which was held in March 2023, and recalled that he had presented L&T's work on Autonomous Underwater Systems (AUS) during the previous workshop. During his speech, he mentioned that his team is looking for ways to analyze what role the industry can play in supporting the cause of underwater domain awareness (UDA) and its role in security.

The industry needs to create capabilities that support the strategic security sector of the underwater domain. If you want control in the underwater, you need submarines to be deployed and if you look at the navies around the world, including China's and the USA's, the core strength is in deploying submarines. India has built capabilities to build such platforms, but we need support from an industrial ecosystem that builds large quantities of submarines (its equipment and hardware).

We can't rely on Western industries to develop a strategic security ecosystem for us. Therefore, companies like Bharat Electronics Limited and Larsen and Toubro need to lend their support to harness such capabilities for the nation. Mr. Ramachandani said there is a need to build an ecosystem that brings together research organizations, think tanks, academia, industry developers, and government organizations to build a strong strategic security base.

▶ Watch full address- here

Shri Mukesh Malhotra,
Chairman, Indo-Swiss Centre of Excellence

Mr. Mukesh Malhotra started his speech by thanking the workshop stakeholders. He said, "I would like to thank the Andaman & Nicobar Command members, the BSF, the Army, Navy, the coast guards, the coastal police, and the members of Bharat Electronics Limited and L&T for helping with this workshop." Further, Mr. Malhotra mentioned the previous UDA Workshop that was organized by the Maritime Research Center (MRC) and Nirdhwani Technology Ltd., in association with the Indo-Swiss Centre of Excellence, on the subject related to underwater domain awareness studies. He said this year's workshop will be more inclined towards strategic security and issues in the underwater domain.

He spoke about the work of the Indo-Swiss Center of Excellence and mentioned that the institution began its journey ten years ago with the idea of imparting skills of tomorrow to the youth of today. Mr. Malhotra spoke about the three verticals of the Indo-Swiss Center of Excellence and talked about agriculture and underwater domains being two of them. While addressing this, he mentioned that India's agricultural capabilities are not even 50% of the world's average, which is a matter of grave concern, and that we must work towards addressing this issue.

He mentioned modern-day technologies like 3D printing techniques, Robotics, automation, etc., and discussed why it is important to equip our youth with such technologies.

Mr. Malhotra also mentioned that the strategic security and protection of the oceans cannot be understated and that there is a huge need to create skilled capabilities to address issues. This understanding led me to include underwater domain studies as the third vertical of the Indo-Swiss Centre of Excellence.

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Discussion on QUAD
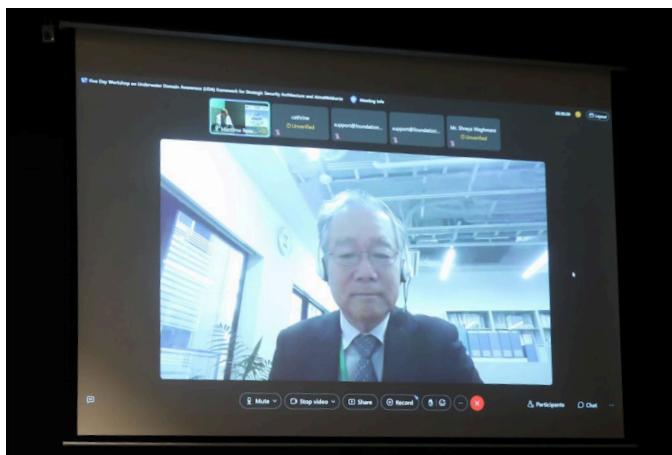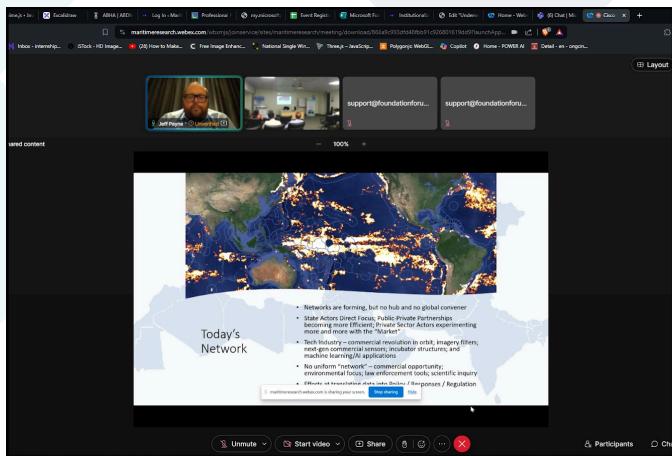
During the workshop, the aspect of QUAD, which brings together four countries– India, Australia, Japan, and the United States- was reflected as representatives from all four nations that participated.

Dr. Ajay Kumar from India discussed the country's strategic security implementation and innovations involved, and **Mr. Kim-Heriot Darragh**, Research & Program Fellow, Perth USAsia Center, Indo-Pacific Strategy, talked about the Indo-Pacific and the India-Australia strategic maritime partnership. Further, **Professor Jeffrey Payne** from North East South Asia (NESA) Strategic Center, National Defence University, USA touched upon aspects of the USA's role in the QUAD grouping and how the QUAD has played a crucial role in protecting the Indo-Pacific region. In addition, **Professor Tomonari Akamatsu** from Waseda University, Japan spoke to the audience about underwater research and ocean governance.

The QUAD participants emphasize that QUAD leaders are committed to delivering results for the region. Infrastructure – from roads to electricity to internet connectivity – is vital to these efforts to meet the needs of the people in the region. It is worth noting that the Quad leaders at the 2022 Leaders' Summit announced the 'Indo-Pacific Partnership for Maritime Domain Awareness (IPMDA)' initiative, through which QUAD is providing near-real-time, integrated, and cost-effective maritime domain data to maritime agencies in the region, supports regional partners' capacity in combatting a wide range of illicit maritime activities, including illegal, unreported and unregulated fishing and responding to climate-related and humanitarian events.

Program Details
Sessions on Day 01

Dr (Cdr) Arnab Das,
Founder and Director, Maritime Research Center

Dr. Das discussed the initiatives undertaken by the Maritime Research Center (MRC) to advance the concept of underwater domain awareness. He mentioned collaborations with key stakeholders and partners, both nationally and internationally, to bolster research and development in this field.

At the national level, MRC has partnered with institutions such as NITI Aayog and the Capacity Building Commission of India (CBC). International collaborations include organizations like UNESCO and the PathFinder Foundation. These partnerships facilitate knowledge exchange, capacity building, and the development of innovative solutions for enhancing underwater domain awareness.

Dr. Das's presentation illuminated the importance of tailored strategies and collaborative efforts in advancing underwater domain awareness, aligning with the overarching vision of promoting maritime security and sustainable development in the Indo-Pacific region.


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Mr. Shridhar Prabhuraman,
Deputy Director, Maritime Research Center

During Plenary Session 2 of the MRC workshop, Mr. Shridhar Prabhuraman, Deputy Director at the Maritime Research Center, delved into the topic of 'Artificial Intelligence in Underwater Domain Awareness (UDA)'. His presentation covered various topics, providing insights into the intersection of AI and UDA.

Shridhar began by introducing the fundamentals of AI, highlighting its ability to enable machines to learn from experiences, adapt to new inputs, and perform tasks traditionally requiring human cognition. He then delved into the role of AI in UDA, emphasizing its potential to enhance underwater surveillance and monitoring capabilities.

Throughout his presentation, Shridhar showcased various case studies and MRC projects where AI has been applied, including shipping radiated noise estimation and sediment management in rivers. These projects exemplify the practical applications of AI in addressing real-world challenges within the maritime domain. However, Shridhar also addressed the challenges associated with AI, both ethical and technological. He underscored the importance of addressing these challenges to ensure the responsible and effective use of AI technologies in UDA and beyond.

Overall, Shridhar's presentation provided valuable insights into the current landscape of AI in UDA, highlighting its opportunities, applications, and associated challenges.
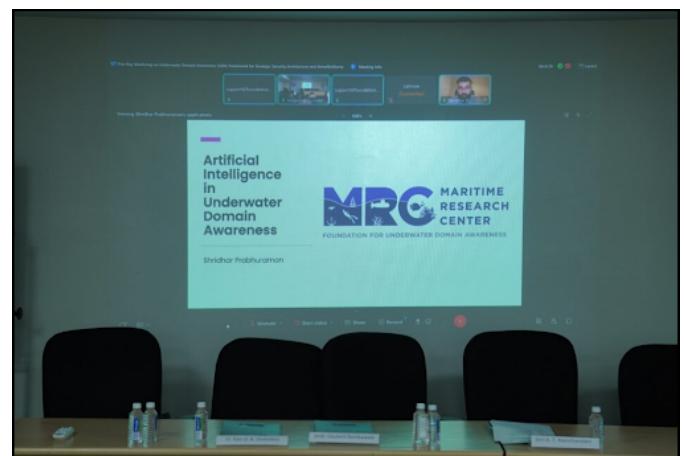
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Program Details
Sessions on Day 02

Cmde R S Vasan (Retd),
Director General Chennai Centre for China Studies,
Regional Director, National Maritime Foundation, Tamil Nadu

On Day 2 of the MRC workshop, Cmde R S Vasan addressed Plenary Session 3, focusing on 'Emerging strategy and security challenges, assessment of impact dynamics, and India's options.' Highlighting the significance of the Indian Ocean Region (IOR), he emphasized its historical centrality to human civilization.

Cmde Vasan underscored the crucial role of maritime trade security and stability for the economies of littoral states in Asia and beyond. Delving into China's interests and concerns in the IOR, he pointed out India's growing military prowess and geographical advantage as key factors.

Furthermore, Cmde Vasan discussed India's increasing influence on the global stage and its decision not to endorse China's Belt and Road Initiative (BRI) as a significant concern for China. He proposed several strategies for India to counter China's influence, including engagement with like-minded partners, pooling resources to counter China's economic leverage, and fostering stronger ties within the maritime neighborhood.

