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MARITIME CAMPUS

A SEMIANNUAL MAGAZINE OF
BANGLADESH MARITIME UNIVERSITY

Advancing
Maritime Research
Methodologies

A Road Map for Global Education & Sustainable Development in Bangladesh

Potential Seaweed Availability Assessment through Remote Sensing and GIS

The Ship That Flips!

Investigating Legal Framework for Marine Environment Protection in Blue Carbon Resources Perspective

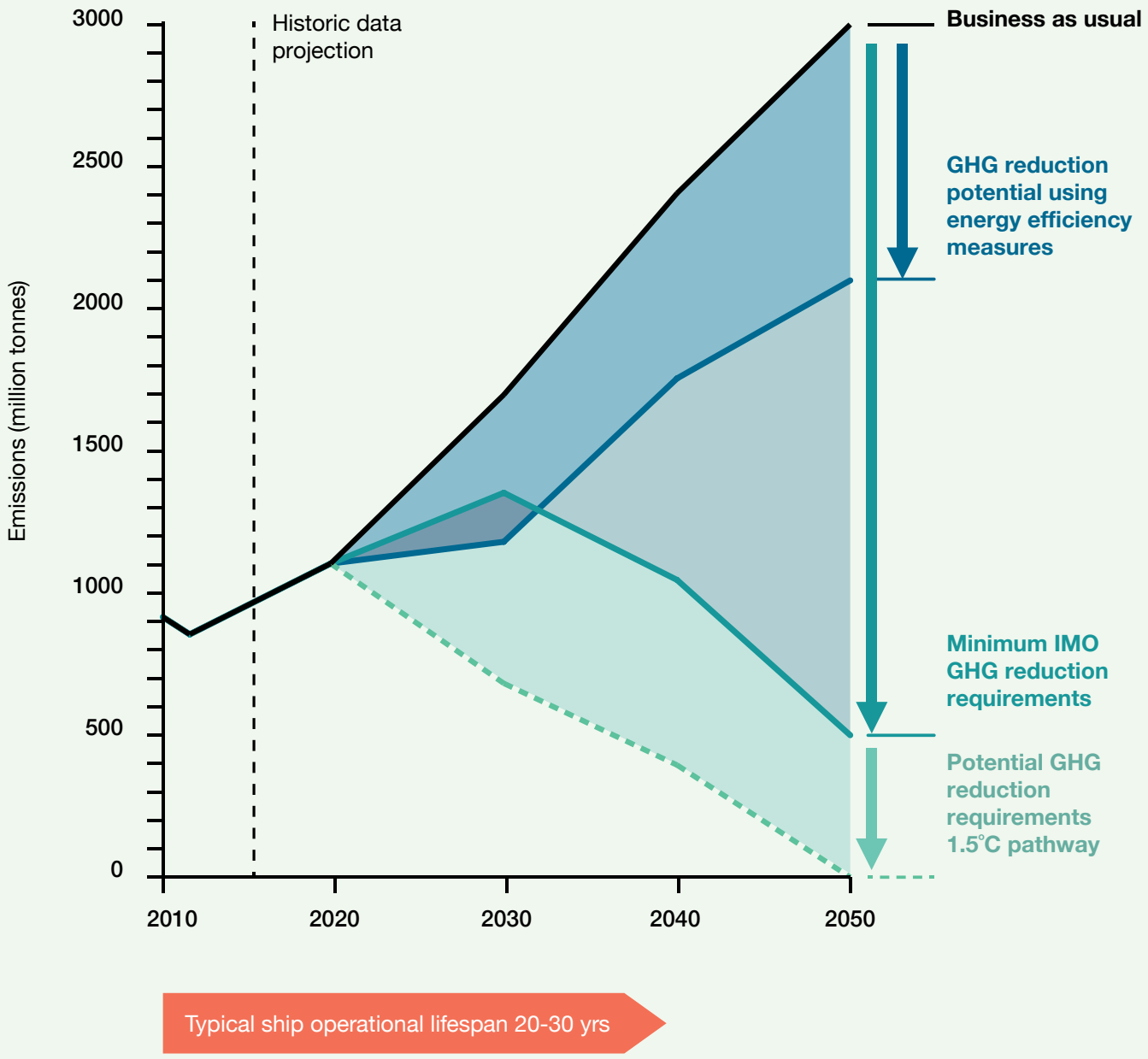
Welcoming Rear Admiral Ashraful Hoq Chowdhury as the 4th Vice-Chancellor of BMU

INFOGRAPHIC

How can shipping decarbonise?

1 Pathways for international shipping emissions

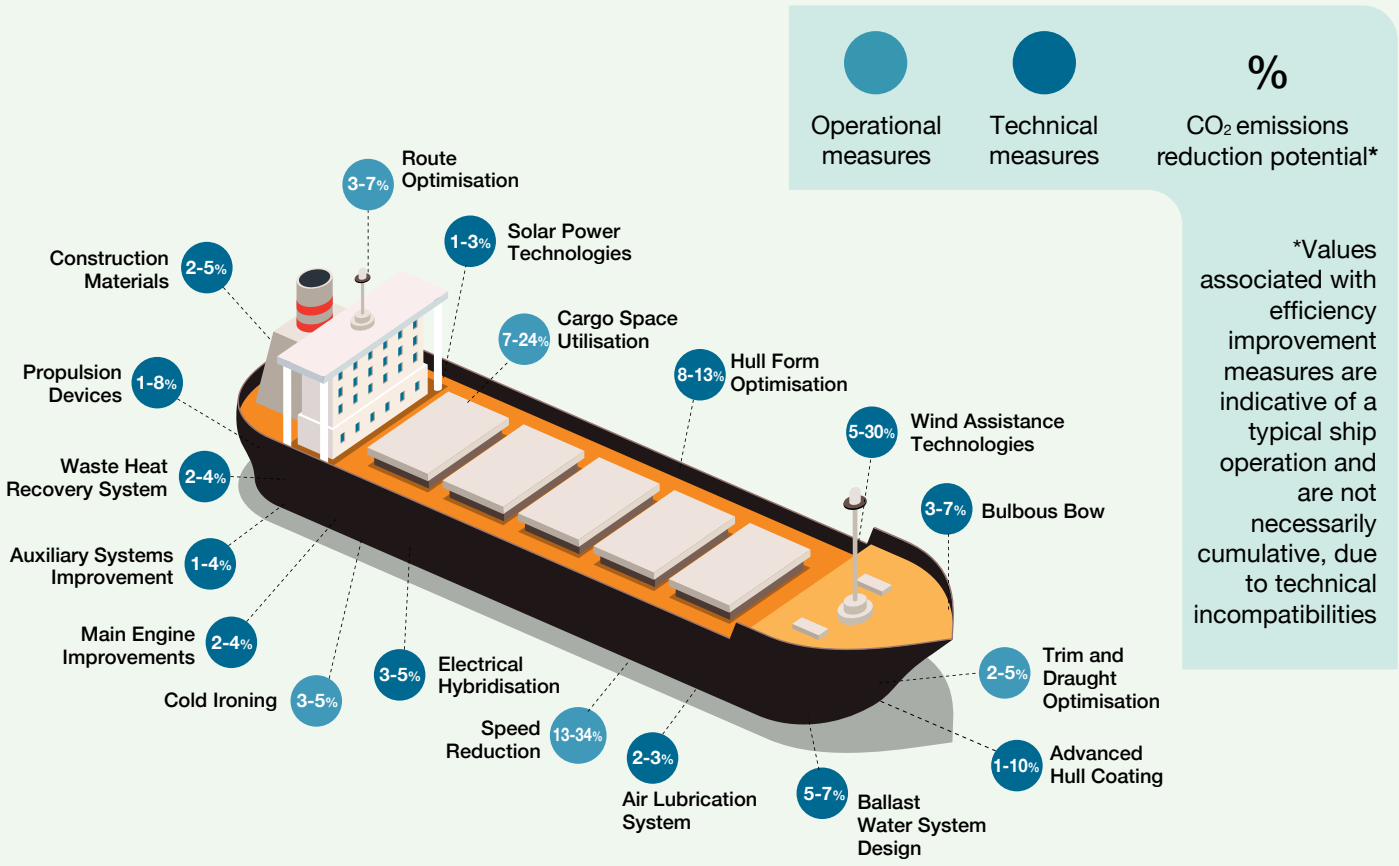
The International Maritime Organisation (IMO) has committed to reducing greenhouse gas (GHG) emissions from international shipping by at least 50% by 2050 (compared to 2008 emissions), with a strong emphasis on reaching zero emissions.



Sources: ICCT (2017) Greenhouse Gas Emissions from Global Shipping, 2013-2015; IEA (2017) Renewable energy for industry. From green energy to green materials and fuels; IMO (2015) Third IMO GHG Study 2014; IMO (2018) Initial IMO Strategy on Reduction of GHG Emissions from Ships; UMAS (2016) CO2 emissions from international shipping. Possible reduction targets and their associated pathways.

2 Efficiency measures

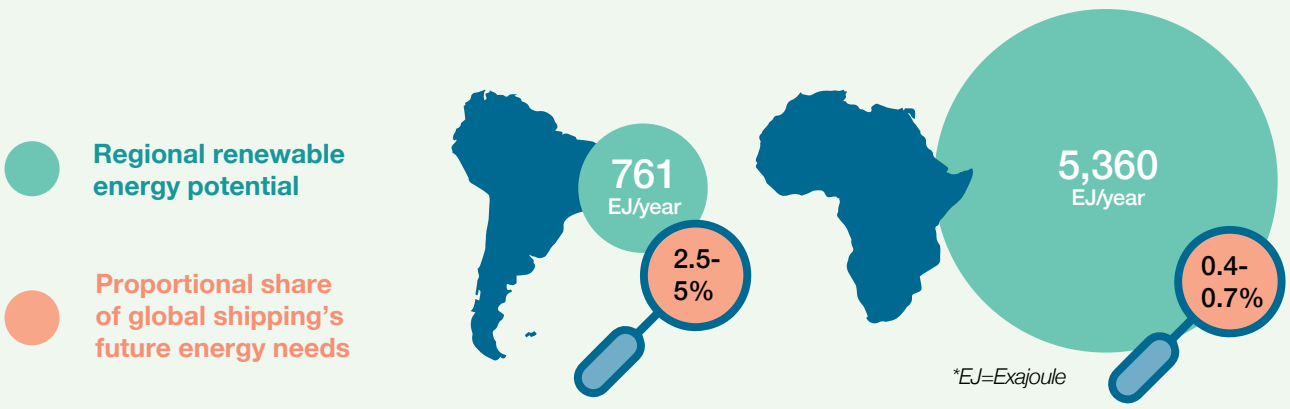
Some of the needed emissions reductions can be achieved immediately using technical and operational energy efficiency measures.



3 Renewable energy potential

Efficiency gains alone can't achieve the IMO's GHG reduction targets. A transition to zero-carbon fuels and electricity from renewable energy resources is needed.

International shipping will need approximately 20-40EJ* of energy a year. For example, this is about 2.5-5% of South America's total renewable energy potential or 0.4-0.7% of that of Africa.



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Editorial

Towards a Sustainable and Secure Maritime Future

Welcome to another edition of Maritime Campus, the semi-annual magazine of Bangladesh Maritime University (BMU). As we embark on this exciting new phase, BMU proudly welcomes Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, as its 4th Vice-Chancellor. With a distinguished career in the Bangladesh Navy, he brings a wealth of experience in maritime strategy, leadership, and academia. His vision will steer BMU towards greater excellence, strengthening its role as a leading institution for maritime education, research, and policy development. “The Helmsman” chapter highlights his appointment and the promise it holds for BMU’s future.

In the ever-evolving maritime world, research stands as a pillar of innovation, sustainability, and strategic growth. With 90% of global trade reliant on maritime transport, rigorous research methodologies are essential for informed decision-making in shipping, marine conservation, and global maritime regulations. Positioned at the heart of the Bay of Bengal, Bangladesh holds immense potential to pioneer groundbreaking maritime research. By fostering interdisciplinary collaboration and integrating technological advancements, BMU is poised to lead the charge in sustainable ocean resource management and maritime security. The Lead Story titled “Advancing Maritime Research Methodologies: A Road Map for Global Education and Sustainable Development in Bangladesh” in explores the transformative impact of cutting-edge research on the industry and BMU’s role in shaping its trajectory.

The protection of the marine environment remains a global priority, and Bangladesh’s constitutional commitment to environmental rights underscores this significance. Blue carbon ecosystems, such as mangroves, seagrass beds, and salt marshes, serve as crucial carbon sinks, yet they remain vulnerable to rapid urbanisation, pollution, and climate change. Strengthening legal frameworks is imperative to safeguard these ecosystems from unregulated exploitation. Through research and policy discourse, BMU aims to contribute to the preservation and sustainable management of these vital coastal resources. In our Academia chapter, the article titled ”Investigating Legal Framework for Marine Environment Protection in Blue Carbon Resources Perspective” delves into the legislative and ecological aspects of this critical issue.

Marine resources extend beyond conventional fisheries, with seaweed emerging as a valuable asset for food security, industry, and ecological balance. Despite covering a small portion of the oceans, seaweed and seagrass play a significant role in global marine productivity. Cutting-edge Geographic Information System (GIS) and Remote Sensing technologies enable precise mapping and sustainable management of seaweed resources. BMU’s commitment to integrating these modern tools will drive advancements in maritime studies and reinforce Bangladesh’s position in the blue economy. The article titled “Potential Seaweed Availability Assessment through Remote Sensing and GIS” in the New Horizon chapter examines the potential of these technologies in revolutionising marine resource management.

The New Waves chapter showcases the vibrant contributions of our talented student body, offering fresh perspectives on the maritime sector. For a comprehensive look at global and local maritime developments, do not miss “Campus Canvas”, “Maritime Bangladesh”, and “Around the World”.

As we chart our course towards a brighter maritime future, we extend our sincere gratitude to our Chief Patron, Rear Admiral Ashraful Hoq Chowdhury, whose steadfast support has made this edition possible. Special thanks also go to all departments for their cooperation and to the dedicated members of the Editorial Board, whose tireless efforts ensure the timely publication of Maritime Campus. BMU remains committed to excellence, innovation, and sustainability, navigating the waves of change to shape the future of maritime Bangladesh.

Thanking you,

Commodore M Mahfuzur Rahman, (L), BSP, psc, BN
Editor and Controller of Examinations
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Email: editor.mc@bmu.edu.bd

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Welcoming
Rear Admiral Ashraful Hoq Chowdhury
as the 4th Vice-Chancellor of BMU

Bangladesh Maritime University (BMU) proudly welcomes Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, as its 4th Vice-Chancellor. Assuming office on 9 September 2024, Rear Admiral Ashraful Hoq Chowdhury brings with him an illustrious career in the Bangladesh Navy, marked by excellence in maritime strategy, command leadership, and academic contributions. His appointment is a testament to BMU's commitment to fostering a world-class maritime education system that aligns with national and global advancements in the maritime domain.

A distinguished Flag Officer, Rear Admiral Ashraful Hoq Chowdhury was commissioned into the Executive Branch of the Bangladesh Navy on 1 January 1988. A gunnery specialist, his extensive maritime expertise includes commanding a diverse array of naval vessels, including Missile Boats, Patrol Crafts, Offshore Patrol Vessels (OPV), and the Frigate BNS ABU BAKR. Additionally, he has commanded the naval base BNS HAJI MOHSIN, further solidifying his leadership credentials. His tenure in these capacities has demonstrated his capability to navigate complex operational environments while ensuring mission success and national security.

Beyond his command roles, Rear Admiral Ashraful Hoq Chowdhury has made significant contributions to inter-service operations. His tenure as Director General of the Centre for Maritime Research (CMR) in the Armed Forces Division, as well as his service as Colonel General Staff in the Directorate General of Forces Intelligence (DGFI), reflects his strategic acumen and ability to integrate military intelligence with national defence policies. Moreover, his roles as a Senior Instructor (Navy) and Directing Staff at the Defence Services Command and Staff College (DSCSC) in Mirpur underscore his dedication to the professional development of naval officers.

