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MARITIME CAMPUS

A SEMIANNUAL MAGAZINE OF
BANGABANDHU SHEIKH MUJIBUR RAHMAN
MARITIME UNIVERSITY, BANGLADESH

A Roadmap to Maritime Education & Training in the Context of Smart Bangladesh

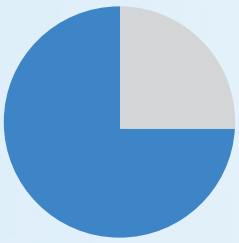
Dhaka's December 2023 Earthquake
A Vulnerability Alarm for Underground Civil Construction

Seawater Quality Parameter Analysis through Remote Sensing and GIS

How the Red Sea Crisis Affected Global Maritime Trade?

INFOGRAPHIC

Seas of the World



71%
WATER

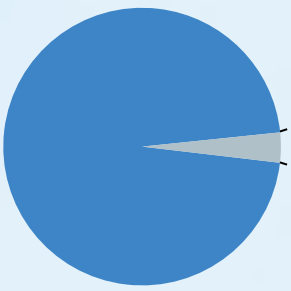
The water in the seas and oceans accounts for 94% of the total amount of water on the planet.

The majority of seas make up areas of oceans near coastlines, almost exclusively on the continental shelf. They are classified as landlocked, continental and open.

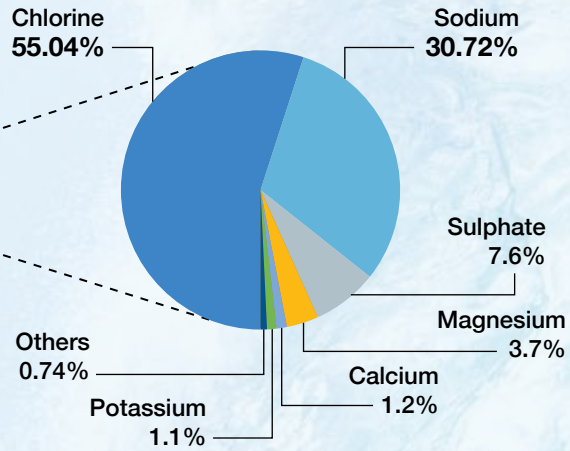
SEAWATER

96.5%
IS PURE WATER

3.5%
solid matter in a dissolved state (salts)