His insights shed light on the evolving strategic landscape of the IOR and underscored the importance of proactive measures for India to navigate emerging challenges and safeguard its interests in the region.

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Mr. Kim-Heriot Darragh,
Research & Program Fellow,
## Perth USAsia Center, Indo-Pacific Strategy

During the 5th plenary session of a workshop on UDA Framework for Strategic Security Architecture and Atmanirbharta, Mr. Kim-Heriot Darragh, Research & Program Fellow at the Perth USAsia Center, delved into the Indo-Pacific and the India-Australia strategic maritime partnership.

He highlighted underwater domain awareness as a critical global security topic and emphasized the evolving maritime relations between India and Australia. Kim stressed the importance of expanding maritime cooperation across government and non-government sectors, citing the significant presence of the Indian diaspora in Australia, with widely spoken Hindi and Punjabi.

He noted the Indian community's representation across various sectors in the country. India and Australia share strategic security relations with growing cooperation and mutual interests in the Indo-Pacific region. Over the past few years, both nations have strengthened their ties through various initiatives and collaborations.

Maritime security is a key aspect of their strategic partnership, ensuring freedom of navigation and maintaining stability in the Indo-Pacific. Both countries participate in joint naval exercises and engage in intelligence-sharing efforts to address common security challenges, including maritime piracy and illegal fishing.

Overall, the strategic security relations between India and Australia are characterized by a shared commitment to promoting peace, stability, and prosperity in the Indo-Pacific region through cooperation across various domains, including maritime security, counterterrorism, defense, and cybersecurity.
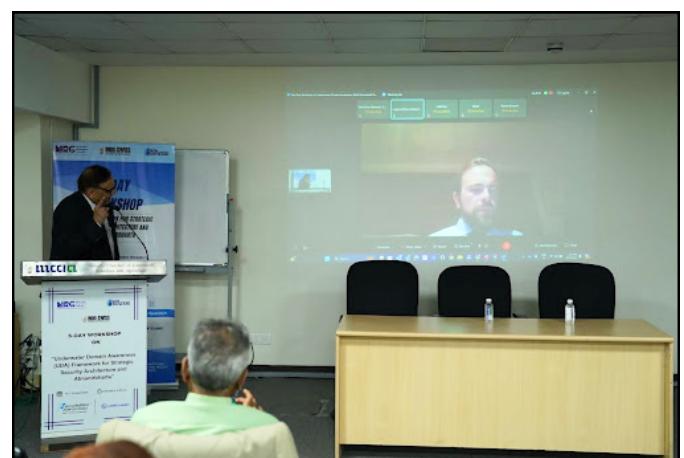
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Program Details
Sessions on Day 03

Prof Radhika Seshan,
Maritime Historian,
Visiting Faculty at Symbiosis Institute of Liberal Arts, Pune

Professor Radhika Seshan, a Maritime Historian, addressed Plenary session 6 of the five-day workshop that MRC hosted on "UDA Framework for Strategic Security Architecture and Atmanirbharta " from 15 April to 19 April 2024. Professor Radhika Seshan's insights shed light on the often-overlooked significance of maritime history and its implications for understanding past societies. By questioning how and why we study maritime history, she prompts reflection on the importance of this field of study. Her observation about the neglect of water in academic works, except for its sacred connotations in colonial historiography, underscores a bias that has obscured the practical and cultural significance of waterways in daily life.

Moreover, her examination of the Portuguese entry into Asian trading highlights a pivotal moment in maritime history and prompts inquiry into its lasting effects. By questioning the extent of Portuguese impact on regional waters, she encourages historians to reassess traditional narratives and explore nuanced perspectives.

Overall, Professor Seshan's address underscores the rich potential of maritime history to provide insights into past societies, challenge prevailing narratives, and deepen our understanding of historical dynamics.


Watch full address- here

Prof Jeffrey Payne,
Assistant Professor,
Near East South Asia, Center for Strategic Studies, USA

Professor Jeffrey Payne's presentation at the workshop provided valuable insights into the United States' perspective on the Indo-Pacific region, particularly regarding maritime security. By emphasizing that the competition in the Indo-Pacific involves more than just the United States and China, he acknowledges the complex geopolitical landscape in the region. Highlighting the involvement of other key players like India underscores the importance of multilateral cooperation in addressing maritime challenges.

Furthermore, his discussion on maritime domain awareness (MDA) and the need for new elements like underwater domain awareness (UDA) reflects the evolving nature of security threats in the maritime domain. This recognition suggests a proactive approach towards enhancing maritime security capabilities to address emerging challenges effectively.

The call for increased cooperation among QUAD nations, particularly through research-based collaboration involving universities, demonstrates a commitment to leveraging expertise and resources for a more comprehensive understanding of the Indo-Pacific region. By advocating for partnerships between universities in India, Australia, Japan, and the United States, Professor Payne underscores the importance of academic collaboration in advancing strategic objectives and fostering greater regional stability.
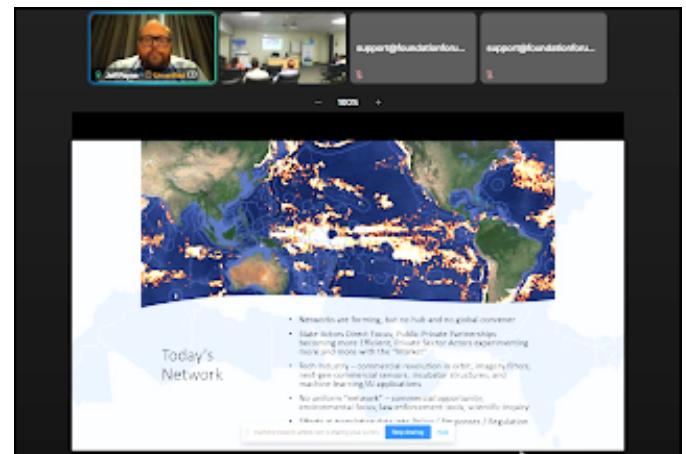
Overall, Professor Payne's presentation contributes to the ongoing discourse on maritime security in the Indo-Pacific and highlights the importance of collaboration and innovation in addressing contemporary challenges in the maritime domain. The relationship between the United States and India is one of the most strategic and consequential of the 21st century. The United States supports India's emergence as a leading global power and a vital partner in promoting a peaceful, stable, and prosperous Indo-Pacific region.

Watch full address- here

Program Details
Sessions on Day 04

Ms. Lakshmi Krishnakumar,
Founder, O Trust,
Shakespeare Scholar

Ms. Lakshmi Krishnakumar presented on 'Ancient India and Shakespearean Sounds: Exploring Human Experience of the Depths.' Her presentation revolved around bridging the existing gaps between Science and Arts.

Ms. Lakshmi used references from Mahabharata, Ramayana, The Sangam Poems, Geoffrey Chaucer's Canterbury Tales, and Shakespeare's Plays during her presentation to elaborate on the topic. "Sound drives life underwater, be it for the largest living creature on planet Earth, the blue whale, or what makes their diet, the minute zooplanktons," she said. She added that human-generated underwater noise interferes with crucial life functions of aquatic animals, ranging from communication between individual aquatic species underwater, schooling behavior, foraging, mating, avoiding predators, feeding, and so on leading to changes in behaviors, migration patterns, and population reduction. It does not stop at that, even seabirds are affected.

She elaborated on the following three aspects of sounds from the Ancients, which she said, were reflected in Shakespare's literature as well– Vibrations (called as Dhvani), Time (Kala), and Word (Padma). She said there is not one play, from all of his surviving plays, where Shakespeare has refrained from referencing the water world. Shakespeare makes numerous other references to the sea and sailing, pointing to trade and trade relationships: merchandise, gold, riches, precious stones, people, culture, diplomacy, and so on, across and via the waterbodies are often featured details in his plays.

Ms. Krishnakumar's synthesis of art and science underscored the intrinsic value of disciplines such as art, poetry, theatre, and craft alongside fields traditionally associated with strategic security and scientific inquiry. In her view, these diverse domains collectively enrich our understanding of the human experience and offer holistic perspectives essential for addressing contemporary challenges. Her presentation served as a poignant reminder of the symbiotic relationship between creativity and knowledge, urging for a harmonious integration of diverse disciplines in our quest for understanding and stewardship of the natural world.

▶ Watch full address- here

Vice Admiral DSP Varma (Retd),
former Director-General of the Advanced Technology Vessel Program
former Chief of Materiel, Indian Navy

Vice Admiral DSP Varma spoke on the topic 'Indigenization & Challenges' associated with the Maritime Domain. He emphasized that Indigenization in the maritime domain refers to the process of developing and utilizing indigenous capabilities, resources, and technologies to strengthen a country's maritime sector. This can include building indigenous ships, developing maritime infrastructure, training local personnel, and establishing maritime industries.

He mentioned that many countries rely on foreign technology and expertise for their maritime operations, leading to a dependence on external suppliers. Developing indigenous technology and expertise can be costly and time-consuming. Building indigenous maritime capabilities often requires significant investment in research, development, and infrastructure. Many countries, especially those with limited financial resources, struggle to allocate sufficient funds for these purposes.

Watch full address- here

Shri Praful Talera
Director, Dynamic Logistics
MRC Advisor for Blue Economy

Mr. Praful Talera, who is MRC's Advisor on Blue Economy, spoke on 'Master Keys in Geopolitics.' During his presentation, Mr. Talera focused on various geopolitical events happening across the globe including the ongoing Russia-Ukraine conflict, the Afghanistan situation, cyber security threats, etc. He mentioned that the geopolitics of the maritime domain encompasses a complex interplay of interests, strategies, and challenges among coastal and maritime states, as well as international actors.