Among his most remarkable achievements, Rear Admiral Ashraful Hoq Chowdhury commanded the Western Flotilla as COMFLOT (West), during which he oversaw the first successful test-firing of an anti-submarine torpedo. His leadership was further recognised when he assumed command of the Khulna Naval Area as COMKHUL, followed by his appointment as the Director General of the prestigious Bangladesh Coast Guard. His tenure in these positions has significantly contributed

Newly appointed Vice Chancellor Rear Admiral Ashraful Hoq Chowdhury formally takes charge of Bangladesh Maritime University from former VC Rear Admiral Mohammad Musa during a dignified signing ceremony

to enhancing Bangladesh's maritime security and safeguarding its territorial waters.

Newly appointed Vice Chancellor's academic credentials are equally commendable. He is an alumnus of several prestigious institutions, including the National Defence University, Beijing; the Armed Forces War College; National Defence College, Mirpur; the Defence Services Command and Staff College, Mirpur; and the United States Naval War College in Rhode Island. These institutions have shaped his strategic thinking and equipped him with the knowledge required to navigate contemporary maritime challenges.

His commitment to global peacekeeping was exemplified during his service under the 'Blue Helmet' mandate in the United Nations Mission in Sudan. Furthermore, his participation in high-level international seminars and diplomatic delegations has strengthened Bangladesh's maritime presence on the global stage. As a former Senate Member of BMU, he is well acquainted with the university's vision, mission, and academic aspirations.

With his vast experience and visionary leadership, Rear Admiral Ashraful Hoq Chowdhury's appointment heralds a new era for BMU. His expertise in maritime security, naval command, and academic mentorship will undoubtedly drive the university towards greater excellence in maritime education and research. The BMU community looks forward to his leadership in shaping the future of maritime professionals in Bangladesh and beyond.

Rear Admiral Ashraful Hoq Chowdhury, the 4th Vice-Chancellor of Bangladesh Maritime University (BMU), stands in solemn reflection with students during the commemoration of International Mother Language Day, honouring the martyrs of 21 February and reaffirming the nation's commitment to linguistic and cultural heritage

Advancing Maritime Research Methodologies

A Road Map for Global Education and Sustainable Development in Bangladesh

Maritime Campus desk

Maritime research is a cornerstone of global trade, environmental sustainability, and policy development. With approximately 90% of world trade conducted via maritime routes, the need for rigorous research methodologies in maritime studies is more pressing than ever. Research methodology, as a structured framework for knowledge creation, ensures that data-driven insights lead to effective decision-making in shipping, marine conservation, and international regulations. This article explores the significance of research methodologies in maritime education, their impact on global maritime industries, and how Bangladesh Maritime University (BMU) can adopt cutting-edge research approaches to harness the resources of the Bay of Bengal sustainably. The discussion highlights the importance of interdisciplinary collaboration, empirical evidence, and technological advancements in maritime research, offering strategic insights into the evolving landscape of maritime studies.

Department of Oceanography and Hydrography of BMU conducting oceanographic field study in the Bay of Bengal

Introduction

Research methodologies serve as the backbone of knowledge generation, offering structured approaches to problem-solving and innovation. In the maritime domain, research enables the effective utilisation of ocean resources, enhances safety and efficiency in shipping, and fosters the sustainable exploitation of marine biodiversity. The maritime sector is a complex, multi-dimensional industry that involves transportation, resource extraction, security, and environmental protection. With over 80% of global merchandise trade carried by sea, maritime research ensures the continuous development of efficient and sustainable shipping practices.

Global shipping contributes nearly 3% of global carbon dioxide emissions, necessitating ongoing research to reduce its environmental footprint. According to the International Maritime Organisation (IMO), these emissions could rise by 50% to 250% by 2050 if corrective measures are not taken. Furthermore, studies on maritime security have shown that piracy and illegal fishing cost the global economy approximately $13 billion annually. In West Africa alone, the Gulf of Guinea experiences annual economic losses exceeding $2 billion due to piracy and illegal fishing.

For an emerging maritime economy like Bangladesh, robust research frameworks are necessary to develop policies and strategies that

align with international best practices. Bangladesh, with a coastline of approximately 710 km and exclusive economic zones (EEZs) covering around 118,813 square kilometres, has immense potential for marine resource utilisation. The Bay of Bengal, one of the largest marine ecosystems, is rich in fish stocks, energy resources, and trade opportunities. However, unregulated exploitation of these resources could lead to environmental degradation and economic inefficiencies. BMU, as the country's premier institution for maritime education, has the potential to drive the nation's blue economy by implementing advanced research methodologies. By leveraging data-driven decision-making and interdisciplinary research, BMU can contribute to global maritime advancements while ensuring economic sustainability and environmental protection.

Additional Facts and Figures

Global Trade and Shipping: The global shipping industry is responsible for transporting over 11 billion tons of goods annually, making it the backbone of international trade.

Environmental Impact: The maritime industry is under increasing pressure to reduce its environmental footprint. The IMO has set a target to reduce greenhouse gas emissions from international shipping by at least 50% by 2050 compared to 2008 levels.

Economic Contributions: The maritime industry contributes approximately $380 billion annually to the global economy, with significant contributions from shipping, fishing, and offshore energy sectors.

Technological Advancements: The adoption of blockchain technology in maritime logistics has shown potential to reduce administrative costs by up to 20% and improve supply chain transparency.

Examples and Case Studies

Singapore Maritime Education: Singapore's maritime education system is a prime example of how research methodologies can be integrated into curricula to produce highly skilled professionals. The country's emphasis on research and development has made it a global leader in maritime technology and innovation.

Norway's Green Shipping: Norway has been at the forefront of green shipping initiatives, with research playing a crucial role in developing hybrid and electric-powered vessels. The country's commitment to sustainable maritime practices has set a benchmark for other nations.

The Role of Research Methodology in Maritime Studies

Research methodology encompasses the systematic techniques used to collect, analyse, and interpret data. In maritime studies, methodologies range from qualitative and quantitative research to experimental and observational studies, each contributing to various facets of maritime education and policy formulation. Given the complexity of maritime operations, adopting precise methodologies ensures that studies yield actionable results, whether in shipbuilding efficiency, offshore energy development, or marine conservation.

Interdisciplinary Research: The complexity of maritime challenges necessitates an interdisciplinary approach. Combining insights from oceanography, engineering, economics, and environmental science can lead to holistic solutions that address multiple facets of maritime issues.

Students of Oceanography & Hydrography department of BMU are in a practical learning session with oceanographic tools

Data-Driven Decision Making: The integration of big data analytics and AI in maritime research can revolutionise decision-making processes. Predictive analytics can enhance safety, optimise routes, and reduce operational costs, leading to a more efficient and sustainable maritime industry.

Policy Implications: Research findings must be effectively communicated to policymakers to ensure that regulations are based on empirical evidence. This requires a collaborative approach between researchers, industry stakeholders, and regulatory bodies.

A BMU student is using spectrophotometer to measure the concentration of a compound in an aqueous solution

Terrameter is used by the Department of Oceanography and Hydrography of BMU for geotechnical, groundwater, mineral or environmental surveys and research work

Enhancing Data Collection and Analysis

Accurate data collection and analysis are crucial for maritime research. Advanced methodologies, such as Geographic Information Systems (GIS), remote sensing, and big data analytics, allow researchers to monitor shipping traffic, assess climate change impacts, and improve maritime security. For instance, GIS technology is extensively used in predicting and mitigating the risks of maritime accidents, reducing collision probabilities by 25% in high-traffic shipping lanes.

Additionally, big data analytics plays an essential role in fleet management and predictive maintenance. Research by the Baltic and International Maritime Council (BIMCO) indicates that AI-driven predictive maintenance can reduce operational costs in the shipping industry by up to 20%. Furthermore, research on autonomous vessel navigation, utilising machine learning algorithms, has demonstrated a reduction in accident rates by 30%, proving that data-driven methodologies significantly improve maritime safety and operational efficiency.

Another key area where research methodology has proven invaluable is oceanographic studies. With climate change threatening rising sea levels, increased storm intensity, and alterations in marine biodiversity, precise research methodologies help assess and mitigate risks. Advanced hydrodynamic models and satellite-based monitoring systems allow researchers to predict and respond to environmental threats more effectively. A study conducted by the National Oceanic and Atmospheric Administration (NOAA) demonstrated that real-time ocean monitoring can improve disaster response time by 40%, preventing significant economic and ecological damage.

Informing Policy and Regulatory Frameworks

Empirical research provides the evidence base necessary for developing effective maritime policies. Regulatory bodies such as the International Maritime Organisation (IMO) and regional organisations like BIMSTEC rely on rigorous research methodologies to enforce safety standards and environmental regulations. Studies on ballast water management, for example, have helped develop policies to prevent the spread of invasive aquatic species, reducing ecological disruptions by nearly 40% over the past decade.

Case studies and longitudinal research methodologies are instrumental in evaluating the effectiveness of existing regulations. By analysing ship emissions over time, researchers provide policymakers with tangible evidence on the need for stricter environmental regulations, influencing agreements such as the IMO's 2020 sulphur cap, which mandates a reduction in sulphur content in marine fuels from 3.5% to 0.5%. Research has also contributed to the formulation of the Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships, addressing global concerns about hazardous shipbreaking practices.

Moreover, quantitative modelling of global trade patterns and economic projections has become essential in understanding the maritime industry's future. For example, studies have shown that efficient port logistics and smart supply chain management can increase global trade efficiency by up to 15%, highlighting the necessity for research-driven policy improvements.

Impact of Research Methodology on Global Maritime Education

The integration of research methodologies into maritime education enhances curriculum development, improves training outcomes, and prepares graduates for real-world challenges. Research-oriented education ensures that future maritime professionals are well-equipped to address emerging challenges in the industry.

Curriculum Development

Maritime education institutions worldwide are incorporating research-based insights into their curricula to keep pace with industry developments. For instance, the World Maritime University (WMU) in Sweden continually updates its courses based on empirical research

findings. Recent research indicates that curricula incorporating advanced digital navigation training reduce human error in maritime operations by 30%.

By following a similar model, BMU can ensure that its curriculum remains relevant and aligned with international standards. Introducing coursework focused on emerging maritime challenges—such as cybersecurity, automated logistics, and marine renewable energy—can strengthen Bangladesh's maritime workforce.

Skill Enhancement

Engaging students in research projects cultivates critical thinking and problem-solving skills. Empirical studies suggest that maritime cadets who participate in research activities demonstrate higher adaptability and leadership abilities. For example, qualitative research on maritime education in Singapore revealed that research-oriented training significantly improves decision-making skills among cadets.

Moreover, studies show that practical engagement in research enhances student employability. Research published by the International Chamber of Shipping (ICS) found that 78% of maritime employers prefer graduates with research-based training experience.

Implementing Effective Research Methodologies at Bangladesh Maritime University

To establish itself as a leading maritime research institution, BMU must adopt and implement advanced research methodologies. Investing in interdisciplinary research and industry partnerships will enhance its role in maritime development.

Establishing Research Centres and Collaborations

BMU can benefit from establishing dedicated research centres focused on maritime technology, oceanography, and policy development. Collaborations with international institutions such as WMU and IMO can facilitate knowledge exchange and joint research initiatives. Data-sharing agreements with global shipping companies can enhance research accuracy and applicability.

Strategic Recommendations for BMU

Investment in Research Infrastructure: Establishing state-of-the-art research facilities and laboratories will enable BMU to conduct cutting-edge research in maritime technology and oceanography.

Collaborative Partnerships: Forming partnerships with international maritime institutions and industry leaders will facilitate knowledge exchange and provide access to global research networks.

Curriculum Innovation: Regularly updating the curriculum to include emerging topics such as cybersecurity, marine renewable energy, and automated logistics will ensure that graduates are well-prepared for future challenges.

Student Engagement in Research: Encouraging students to participate in research projects will enhance their critical thinking and problem-solving skills, making them more competitive in the job market.

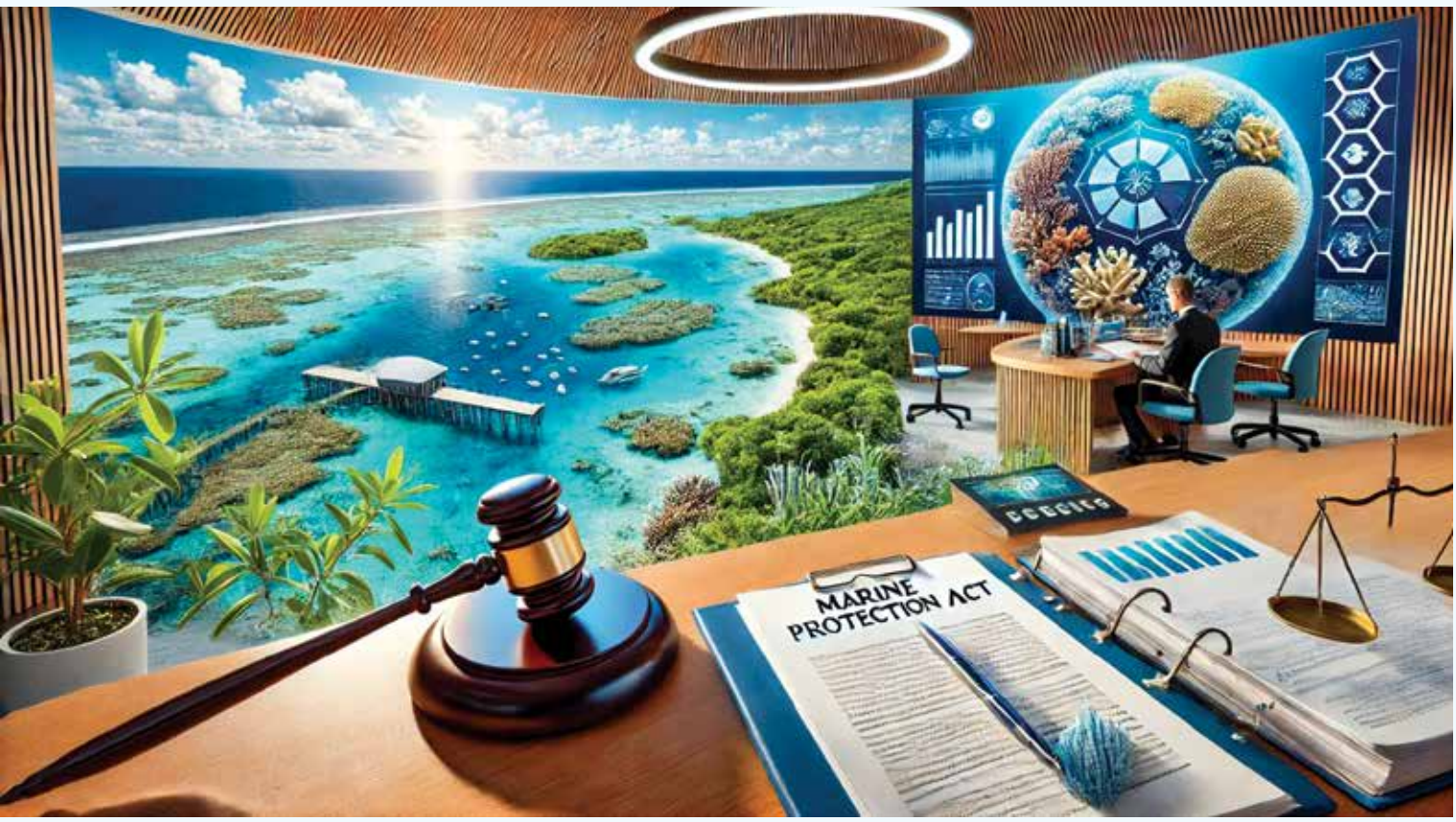
Policy Advocacy: BMU should actively engage with policymakers to advocate for research-driven maritime policies that promote sustainability and economic growth.

By adopting these strategies, BMU can position itself as a leader in maritime research and contribute significantly to the sustainable development of Bangladesh's maritime sector. The integration of advanced research methodologies will not only enhance the quality of maritime education but also drive innovation and policy development, ensuring a prosperous and sustainable future for the global maritime industry.

Conclusion

Research methodology is indispensable in advancing maritime education, shaping policies, and fostering technological innovation. Institutions such as BMU must embrace cutting-edge research methodologies to unlock the Bay of Bengal's potential sustainably. By investing in interdisciplinary research, digital tools, and global collaborations, BMU can position itself as a leader in maritime research and contribute significantly to Bangladesh's economic development.