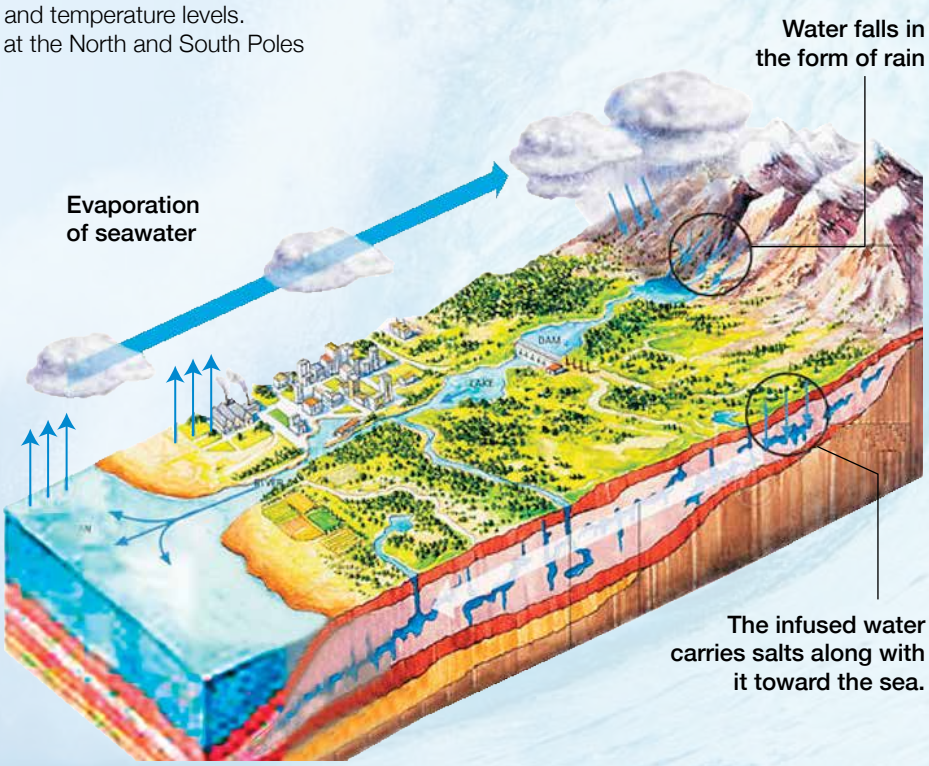


DISSOLVED MINERALS



SALINITY

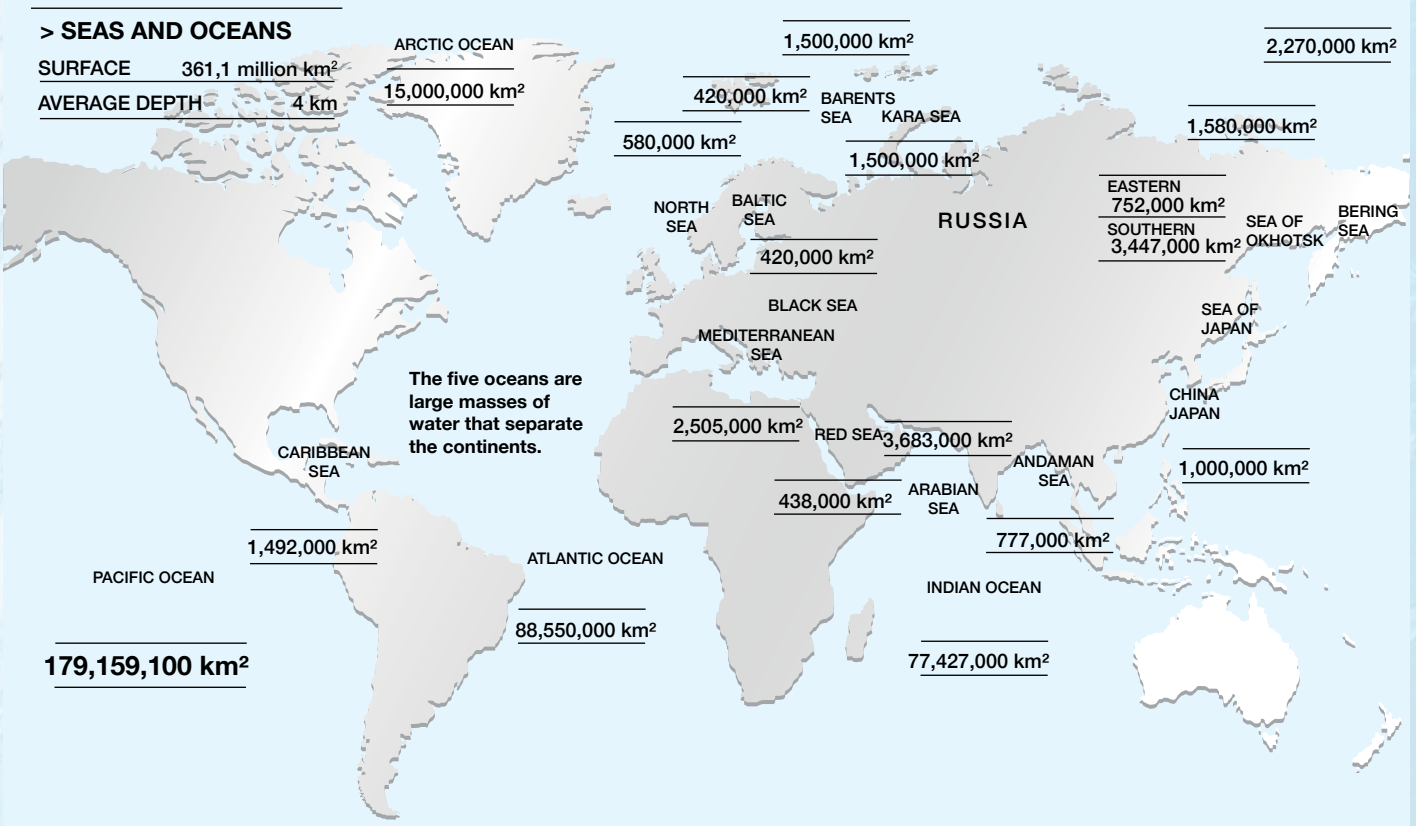
Salinity varies from one sea to another, depending on the influx of freshwater it receives and on evaporation and temperature levels. LOWER SALINITY, found on the Equator, at the North and South Poles and at great depths.