Moreover, issues such as maritime piracy, illegal fishing, environmental degradation, and maritime security threats further underscore the complexity of the maritime domain's geopolitics. Efforts to navigate these challenges often involve diplomatic negotiations, multilateral cooperation, and the establishment of maritime security frameworks to ensure stability and prosperity in the maritime commons.

▶ Watch full address- here

Program Details
Sessions on Day 05

Prof Ajay Dandekar,
Shiv Nadar University

Professor Ajay Dandekar, hailing from Shiv Nadar University, delivered a comprehensive and insightful presentation about the intricate nexus between water security and internal security challenges. In his discourse, Professor Dandekar underscored the paramount importance of the Brahmaputra River to our nation's vitality, shedding light on its pivotal role in sustaining various facets of our socio-economic and ecological landscape.

Professor Dandekar highlighted the disproportionate utilization of India's groundwater resources. A staggering 89-90 percent is allocated for agricultural endeavors, leaving a mere 10 percent for domestic and industrial purposes. This alarming statistic underscores the pressing need for a paradigm shift in our water management and allocation approach.

Moreover, Professor Dandekar drew attention to the alarming trend of diminishing effective rainfall days and the consequential runoff of water into rivers, exacerbating the challenge of water scarcity. He attributed this phenomenon to the adverse impacts of climate change, particularly the accelerated melting of glaciers in the Himalayan region, which significantly contributes to water inflow into rivers.

In light of these challenges, Professor Dandekar advocated for proactive measures to mitigate the impacts of climate change, emphasizing the imperative to transition from conventional thermal energy sources to renewable alternatives such as hydel and solar energy. This strategic shift, he argued, not only aligns with global efforts to combat climate change but also presents opportunities for sustainable energy development and resilience building.

Furthermore, Professor Dandekar articulated a range of solutions to address the multifaceted water security challenges facing India, ranging from innovative water conservation techniques to robust policy frameworks promoting equitable water distribution and efficient utilization.

Professor Dandekar's presentation provided a comprehensive analysis of the interconnected challenges of water security and internal security while offering pragmatic solutions to navigate these complex issues in the face of evolving climatic realities and socio-economic imperatives.

▶ Watch full address- here

Professor Tomonari Akamatsu,
Research Organization for Nano and Life Innovation,
Waseda University, Japan

Professor Tomonari Akamatsu from Waseda University, Japan, explained to the audience the nitty-gritty of underwater research and ocean governance. Professor Akamatsu underscored their pivotal role in fostering connectivity between nations such as India and Japan, emphasizing the significant geopolitical relevance of oceans like the Pacific Ocean and the South China Sea. He elucidated how these maritime routes serve as vital conduits for trade, cooperation, and strategic interactions, thereby rendering a free and open Indo-Pacific ocean indispensable for the prosperity and security of numerous regional stakeholders.

Drawing upon insights gleaned from the Intergovernmental Panel on Climate Change (IPCC) report, Professor Akamatsu articulated the urgent need for heightened awareness and concerted action to address the pernicious impacts of climate change on our planet. He underscored the imperative of acknowledging the escalating environmental degradation wrought by climate change and the imperative to accord it the utmost seriousness it demands. In this vein, he highlighted the cascading effects of climate change on food security, noting its emergence as a paramount concern in the region and beyond. Furthermore, Professor Akamatsu elucidated the multifaceted dimensions of the climate crisis, delving into its ramifications for oceanic ecosystems, marine biodiversity, and the socio-economic fabric of coastal communities. He underscored the imperative of adopting a holistic approach to ocean governance that integrates environmental conservation, sustainable resource management, and equitable socio-economic development.
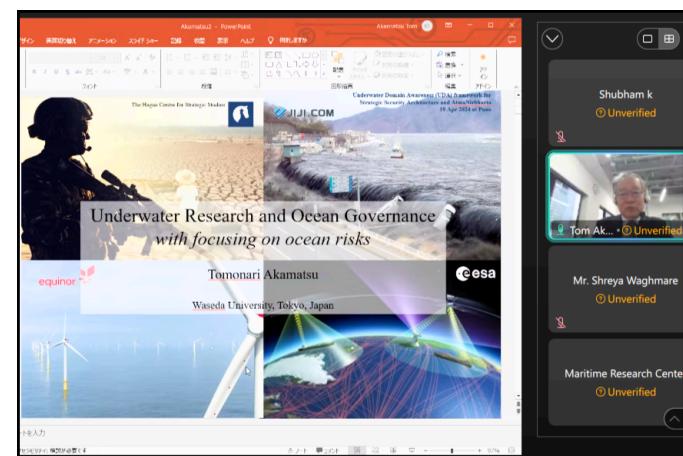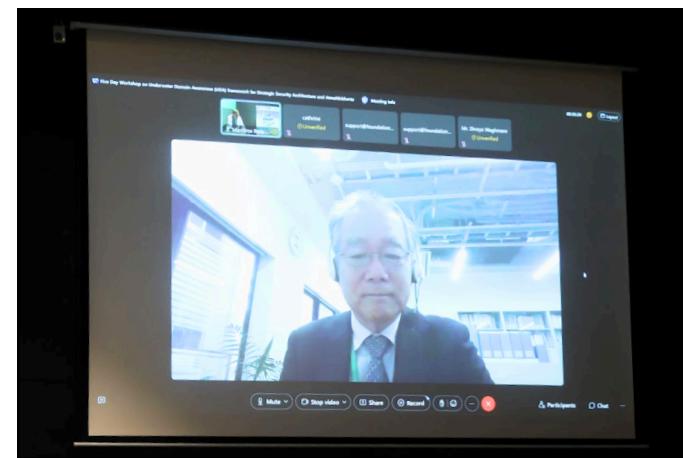
Professor Akamatsu's presentation served as a clarion call for collective action and international cooperation to safeguard our oceans, mitigate the impacts of climate change, and ensure a sustainable and prosperous future for generations to come. His insights underscored the interconnectedness of global challenges and the imperative of forging synergies across borders to address them comprehensively. Ever since the establishment of diplomatic relations, the two countries (India and Japan) have enjoyed cordial relations.

▶ Watch full address- here

Presentations by MRC Fellows

Cathrine Jeorge,
Head of Publication and Research,
Maritime Research Center
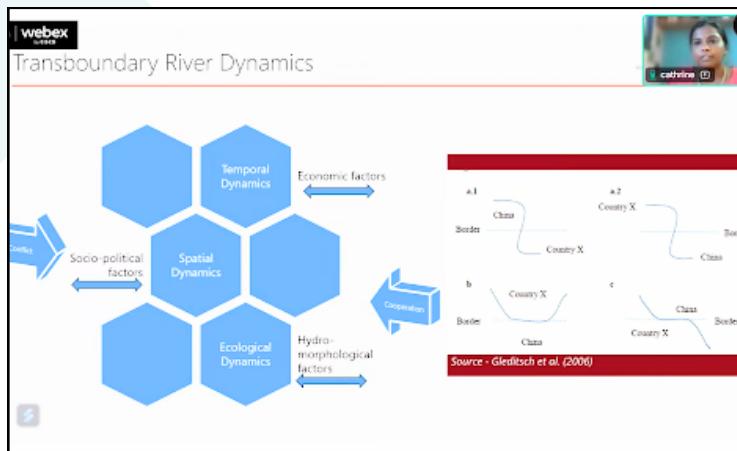
▶ Watch full address- here

Cathrine's presentation on 'Transboundary Rivers and Underwater Domain Awareness-Case Study on Indus Water' highlighted the transboundary river dynamics and historical factors associated with the Indus River. She further explained in detail the 1960 Indus Water Treaty. She concluded her presentation with points on policy interventions, highlighting the following: understanding the consequences of socio-political goals, addressing food security, energy security, and strategic security, and collaborating between Riparian countries for technology and capacity building, digital intervention, and integration with Marine Spatial Planning, China's interference, and India as a regional leader.

Divya Rai,
Research Fellow,
Maritime Research Center

▶ Watch full address- here
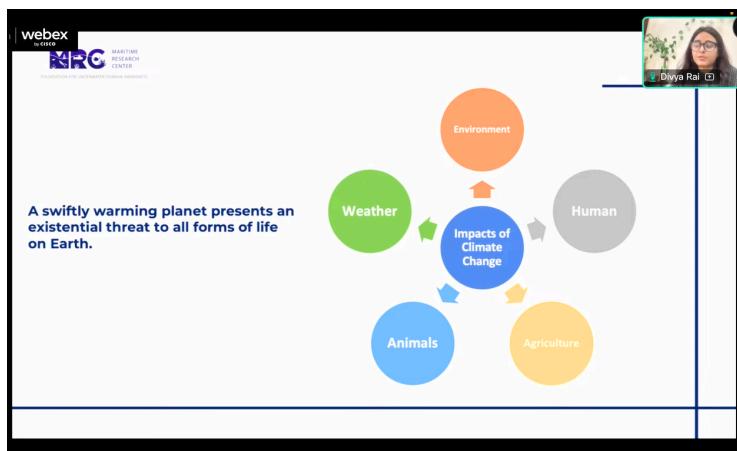
Divya made an elaborate presentation on 'Underwater Domain Awareness for Climate Resilience in Coastal Regions: A Case of Bay of Bengal Region (BoB).' During her presentation, Divya Rai elaborated on the Impact of Climate Change, an assessment of climate risk: a case of the Bay of Bengal Region and the way forward using the UDA approach.