Seaweed collection in coastal areas of Bangladesh is being conducted by the students of Genetic Engineering and Marine Biotechnology department of BMU for research purposes



Investigating Legal Framework for

Marine Environment Protection in Blue Carbon Resources Perspective

Lieutenant Commander S M Are-Rahbarul Islam, (Edn), BN

In Bangladesh, we are well aware of and understand the environmental rights as essential for allowing the human beings to live in a decent environment on this planet. Currently, environmental rights have universally been recognised as third-generation human rights because the sole purpose of living in a decent environment is to uphold the right to life. In the constitution, the people of Bangladesh have the fundamental right to life, regardless of their social and religious status.

Coastal habitats, such as mangroves, seagrass beds, and salt marsh, are recognised as “blue carbon” and have recently received significant attention due to their high carbon sequestration capacity. Since the global area of blue carbon ecosystem is much smaller than that of terrestrial ecosystem, they sequester carbon in a much larger amounts, both in their living biomass and in sediment. Conservation and restoration of these coastal ecosystems have become increasing important due to coastal development, deforestation, expanding agriculture, aquaculture, and pollution. To raise awareness regarding the conservation of such productive ecosystems, such as mangroves, seagrass beds, and salt marshes, adequate knowledge of their spatial distribution, total cover, standing biomass, change detection, and the distinctive mechanisms governing carbon sequestration is required. Additionally, a pragmatic approach is needed when developing protection and preservation policies and management guidelines; otherwise, unjust intervention in the name of land, rivers, water, air, and other environmental resources would inevitably impact people’s lives.

Legal Background (International) for the Use of the Marine Environment

The oceans have been governed by the freedom of the seas doctrine since the seventeenth century. This principle restricts the national rights and jurisdiction over the oceans and seas to a narrow belt around a nation's coastline. The whole ocean is free to all and belongs to none. The doctrine has been somewhat restricted by various conventions and measures implemented by global international agencies responsible for maritime affairs. The principal agencies in this regard include the Food and Agriculture Organisation of the United Nations (FAO), the International Maritime Organisation (IMO) and the United Nations Environment Programme (UNEP), among others.

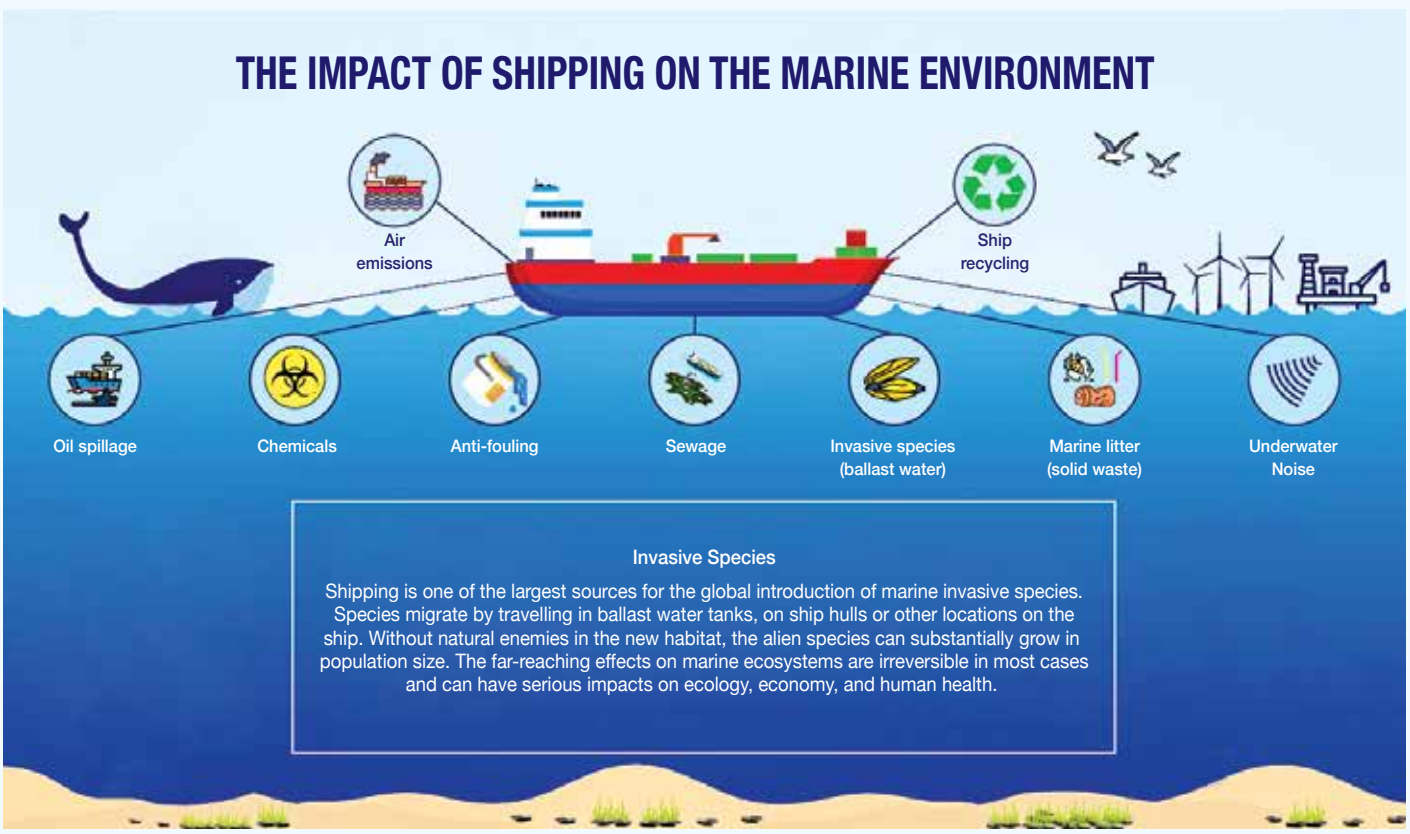
The most important convention regulating access to the oceans' resources is the 1982 United Nations Convention on the Law of the Sea (UNCLOS, which, among other things, deals with economic jurisdiction, the legal status of resources on the seabed beyond national jurisdiction, conservation and management of living marine resources, a marine research regime, a binding procedure for the settlement of disputes between States, and protection of the marine environment.

Impacts of Shipping on the Marine Environment and International Regulating of It

Shipping is the most climate-friendly form of commercial transport, but far not environmentally harmless. Shipping gives rise to a number of pressures and risks to the seas and oceans by discharging hazardous substances such as oil, atmospheric emissions, noise pollution, sewage and litter, by introducing non-indigenous species, and by creating the risk of oil spills. Threats from many aspects of shipping are poorly monitored. The emission of atmospheric pollutants by ships has negative effects on both ecosystem and air quality.

UNCLOS, among other instruments, provides a framework for the management of shipping worldwide. The Law of the Sea treaty is based upon the principle that shipping standards concerning construction, equipment, seaworthiness and manning of ships are principally the concern of the respective flag states. Ships are subject to the exclusive jurisdiction of the state whose flag they fly. If requested by another state, a flag state is obliged to investigate any and all violations committed by a ship flying its flag. Measures against ships flying foreign flags are only permissible under the Law of the Sea treaty if they are taken within territorial waters of the respectively coastal states. Any port state is obligated to detect and take appropriate administrative measures to prevent a ship from leaving the port if it finds that the vessel is violating the international rules and standards on seaworthiness. thereby threatening to damage the marine environment. Coastal states are also entitled to monitor whether ships present in their EEZs comply with international pollution regulations.

UNCLOS also establishes general obligations regarding the protection of the marine environment. The most relevant body arising from this agreement is the International Maritime Organisation (IMO), which is the UN specialised agency responsible for ensuring safety at sea and preventing marine pollution by ships. The IMO organisation has five committees, one of which is for marine environment protection (MEPC). The MEPC is concerned with the adoption, amendment, and enforcement of conventions, regulations, and measures for the prevention and control of pollution from ships.



The major convention for the protection of the marine environment from shipping pollution (under the responsibility of the IMO) is the 1973/1978 International Convention for the Prevention of Pollution from Ships (MARPOL). The MARPOL Convention, with its thematic Annexes I to VI, regulates all kinds of marine pollution—namely, the emission, release, and discharge of oil; noxious liquid substances carried in bulk; harmful substances carried by sea in packaged form; sewage; garbage; and air pollution. The IMO recognised that, because of their biological or ecological importance, the seabed and its overlying waters in a number of marine areas require a more stringent regulatory regime concerning pollution from ships. Following this, another effective measure to reduce shipping-generated pollution at the international level was the enforcement of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention, 1972). Some important IMO conventions in this context are the 1978 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), as amended; the 1972 Convention on the International Regulations for Preventing Collisions at Sea (COLREG); and the 1965 International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties.

International and Regional Activities and Regulations for Fisheries

Several instruments and measures exist for the sustainable management of fisheries. The first step is to restrict the exploitation of fish resources to a level that is compatible with the marine environment and the resource's future use. Bottom trawling should be banned, as the fishing nets—towed by one or two boats and held open by boards (trawl doors) or a metal beam—often come into contact with the seabed, which is a serious concern in terms of blue carbon resources. The Law of the Sea treaty mandates proper conservation and management measures to ensure that fish stocks are used in a manner that does not destroy them and avoids over-exploitation of living resources. Article 62 of UNCLOS includes several conservation measures and instruments, such as licensing of fishermen and vessels, fisheries research programs, catch quotas, temporal and spatial fishing bans, gear restrictions, vessel position reporting, enforcement procedures, and minimum fish sizes, which may be established by coastal states.

Non-target species and the protection of the marine ecosystem are also addressed in UNCLOS. This is evident from Article 61(4), which states that "the coastal states shall take into consideration the effects on species associated with or dependent upon harvested species." General obligations also arise from the duty to protect the marine environment, rare and fragile ecosystems, and the habitats of depleted, threatened, or endangered species.

The Problems and Causes of Environment issues in Bangladesh

Bangladesh is a low-lying, riverine country, traversed by many branches and tributaries of the rivers Ganges, Jamuna, Meghna, and Brahmaputra, which serve as the lifeline of the nation. Tropical monsoons, as well as frequent floods and cyclones, inflict heavy damage in the delta region. Currently, 36.24 Tg C and 54.95 Tg C are stored in the above-ground and below-ground compartments, respectively, resulting in a total blue carbon stock of 91.19 Tg C. According to predictions, 15.88 Tg C could be lost from this region by the year 2115.

The main issues contributing to environmental degradation in Bangladesh include:

a) Extensive filling of wetlands for industrialisation or rapid urbanisation

The encroachment of wetlands in and around the capital by housing and real estate developers—even in violation of the law, despite these lands being designated as protected areas under the master plan for the capital—is a great concern. These low-lying areas serve as pathways for rainwater removal from the capital; hindrances in the natural flow of water lead to an imbalance in the marine ecosystem.

Unchecked encroachment like this by housing and real estate developers in and around the capital threatens the delicate ecosystem, endangering biodiversity, disrupting water flow, and increasing the risk of urban flooding

b) Contamination of river water and other water sources by industrial pollutants and inadequate waste management

More than 200 branch rivers in Bangladesh directly or indirectly receive large quantities of untreated industrial waste and effluent. Leather-processing tannery industries are among the oldest industries in Bangladesh and are mainly located on the banks of the

Relentless pollution from leather-processing tanneries contaminates water sources, endangering aquatic life and public health with untreated chemical waste

Buriganga, one of the main rivers in the heart of Dhaka. Other major contributors to water pollution include industries such as pulp and paper, pharmaceuticals, metal processing, food processing, fertilisers, pesticides, dyeing and painting, and textiles. In effect, they have turned at least four major rivers into toxic dumps by indiscriminately discharging their waste into them.

c) Drying up of rivers due to excessive water withdrawal from shared rivers

Bangladesh is a tragic victim of environmental injustice due to the disproportionate withdrawal of water from shared rivers. Every scorching summer, the rivers Padma, Jamuna, Teesta, and Brahmaputra face serious water shortages, which cause severe drought and have negative implications for the conservation of blue carbon in coastal waters.

Disproportionate withdrawal of water from shared rivers disrupts Bangladesh's ecosystems, threatening agriculture, fisheries, and livelihoods dependent on these vital waterways

d) Air pollution from the emission of transport gases

One of the major sources of air pollution in urban areas of Bangladesh is unburned fuel from two-stroke engine vehicles. The degradation of air quality due to hazardous transport emissions in cities and major commercial hubs is another major concern for the nation, as numerous life-threatening diseases are linked to such air pollution.

Hazardous emissions from industries and vehicles continue to degrade air quality in cities and commercial hubs, posing severe health and environmental risks for the nation

Legislative Approaches to Environmental Issues in the National Context

Bangladesh, being seriously concerned with environmental degradation and threatened by sea-level rise, is a determined signatory to almost all international conventions and treaties on environmental conservation and the promotion of biodiversity. The enactment of specific laws in Bangladesh by a conscientious legislature, concerning environmental conservation and climate action, is notable. The major laws in this area are the Environment Conservation Act, 1995; the Water Bodies Act, 2010 (Joladhar Ain 2010) and its associated rules; and the Environment Courts Act, 2010. The dispensation of justice in environmental matters is mainly carried out by the Environmental Courts and the Environmental Appellate Court, established under the Environmental Courts Act, 2010. However, the number of courts seems to be inadequate given the number of environmental violations. In fact, there is currently a dearth of laws, regulations, or rules in the areas of environmental conservation and biodiversity, as well as in punishing those who violate these laws.

Conclusion and Recommendation:

Bangladesh has always demonstrated a spirit of resilience in the face of hazards and disasters. Society in Bangladesh is continuously responding to the global call for environmental protection. With the adoption of new laws and regulations, the legal regime, as it stands today, appears more progressive and responsive. A major challenge in international marine protection policies is to safeguard marine biodiversity and use marine resources sustainably so that future generations can benefit from all the services provided by marine ecosystems. The examples of shipping and fisheries clearly show that the implementation of marine environmental protection instruments and measures, particularly in terms of blue carbon sequestration, remains a great challenge. One possible way to provide greater protection to the most heavily polluted regional seas from shipping-related pressures is to extend the designation of Preserved and Special Areas to other marine regions. Deficiencies in preventing detrimental actions and enforcing environmental laws and regulations should be addressed through judicial activism. Finally, it would be highly desirable to have a more in-depth public discussion and understanding of our oceans and seas, their sustainable use, and their marine ecosystem conservation services.

Lieutenant Commander S M Are-Rahbarul Islam, (Edn), BN

Staff Officer Law to COMKHUL
Bangladesh Navy

Exploring the Marine Marvel Beyond the Expectations and Beauties

A Field Trip to St. Martin's Island

Muhammad Sajid Anam Hoque

From 11 to 16 December 2024, a field trip to St. Martin's Island, Bangladesh, was conducted under the Department of Oceanography & Hydrography for the 5th batch of students, which opened a new window of knowledge for them about the island's marine ecosystem along with its outstanding natural beauty. But this trip wasn't just a lesson in learning—it was a meaningful experience that granted us a glimpse into the fragile balance of life in this coastal paradise. Thousands of turtles spend a significant part of their life cycle in this particular habitat, making St. Martin's Island a perfect study site.

Personal Highlights: Sunrise, Sunset, and a Bicycle Ride

One of the most unforgettable parts of our trip happened before we even set foot on the island. While traveling by ship at daybreak, we found ourselves on the deck, enveloped by a cold ocean breeze as we watched the sun peek over the horizon. The way the sky transitioned from soft pastels to vivid oranges felt almost surreal, and seeing seabirds flying in a flock alongside us only made the moment more magical. Then, as we headed back in the late afternoon, we were treated to an equally spectacular sunset—painting the sky in shades of pink and orange—capping off a day we would cherish for a lifetime.

Another cherished memory took place one evening when a group of us rode bicycles from the main part of St. Martin's Island to Chera Dwip along the beach. The sight of the endless shoreline against the setting sun was breathtaking, and it truly reminded us of how special this island is. On our way back, we chose to cycle through the island's interior. That route revealed a different side of St. Martin's: while the busier areas offer electricity and decent roads, more remote regions remain underdeveloped. This might help conserve fragile habitats, but it also means many locals in those areas have limited access to information about conservation. It served as a clear reminder that striking a balance between development and environmental protection is no easy task—and that successful conservation calls for everyone's involvement, not just those who live near the tourist spots.