Romit Kaware,
Research Fellow,
Maritime Research Center
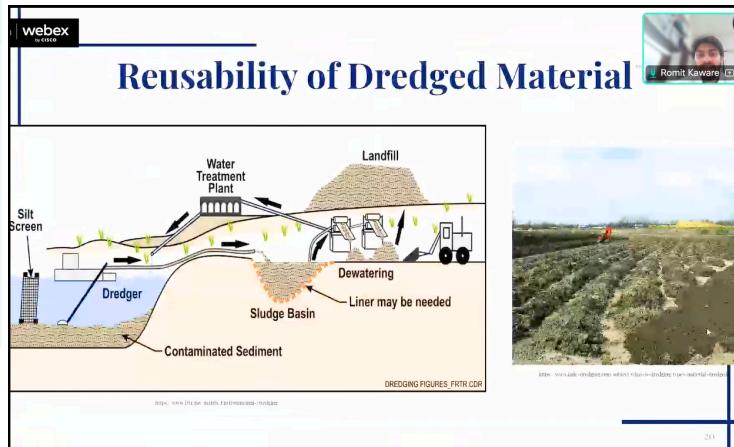
▶ Watch full address- here

Romit made an elaborate presentation on the topic 'Sediment Bearing Pressure in Tropical Waters' on Day 5 of the workshop. He made a similar presentation on Day 2 of the five-day workshop series as well. While presenting on the sediment-bearing pressure in tropical waters, he introduced the topic to the audience, spoke about its importance, various data collection techniques, model-based classification and way ahead. He highlighted that the knowledge of initial sediment-bearing pressure estimates is necessary during the initial design phases of the intended projects.

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Shlok Nemani,
Research Fellow,
Maritime Research Center

▶ Watch full address- here
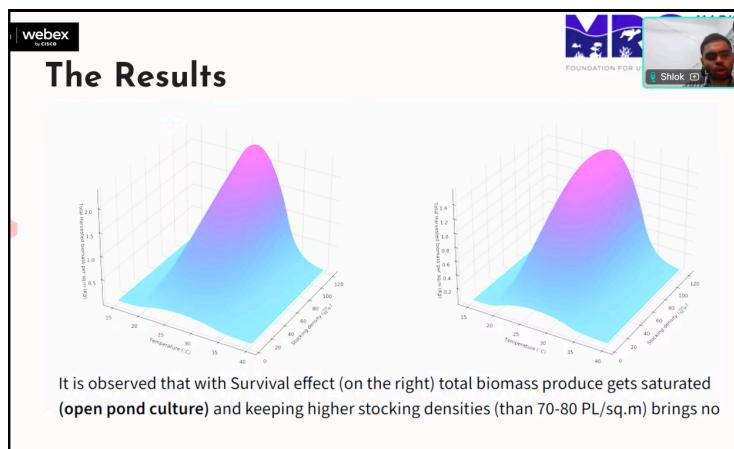
Shlok's topic of the presentation was 'Digital Transformation.' He further shared key details on Digital Transformation to aquaculture, APY analysis & APY tool, and the notion of modern aquaculture. While presenting, he noted that Aquaculture employs 28M people in India, which shows how the Blue Economy acts for the people, providing employment opportunities for Cargo Shipping.

Akshita Mangal,
Research Fellow,
Maritime Research Center

Watch full address- here

Akshita made a presentation on the estimation of radiated noise from marine vessels. She noted that it has become an important research challenge. During her presentation she highlighted the following aspects of underwater radiated noise- (1) Shipping noise is the single ubiquitous source of ambient noise in the ocean, (2) The Indian Ocean Region (IOR) has emerged as the most critical sea area in the 21st century, and (3) The shipping traffic due to the merchant marines and the naval deployments have seen a manifold rise in the IOR.

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Nishtha Vishwakarma,
Communications & Advocacy Lead,
Maritime Research Center

Watch full address- here

Nishtha made an elaborate presentation on all the existing UDA platforms at MRC. The four UDA platforms are as follows- UDA Digest, UDA Knowledge Center, Learning Center, and UDA Dialogue. She encouraged the participants to share their views on the concept of Underwater Domain Awareness and its significance in the strategic security space for UDA Digest. She further informed the participants about recent reports that have been published by the MRC such as UDA Annual Report 2023, Marine Spatial Planning (MSP) Position Paper, Skilling Handbook, Blue Economy Position Paper, etc.

Ayush Sawadh,
Research Engineer,
Maritime Research Center

▶ Watch full address- here

Ayush's presentation on Day 1 of the five-day workshop revolved around navigating the UDA platforms that the team has built over the years. Ayush spoke about various platforms available on the UDA Framework page that he has built for the Maritime Research Center's website. He also spoke about other key deliverables on the page including the Marine Spatial Planning (MSP) Position Paper, Blue Economy Position Paper, UDA 2023 Annual Report, the Skilling Handbook, etc. He further elaborated on the UDA Framework cube that has been internally built and promoted by the team since the very beginning.

Jay Pinjarkar,
Research Engineer,
Maritime Research Center

▶ Watch full address- here

Jay talked about the Marine Spatial Planning (MSP) tool that he is working on creating at the Maritime Research Center. He noted it will be a dynamic digital transformation tool for underwater governance and research. The major stakeholders for the MSP tool belong to the following backgrounds: coastal and marine tourism, Sustainable development Goals, Resource mapping, climate change and risk management, marine infrastructure, and operations.

Conclusion

The takeaways of the workshop for the MRC are as follows:

- Massive outreach across the key stakeholders in the strategic security establishments.

- These stakeholders are convinced on three counts: the immense possibilities in the underwater domain, the urgent need for capacity and capability building, and the credibility of MRC in bridging that gap.

- The resource persons came from key positions that will shape opinions and decision-making in the future. They all have returned with a deeper appreciation of the UDA framework and its relevance in driving India to the next level. Each one of them also recognizes the credibility of MRC.

- The importance of the UDA framework is slowly getting established in the QUAD circles. The Indo-Pacific initiative will require the UDA framework to meaningfully drive strategic security, sustainable blue economic requirements, and climate change risk management. The think tanks from the QUAD countries have been briefed and onboarded.

- The BSF had deputed their three key officers for the event. DIG (Ops) from East, West, and the Headquarters, who are facing these challenges on a day-to-day basis. These officers were overwhelmed by the workshop and have committed to working closely with MRC to build a structured capacity & capability-building framework for their organization.

- The workshop was a significant morale booster for MRC on the relevance of their effort to the ecosystem and the specific stakeholders. The feedback session at the end of the workshop was overwhelming for all present. The UDA framework is aligned with the national, regional, global, geopolitical, and geostrategic priorities. They were also convinced that the MRC is the only organization that is ready in all respects to play a significant role going forward.

MRC's Model of 'Outreach, Engage, and Sustain'

The MRC has proposed a few concrete measures to achieve the implementation of the UDA Framework in the Strategic Security space to achieve Atmanirbharta for realizing the SAGAR vision. The way ahead has to be structured to achieve a concrete outcome.

Outreach: This workshop is the beginning of outreach to sensitize the ecosystem on the merits of the UDA framework towards realizing the SAGAR vision. More targeted workshops, seminars, and conferences will be required to get more people on board. A structured outreach will be required at regular intervals to sensitize a large section of policymakers, government officials, stakeholders, students, young professionals, practitioners, and others.

- **UDA Summer School:** A five-week internship program is planned for June-July 2024. It will be a project-based program with field experiments, expert interaction, and industry exposure. The participants will come from academia, industry, stakeholders, and policymakers.
- **UDA Internship:** An eight-week internship is planned in May, June, and July for students from premier institutes interested in research and innovation. MRC gets regular applications from IITs, BITS Pilani, and other premier institutes for summer internships. The focus here is project-based learning with high research and innovation content.

Short Seminars: A set of one-day, two-day,, and five-day seminars will be conducted for multiple stakeholders and policy makers. The seminars will be for domestic and global audiences.

Engage: The outreach has to translate to engagement with the multiple components of the ecosystem. This step will bring more involved engagement to ensure a deeper appreciation of the nuances of the UDA framework to enable them to drive it to the next level.

UDA Fellowship: The students and young professionals found suitable to contribute further during the outreach interactions will be offered UDA fellowships. Three types of fellowships are on offer:

- **UDA Project Fellowship** is a part-time five-month engagement for students and young professionals. They are paid a monthly stipend for their contribution.
- **UDA Theme Fellowship** is a one-year full-time program for young professionals. Even research scholars can join.
- **UDA Research Fellowship** is a deliverable-based program with more serious outcome expectations.

Stakeholder Engagement: The stakeholders, including academia, industry, users, and practitioners have started signing MoUs with MRC to drive the UDA framework for their specific requirements. Capacity & capability building to more specific policy & technology interventions for their strategic requirements.

Strategic Engagement: The policymakers at the central and state level need to engage with the UDA framework. A comprehensive and inclusive mechanism needs to be evolved with the existing structures.

Sustain: The outreach and engage steps must evolve into more tangible policy & technology interventions for the realization of the SAGAR vision on the ground. Specific project proposals will be submitted to get funding and recognition from the authorities for implementing the projects. A mix of corporate, CSR, and government support will be sought to make it a collaborative and synergized mechanism of nation-building.

Policy Intervention: Specific UDA-related global, regional, national, and local policy interventions need to be formulated to achieve the desired outcomes. The policy draft with well-informed research and innovation inputs will require dedicated effort and expert involvement. Such efforts cannot be undertaken by private citizens without the support of the appropriate authorities. MRC has been tasked by the International Maritime Organization (IMO) through the Government of India to work on Underwater Noise Management in the tropical waters of the IOR. It started with a body of work generated by MRC on its own for over five years, before it got picked up by the Government of India. Similar work will be required for multiple other sectors to realize the Sustainable Development Goals (SDGs) in the IOR and beyond.

Technology Intervention: Marine Spatial Planning (MSP) as part of the digital transformation in the underwater domain has become the de-facto tool for effective governance in the marine and freshwater systems. The digital transformation in tropical waters has its unique challenges and requires site-specific R&D efforts to build a deeper understanding of the local ground realities. Even mapping of traditional knowledge onto modern digital tools will be an effective way forward. Project proposals for building the hardware and software for such digital transformation tools. Multi-disciplinary researchers have to get involved to build this know-how with adequate funding made available from diverse sources.

MEDIA LIBRARY

All photos are available for you to download.
click below.