The Marine Ecosystem of St. Martin's Island

St. Martin's Island is the only coral island in Bangladesh, with a rich marine environment and unique ecological conditions. The island harbours expansive marine life, including fish, invertebrates, and sea turtles, which are essential for the ecological balance of the area. Coral reefs are essential for marine biodiversity because they offer shelter and breeding grounds for many marine animals and fish,

The Joy and Enthusiasm of a Group Bicycle Ride, Capturing the Spirit of Togetherness

supporting the fisheries that are an important means of livelihood for the islanders.

During this trip, we witnessed the complexity of the relationships within the marine ecosystem. The traditional conservation activities in the region are also aided by the presence of sea turtles, especially green turtles *(Chelonia mydas)*. These turtles are essential in ensuring that seagrass beds and coral reefs remain healthy because they control the numbers of other species that graze in these areas. At the same time, this exploration was marked by a sad finding: a dead turtle, which highlighted how pollution and habitat destruction are threatening all forms of marine life.

The Beauty of Sunset and Environmental Observations

The Bay of Bengal holds a special place for us simply because of the raw beauty it offers — ornately hued sunrises and sunsets. It goes without saying that the memories we managed to forge here will remain etched in our minds.

Such wonders of Mother Nature underline more than just a single moment—they serve as urgent reminders to preserve unspoiled nature for future generations. Unfortunately, the island's ecological health is imperiled by overfishing and pollution, and it is no wonder that the island's beauty is profoundly affected, to put it mildly.

Speaking of Mother Nature, during our attempts to appreciate the intrinsic beauty the island had to offer, we stumbled upon rip currents as well, which were often present in the island's coastal waters. Grasping the unpredictable nature of these currents became exceedingly important for the well-being of the local fishermen and tourists. Rip currents can have a strong influence on the distribution of various marine organisms and coastal ecosystems. It is understandable how intricate any and all forms of marine life are when considering the combination of these waters and currents, which is why the conservation planning of these diverse and beautifully intricate ecosystems requires such depth of study.

Biodiversity and Local Community Interactions

Apart from its marine life, St. Martin's Island also has an impressive diversity of birds. The local people are key to this biodiversity and its conservation. Several households rely on ecotourism and sustainable fishing activities that help promote environmental awareness and conservation. However, there are still problems that must be

addressed, as some of these ecosystems are prone to damage by conventional practices.

Marine life is essential for the majority of the local population, and this means development will have to be controlled with environmental protection in mind. It has been observed that the local people are the best custodians of the coastal environment, and their participation in marine conservation enhances the sustainability of marine resources. Conservation of marine resources not only fosters caring attitudes towards the natural environment, but also strengthens protection against the detrimental effects of global warming and anthropogenic activities.

Community-Led Plastic Exchange Program

While exploring the island, we discovered a heartwarming initiative by the Bidyanondo Foundation, a volunteer-driven philanthropic organisation in Bangladesh known for its creative, community-based projects. On St. Martin's Island, they introduced a simple yet powerful idea: they exchange food and beverages for collected plastic waste. We saw long lines of people patiently waiting, each with bags full of plastic waste they had gathered from the beaches. Some people were even roaming the shore, picking up every scrap of plastic they could find—eager not only to claim a free snack but also to contribute to a cleaner environment. It was an inspiring display of how a single grassroots project can motivate both locals and visitors to join forces and protect the island's fragile ecosystem.

The Impact of Climate Change and Pollution

The reefs around St. Martin's Island are highly vulnerable to threats such as pollution and climate change, because these are the major factors that lead to increased ocean acidification and higher temperatures, ultimately causing coral bleaching, which in turn damages the biodiversity around these reefs. There are even more threats that stem from land-based pollution: heavy metal

The Beauty of a Sunset Over the Horizon, Showcasing Natural Aesthetics and Key Environmental Observations

A Deceased Sea Turtle Washed Ashore, Highlighting the Impact of Marine Pollution and Coastal Hazards

contamination and plastic pollution are just a few of them, and these have also been reported in coastal areas, meaning the marine life there is at significant risk. Not to mention the already severe threat that microplastic pollution poses to marine organisms and the entire food web.

The reduction of pollution is crucial in maintaining the health of the island's waters. Improving waste management practices and reducing plastic waste should be important goals to achieve while keeping marine life in mind. Our visit to the region strengthened the idea of collaboration between local communities, government bodies, and NGOs to implement safe practices and promote positive change in response to challenges already posed. A robust marine ecosystem on Saint Martin's Island is key to the survival of its marine life.

Conclusion: A Call for Conservation

The excursion to St. Martin's Island was an extremely interesting exercise that helped us appreciate the marine environment and marine life more profoundly. The essence of St. Martin's Island and the problems it presents clearly point out that there is an immediate need for remedial action. For us, as prospective oceanographers and environmental scientists, it is imperative to push for responsible practices and make a difference in the conservation of this irreplaceable ecosystem.

To summarise, the reflective point of our visit, which has progressively grown, is that St. Martin's Island, which we set out to study, took us on a journey of discovery, providing us with great insight into how St. Martin's beaches—true natural wonders—are deserving of appreciation. The events we witnessed and the theories we applied will either make or break us collectively as future experts in the field of marine science and conservation. Throughout our journey, we will hopefully remember and embrace the complex unity of all living things and the responsibility of taking care of the Earth and its natural resources for future generations.

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Insights Gained from the **State of the Map Asia 2024**

Abu Syed Al-Imam

Honoured to attend the State of the Map Asia (SotM Asia) in Cox's Bazar, where innovators and experts gathered to shape the future of geospatial technology and collaborative mapping

I attended the State of the Map Asia (SotM Asia), held in Cox's Bazar, Bangladesh, from November 30th to December 1st, 2024. It was an event organised by the OpenStreetMap (OSM) Asian community, which brought together mappers, professionals, and academics from across the continent to discuss challenges, share experiences, and celebrate the spirit of open mapping.

Being an active contributor to OSM and a member of YouthMappers at BMU, the conference theme of collaborative mapping and geospatial data immediately captured my attention. I hoped to learn from international experts, take part in valuable discussions, and connect with like-minded individuals working toward the advancement of open mapping.

I had the opportunity to present on the second day in a lightning talk titled "Assessing the Availability of Fire Stations and Hospitals Near Factories and Overcrowded Restaurant Areas in Dhaka City Using OpenStreetMap Data." The presentation went quite well and was well received by both the audience and experts alike, leading to vital discussions about the availability of emergency services in highly populated urban areas.

Presenting my project at State of the Map Asia (SotM Asia) in Cox's Bazar

During this conference, I had the opportunity to interact with professionals from India, Nepal, Sri Lanka, the Philippines, Pakistan, Ghana, Nigeria, Indonesia, and others. Their interactions offered me a broader perspective on how mapping is conducted and the myriad uses of OSM data in different regional settings. Also, I was privileged to meet renowned open mapping experts like Nilabrata Sanyal from West Bengal, India, Mikko Tamura of the Philippines, and Rabina Poudyal from Nepal. The discussions on collaborative mapping practices were truly inspirational and opened paths for future collaboration.

Engaged in insightful discussions and learning from innovative projects

The poster presentation sessions featured some enlightening displays highlighting new project ideas and research being undertaken by the community in OSM. Voting for the best poster was done zealously, and because of that, I got to see all the innovative ways used to solve the challenge called Mapping Asia.

A glimpse of the Poster Presentation at State of the Map Asia (SotM Asia), where creativity meets knowledge to drive the future of mapping and geospatial solutions

The glamour of Cox's Bazar's sea front is globally acknowledged and very proudly boasts a long natural sandy sea beach. All of this provided a tranquil setting for the conference. The vicinity to the ocean created an environment conducive to serenity, providing the added strength needed for decision-making discussions.

This beautiful ambiance enriched the overall experience, allowing participants to gather their thoughts in a relaxed setting, surrounded by nature.

Enjoying the breathtaking beauty of Cox's Bazar sea beach, where the endless horizon meets the calm waves, offering a perfect escape

I would like to express my deepest gratitude to my co-authors Shanji Rahman and Atika Afia Broty Apu for their immense support and effort toward our project. Special thanks to my chapter, YouthMappers at BMU, especially Amena Rashid Bania, Mohammad Azhar, Fida Hasan, and Khan Mohammad Ibtehal for their continuous encouragement. I also thank the organisers of SotM Asia for their hospitality. Evidently, the conference's success is a sign of good planning and warm hospitality, which made the programme both unforgettable and useful for the participants.

Members of YouthMappers at BMU standing together, ready to make a difference in the world

The State of the Map Asia 2024 conference proved to be a great avenue for delving into open mapping and its uses. The knowledge gained, connections established, and the friendly atmosphere of this conference have motivated me to commit to further contributions to the OSM community and to apply the insights gained in upcoming projects.

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The Ship That Flips!

Rasmin Rezwan Shreyosi

Vessel but instead flips vertically in the water to become a towering pillar of stability. Meet the U.S. Navy's Floating Instrument Platform, better known as FLIP. Designed in 1962 as a groundbreaking tool for oceanographic research, FLIP is one of the most unique ships ever built. Unlike conventional ships, FLIP transitions from a horizontal position, where it resembles a standard vessel, to a vertical orientation, where it functions as an ultra-stable research platform.

This engineering marvel was created to meet the challenges of studying underwater acoustics, ocean waves, and atmospheric conditions without being affected by the rolling and pitching of waves. With its ingenious ballast system and innovative design, FLIP has become an icon of naval innovation and a cornerstone of scientific discovery at sea.

FLIP: What It Is & What's Its Purpose?

Flip ship, also known as a FLIP (Floating Instrument Platform), is a unique marine vessel designed to operate in both horizontal and vertical orientations. These remarkable ships can transition from a standard horizontal floating position to a vertical, partially submerged stance, resembling a floating tower.

The U.S. Navy's FLIP (Floating Instrument Platform) was developed in 1962 by the Marine Physical Laboratory at the Scripps Institution of Oceanography in collaboration with the Navy. It was designed to address the growing need for a stable platform for underwater acoustics research during the Cold War.

FLIP can be used in-

- **Marine Research:** FLIP provides unmatched stability for deep-sea research, enhancing data collection and extending mission durations.
- **Oil and Gas Exploration:** It ensures stability in harsh offshore conditions, improving drilling efficiency and crew safety.
- W**eather and Oceanographic Studies:** FLIP offers a stable platform for accurate atmospheric measurements and long-term ocean monitoring.

• **Military and Defence:** Used for submarine detection, acoustic research, and covert surveillance missions.

• **Versatility:** Its ability to operate in both horizontal and vertical positions allow for superior stability and access to deep-sea environments.

Understanding the Unique Design of Flip Ships:

FLIP is 108 metres (354 feet) long with a beam of 7.6 metres (25 feet). When in its vertical position, it stands about seventeen metres (55 feet) above the water.

FLIP uses a ballast system to transition from a horizontal to a vertical position. Water is pumped into and out of tanks along the ship's hull to flip it. This process takes about 20–30 minutes. In its vertical state, FLIP's stability is enhanced, minimising the effects of ocean waves, making it ideal for precise scientific research.

Several key features make the flipping process possible:

• **Ballast system:** A complex network of tanks and pumps

• **Unique hull design:** Elongated structure with specialised compartments

• **Flexible internal systems:** Adaptable equipment and living quarters

• **Stabilisation mechanisms:** Thrusters and dynamic positioning systems

Comparison with traditional vessel designs:

To better understand the unique nature of flip ships, let us compare them with traditional vessel designs:

Feature	Flip Ships	Traditional Ships
Orientation	Can operate horizontally and vertically	Horizontal only
Stability	Exceptional in vertical position	Varies based on design
Research capabilities	Enhanced for oceanographic studies	Limited by conventional design
Living quarters	Adaptable to orientation changes	Fixed layout
Propulsion	Limited self-propulsion	Fully self-propelled
Cost	Higher due to specialised design	Generally lower

Life Aboard FLIP:

Life aboard FLIP is uniquely adapted to its flipping mechanism. The ship's interior, including living quarters, labs, and workspaces, is designed to function in both horizontal and vertical positions. Beds, sinks, and tables are built to rotate or operate in either orientation. Crew members must adjust to the transition process, which takes about 20–30 minutes, as the ship tilts vertically. Despite its unconventional design, FLIP offers a functional and stable environment for extended research missions at sea.

The U.S. Navy's Floating Instrument Platform (FLIP), a unique research vessel designed for oceanographic studies, demonstrating cutting-edge technology in marine exploration

FLIP has left a lasting legacy as a pioneering platform for oceanographic research and naval science. Its innovative design revolutionised the study of underwater acoustics, ocean waves, and climate patterns, setting a benchmark for stability and precision at sea. This pioneering research vessel operated for more than fifty years by the U.S. Navy's Office of Naval Research and the Scripps Institution of Oceanography, was decommissioned in August 2023, and towed to Mexico to be scrapped. FLIP has concluded its extraordinary career, but its groundbreaking design continues to inspire oceanographic research and marine engineering. By redefining stability and precision at sea, it paved the way for studying underwater acoustics, waves, and climate with unmatched accuracy. Today, modern vessels build on FLIP's legacy, and as the demand for advanced marine platforms grows, its innovative concept will remain a cornerstone for future developments in maritime technology and exploration.

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A Night to Remember

Celebrating PML Day 2025

Iftasum Ahmed

On 16 January 2025, the Department of Port and Shipping Management under the Faculty of Port Management and Logistics (PML) at Bangladesh Maritime University came alive with celebration and camaraderie. The occasion was the 2nd annual PML Day, a joyous event dedicated to bidding farewell to the outgoing PML 2nd Batch, and marking a momentous evening of shared memories, gratitude, and festivities. The celebration not only highlighted the strong bond among students, faculty, and alumni but also reflected the essence of unity and pride within the department.

A Thoughtful Farewell and a New Chapter

The PML Day 2025 served as a heartfelt tribute to the graduating PML 2nd Batch. It was a time to honour their journey and contributions to the department while ushering them into the next phase of their lives. This year's event also held special significance as it was an opportunity to bid farewell to the outgoing dean of the faculty Commodore Mohammad Mahabbat Ali, (G), NGP, psc whose leadership had been instrumental in shaping its growth. At the same time, the occasion warmly welcomed the incoming dean, Commodore Md. Atiqur Rahman, (G), NUP, NPP, afwc psc, M Phil marking the beginning of a new chapter with fresh leadership and vision. The evening provided a platform for both farewells and celebrations, combining nostalgia with hope for the future.

The Venue and Atmosphere

The Cuisine Hub, located in Mirpur 12, was chosen as the venue for the grand evening. Known for its inviting ambiance and spacious setting, the location proved ideal for hosting the large gathering. The venue was adorned with tasteful decorations that reflected the maritime theme, paying homage to the department's focus. Lights twinkled as the vibrant energy of the participants filled the air, creating a sense of excitement and anticipation.

Organisers and Participants

The responsibility of organising the programme rested on the capable shoulders of the PML 3rd Batch. They took charge of every detail, from planning the agenda to ensuring smooth execution. Their efforts were supported by Commander Julhas Faisal Associate Professor and Md Mostafa Aziz Shaheen, an assistant professor in the department, whose guidance and encouragement were invaluable. Participants included students from the PML 3rd, 4th, 5th, and 6th batches, as well as alumni from the PML 1st Batch. The presence of the Head of the department Captain Kazi Ali Imam and his family added warmth to the occasion, emphasising the familial spirit of the PML community.

A Cultural Extravaganza

A highlight of the evening was the cultural programme, which displayed the talents and creativity of students across all participating

The winner receives their well-deserved prize, a testament to their hard work and achievement.

batches. From captivating musical performances to lively dance routines and heartfelt recitations, the event celebrated the diversity and energy of the PML community. Each batch contributed unique performances, making the event a mosaic of entertainment and artistic expression. The audience, including faculty, students, and alumni, joined in with applause and cheers, enhancing the celebratory atmosphere.

Messages of Gratitude and Inspiration

Speeches from key figures added depth to the evening. The head of the department delivered an inspiring address, reflecting on the achievements of the PML 2nd Batch and the milestones of the department. Alumni from the PML 1st Batch shared earnest anecdotes, inspiring current students to continue striving for excellence. The outgoing dean expressed gratitude for his tenure and encouraged students to uphold the values of hard work and perseverance. These messages resonated deeply, creating a sense of connection and motivation among attendees.

Moments to Cherish

The evening was filled with memorable moments that left an indelible mark on everyone present. The farewell segment for the PML 2nd Batch was particularly emotional, as faculty and peers shared stories of their experiences and extended their best wishes. Tokens of appreciation and mementos were presented, symbolising the enduring ties between the graduates and their alma mater. The programme's inclusive nature ensured that every participant felt valued and celebrated.

Culinary Delights and Social Bonds

True to its name, The Cuisine Hub treated attendees to a delectable array of dishes. The dinner was not just a meal but a time for bonding and camaraderie. Students and faculty mingled freely, strengthening relationships, and fostering a sense of community. The shared laughter and conversations over dinner added to the joy of the occasion, making it a night to remember.

Reflections and Takeaways

PML Day 2025 was more than just an event; it was a celebration of the department's spirit and the collective journey of its members. The meticulous planning and enthusiastic participation of the PML 3rd Batch, supported by faculty, set a benchmark for future celebrations. It also reinforced the importance of fostering connections and honouring the contributions of every individual within the department.

For the outgoing PML 2nd Batch, the evening was a fitting farewell that acknowledged their accomplishments and sent them off with best wishes for the future. For current students and alumni, it was a reminder of the strength of their shared identity as members of the PML family. The event not only strengthened the bond among attendees but also highlighted the values of respect, gratitude, and collaboration that define the department.

A Legacy of Excellence

As the night drew to a close, it was clear that PML Day 2025 had left an enduring legacy. The programme was a testament to the dedication and passion of everyone involved, from the organisers to the performers and participants. It also served as a reminder of the department's commitment to nurturing talent, fostering unity, and celebrating achievements.

With the success of this year's event, the stage is set for future PML Days to build on this foundation of excellence. The memories created on this special evening will continue to inspire and unite the PML community for years to come, making PML Day a cherished tradition within the Bangladesh Maritime University.

Iftasum Ahmed
Student, 4th Batch
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An unforgettable evening of talent and creativity, as students from all batches came together to showcase the vibrant cultural spirit of the PML community through music, dance, and recitation

Memorandum of Understanding Signed Between BMU and WMU

On 29 September 2024, Bangladesh Maritime University (BMU) signed a Memorandum of Understanding (MoU) with the World Maritime University (WMU), Malmö, Sweden. On behalf of BMU, the Honourable Vice Chancellor Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc signed the MOU. Subsequently, the President of WMU, Professor Maximo Q. Mejia Jr., signed the MoU on 28 October 2024.

The purpose of this MoU is to establish the terms under which BMU and WMU will collaborate in the fields of maritime and marine affairs, with a primary focus on expanding educational opportunities for students. The agreement encompasses a range of initiatives, including academic exchange, sharing of academic information, and participation of BMU faculty in WMU programmes. It also facilitates faculty exchange, the development of joint scientific and/or technological research projects and publications, professional development courses, as well as additional provisions aimed at strengthening the academic and professional ties between the two institutions.

Bangladesh Maritime University Commemorates Martyrs of the Anti-Discrimination Movement and July Uprising

On 5 December 2024, Bangladesh Maritime University (BMU) organised a commemorative event in memory of the martyrs and those injured during the anti-discrimination movement and the July Uprising. The event was held at the university's temporary campus auditorium in Pallabi, Mirpur-12, Dhaka.

The Honourable Vice Chancellor of BMU, Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, graced the occasion as the chief guest, alongside university teachers, officers, employees, and students. During the event, Mr Hasibul Islam, Lecturer in the Department of Management, and two students of the university delivered speeches on the significance of the movement and its enduring impact.

In addition to the speeches, the university's cultural club organised a cultural programme, which featured vibrant student participation. The Honourable Vice Chancellor took the opportunity to respectfully remember the martyrs and those injured during the anti-discrimination movement, as well as those who contributed to the Independence of Bangladesh.

Rear Admiral Chowdhury urged the gathering to work towards building a prosperous, just, and knowledge-based society—one that is non-communal, technology-driven, and grounded in law and order, with a strong emphasis on human rights and zero unemployment. He also called upon all students, teachers, officials, and employees to come forward, unite through patriotism, and work together to eliminate irregularities, corruption, human rights violations, and discrimination in all sectors of the country.

Vice-Chancellor of BMU Pays Courtesy Call on UGC Chairman

On 23 October 2024, the Vice-Chancellor of Bangladesh Maritime University (BMU), Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, paid a courtesy visit to the esteemed Chairman of the University Grants Commission (UGC), Professor Dr S M A Faiz.

During the meeting, the Vice-Chancellor provided the UGC Chairman with a comprehensive briefing on the academic and administrative activities conducted at the university's temporary campus in Dhaka. He also apprised the Chairman of the progress made in constructing BMU's permanent campus, located in Hamidchar under Chittagong Port and Chadgaon Thana.

In response, Professor Dr S M A Faiz assured the Vice-Chancellor of his full support in facilitating the efficient execution of the university's academic and administrative endeavours. He further pledged UGC's assistance in ensuring the smooth and timely completion of the permanent campus construction, reinforcing BMU's commitment to academic excellence and institutional development.

BMU Hosts Workshop on Research Methodology

The Institutional Quality Assurance Cell (IQAC) of Bangladesh Maritime University (BMU) organised a workshop on *Research Methodology* on 24 October 2024 at the auditorium of its temporary campus in Mirpur-12, Dhaka. The esteemed Vice-Chancellor of BMU, Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, graced the event as the Chief Guest.

The keynote address was delivered by the distinguished Vice-Chancellor of Jamalpur Science & Technology University (JSTU), Professor Dr Mohammad Raknuzzaman. The workshop also featured insightful presentations from prominent academics, including Professor Dr Muhammad Shariat Ullah, Chairman of the Department of Organisation Strategy & Leadership at the University of Dhaka; Professor Dr Yearul Kabir, Academic Advisor at BMU; and Ferdousi Begum, Assistant Professor in the Department of Law at AIUB.

The workshop was attended by faculty members and officers of BMU, who actively engaged in discussions aimed at enhancing research capabilities and fostering a culture of academic excellence within the institution.

This initiative reflects BMU's ongoing commitment to strengthening research methodologies and ensuring high standards of academic inquiry among its scholars.

Inspector of Academies Participates in 3rd Governing Body Meeting of Bangladesh Marine Academy, Pabna

On 14 July 2024, the Inspector of Academies/Institutes Captain Md. Zahidul Islam, (L), psc, BN participated in the 3rd Governing Body meeting of Bangladesh Marine Academy, Pabna. The meeting provided a platform for discussing several important issues concerning the development of the academy. Various aspects of the academy's growth and progress were thoroughly examined, with a focus on enhancing the institution's academic and training facilities to better serve the needs of cadets and the maritime sector. The discussions aimed to ensure the continued development and improvement of the academy's infrastructure, curriculum, and overall performance, as well as to address future challenges and opportunities.

Passing Out Parade of Marine and Fisheries Academy Held

In December 2024, the Passing Out Parade for cadets of Bangladesh Marine Academy, Chattogram, Pabna, Barishal, Sylhet, Rangpur, and Marine Fisheries Academy, Chattogram, was held with grandeur and ceremony. The parade marked the successful completion of training for the cadets and their transition to professional roles within the maritime and fisheries sectors.

As part of the event, key officials from Bangladesh Maritime University (BMU) were invited to witness the ceremony. Among the distinguished guests were the Treasurer, Registrar, Deans, and other high-ranking officials from BMU. Their presence underscored the importance of the event and highlighted the collaborative efforts between the institutions in shaping the future of the maritime and fisheries industry in Bangladesh.

BMU's Permanent Campus Construction Progressing Steadily

Bangladesh Maritime University (BMU), the country's first specialised maritime university, was established in 2013 with the vision of advancing maritime education, research, and innovation. A significant milestone in its development was reached on 4 March 2024, with the inauguration of the construction of its permanent campus at Hamidchar, under Chattogram Port and Chadgaon Thana in Chattogram.

The first Revised Development Project Proposal (RDPP) for BMU's permanent campus was approved on 4 October 2023, paving the way for large-scale infrastructural development. At present, 90 per cent of the foundation work for various academic, administrative, and residential hall buildings has been completed under this initiative. The remaining construction is on track to be completed within the stipulated project timeframe, ensuring the timely realisation of this state-of-the-art educational facility.

Recently, the Vice-Chancellor of BMU, Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, visited the construction site to assess the progress of the project. During his visit, he provided strategic guidance to ensure the successful and efficient completion of the work. Furthermore, he expressed his strong commitment to relocating the university's temporary campus to its permanent site by the year 2026, marking a new era for BMU as a leading institution in maritime education and research.

VC, BMU Meets Senior Secretary of Secondary and Higher Education Division (SHED)

On 6 November 2024, the Vice Chancellor of BMU, Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, held a meeting with the Senior Secretary of the Secondary and Higher Education Division (SHED), Mr Siddique Zobair, in Dhaka. During the meeting, Rear Admiral Chowdhury had a fruitful discussion with the Senior Secretary, providing an update on the ongoing academic and administrative activities of the university at its temporary campus. He also informed the Senior Secretary about the progress of the construction works for establishing the university's permanent campus at Hamidchar, Chattogram. In response, the Honourable Senior Secretary assured the Vice Chancellor of his full-hearted support to ensure the smooth journey of the university, alongside the establishment of its permanent campus.

BMU Relief Team Distributes Aid to Flood Victims in Feni

A relief team from Bangladesh Maritime University (BMU) distributed essential supplies to flood victims in Feni on 23 August 2024, under the direction of former Vice-Chancellor Rear Admiral Mohammad Musa, OSP, NPP, rcds, afwc, psc, PhD.

The team visited five flood-affected shelter centres in Sharshadi Union, providing dry food, oral saline, and fresh water to 800 flood victims. Additionally, they distributed relief supplies to a further 100 affected individuals in the Khajuria and Rampura areas of Feni.

Meanwhile, students of BMU mobilised donations, collecting over two lakh taka, along with dry food and clothing, to support the flood relief efforts. The university also gathered contributions from individual donors. Furthermore, all faculty members, officers, and staff have given their one day's salary.

BMU remains committed to standing by those affected and pledges to continue its relief and financial aid initiatives to support flood victims in future.

Inspection Team Visits Bangladesh Marine Academy, Barishal for Evaluation and Guidance

From 20 to 22 October 2024, an inspection team headed by the Inspector (Academies/Institutes) Captain Md. Zahidul Islam, (L), psc, BN visited Bangladesh Marine Academy in Barishal. The team conducted a comprehensive evaluation of the academy's educational and training facilities, engaging in discussions with faculty members on various academic and operational matters.

During the visit, the team toured numerous key facilities, including the Academic & Administrative Building, Swimming Pool, Firefighting Unit, Workshop, Engineering Drawing Room, Computer and Language Laboratories, Cadet Block, classrooms, and specialised laboratories (such as Seamanship, Electrical & Electronics). The inspection also covered the library, auditorium, medical centre, barber and laundry shop, galley, and gymnasium.

The team provided valuable directives and guidelines to both the faculty members and cadets, offering recommendations for improvements and ensuring that the academy continues to meet the highest standards in maritime education and training.

Bangladesh Maritime University Celebrates "University Day, 2024" with Due Fervor and Enthusiasm

On 7 November 2024, Bangladesh Maritime University (BMU), the country's premier maritime specialised public university, celebrated "University Day, 2024" with great dignity and enthusiasm. To mark the occasion, a vibrant rally was organised in front of the university, where teachers, officials, employees, and students participated. The rally circled the university's temporary campus in Pallabi, Mirpur-12, Dhaka, reflecting the unity and spirit of the university community.

The celebrations also featured a series of engaging activities, including a photo exhibition, a blood donation programme, decorations, a short painting exhibition, and the screening of a documentary and videos. The highlight of the day was a spectacular cultural programme held in the university's auditorium.

The Honourable Vice Chancellor of BMU, Rear Admiral Ashraful Hoq Chowdhury graced the occasion as the chief guest. During the celebrations, he emphasised that the university is committed to conducting education and research programmes aimed at making a significant contribution to the country's economy. This is achieved through the development of skilled manpower, advancing maritime innovation, the application of modern technology, and the exploration and proper utilisation of marine resources, all crucial to the nation's progress.

UGC Member Visits BMU's Temporary Campus, Pledges Support for Expansion

On 5 November 2024, the esteemed Member of the University Grants Commission (UGC) of Bangladesh, Professor Dr Mohammad Anwar Hossen, visited the temporary campus of Bangladesh Maritime University (BMU) at Pallabi, Mirpur-12, Dhaka. His visit was marked by a briefing session, during which university officials outlined the pressing need for additional rented facilities to accommodate the expansion of BMU's academic and administrative activities, as well as to enhance residential facilities for students.

The Honourable Vice-Chancellor of BMU, Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, accompanied Professor Dr Mohammad Anwar Hossen throughout the visit. The UGC Member was given a comprehensive overview of how the university has been operating within its current spatial constraints while maintaining its commitment to academic excellence.

Recognising these challenges, Professor Dr Hossen assured the university authorities of his full support in securing approval for additional rented premises. His commitment to facilitating this expansion reflects UGC's continued dedication to fostering an improved learning environment for BMU's students and faculty. This initiative is expected to significantly enhance the university's capacity to provide high-quality maritime education and research opportunities.

Combined Marine Cadet Admission for Session 2024-25: 660 Cadets Selected for Admission

The Combined Marine Cadet Admission circular for the 2024-25 session was published on 10 September 2024. A total of 4,169 applicants appeared for the entrance examination, and out of these, 1,135 candidates successfully passed the exam.

According to the merit list, 660 cadets have been selected for admission in the academic year 2024-25 to various government and approved private marine academies. The selection process was rigorous, ensuring that only the most qualified candidates were chosen.

The Inspector (Academy/Institute) served as an examiner on the viva board, while the Assistant Inspector (Academy/Institute) represented Bangladesh Maritime University (BMU) in various meetings of the Combined Marine Cadet Admission Examination Management Committee. These roles were pivotal in ensuring the smooth conduct of the admission process.

Rear Admiral Mohammad Musa Honoured with Prestigious Fellowship at Oxford University

Rear Admiral Mohammad Musa, OSP, NPP, rcds, afwc, psc, PhD, former Vice-Chancellor of Bangladesh Maritime University (BMU), has been awarded an Honorary Fellowship by the UK Centre for Business and Economic Research (CBER) at Oxford University. This distinguished honour recognises his outstanding contributions to maritime affairs, both nationally and internationally.

The accolade was conferred during the 13th International Conference on Restructuring of the Global Economy (ROGE): Promoting Sustainability, organised by CBER and held at Oxford University on 5–6 August 2024. As part of the conference, Rear Admiral Musa delivered a keynote address titled "Sustainable Ocean Economy: Bangladesh's Journey on the Roadmap to a Blue Economy".

The Honorary Fellowship from CBER, Oxford University, is expected to significantly enhance the international standing of both Rear Admiral Musa and BMU. This prestigious recognition will facilitate participation in global seminars, research presentations, and high-impact publications, thereby elevating the global reputation of the institution and, by extension, Bangladesh.

Notably, Rear Admiral Musa is an alumnus of the Royal College of Defence Studies and King's College London, further cementing his strong academic and professional ties with the United Kingdom.

10th Annual Senate Meeting of Bangladesh Maritime University Held

On Sunday, 29 December 2024, the 10th Annual Senate Meeting of Bangladesh Maritime University (BMU) took place at the Conference Room of the university's temporary campus in Pallabi, Mirpur-12, Dhaka. The meeting was chaired by the Vice Chancellor of BMU and Chairman of the Senate, Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc.

The meeting was attended by several distinguished members, including the Assistant Chief of Naval Staff (M), Rear Admiral Khandakar Akhter Hossain, NUP, ndc, psc, PhD, the Director General of the Bangladesh Coast Guard, Rear Admiral Md Ziaul Hoque, OSP, ndc, afwc, psc, and the Member of the University Grants Commission (UGC), Professor Dr Mohammad Anwar Hossen, alongside other Senate members.

At the start of the meeting, the Chairman of the Senate expressed his gratitude to the outgoing members and extended a warm welcome to the newly appointed members. Rear Admiral Chowdhury then provided a brief update in his Senate speech, highlighting the key activities carried out over the past year.