DOWNLOAD

DAY - 1

DAY - 3

DAY - 4
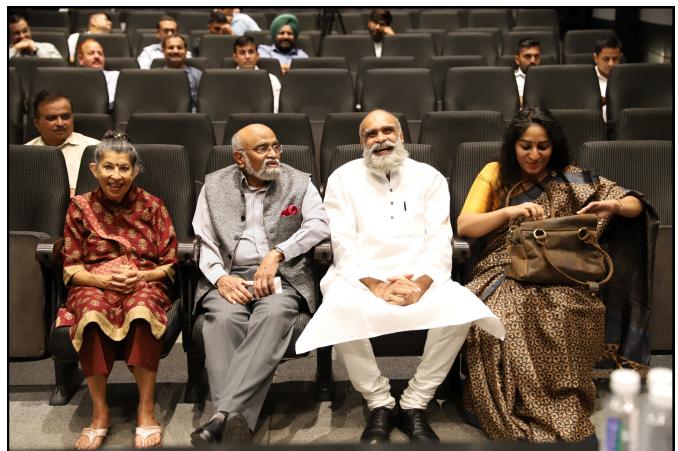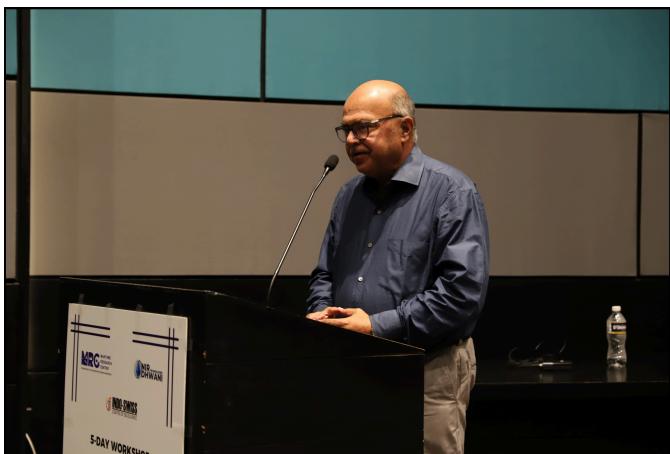
'अंडरवॉटर डोमेन'मध्ये मोठ्या आर्थिक संधी

कार्यशाळेत माजी संरक्षण सचिव डॉ. अजय कुमार यांचे प्रतिपादन

पुणे, ता. २२ : "पृथ्वीवरील ९४ टक्के जीवसृष्टी ही समुद्रामध्ये आहे असे मानले जाते. मात्र, चंद्र आणि मंगळावर देशाने केलेल्या संशोधनापेक्षा खूप कमी संशोधन हे जलपृष्ठभागाखालील (अंडरवॉटर डोमेन) क्षेत्रामध्ये झाले आहे. जल पृष्ठभागाखालील क्षेत्रात अनेक कंगोरे असून यामध्ये मोठ्या प्रमाणात आर्थिक संधी दडलेल्या आहेत," असे प्रतिपादन भारताचे माजी संरक्षण सचिव डॉ. अजय कुमार यांनी केले.

'अंडरवॉटर डोमेन अवेअरनेस' क्षेत्रात कार्यरत असलेल्या पुण्यातील मेरिटाईम रिसर्च सेंटर'तर्फे (एमआरसी) आणि इंडो-स्विस

फायदे काय ?

- सॉफ्टवेअर आणि कृत्रिम बुद्धिमत्ता (एआय) यांमध्ये आपली क्षमता ही महासागराचा अभ्यास, पर्यटन, शिपिंग, मत्स्यपालन आदी विषयांसाठी नक्की वापरली जाऊ शकते
- उपलब्ध माहितीचे विश्लेषण करून त्यावर उपाय शोधण्याची खरी गरज आहे
- लाखो नोकऱ्या निर्माण करण्याची आणि सागरी संसाधनांचा लाभ घेत अब्जावधींचा महसूल निर्माण करण्याची क्षमता

सेंटर ऑफ एक्सलन्स' व 'नीरध्वनी टेक्नॉलॉजीज' यांच्या विशेष सहकार्याने 'अंडरवॉटर डोमेन अवेअरनेस फ्रेमवर्क फॉर स्ट्रॅटेजिक सिक्युरिटी आर्किटेक्चर अँड आत्मनिर्भरता' या विषयावर आयोजित

कार्यशाळेत डॉ. अजय कुमार बोलत होते. त्यांनी 'धोरणात्मक सुरक्षा आणि नवसंकल्पना' या विषयावर मार्गदर्शन केले. 'एमआरसी'च्या धोरणात्मक सल्लागार समितीचे अध्यक्ष लेफ्टनंट जनरल (निवृत्त) डी. बी. शेकटकर,

प्रफुल्ल तलेरा आणि संस्थापक संचालक कमांडर डॉ. अर्णब दास यांचेवेळी उपस्थित होते.

डॉ. अजय कुमार म्हणाले, 'जल पृष्ठभागाखालील क्षेत्रासंबंधी जागरूकता निर्माण करणे ही काळाची गरज झाली आहे. या क्षेत्रात असलेल्या छुप्या संधी आणि या क्षेत्राची क्षमता ओळखणे भारतासाठी महत्त्वाचे आहे. आपण असे केले नाही तर इतर देशांशी तुलना

> समुद्रमार्गे होणारी आक्रमणे ज्या प्रकारे सुरक्षेच्या दृष्टीने धोकादायक आहे. आता नदीमार्गे उभे राहणारे राष्ट्रीय सुरक्षेचे प्रश्न देखील तितकेच महत्त्वाचे आहेत. ब्रह्मपुत्रा नदीचा प्रवाह बदलत चीन नेमके हेच करीत आहे.
> - डी. बी. शेकटकर, लेप्टनंट जनरल (निवृत्त)

करीत आपण त्यांच्या मागेच राहू. महासागर हे हरितगृह वायूंच्या व्यवस्थापनासाठी महत्त्वपूर्ण आहेत. या हरितगृह वायू ठरवतात असे म्हटले जाते. याचे व्यवस्थापन करायचे असल्यास आपल्याला महासागराचे व्यवस्थापन करावे लागेल. भूभागाप्रमाणेच आपले सागरी क्षेत्रही आपल्याला अनेक संसाधने पुरविते असते.'

अंडरवॉटर डोमेन क्षेत्रात आर्थिक संधी

▶ पुणे : प्रतिनिधी

पृथ्वीवरील ९४ टक्के जीवसृष्टी ही समुद्रामध्ये आहे, असे मानले जाते. मात्र, चंद्र आणि मंगळ या दोन ग्रहांवर भारताने जे काही संशोधन केले आहे, त्यापेक्षा खूप कमी संशोधन हे आजवर अंडरवॉटर डोमेन या क्षेत्रामध्ये झाले आहे. ही काळजी करण्यासारखी बाब आहे. अंडरवॉटर डोमेन अर्थात जल पृष्ठभागाखालील क्षेत्राचे अनेक कंगोरे असून, यामध्ये मोठ्या प्रमाणात आर्थिक संधी दडलेल्या आहेत, असे मत भारताचे माजी संरक्षण सचिव डॉ. अजय कुमार यांनी केले.

मेरिटाईम रिसर्च सेंटर (एमआरसी)च्या वतीने आणि इंडो-स्वीस सेंटर ऑफ एक्सलन्स व नीरध्वनी टेक्नॉलॉजीज यांच्या विशेष सहकार्याने अंडरवॉटर डोमेन अवेअरनेस फ्रेमवर्क फॉर स्ट्रॅटेजिक सिक्युरिटी आर्किटेक्चर अँड आत्मनिर्भरता या महत्त्वाच्या विषयावर आयोजित पाच दिवसीय कार्यशाळेदरम्यान डॉ. अजय कुमार यांनी धोरणात्मक सुरक्षा आणि नवसंकल्पना या विषयावर उपस्थितांना मार्गदर्शन केले. याप्रसंगी एमआरसीच्या धोरणात्मक सल्लागार समितीचे अध्यक्ष लेफ्टनंट जनरल (निवृत्त) डी. बी. शेकटकर, एमआरसीचे सल्लागार प्रफुल तलेरा आणि एमआरसीचे संस्थापक संचालक कमांडर डॉ.

अर्नब दास आदी उपस्थित होते.

डॉ. अजय कुमार म्हणाले, अंडरवॉटर डोमेन अर्थात जल पृष्ठभागाखालील क्षेत्रासंबंधी जागरूकता निर्माण करणे ही काळाची गरज झाली असून, या क्षेत्रात असलेल्या छुप्या संधी आणि या क्षेत्राची क्षमता ओळखणे भारतासाठी महत्त्वाचे झाले आहे. अंडरवॉटर डोमेनमधील संधींवर आपण लक्ष केंद्रित करायला हवे आहे. आपण जर असे केले नाही, तर इतर देशांशी तुलना केल्यास आपण त्यांच्या मागेच राहू. महासागर हे हरितगृह वायूच्या व्यवस्थापनासाठी महत्त्वपूर्ण आहेत. देशात स्मार्ट शहरांप्रमाणेच आता सागरी क्षेत्रात स्मार्ट रिजन उभारण्यावर आपण भर द्यायला हवे आहे.

जलपृष्ठभागाखालील संशोधनात मोठ्या संधी

माजी संरक्षण सचिव कुमार यांचे मत

म. टा. प्रतिनिधी, पुणे

'पृथ्वीवरील ९४ टक्के जीवसृष्टी समुद्रामध्ये आहे, असे मानले जाते. मात्र, चंद्र आणि मंगळ या दोन ग्रहांवर भारताने जे काही संशोधन केले आहे, त्याच्यापेक्षा खूप कमी संशोधन आजवर अंडरवॉटर डोमेन क्षेत्रात झाले आहे. ही चिंतेची बाब आहे. या क्षेत्राचे अनेक कंगोरे असून, यामध्ये मोठ्या प्रमाणात आर्थिक संधी दडलेल्या आहेत,' असे भारताचे माजी संरक्षण सचिव डॉ. अजय कुमार यांनी सांगितले. नजीकच्या भविष्यामध्ये हे क्षेत्र नवा आयाम घेऊन उदयास येणारे क्षेत्र असेल, याकडे त्यांनी लक्ष वेधले.

'अंडरवॉटर डोमेन अवेअरनेस' अर्थात 'यूडीए' या क्षेत्रात गेली अनेक वर्षे कार्यरत असलेल्या पुण्यातील मेरिटाइम रिसर्च सेंटरच्या (एमआरसी) वतीने आणि इंडो-स्विस सेंटर ऑफ एक्सलन्स व नीरध्वनी टेक्नॉलॉजीज यांच्या सहकार्याने 'अंडरवॉटर डोमेन अवेअरनेस फ्रेमवर्क फॉर स्ट्रॅटेजिक सिक्युरिटी आर्किटेक्चर अँड आत्मनिर्भरता' या महत्त्वाच्या विषयावर आयोजित करण्यात आलेल्या

पाच दिवसांच्या कार्यशाळेत डॉ. अजय कुमार बोलत होते.

'एमसीसीआयए'च्या नवलमल फिरोदिया हॉलमध्ये ही कार्यशाळा झाली. या वेळी डॉ. कुमार यांनी 'धोरणात्मक सुरक्षा आणि नवसंकल्पना' या विषयावर उपस्थितांना मार्गदर्शन केले. 'एमआरसी'च्या धोरणात्मक सल्लागार समितीचे अध्यक्ष लेफ्टनंट जनरल (निवृत्त) डी. बी. शेकटकर, 'एमआरसी'चे सल्लागार प्रफुल तलेरा आणि 'एमआरसी'चे संस्थापक संचालक कमांडर डॉ. अर्णव दास आदी उपस्थित होते.

डॉ. अजयकुमार म्हणाले, 'जल पृष्ठभागाखालील क्षेत्रासंबंधी जागरूकता निर्माण करणे ही काळाची गरज आहे. या क्षेत्रात असलेल्या छुप्या संधी आणि या क्षेत्राची क्षमता ओळखणे भारतासाठी महत्त्वाचे झाले आहे. आपण असे केले नाही, तर इतर देशांच्या तुलनेत आपण मागे राहू.'

'समुद्रमार्गे होणारी आक्रमणे ज्या प्रकारे सुरक्षेच्या दृष्टीने महत्त्वाची आहेत, त्या प्रकारे आता नदीमार्गे उभे राहणारे राष्ट्रीय सुरक्षेचे प्रश्नदेखील तितकेच महत्त्वाचे आहेत,' मत लेफ्टनंट जनरल (निवृत्त) डी. बी. शेकटकर यांनी प्रास्ताविकात व्यक्त केले. 'एमआरसी'चे संस्थापक संचालक कमांडर डॉ. अर्णव दास यांनी आभार मानले.

देशाने औद्योगिक परिसंस्था वाढविण्यावर भर द्यावा : ए. टी. रामचंदानी

पुणे, ता. २१ : 'देशात भविष्यात अंडरवॉटर डोमेन अवेअरनेस (यूडीए) अर्थात जल पृष्ठभागाखालील क्षेत्रासंबंधी जागरूकता या क्षेत्रात भरीव काम करायचे असल्यास पाश्चिमात्य तंत्रज्ञानावर अवलंबून राहता कामा नये.

शिवाय देशाने औद्योगिक परिसंस्था उभारण्याबरोबर ती वाढविण्यावरदेखील भर द्यायला हवा,'' असे मत 'एल अँड टी'चे कार्यकारी उपाध्यक्ष ए. टी. रामचंदानी यांनी केले.

मेरिटाईम रिसर्च सेंटर'च्या

(एमआरसी) वतीने आणि 'इंडो-स्विस सेंटर ऑफ एक्सलन्स' व 'नीरध्वनी टेक्नॉलॉजिज' यांच्या सहकार्यानि 'अंडरवॉटर डोमेन अवेअरनेस फ्रेमवर्क फॉर स्ट्रॅटेजिक सिक्युरिटी आर्किटेक्चर अँड आत्मनिर्भरता विषयावर पाच

दिवसीय कार्यशाळा आयोजित केली. या उद्घाटनप्रसंगी रामचंदानी बोलत होते. सेनापती बापट रस्त्यावरील एमसीसीआयएच्या नवलमल फिरोदिया सेमिनार हॉलमध्ये कार्यशाळा पार पडली.

Needed: An underwater PM Gati Shakti

The oceans harbour vast untapped economic potential worth trillions of dollars, yet much of it remains undiscovered. Not only does 94 per cent life exist underwater, oceans play a critical role in managing greenhouse gases. Earth's longest chain of mountains, the mid-ocean ridge, which spans 65,000 kms, is underwater, as are 3 million shipwrecks, each holding a treasure trove of stories. Surprisingly, oceans remain less explored than the surfaces of the Moon or Mars.

India's maritime domain, covering nearly the same area as its land territory, holds 80 per cent of her resources but contributes only 4 per cent to gross domestic product. As India marches to become the world's third-largest economy, the blue economy provides a shimmering opportunity. India can generate millions of jobs and trillions in revenue from fisheries, aquaculture, tourism, shipping, offshore energy, and minerals. Moreover, the high seas and deep seas have tremendous strategic implications as well. China has the world's biggest fleet engaged in high-seas fishing, and India needs to catch up. Deep-sea minerals, including polymetallic nodules and rare earths, hold boundless value, with advancing technology making their sustainable extraction feasible in the near future. The nation quickest to harness the opportunities in open maritime territories may control the resources and territory in the long run.

The initiation of a blue economy strategy hinges on developing good underwater domain awareness (UDA), a subject largely overlooked. UDA first gained importance during the Cold War, with systems like SOSUS, a seabed hydrophone network set up in the Atlantic by the US Navy to track Russian submarines. However, with technological advancement, UDA is of great economic significance as well. Underwater information is now captured using underwater and space-based sensors. Space-based sensors are used to guide fishing-vessels to fish-rich areas and identify specific high-value fish.

India must prioritise indigenous development of underwater sensor technology because these technologies are closely guarded, and, if shared, are prohibitively expensive, rendering their economic use unviable. Additionally, the equipment developed during the Cold-war era works well in the cold temperate conditions of the Pacific or the Atlantic, but its performance degrades rapidly in the tropical waters of the Indian Ocean, with data inaccuracies of up to 60 per cent. India made a promising beginning with the unveiling of 75 iDEX challenges under the Navy's SPRINT programme in August 2022, resulting in the country's first indigenous underwater technology prototypes. To strengthen UDA, domestic chip development capabilities are essential. A design-led incentive scheme could prioritise UDA sensors for funding, fostering chip-level expertise in this domain. The Ministry of Electronics and IT could consider iDEX-type challenges with assured procurement by the government.

The UDA involves collection and analysis of vast datasets involving thousands of attributes. These datasets cover a wide range of information, including geographic features like sea-mounds, ridges, trenches, as well as underwater events, observations entities such as vessels, objects and their behaviours. Additionally, data on activities like navigation, communications, environmental factors like temperature, salinity, density, water-quality and chemical composition, ocean-currents and acoustic-signals, seismic activity and the Earth's magnetic field are included. Central Ministries, organisations, coastal states collect separate data, resulting in isolated datasets.

An open-API framework akin to India-stack applications such as in UPI and Aadhaar, could facilitate sharing of data. This could foster development of applications by startups and organisations and promote the use of artificial intelligence in this domain. Furthermore, a PM Gati Shakti for economic UDA, akin to the PM Gati Shakti for terrestrial economic development could be established. The initiative would provide a comprehensive picture of available data, identify strengths and gaps, and guide future data collection efforts. Furthermore, it could serve as a centralised coordination platform for multiple agencies, reducing duplication and wasteful expenditure.

The PM Gati Shakti for economic UDA would be characterised by a GIS-based platform. This will have four-dimensional data points — latitude, longitude, depth and time. Since the changes in UDA attributes like temperature, salinity, density, and acoustics are ever-changing, the time dimension of this GIS-based platform would be very important.

Diverse underwater domains in the Sunderbans and Sir Creek demand context-specific maritime planning. The PM Gati Shakti for economic UDA could enable India to spearhead the development of "Smart Maritime Zones", similar to "Smart Cities", which would facilitate technology-driven maritime spatial planning based on location-specific characteristics, ensuring optimal and sustainable exploitation of marine resources and addressing challenges like safe navigation, search and recovery operations, protection of economic assets and prevention of underwater pollution. This would take the vision of Sagar — security and growth for all in the region — to a higher level and would enable India to be a leader in this domain in the Indian Ocean region.

A Gati Shakti plan for economic UDA would guide human resources planning. There is a need to enhance awareness amongst policymakers, military and the police. The Marine Research Centre (MRC) has emerged as a resource centre in this domain. Expanding the MRC's role, a national programme could be envisioned with the MRC evolving into a regional capacity-building centre for foreign littoral nations. The MRC could also work towards developing into an innovation-hub, nurturing UDA focused startups.

While UDA has been viewed as a security issue, it holds potential as a key economic catalyst. Similar to past initiatives like the electronic, space and atomic energy commissions, a Gati Shakti plan for economic UDA could position India as a frontrunner in leveraging this domain. UDA has the capacity to revive India's maritime legacy, offering significant opportunities for economic growth and global leadership.