The Senate approved the revised budget for the fiscal year 2023-2024, as well as the main budget for the fiscal year 2024-2025, which had been presented by the university's Treasurer. The 10th Annual Report of BMU, covering the period from July 2023 to June 2024, was also unanimously approved by the Senate members.

A significant part of the meeting was dedicated to discussing the ongoing development of the university. The Senate members expressed their confidence that the university's permanent campus would soon be constructed, with the intention of relocating as quickly as possible to allow for the opening and full functioning of all faculties and departments approved in the university's Terms of Establishment.

3rd Board of Governance Meeting of IBBBS Held at BMU Temporary Campus

The 3rd Board of Governance (BoG) meeting of the Institute of Bay of Bengal and Bangladesh Studies (IBBBS) took place on 22 December 2024 in the conference room of the temporary campus of Bangladesh Maritime University (BMU).

The meeting was presided over by Rear Admiral Ashraful Hoq Chowdhury, NBP, OSP, BCGM, ndu, afwc, psc, Vice-Chancellor of BMU. The attendees included key members such as Commodore Md. Neamul Hasan, Cdre Sheikh Shahid Ahmed, Professor Dr Sheikh Aftab Uddin, Dr Mohammad Nazir Hossain, and Dr K M Azam Chowdhury, among others. Additionally, Cdre Mohammad Tariqul Islam and Cdre Md Monir Uddin Mollick, Treasurer and Registrar of BMU, were also present, having been approved by the BoG President.

The member secretary of BoG and Director of IBBBS, Captain Mohammad Mosharrof Hossain, presented a report on the activities of the Institute from July to December 2024. The meeting also outlined plans for the upcoming activities of IBBBS from January to June 2025, focusing on the Institute's continued progress and development.

39th Syndicate Meeting of BMU Addresses Key Academic and Administrative Issues

The 39th Syndicate Meeting of Bangladesh Maritime University (BMU) was held on 31 July 2024 at the conference room of the university's temporary campus, located at 14/6-14/23, Pallabi, Mirpur-12, Dhaka-1216. The meeting was chaired by the former Vice-Chancellor, Rear Admiral Mohammad Musa.

During the meeting, several important academic and administrative decisions were made. These included the approval of recruitment processes, the permanentisation of teachers, officers, and employees, and the approval of the revised budget for the fiscal year 2023-2024, as well as the original budget for the fiscal year 2024-2025. Additionally, two members were nominated by the Syndicate for the Planning, Development, and Evaluation Committee.

The meeting also saw the presentation and approval of the University's draft 10th Annual Report for the fiscal year 2023-2024, along with the approval of final results for various batches of postgraduate and undergraduate (Honours) programmes at the university, as well as graduate programmes at affiliated institutions. These decisions marked significant steps in the university's ongoing development and commitment to academic excellence.

IBBBS Publishes Monograph on Matarbari Deep Sea Port's Sustainability

In October 2024, the Institute of Bay of Bengal and Bangladesh Studies (IBBBS) published a research paper titled "Evaluating Matarbari Deep Sea Port's Sustainability Roadmap: A Triple Bottom Line Approach" as part of its monograph series. The publication delves into the sustainability framework of the Matarbari Deep Sea Port, analysing its economic, environmental, and social impacts. This research contributes valuable insights to the ongoing discourse on sustainable development in the maritime sector, further cementing IBBBS's role in advancing scholarly work related to the Bay of Bengal region.

40th Syndicate Meeting of BMU Addresses Key Academic and Administrative Matters

The 40th Syndicate Meeting of Bangladesh Maritime University (BMU) was held on 14 November 2024 at the university's temporary campus in Mirpur-12, Dhaka. The meeting was chaired by the Vice-Chancellor, Rear Admiral Ashraful Hoq Chowdhury.

Several significant academic and administrative decisions were made during the meeting. These included the approval of recruitment processes, the permanentisation of teachers, officers, and employees, and the approval of the newly formulated registration policy for the university. The Syndicate also approved study leave and its extension for faculty and staff, alongside the decision to rename the BSc (Hons) in Marine Fisheries to BSc (Hons) in Fisheries for the Bachelor (Hons) programme in the Department of Marine Fisheries and Aquaculture.

Further discussions resulted in the approval of an extension of the registration period for the 48-51st batches of the Nautical and Engineering departments at Bangladesh Marine Academy, Chittagong. Additionally, the proposed academic year 2025 was approved, and final results for various departments at the university were also ratified.

These decisions reflect the university's continued commitment to enhancing academic quality and streamlining administrative processes, marking an important step in BMU's development.

44th Academic Council Meeting of BMU Approves Key Academic Decisions

The 44th Academic Council Meeting of Bangladesh Maritime University (BMU) was held on 29 September 2024 at the conference room of the university's temporary campus in Pallabi, Mirpur-12, Dhaka. The meeting was chaired by the Vice-Chancellor, Rear Admiral Ashraful Hoq Chowdhury.

During the meeting, several important academic decisions were made to enhance the university's academic framework. One key decision was the approval to rename the BSc (Hons) in Marine Fisheries to BSc (Hons) in Fisheries for the Bachelor (Hons) programme in the Department of Marine Fisheries and Aquaculture. Additionally, the curriculum for the BSc (Hons) in Marine Fisheries and Aquaculture programme was revised.

The Academic Council also approved the syllabus for two new degree courses included in the LLB (Hons) in Maritime Law programme, further strengthening the legal studies component. The university's newly formulated registration policy was ratified, alongside the re-constitution of the Curriculum Board for the Port and Shipping Management Department.

Furthermore, the meeting approved the academic calendar for various semesters of the university's undergraduate programmes, extended the registration period, and confirmed thesis topics and supervisors. The Semester Final Examination Committee was also finalised.

These decisions reflect BMU's commitment to maintaining a high standard of academic excellence and ensuring the continued development of its maritime and academic programmes.

Inspection Team Visits International Maritime Academy, Gazipur for Evaluation

On 6 October 2024, an inspection team from the Office of the Inspector (Academies/Institutes) of Bangladesh Maritime University (BMU) conducted a visit to the International Maritime Academy in Gazipur, the only non-government affiliated maritime academy.

During the visit, the team thoroughly assessed the facilities, including the Academic & Administrative Building, classrooms, Cadet Block, various laboratories (Physics, Chemistry, Seamanship, Electrical & Electronics), the library, auditorium, medical centre, galley, gymnasium, workshop, and the firefighting unit.

Additionally, the team visited Zinda Park and Megh Bari Resort, which are currently being utilised for cadet training as a football ground and swimming pool, respectively, under two separate memoranda of understanding (MoUs). The Inspector of Academies noted that the football ground is located 6-7 kilometres away from the academy, which limits cadet access and restricts use to weekends only. Furthermore, the swimming pool's depth, ranging from 2 to 7 feet, is deemed unsuitable for proper swimming practice.

While these MoUs provide temporary solutions, the Inspector emphasised that permanent arrangements are necessary to meet the conditions required for affiliation, ensuring that the academy can offer the appropriate facilities for cadet training and development.

7th Governing Body Meeting of Marine Fisheries Academy, Chattogram Held

On 30 December 2024, the 7th meeting of the governing body of Marine Fisheries Academy, Chattogram, was held at the academy's conference room. The meeting brought together key stakeholders to discuss matters regarding the academy's development and future plans.

The Inspector (Academy/Institute) participated in the meeting as a representative of Bangladesh Maritime University (BMU), joining the discussions virtually via the Zoom app. The meeting provided an opportunity for the governing body to review ongoing initiatives and address issues related to the academy's academic and operational growth.

Training Activities at Bangladesh Marine Academy, Rangpur

Inter-Department Debate Competition

Practical firefighting training for cadets

On 11 December 2024, Mr Mohammad Yusuf, the Honourable Secretary of the Ministry of Shipping, graced the Graduation Parade (Passing Out Parade-2024) of the 3rd Batch of Cadets at the Marine Academy in Rangpur, Bangladesh, as the Chief Guest

Cadets from the Engineering Department of the Bangladesh Marine Academy, Rangpur, are undergoing practical training at the Central Locomotive Workshop

Bangladesh Marine Academy (BMA), Rangpur, has successfully organised a series of training activities and events from July to December 2024, aimed at enriching the academic and practical training of its cadets.

The training activities began with an Inter-departmental Debate Competition, which fostered critical thinking and communication skills among the cadets. This was followed by a structured provision of appointment times to cadets, designed to ensure they receive personalised guidance for their academic and professional development.

One of the key practical training components was firefighting training, where cadets underwent practical sessions to hone their skills in emergency response. These exercises were essential in preparing them for real-life maritime challenges.

In addition to in-house training, the academy expanded its exposure by participating in the International Power & Energy, Agro & Marine Tech Expo & Seminar-2024, held at the International Convention City-Bashundhara. This event provided cadets with insights into the latest technological advancements in the maritime industry.

Educational tours formed an integral part of the academy's training programme. Cadets visited significant maritime sites, including Shat Gombuj Mosque, Bagerhat and the Institute of Marine Technology, Bagerhat, enhancing their understanding of the region's maritime heritage and technical advancements. They also visited Khulna Shipyard and Mongla Port, gaining firsthand experience of shipbuilding and port operations.

In a gesture of professional networking, the Commandant of Bangladesh Marine Academy, Rangpur paid a courtesy call on the Commander Flotilla West, reinforcing the relationship between the academy and the naval forces. Additionally, a visit by the Joint Secretary of the Ministry of Finance, Mr Dr Abdur Rahim, offered valuable insights into the administrative aspects of the maritime sector.

The cultural spirit of the academy was showcased during the Cadets' Campfire and Colourful Cultural Program events, which highlighted the talents and camaraderie of the cadets.

A highlight of the training activities was the Passing Out Parade-2024, held on 11 December 2024, where the Honourable Senior Secretary of the Ministry of Shipping, Mohammad Yusuf, graced the event as the chief guest. The parade marked the completion of training for the 3rd batch of cadets of Bangladesh Marine Academy, Rangpur, signifying their readiness to embark on their maritime careers.

These activities collectively reflect Bangladesh Marine Academy's commitment to providing holistic training, blending academic excellence with practical skills, leadership development, and cultural enrichment.

Bangladesh Marine Academy, Barishal: Key Activities and Achievements from July to December 2024

The Commandant awarded epaulettes to the 4th Batch of Cadets of the Bangladesh Marine Academy, Barishal on 29 July 2024

The Training Completion Parade (Passing Out Parade-2024) for the 3rd Batch of Cadets at the Bangladesh Marine Academy, Barishal, was successfully held on 2 December 2024. The Honorable Advisor to the Ministry of Shipping, Brigadier General Dr M. Sakhawat Hossain (retd), graced the occasion as the Chief Guest

Between July and December 2024, Bangladesh Marine Academy, Barishal, (BMAB) organised a series of significant events and activities aimed at enhancing the education and training of its cadets. These activities encompassed academic, cultural, and practical training sessions, reflecting the academy's commitment to providing a comprehensive learning experience for its students.

One of the notable events was the Epaulette presentation on 29 July 2024, where the Commandant of the Academy presented epaulettes to the 4th batch cadets of BMAB, marking an important milestone in their maritime education.

The Inter-departmental debate competition for the 3rd and 4th batch cadets, held on 8 August 2024, provided a platform for cadets to demonstrate their critical thinking and public speaking skills, fostering a spirit of healthy academic competition.

On 31 August 2024, the academy hosted a seminar titled "Skill Development in the Maritime Sector in line with the 4th Industrial Revolution". The seminar aimed at equipping cadets with a deeper understanding of the evolving maritime sector and the integration of advanced technologies. Senior officials from the maritime industry and invited guests contributed valuable insights during the event.

A key highlight in September was the practical training in Personal Survival Techniques (PST) for the 3rd batch cadets at the National Maritime Institute, Chittagong, held from 8 to 14 September 2024.

Training Graduation Parade (Passing Out Parade-2024) for the 3rd Batch of Cadets

The cadets also participated in an industrial visit, gaining hands-on experience in maritime operations.

On 22 September 2024, the Honourable Advisor to the Ministry of Shipping, Brigadier General Dr M. Sakhawat Hossain (retd), visited Bangladesh Marine Academy, Barishal. His visit underscored the academy's commitment to engaging with key stakeholders in the maritime sector.

The academy also took part in the International Maintech, Powertech Expo & Seminar at the International Convention City-Bashundhara (ICCB), Dhaka, held from 26 to 28 September 2024. This event allowed the cadets and faculty to explore the latest trends and technological advancements in the maritime industry.

On 17 October 2024, a cross-country competition was organised for the 3rd and 4th batch cadets, followed by a prize distribution ceremony. This event encouraged physical fitness and team spirit among the cadets.

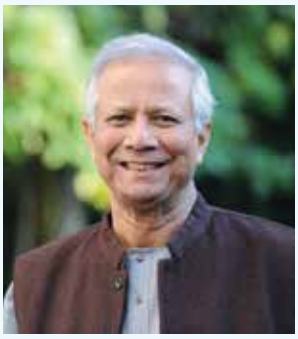
In late October, a representative from Bangladesh Maritime University (BMU) visited Bangladesh Marine Academy, Barishal, from 20 to 22 October 2024, to review the academy's training programs and activities, reinforcing its status as an affiliated institution of BMU.

The Cadets' Campfire 2024 took place on 26 November 2024, fostering camaraderie and a sense of community among the cadets. A colourful cultural program and Mess Night-2024 were also organised on 28 November 2024, to celebrate the passing out of the 3rd batch cadets.

The Passing Out Parade-2024 of the 3rd batch cadets was held on 2 December 2024, with Brigadier General Dr M. Sakhawat Hossain (retd), Honourable Advisor to the Ministry of Shipping, as the chief guest. A total of 53 cadets (27 from the Nautical Department and 26 from t he Engineering Department) successfully completed their training and graduated from the academy.

These events highlight the active role that Bangladesh Marine Academy, Barishal plays in shaping future maritime professionals, providing a rich blend of academic learning, practical training, and cultural engagement for its cadets.

Chief Adviser's UNGA Visit Marked as 'Very Successful, Historic'



The Honourable Chief Adviser Professor Yunus's four-day visit to New York during the United Nations General Assembly (UNGA) has been described as a "very successful" and "historic" moment in Bangladesh's diplomatic history. The visit was concluded in 30 September 2024.

Throughout the visit, Professor Yunus participated in 50 major events and held nearly as many bilateral and multilateral meetings, including over a dozen with top global leaders such as US President Joe Biden. His presence drew significant attention on the global stage.

At the UN headquarters, Professor Yunus reportedly received an exceptionally warm welcome, often embraced by world leaders in public displays of solidarity. Observers described the reception as akin to that of a global celebrity, underscoring his stature in the international community.

In both formal and informal settings, Professor Yunus consistently brought attention to Bangladesh's student-led revolution and its aspirations for democracy, justice, and reform. His message resonated strongly in diplomatic and civil society circles alike.

Compared to previous decades of Bangladesh's participation in the UNGA—often limited to a few engagements with regional leaders—this year's visit marked a striking departure. The chief adviser maintained a packed schedule, reflecting growing global interest in Bangladesh's political transition.

Leaders across continents expressed full support for the interim government and acknowledged the complexity of implementing comprehensive reforms. There was a clear consensus that Bangladesh is entering a critical phase of transformation, and global partners indicated their willingness to collaborate closely with the transitional leadership.'

On September 26 alone, Professor Yunus attended a record 16 events. In his address to the international community, he called for active engagement with the "new Bangladesh," rooted in the principles of freedom, inclusion, and democratic renewal.

Government Committed to Supporting Fishermen During Hilsa Ban: Advisor

Fisheries and Livestock Advisor Farida Akhter has reaffirmed the government's commitment to alleviating the hardships faced by fishermen during the 22-day ban on hilsa fishing.

Speaking as the chief guest at the result-sharing and phase-out workshop of the Ecofish-2 project in the capital on 22 October 2024, she emphasised the importance of hilsa to both the economy and the livelihoods of fishing communities. The project, implemented by WorldFish Bangladesh with USAID support, aims to improve the well-being of marginal fishing families while conserving coastal and marine biodiversity.

"The government is working to ensure that fishermen do not suffer or go hungry during the ban," Akhter stated, adding that further support measures would be introduced. She also highlighted the country's untapped marine potential, stressing that proper resource management could eliminate poverty.

The event showcased Ecofish-2's achievements, including benefiting over 72,000 people, training 15,000 fishermen, and empowering women through economic initiatives. The project has also contributed to marine conservation, with 236 endangered species rescued and 36 metric tons of plastic waste removed.

Officials and experts present underscored the project's role in sustainable fisheries management and its contribution to Bangladesh's emerging blue economy.

Unilever Bangladesh Hosts 'Progressing Sustainably: Together for Bangladesh' Event

Unilever Bangladesh Limited (UBL), the country's leading Fast Moving Consumer Goods (FMCG) company, organised an event titled 'Progressing Sustainably: Together for Bangladesh' in Dhaka on 1 December. The event gathered industry leaders, sustainability advocates, and key partners to discuss progress and future strategies for a sustainable Bangladesh.

A highlight of the event was the launch of the Sustainability Blue Book 2024, UBL's second voluntary report, showcasing their sustainability initiatives. The event featured three expert-led roundtable discussions on environmental protection and sustainable development.

British High Commissioner H.E. Sarah Cooke attended as Chief Guest, alongside UBL Chairman and Managing Director Zaved Akhtar and Director of Corporate Affairs Shamima Akhter. UBL presented four case studies focusing on Climate, Nature, Plastic, and Livelihood, aligning with their Growth Action Plan (GAP) 2024.

The roundtable discussions, held in partnership with leading organisations, explored achieving plastic circularity, climate resilience, and improving livelihoods. High Commissioner Cooke praised UBL's sustainability leadership, while Zaved Akhtar emphasised collective action for impactful progress.

UBL reaffirmed its commitment to driving sustainability in Bangladesh through collaboration with partners, industry leaders, and policymakers.

Rear Admiral SM Moniruzzaman Takes Charge as CPA Chairman

Rear Admiral SM Moniruzzaman, OSP, ndc, ncc, psc officially assumed the role of Chairman of the Chittagong Port Authority (CPA) on 13 August 2024. Before taking on this role, he served as the Commander of the Bangladesh Navy (BN) Fleet.

Born in Kushtia, Rear Admiral Moniruzzaman completed his higher secondary education at Cumilla Cadet College in 1987. He joined the Bangladesh Navy as an officer cadet in 1988 and was commissioned into the executive branch in 1990. Throughout his distinguished career, he has held numerous operational and strategic roles at both national and international levels.

He has commanded various frontline ships, including the flagship BNS Bangabandhu, and led the BN's Western Flotilla as its pioneer commander. His leadership extends beyond the Navy, having served as Managing Director of Bangladesh Shipping Corporation and DEW Limited, among other key roles.

A graduate of prestigious military institutions in Germany, Pakistan, Turkey, and the USA, he has played a vital role in peacekeeping, including overseeing the disarmament of rebel groups in the Democratic Republic of the Congo under the UN. His contributions have been recognised with the Outstanding Service Medal (OSP).

First Direct Maritime Link Between Pakistan and Bangladesh Established

On 13 November 2024, a cargo vessel from Pakistan's Karachi has made history by arriving at Chittagong Port, marking the first-ever direct maritime link between the two countries. The vessel, with an estimated capacity of 2,300 TEUs, was carrying a diverse range of goods, underscoring the growing demand for direct trade between Pakistan and Bangladesh.

Pakistan's High Commissioner to Bangladesh, Syed Ahmed Maroof, hailed the direct shipping route as a significant step towards strengthening bilateral trade and business ties. He also emphasised that the initiative would enhance regional trade connectivity, creating new opportunities for businesses on both sides.

The vessel, Panama-flagged Yuan Xiang Fa Zhan, arrived at Chattogram Port on 11 November from Dubai via Karachi, carrying 370 TEU containers. After unloading, it departed from Chattogram on 12 November. Chattogram Port Authority Secretary Md Omar Faruk explained that, although no fixed direct route currently exists between Chattogram and Pakistan, the Yuan Xiang Fa Zhan travelled along the Dubai-Karachi-Chattogram route, paving the way for future direct maritime trade between the two nations.

This historic voyage is expected to accelerate trade flows, boosting economic cooperation and fostering greater connectivity in the region.

Sandwip Declared Bangladesh's Only Coastal River Port

In a significant move, the Ministry of Shipping has declared Sandwip as the country's first coastal river port. This announcement, made through a notification on 11 December 2024, officially defines the geographical boundaries of the Sandwip Coastal River Port in Chittagong. The notification was published in the official gazette the following day.

According to the notification, the port's jurisdiction covers a 50-metre stretch inland from the maximum tidal water level along the shores of Sandwip Island. Furthermore, the canals within the coastal area of Sandwip are also under the port's jurisdiction.

In a separate gazette issued on the same day, the government appointed the Bangladesh Inland Water Transport Authority (BIWTA) as the custodian of the new river port.

This development brings the total number of river ports in the country to 54. Among these, four major river ports—Dhaka (Sadarghat), Narayanganj, Chandpur, and Barishal—play pivotal roles in the nation's water transport network. Additionally, Dhaka's Pangaon functions as the country's container terminal river port. The establishment of Sandwip Coastal River Port is expected to enhance the efficiency of maritime transport in the region.

China Poised to Resume Mongla Seaport Development Project

Bangladesh's interim government is set to allow Chinese investment in a significant project aimed at upgrading Mongla seaport. The Mongla Port Authority (MPA) has sought approval for a Tk 40.68 billion project, with China offering to finance Tk 35.93 billion (approximately US$335.78 million) through a loan.

The project was initially put on hold by the previous government due to geopolitical concerns. However, following the change in Bangladesh's political landscape in August 2024, the development of the Mongla Port is now gaining momentum.

The Mongla Port, under the Shipping Ministry, has been part of a larger Tk 60.15 billion upgrade project since 2020, with Indian financial support for part of the work. The new China-backed project involves the construction of two container jetties, a large container yard, and several pieces of equipment to boost the port's container-handling capacity by 394,000 TEUs per year.

With the recent completion of the Padma Bridge, Mongla's strategic importance has increased, attracting more international shipping lines and garment exporters. The port's proximity to Dhaka makes it a vital hub for trade and regional connectivity, further enhancing its role in Bangladesh's economy.

Handover of "Xin Hongzhuan" Marks a Milestone in Maritime Technology and Education

On 8 July 2024, COSCO Shipping Heavy Industry Co., Ltd. in Dalian hosted the grand handover and naming ceremony of the "Xin Hongzhuan," a cutting-edge intelligent research and training ship. This milestone event was attended by prominent dignitaries and leaders from the maritime industry.

Developed by the Shanghai Ship Research and Design Institute and built by Dalian COSCO Shipping, the "Xin Hongzhuan" features impressive specifications, including a length of 69.83 metres, a beam of 10.9 metres, and a depth of 5 metres. The vessel, capable of reaching speeds of 17.5 knots, is manned by 15 crew members, 5 researchers, and 30 students. It proudly flies the Chinese national flag and is classified by the China Classification Society.

Equipped with a fully electric dual-pod propulsion system, the "Xin Hongzhuan" is the first vessel to achieve the i-Ship intelligent ship classification, combining remote control, autonomous navigation, and comprehensive training functions. This advanced ship will play a crucial role in maritime education and research.

The project, initiated in 2018, represents a key achievement of Dalian Maritime University's "14th Five-Year Plan" for scientific and technological innovation, enhancing China's maritime and transportation strategies.

AI Chatbots: A Game-Changer for Maritime Training and Safety

As industries worldwide undergo digital transformation, the maritime sector—traditionally steeped in convention—finds itself at a pivotal moment of technological change. Seafarers, the backbone of global trade, are navigating an increasingly complex and dynamic environment that demands real-time adaptability both at sea and onshore, says Paul Munro, Innovation Director at Mintra.

Central to this shift is a transformation in training methods. Modern seafarers require accessible, personalised learning, with artificial intelligence (AI) emerging as a crucial enabler. AI chatbots, in particular, are poised to revolutionise maritime education, bridging knowledge gaps in areas such as automation, decarbonisation, and cybersecurity. With demand for skilled officers rising—tens of thousands more required by 2026—AI-driven solutions are essential for upskilling current workers and attracting new talent.

Mintra's Mentor AI, an intelligent chatbot designed for maritime professionals, provides real-time learning, regulatory updates, and safety insights. Available online and on mobile platforms, it ensures seafarers receive precise, up-to-date information instantly. The chatbot adapts to users' learning needs and supports multiple languages, enhancing accessibility.

Future enhancements will integrate predictive analytics and advanced diagnostics, enabling proactive problem-solving. As connectivity improves, AI chatbots like Mentor AI will become indispensable, ensuring maritime professionals remain well-equipped in an evolving industry.

India Unveils Ambitious Maritime Development Strategy

The Prime Minister's Office has approved a comprehensive three-pronged strategy to boost India's maritime sector, with a key focus on port development. A significant portion of this plan includes allocating at least Rs 25,000 crore from the Maritime Development Fund (MDF) to modernise and expand port infrastructure. This move comes as India's 'major ports,' managed by the central government, face urgent funding shortages to accommodate the growing ocean-going traffic, which is projected to increase at a compound annual growth rate (CAGR) of nearly 5%. In the first half of FY24, traffic growth already reached 4.6%.

The Sagarmala Development Company will spearhead the expansion of port capacities, ensuring efficient handling of the rising maritime trade. This initiative aims to enhance India's global trade competitiveness, reduce logistics costs, and strengthen the country's position as a key player in international shipping. The strategy underscores the government's commitment to transforming India's maritime infrastructure to meet future demands.

World Maritime Forum 2025 Set to Shape the Future of the Industry

The World Maritime Forum 2025, taking place on 18-19 February at the AC Bella Sky Convention Center in Copenhagen, is poised to be the year's most influential maritime event. As the "Center of Maritime," it offers a unique platform for suppliers, technology firms, shipowners, and managers to connect, collaborate, and explore transformative industry solutions.

This year's discussions will address critical topics such as decarbonisation, clean energy solutions, ship repair, maintenance, digitalisation, recycling, and cybersecurity. These sessions aim to spark dialogue on innovative strategies to meet the evolving challenges faced by the maritime sector.

With over 700 attendees, including industry leaders and decision-makers, the forum creates a prime opportunity for suppliers and technology providers to engage with potential buyers seeking practical solutions. Two on-stage conversations will delve into global maritime dynamics and long-term visions, offering strategic insights into market trends and business prospects.

The exhibition area, hosting 50 exhibitors, acts as a dynamic marketplace for showcasing products and services.

Liverpool John Moores University Launches Global Centre for Maritime Innovation

Liverpool John Moores University (LJMU) has announced the creation of the LJMU Global Centre for Maritime Innovation, a new initiative designed to unite the university's world-class maritime education, research, and innovation. The centre aims to foster collaboration between academics, external partners, and the broader industry to drive impactful research, education, and training.

Recognised globally for its maritime expertise, LJMU has long been at the forefront of delivering cutting-edge research that shapes the industry and informs its curriculum, ensuring graduates are well-equipped to take leading roles within the sector.

Professor Mark Power, Vice-Chancellor of LJMU, highlighted that the establishment of the Global Centre reflects the university's status as one of the world's leading academic maritime institutions. The centre will enhance the university's links with industry, both regionally and internationally, and support the current and future needs of the maritime sector.

The centre builds on LJMU's rich maritime history, which dates back to the UK's first nautical school in the 1850s. Recently appointed to the International Executive Board of the IAMU, the university is well-positioned to continue driving innovation in the global maritime industry.

The launch of this centre further reinforces the UK's leadership in maritime education and innovation.

Maritime Industry Faces Skills Shortage as Decarbonisation Efforts Ramp Up

The maritime sector, responsible for 3% of global emissions, is under increasing pressure to decarbonise, with the International Maritime Organisation (IMO) aiming for a 40% reduction in emissions by 2030. The industry, which transports 90% of global trade, is turning to low-carbon fuels such as hydrogen, ammonia, and batteries, alongside digital technologies to improve efficiency.

However, a growing concern is the lack of adequate training for the workforce, particularly the 2 million seafarers, mostly from the Global South, who will need new skills to handle these emerging technologies. According to research by Lloyds Register and the University Maritime Advisory Services, 450,000 seafarers will require additional training by 2030, with this number rising to 800,000 by the mid-2030s.

Training challenges persist, with regulatory uncertainties and financing issues hindering progress. The European Community Shipowners' Associations (ECSA) and the European Transport Workers' Federation (ETF) are working to address these gaps by revising the Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) and launching the SkillSea platform, which focuses on green and digital skills.

As the maritime sector transitions to greener shipping, there is a critical need for upskilling to ensure no worker is left behind, especially in the Global South.

HIMT College Celebrates Anniversary of Groundbreaking VR Lab for Maritime Training

HIMT College, a leader in maritime education, has marked the successful launch anniversary of its state-of-the-art Virtual Reality (VR) lab, a groundbreaking facility designed to revolutionise the training of maritime cadets. This cutting-edge lab, which houses 12 advanced VR stations across two dedicated VR labs, provides cadets with an immersive, interactive learning experience, setting a new benchmark in maritime education.

Developed by HIMT's in-house team of experts, the VR training modules cover a wide array of ship operations and safety procedures. These simulations offer cadets hands-on training in ship familiarisation, machinery operation, maintenance, and emergency protocols, ensuring they are prepared for real-world maritime challenges.

"We are proud to offer our cadets access to such an innovative training resource," said Capt. Anand Subramanian, Principal of HIMT College. "The VR lab not only enhances their learning experience but also equips them with the skills necessary to handle real-life situations confidently."

The VR lab also integrates augmented reality (AR) and extended reality (XR) technologies, further enhancing the training experience. AR enables cadets to overlay digital information on physical objects, while XR combines VR and AR to create a cohesive, immersive learning journey.

HIMT College's investment in these advanced technologies not only enhances education but also supports the global maritime industry by ensuring cadets are trained in cutting-edge skills. As part of its mission to share this innovative approach, HIMT offers consultancy to other institutes seeking to implement similar VR training capabilities.

With plans for continuous expansion, HIMT College is shaping the future of maritime education, preparing the next generation of maritime professionals for the challenges of tomorrow.

Potential Seaweed Availability Assessment through Remote Sensing and GIS

M. R. Ashikur

Background

Numerous types of marine plants and algae that thrive in rivers, lakes, and other bodies of water are together referred to as "Seaweed." It is a useful innovation to lessen resource shortages in the future. Seaweeds are highly nutritious and are used as food in many countries. For many years, the food industry has used seaweeds, either as whole sea vegetables or to extract hydrocolloids for use in food preparation. They have also long been used as fertilisers in agriculture and horticulture. Seaweeds have significant ecological value in addition to their high commercial value. Large strands of seaweed support meiofauna species on beaches in certain locations. Despite making up a ridiculously small part of the world's seas, marine seaweeds, and seagrasses-collectively referred to as macrophytes-produce between 5 and 10% of all oceanic productivity. Seaweeds may simultaneously take in and release oxygen from the dissolved carbon dioxide in seawater through a process called photosynthesis. Seaweeds are found in enormous quantities along 25% of the world's rocky intertidal beaches. Geographic information system (GIS) and remote sensing (RS) techniques are the modern satellite-based systems to assess the vast area of seaweed availability in the Ocean globally.