OFF THE GRID

AJAY KUMAR

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अंडरवॉटर डोमेनमध्ये मोठ्या आर्थिक संधी

पुणे, दि. १९ (प्रतिनिधी) – ...वरील ९४ टक्के जीवसृष्टी ...समुद्रमध्ये आहे, असे मानले ...ते. मात्र, चंद्र आणि मंगळ या ...ग्रहांवर हिंदुस्थानने जे काही ...ोघन केले आहे, त्याच्यापेक्षा ... कमी संशोधन हे आजवर ...डरवॉटर डोमेन या क्षेत्रामध्ये झाले आहे, ...काळजी करण्यासारखी बाब आहे. ...डरवॉटर डोमेन अर्थात जल ...भागाखालील क्षेत्राचे अनेक कंगोरे असून, ...मध्ये मोठ्या प्रमाणात आर्थिक संधी ...लेल्या आहेत, असे मत हिंदुस्थानचे माजी ...क्षण सचिव डॉ. अजय कुमार यांनी व्यक्त ...

मेरिटाईम रिसर्च सेंटरतर्फे ...मआरसी) इंडो-स्विस सेंटर ऑफ ...

एक्सलन्स व नीरघ्वनी टेक्नॉलॉजीजच्या सहकार्याने 'अंडरवॉटर डोमेन अवेअरनेस फ्रेमवर्क फॉर स्ट्रॅटेजिक सिक्युरिटी आर्किटेक्चर अँड आत्मनिर्भरता' या विषयावर आयोजित कार्यशाळेत ते बोलत होते. एमआरसीच्या धोरणात्मक सल्लागार समितीचे अध्यक्ष लेफ्टनंट जनरल (निवृत्त) डी. बी. शेकटकर, एमआरसीचे सल्लागार प्रफुल तलेरा, एमआरसीचे संस्थापक संचालक कमांडर डॉ. अर्नब दास यावेळी उपस्थित होते.

डॉ. अजय कुमार म्हणाले, अंडरवॉटर डोमेन क्षेत्रासंबंधी जागरूकता निर्माण करणे काळाची गरज आहे. या क्षेत्रात असलेल्या छुप्या संधी आणि क्षमता ओळखणे

देशासाठी महत्त्वाचे आहे. अंडर... डोमेनमधील संधीवर आपण लक्ष के... करायला हवे. महासागर हे हरित... वायूंच्या व्यवस्थापनासाठी महत्त्व... आहेत. जीवसृष्टी सुरू राहणार आहे ... नाही हे हरितगृह वायू ठरवतात, असे म्ह... जाते. याचे व्यवस्थापन करायचे असल्... आपल्याला महासागरांचे व्यवस्थापन क... लागेल. सॉफ्टबेअर आणि कृ... बुद्धिमत्तेमध्ये आपली क्षमता ... महासागराचा अभ्यास, पर्यटन, शिपि... मत्स्यपालन विषयांसाठी वापरली जा... शकते. मात्र, उपलब्ध डेटाचे विश्ले... करून त्यावर उपाय शोधण्याचीही ग... आहे. लाखो नोकऱ्या निर्माण करण्या... आणि अब्जावधींचा महसूल निर्मा... करण्याची क्षमता या क्षेत्रात आहे.

## माजी संरक्षण सचिव डॉ. अजय कुमार यांचे मत

लोकसत्ता प्रतिनिधी

पुणे : पृथ्वीवरील ९४ टक्के जीवसृष्टी ही समुद्रामध्ये आहे, असे मानले जाते. मात्र, चंद्र आणि मंगळ या दोन ग्रहांवर भारताने केलेल्या संशोधनापेक्षाही खूप कमी संशोधन जल पृष्ठाखालील क्षेत्रामध्ये (अंडरवॉटर डोमेन) झाले आहे. त्याला जल पृष्ठाखालील क्षेत्राचे अनेक कंगोरे असून यामध्ये मोठ्या प्रमाणात आर्थिक संधी दडलेल्या आहेत, असे मत माजी संरक्षण सचिव डॉ. अजय कुमार यांनी व्यक्त केले. नजीकच्या भविष्यामध्ये हे नव्याने उदयास येणारे क्षेत्र असेल, याकडे त्यांनी लक्ष वेधले.

मेरिटाईम रिसर्च सेंटर (एमआरसी)च्या वतीने आणि इंडो-स्विस सेंटर ऑफ एक्सलन्स व नीरघ्वनी टेक्नॉलॉजीजच्या विशेष सहकार्याने 'अंडरवॉटर डोमेन अवेअरनेस फ्रेमवर्क फॉर स्ट्रॅटेजिक सिक्युरिटी आर्किटेक्चर अँड आत्मनिर्भरता' या महत्त्वाच्या विषयावर आयोजित कार्यशाळेत डॉ. अजय कुमार बोलत होते. 'धोरणात्मक सुरक्षा आणि नवसंकल्पना' या विषयावर त्यांनी मार्गदर्शन केले. एमआरसीच्या धोरणात्मक सल्लागार समितीचे अध्यक्ष लेफ्टनंट जनरल (निवृत्त) डी. बी. शेकटकर, एमआरसीचे सल्लागार प्रफुल तलेरा आणि

म्हणाले, की जल पृष्ठभागाखालील क्षेत्रासंबंधी जागरूकता निर्माण करणे ही काळाची गरज झाली असून या क्षेत्रात असलेल्या छुप्या संधी आणि या क्षेत्राची क्षमता ओळखणे भारतासाठी महत्त्वाची झाले आहे. याकडे लक्ष दिले गेले नाही तर इतर देशांच्या तुलनेत आपण मागे राहू. महासागर हे हरितगृह वायूंच्या व्यवस्थापनासाठी महत्त्वपूर्ण आहेत. जीवसृष्टी सुरू राहणार आहे की नाही हे हरितगृह वायू ठरवतात असे म्हटले जाते. त्यासाठी आपल्याला महासागरांचे व्यवस्थापन करावे लागेल. भूभागाप्रमाणेच आपले सागरी क्षेत्रही आपल्याला अनेक संसाधने पुरवीत असते. मात्र,

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Dr. Ajay Kumar, Former Defence Secretary, GOI

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भारत इलेक्ट्रॉनिक्स लिमि
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BHARAT ELECTRONICS LIMITE
Empowering the Nation's Defence

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India's Former Amb. to China & Pakistan

largest economy in the world. But we are

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🌊 We are thrilled to have had the opportunity to host you all (online and offline) during our five… see more

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5-DAY WORKSHOP
UDA FRAMEWORK FOR STRATEGIC
SECURITY ARCHITECTURE AND
ATMANIRBHARTA

Shri Praful Talera, MRC Advisor on Blue Economy

Just to sum up the five day workshop

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Enclosure 1: Feedback from our key participants

The participants at the MRC workshop came from the strategic security community, including the Armed Forces, Paramilitary Forces, Coastal Police, Defence Industry, Think Tanks, and more. Senior officers came from the Border Security Force (BSF), Andaman and Nicobar Command, Indian Navy, Indian Army, Maharashtra Coastal Police, Indian Coast Guard, and Sri Lankan Navy (online). They concluded by appreciating the event's topics and advocating for further engagement and participation from officers in the future. Some of the participants discussed specific issues like sediment management, proposing solutions and advocating for closer collaboration with other agencies and partners. Additionally, a participant from the BSF suggested areas for improvement including marine spatial planning, sound surveillance systems, and integration of artificial intelligence.

Some participants reflected on the shift in perspective brought about by the workshop, noting its significance for national security and economic progress, particularly concerning the oceans. They highlighted the diverse and informative lectures, including discussions on the SAGAR vision, indigenization programs, and geopolitical choke points, praising the insights shared by various speakers.

One of the key participants emphasized the need for upgraded marine forces and collaboration with coastal police to secure these borders effectively. He emphasized the need for upgraded marine forces and collaboration with coastal police to secure these borders effectively. Our other key participants from the Indian Army highlighted the importance of understanding underwater operations, especially in the context of peacekeeping missions, where knowledge about humanitarian crises and ecological issues proves valuable. He appreciated the opportunity to gain insights from naval perspectives, particularly Cmde Vasan's presentation, which provided a rare glimpse into naval operations for an army officer like himself. The workshop broadened his understanding of oceanic activities, including sea trade and maritime diplomacy. Our particpants were particularly struck by the emphasis on ethics and India's natural strengths, such as spirituality and intellectualism, which they believed could position India as a global leader.

Other key takeaways from the session that covered feedback from participants are as follows:
- The importance of collaboration, technological innovation, and firsthand observation in addressing maritime security challenges.
- The need to emphasize the importance of underwater domain awareness for initiatives like underwater mining and extending search and rescue operations.
- The optimism about the future of underwater research and its parallels with India's successful space and missile missions.
- The significance of 3D mapping technology in enhancing maritime operations, particularly for submarines lacking visual observation capabilities.
- The importance of highlighting the strategic importance of UDA in submarine operations and its implications for maritime security.

Enclosure 2: MRC's Proposal for conducting the UDA Workshop 2024

India's geopolitical landscape has undergone significant changes in the 21st century, prompting active engagement from the global community in strategic power dynamics. The Indo-Pacific strategic framework, focusing on the tropical coastal areas of the Indian and Pacific Oceans, has emerged as a novel approach to security interactions. The Indian Ocean Region (IOR) serves as a pivotal hub for political, economic, military, and socio-cultural exchanges, necessitating India's central role in shaping events in the region.

The Government of India has taken notable steps to reinforce its leading role in global strategic affairs through initiatives like the Security And Growth for All in the Region (SAGAR) vision, led by the Prime Minister. This vision aims to enhance India's influence in the IOR and beyond by addressing regional security concerns and leveraging economic opportunities in maritime sectors. Major projects like Sagarmala, Bharatmala, Inland Water Transport, and Gati Shakti support this vision, alongside addressing challenges related to transboundary rivers such as the Indus and Brahmaputra rivers in the Northeast. Additionally, the strategic significance of the Underwater Domain is increasingly recognized.

The tropical waters of the Indian Ocean Region (IOR) present unique challenges and opportunities. Political instability in the region raises significant security concerns, while its geographical location and tropical climate offer vast economic potential. External interference in the domestic affairs of IOR nations often enables non-state actors to engage in subversive activities with covert state support. Security establishments must prepare for asymmetrical threats and disruptive tactics employed by these invisible adversaries, leveraging technological advantages and adopting nuanced strategies.

The MRC and M/S NirDhwani Technology Pvt Ltd (NDT) in collaboration with the IndoSwiss Center of Excellence (ISCE), Pune, hosted a high-level dialogue titled "Underwater Domain Awareness (UDA) Framework for Strategic Security Architecture and AtmaNirbharta." The event brought together senior decision-makers in the strategic security establishment and the supporting organizations, to discuss the challenges and formulate the way forward.

The following issues were discussed during our five-day workshop:
1. Emerging underwater threats exist in marine and freshwater systems. Policy and technology interventions are required to manage the challenges.
2. Capacity & capability building requirements for managing underwater threats across multiple dimensions.
3. User-Academia-Industry partnership to ensure adequate capacity & capability-building framework.
4. AtmaNirbharta and the Start-up Ecosystem. How to manage innovation in a new domain.
5. Indigenous research and development (R&D) should appropriately balance traditional knowledge and modern science and technology (S&T) tools.
6. The UDA framework and the SAGAR Vision—New Way Forward.

Enclosure 3: List of Participants

Particpants from Border Security Force (BSF)
- DIG Rajan Sud
- DIG Kanwaljt Singh
- DIG Madhukar

Particpants from National Defence Acandemy (NDA)
- Cdr Saurabh Bajpai
- Cdr Wishwajit Malshe
- Cdr Kamaljeet Yadav
- Lt Cdr Sangeeta Saharan
- Lt Cdr Sweatha Govind
- Lt Cdr Rishav Kumar
- Lt Cdr Shubham Pandey
- Lt Cdr Deepak Kandel
- Lt Cdr Sanket Suresh Kadam

Particpant from the Military
- Cdr Paresh Dhasmana

Particpants from the Indian Amry
- Lt Col Amit Kumar Roshan
- Lt Col Rajat Dhyani
- Lt Col Harjap Singh
- Lt Col D K Singh
- Maj Ravi Kant
- Maj Ankit Tomar
- Maj Aditya Babuta
- Maj Varun R R

Participant from the Indian Coast Guard
- Comdt (JG) Rajendra Swaroop

Participant from the Indian Air Force
- Sqn Ldr Gaurav Sharma

Participants from the Indian Navy
- Cdr Amar K Lahariya
- Cdr PK Singh, 42344K
- Cdr G Hari Krishnan
- Cdr Gaurav Verma

Participants from the Indian Navy (Cont.)
- Cdr Shreejith S
- Lt Cdr Abhishek Verma
- Lt Mahesh Kumar
- Lt P Raamcharantejaa
- Lt Rohit Ghosh
- Lt Anushil Kumar

Other participants
- Shrinivas Ghadge
- Sneha Kamble
- Rajendra Bhide
- Anushil Kumar
- Praneet Shukla
- Nirav Suratwala
- Sanjeev Javale
- Ashok Shah
- Suhas Joshi
- Suhail Ansari
- Anil Bhosale
- Tarak Priya
- Aman Kataria
- Ankit Dabas
- Deepak Tyagi

Dignitaries
- Lt Gen D B Shekatkar (Retd)
- Amb Anup Mudgal
- Dr. Ajay Kumar, IAS
- Vice Admiral DSP Varma (Retd)
- Shri A T Ramchandani
- Amb Gautam Bambawale
- Shri Mukesh Malhotra
- Shri Praful Talera
- Cmde R S Vasan (Retd)
- Dr (Cdr) Arnab Das
- Mr. Kim-Heriot Darragh (Online)
- Prof Radhika Seshan
- Prof Tomonari Akamatsu (Online)
- Prof Jeffrey Payne (Online)
- Ms. Lakshmi Krishnakumar
- Prof Ajay Dandekar
- Mr. Shridhar Prabhuraman

Enclosure 3: List of Participants

MRC Research Fellows
- Mr. Romit Kaware
- Mr. Shlok Nemani
- Ms. Cathrine J
- Ms. Divya Rai
- Ms. Akshita Mangal

MRC Team (Deployed onground)
- Ms. Divya Nagarajan
- Mr. Jay Pinjarkar
- Mr. Shreya Waghmare
- Ms. Nishtha Vishwakarma
- Mr. Rohit K
- Mr. Shubham Kalaskar
- Mr. Ayush Sawadh

Enclosure 4: About Underwater Domain Awareness

The proposed Underwater Domain Awareness (UDA) framework, championed by the Maritime Research Centre (MRC) under the leadership of Dr. Arnab Das, presents a holistic strategy to comprehend and regulate activities within maritime and freshwater ecosystems. This initiative acknowledges the imperative to monitor these environments not solely for security reasons, but also to foster economic growth, preserve ecological integrity, and enhance disaster mitigation capabilities. By addressing a diverse array of interests, the framework endeavors to provide a comprehensive blueprint for navigating the intricate dynamics of the underwater realm, aligning security imperatives with broader socio-economic and environmental considerations.

At the heart of the UDA framework lies the imperative to gain insights into various dimensions of the underwater domain, spanning from identifying potential threats to assessing available resources and ongoing activities. This entails a horizontal analysis of technological prowess, infrastructure readiness, and resource allocation, with particular emphasis placed on bolstering acoustic capabilities. Furthermore, the framework delineates a vertical hierarchy for establishing UDA, commencing from data acquisition and extending to strategic planning and regulatory formulation. Such a structured approach ensures systematic management of underwater activities, enabling proactive responses to emerging challenges and opportunities.

A pivotal strength of the UDA framework lies in its advocacy for collaborative engagements among stakeholders. By fostering synergistic partnerships between academia, industry, and governmental entities, the framework aims to mitigate fragmentation and optimize resource utilization. This collaborative ethos facilitates the exchange of knowledge, expertise, and resources, fostering more informed decision-making processes and agile response mechanisms. Through such collective endeavors, the framework seeks to maximize the benefits derived from underwater activities while minimizing associated risks and ecological impacts, thereby promoting sustainable development across sectors.

In regions such as the Indo-Pacific, where unique challenges such as suboptimal sonar performance in tropical waters prevail, the UDA framework assumes heightened significance. Dr. Das underscores the necessity to tailor technological solutions to local conditions and harness the knowledge and resources of developing nations. By tailoring interventions to address region-specific challenges and fostering capacity-building initiatives, the framework aims to bolster security, unlock economic potential, and enhance environmental resilience. In doing so, it offers a pathway towards realizing a more robust and inclusive approach to managing the underwater domain, capable of meeting the diverse needs and aspirations of stakeholders on a global scale.

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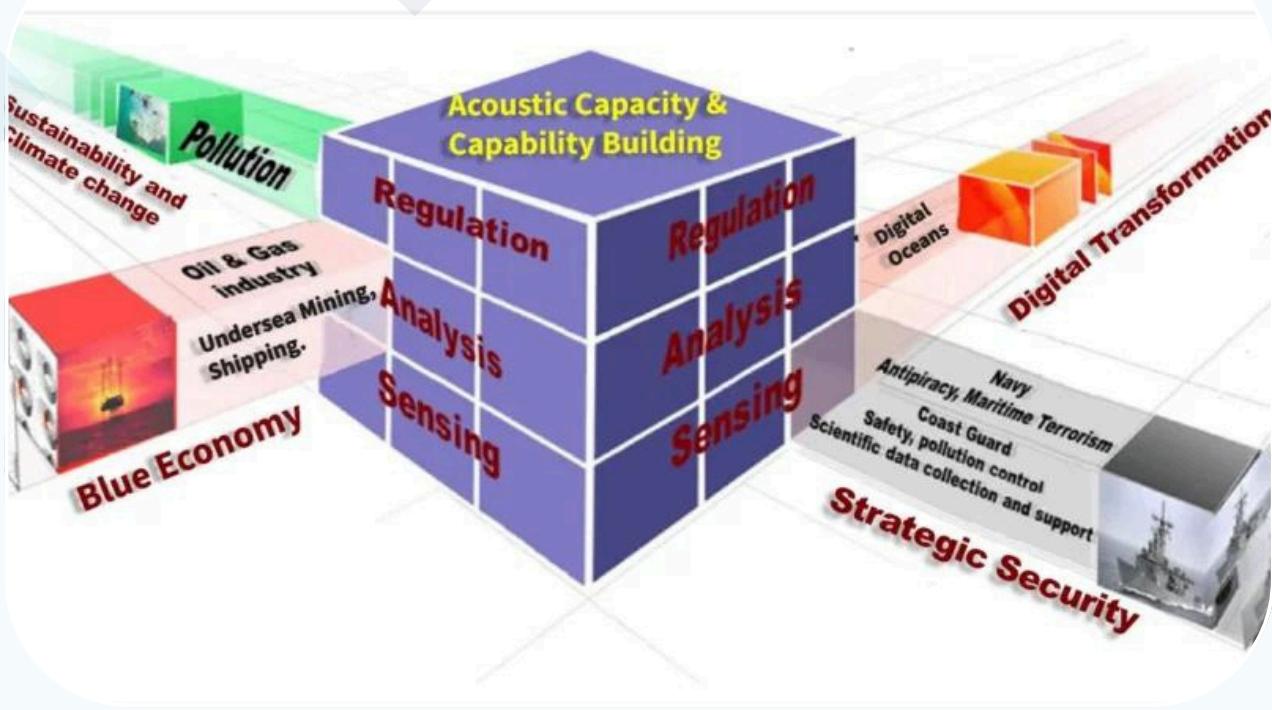
Let's Collaborate!

Dr. (Cdr) Arnab Das
Founder and Director, MRC

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🌐 **UDA Framework Page**

✉️ **director.mrc@foundationforuda.in**

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