Scope of Potential Seaweed Cultivation in Bangladesh

Bangladesh offers enormous potential for growing seaweed because of its long coastline and ideal seaweed-growing environment. Bangladesh's lengthy coastline along the Bay of Bengal (BoB) has many opportunities for seaweed production. Seaweed thrives in coastal waters that are rich in nutrients, have plenty of sunshine, and are warm and tropical in climate. Furthermore, seaweeds grow well in coastal places because they provide an excellent environment for cultivation and favourable growing circumstances. These features accelerate growth rates and boost biomass production, which

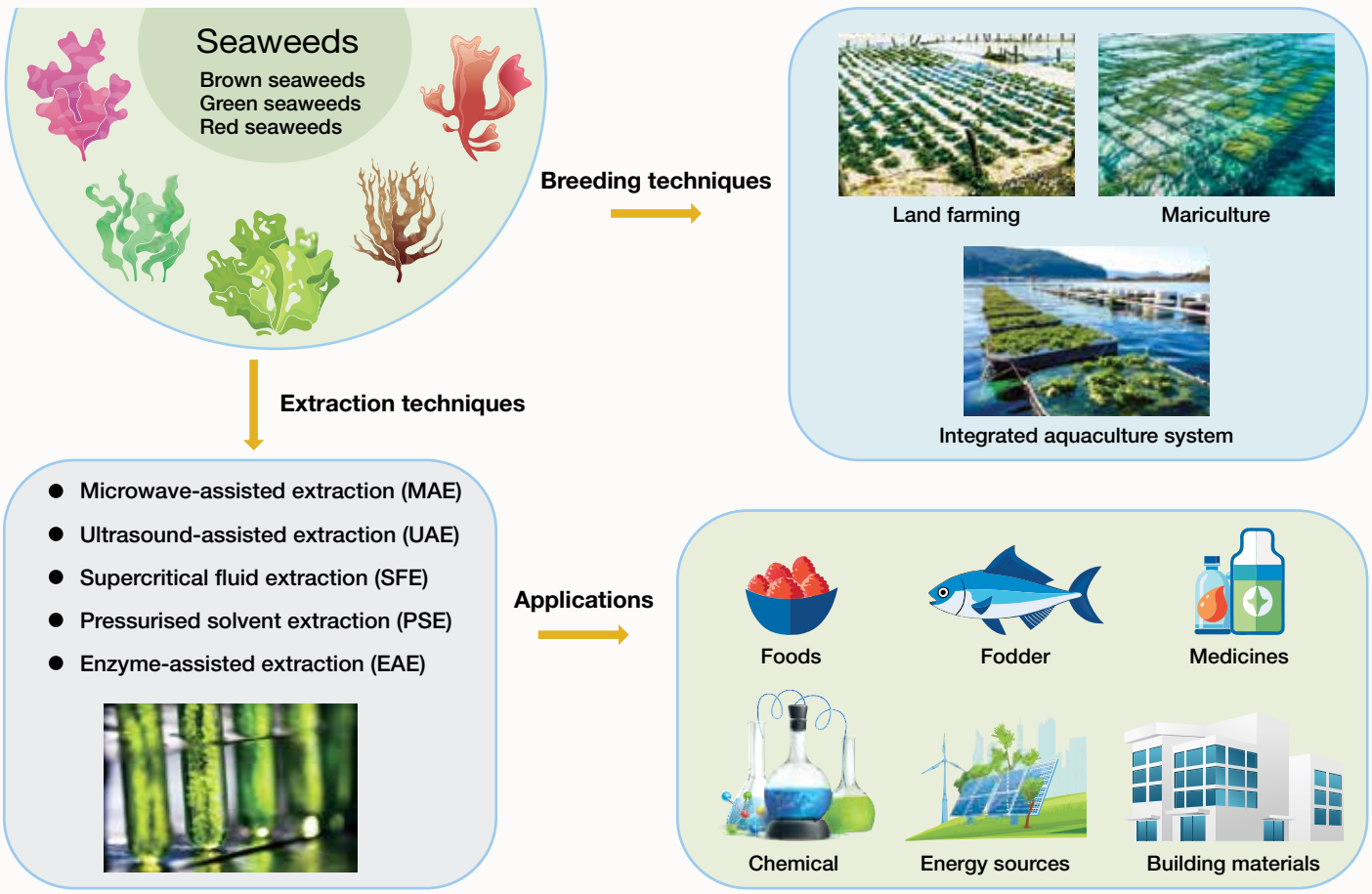


Fig. 1: Seaweed farming scope and opportunities.

makes Bangladesh the perfect location to produce a wide variety of seaweed species. In addition, Bangladesh's coastal waters include a rich diversity of marine life, including many kinds of seaweed. Seaweed cultivation can be integrated with the aquaculture practices now used in Bangladesh. In addition, the diversity of seaweeds presents opportunities for the cultivation of species that are sought after for trade, satisfying the needs of different markets. In addition, the ability of seaweed to absorb excess nutrients from the water helps to mitigate the eutrophication issue in coastal regions. Through increased water quality and nutrient recycling, seaweed farming helps improve resilient coastal ecosystems and mitigate environmental problems. Furthermore, the seaweed business in Bangladesh has the potential to strengthen the nation's economy, particularly for coastal communities and small-scale growers. Moreover, seaweeds are rich in nutrients and can provide a sustained food source. Processing and growing seaweed can benefit local economies by generating income, jobs, and value-added products that support economic expansion and the battle against poverty. Seaweed production in Bangladesh can contribute to the assurance of food and nutritional security because seaweeds are a nutrient-dense food source that can be exported or consumed locally. Fig. 1 notifies the seaweed farming scope and opportunities all over the world.

Potential Seaweed Cultivation Research Necessities

Research on seaweed farming has the potential to advance sustainable technology development in several ways. Seaweeds are excellent at absorbing and storing carbon dioxide, especially macroalgae. Storing carbon dioxide in the biomass of seaweed plants and removing it from the atmosphere through extensive seaweed farming, slows down the effects of climate change. In doing so, carbon neutrality is achieved, and greenhouse gas emissions are reduced. In addition, seaweed is a renewable and sustainable source of bioenergy. This reduces the amount of carbon emissions, decreases dependency on non-renewable energy sources, and makes the transition to a cleaner energy mix easier. Because they can be converted into biofuels like biogas, bioethanol, and biodiesel, they offer an alternative to fossil fuels. Seaweeds are also vital to marine ecosystems because they provide food, shelter, and habitat for a wide range of marine animals. It can boost fisheries, restore degraded coastal areas, and aid in the recovery of threatened species. Furthermore, excess nutrients like nitrogen and phosphorus from aquatic settings can be absorbed by seaweeds. Seaweed farming can also aid in the recycling of nutrients because harvested seaweed can be used as organic fertiliser or animal feed. Furthermore, aquaculture methods that can be applied to seaweed farming include fish and shellfish cultivation. Seaweeds provide a natural habitat and food source for many aquatic organisms, which increases aquaculture system productivity and biodiversity. Furthermore, dietary seaweeds are rich in protein, vitamins, and minerals and are extremely nutrient-dense. By promoting the growing of seaweed for human consumption, the program helps to promote sustainable and nutritious diets while reducing the burden on traditional land-based agriculture systems. The planned seaweed farming initiative may also have positive economic effects, particularly for small-scale farmers and coastal communities. Seaweed farming has the potential to be economically beneficial for coastal areas since it may create jobs and diversify revenue streams. Additionally, the initiative ensures equitable benefit distribution and improves the wellness of surrounding communities by promoting sustainable practices and community engagement. However, GIS and RS are contemporary modern techniques that can be used for the research of seaweed mapping the vast maritime region of Bangladesh.

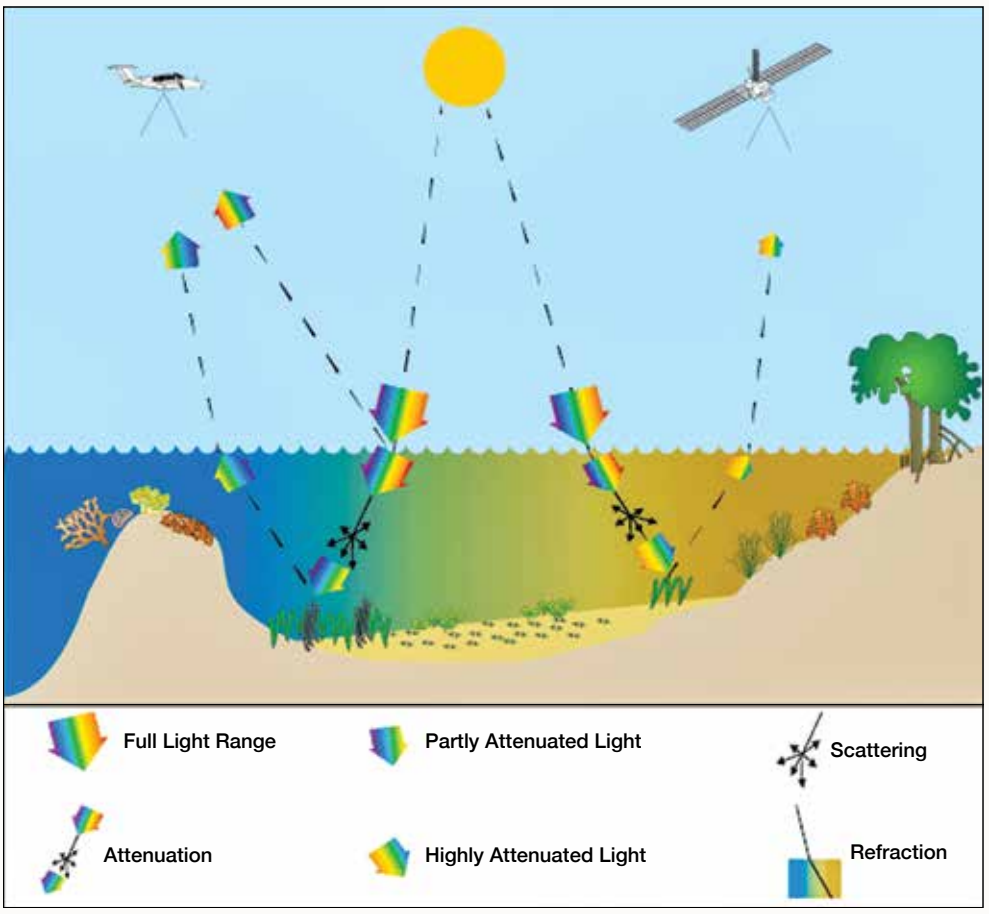


Fig. 2: Three challenges of remote sensing shallow marine habitats such as coral reefs and seagrass.

GIS and RS Techniques for Identifying Seaweed

Since the 1970s, many analytical objectives have been achieved using GIS and RS techniques, which are still commonly employed today to study a wide range of sea water parameters and associated marine resources. To gather and analyse data on characteristics linked to seawater quality as well as other water-related metrics like wave height, water depth, etc., the use of GIS and RS techniques has increased recently. Finding potential seaweed farming locations can be aided by the application of RS and GIS technologies. Furthermore, the optimal locations for seaweed cultivation can be identified by mapping coastal zones using remotely sensed data, such as satellite imagery. GIS tools can then be used to analyse the satellite data, assess coastal features, and categorise areas based on predetermined criteria.

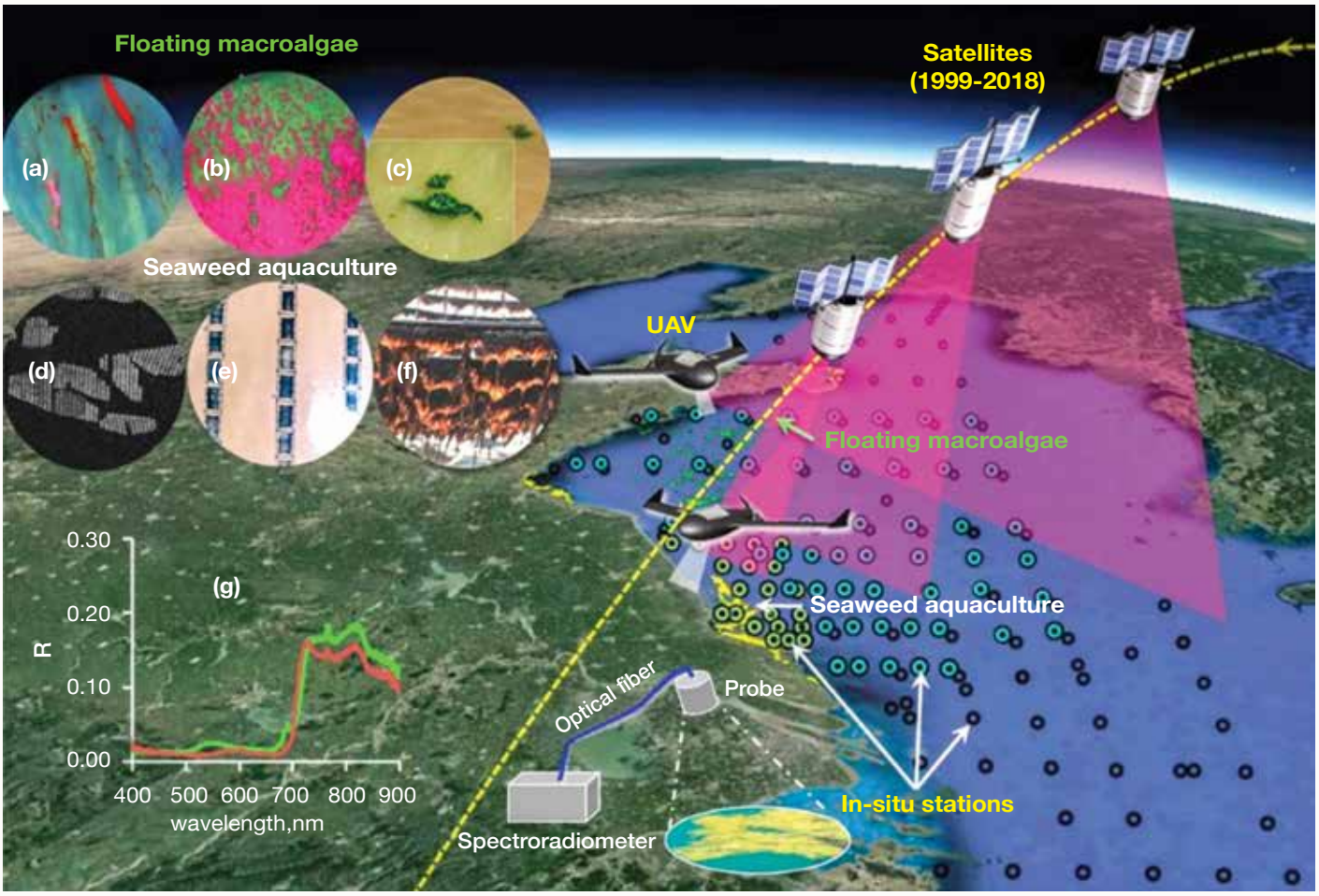


Fig. 3: Schematic of multi-sensor, multi-temporal and multi-spatial (3 M) RS for the surveillance of macroalgal blooms and seaweed aquaculture in China.

Additionally, RS techniques like multi-beam sonar or LiDAR can yield bathymetric data, which shows the depth of the water. When considering the unique requirements of different seaweed species, the integration of bathymetric data with GIS makes it easier to identify suitable locations for seaweed cultivation. Furthermore, turbidity, dissolved organic matter, and chlorophyll-a concentration are just a few of the water quality parameters that can be tracked to support RS. By analysing data from satellites, GIS can help identify areas with suitable water quality parameters for the growth of seaweed. Moreover, GIS can provide more accurate and up-to-date data on water quality by combining data from in-situ sensors and monitoring stations. Additionally, GIS can incorporate a range of environmental data layers, such as temperature, wave energy, sunshine availability, nutrient concentrations, and availability, to assess whether a location is ideal for seaweed cultivation. Fig. 2 shows the challenges of RS shallow marine habitats in the sea.

Land-Ocean Site Suitability Modelling by GIS and RS

GIS and RS may be used to analyse the interactions between land and sea and identify areas where runoff from the land that is rich in nutrients can promote the growth of seaweed. By combining information on land use, soil characteristics, and coastal hydrology, GIS and RS can pinpoint areas where nutrient inputs from land can support productive seaweed production. Furthermore, GIS and RS can help with the development of site suitability models for seaweed farming. These models use a range of factors, including substrate type, environmental conditions, water depth, and water quality, to determine which locations have the best chance of being successfully cultivated. GIS and RS-based modelling can help choose potential seaweed farming sites and optimise resource utilisation. Fig. 3 shows a sample RS application in the seaweed area of China.

Concluding Remarks

Government agencies, academic institutions, research centres, coastal communities, and the private sector can further harness Bangladesh's seaweed production potential by working together and supporting sustainable development in the coastal regions. Furthermore, by using the sustainable features of seaweeds, research on seaweed production has the potential to address a range of socioeconomic and environmental challenges. However, the Bangladesh Maritime University and other research institute can identify and prioritise potential seaweed growing locations based on a range of geographic criteria by combining GIS analysis and RS data. This process enhances decision-making, distributes resources as efficiently as possible, and promotes the long-term sustainability of seaweed farming initiatives.

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