ORIGINS OF SALT

Comes from the path taken by rainwater and melted ice. A considerable amount of earth infiltrates the water on its path drawing with it numerous substances, among them salts

THE MAIN SEAS



> CLASSIFICATION OF THE SEAS

LANDLOCKED SEAS: Deprived of extemal access. Found in depressed areas, they are the remains of seas which originally had direct access to the oceans. Subject to extensive evaporation, and temperature with higher levels than other seas.

CONTINENTAL SEAS: These are inlet seas or extensions of larger bodies of water. They are almost completely landlocked and have very little connection with the ocean. Their salinity levels and temperatures are higher than those of open seas.

OPEN: They have considerable communication with the ocean. Their salinity and temperature levels are lower than those of continental or landlocked seas. Example include the South China Sea and the East China Sea.

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Editorial

Setting Sail in a Sea of Change: A Look Ahead

Welcome once again to Maritime Campus, the semiannual magazine of Bangabandhu Sheikh Mujibur Rahman Maritime University! As we embark on this new year, a sense of exciting momentum permeates the maritime landscape of Bangladesh.

In our lead article, “A Roadmap to Maritime Education and Training in the Context of Smart Bangladesh,” Rear Admiral Mohammad Musa, our esteemed Vice-Chancellor, lays out a clear vision for the future. This vision emphasises the crucial role BSMRMU plays in shaping the maritime workforce that will propel our nation towards becoming “Smart Bangladesh.”

The “Focus” section delves into a recent global event with significant maritime ramifications. Md. Mostafa Aziz Shaheen’s article, “How the Red Sea Crisis Affected Global Maritime Trade?” offers a critical analysis of the disruptions caused by this event and the lessons learned.

Turning to the “Academia” section, Dr Aftab Alam Khan’s insightful piece, “Dhaka’s December 2023 Earthquake: A Vulnerability Alarm for Underground Civil Construction”, brings a local event with wider implications into focus. This article serves as a timely reminder of the importance of considering geological vulnerabilities in our pursuit of maritime progress.

In Thalassography section, the article “Seawater Quality Parameter Analysis through Remote Sensing and GIS” by M. R. Ashikur, Research Officer of the Institute of Bay Bengal Studies (IBBBS) at BSMRMU, explores the innovative use of remote sensing and Geographic Information Systems (GIS) for analysing seawater quality parameters.

The “New Waves” section, brimming with contributions from our talented student body, offers a glimpse into the future generation of maritime professionals. Their fresh perspectives and innovative ideas are a source of immense pride for BSMRMU.

For a comprehensive look at the maritime world, do not miss the “Campus Canvas,” “Maritime Bangladesh,” and “Around the World” sections. These sections provide a wealth of information on significant events and developments within the last six months.

On a final note, we extend our heartfelt gratitude to the Chief Patron and Honourable Vice-Chancellor, Rear Admiral Mohammad Musa, for his unwavering support in making this edition a reality. We also express our sincere appreciation to all the departments for their cooperation in sharing information about their activities. Finally, a special thanks goes to the tireless members of the Editorial Board, whose dedication ensures the timely publication of Maritime Campus.

As we navigate the ever-changing tides of the maritime industry, BSMRMU remains steadfast in its commitment to excellence. Together, we will chart a course towards a brighter maritime future for Bangladesh.

Thanking you

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CONTENTS

A Roadmap to Maritime Education and Training in the Context of Smart Bangladesh

Rear Admiral Mohammad Musa

"We'll make Bangladesh a developed country by 2041, and that Bangladesh will be a Smart Bangladesh".

– Honourable Prime Minister Sheikh Hasina during inaugural programme of Digital Bangladesh Day 2022 on 12 December 2022

Introduction

Bangladesh, with its strategic focus on transforming into a Smart and Digital nation, has set its sights on a progressive and sustainable future. The Vision 2041 initiative, coupled with the principles of a Digital Bangladesh, underscores the nation's commitment to harnessing technology, innovation, and sustainable practices. Development and Economy are directly linked with managing resources both on land and sea. Declaration of 'The Territorial Waters and Maritime Zones Act – 1974 was the first step towards achieving maritime potential. In this journey towards progress, the concept of a Blue Economy and the ongoing Decade of Ocean Science play pivotal roles, unlocking the potential of marine resources and fostering scientific advancements.

A Smart Bangladesh envisions an interconnected and technologically advanced society, where information and communication technologies (ICTs) drive socio-economic development. The integration of smart solutions in various sectors, from healthcare to education and governance, aims to enhance efficiency, transparency, and overall quality of life for its citizens. Through the deployment of cutting-edge technologies, Bangladesh aims to create a digitally empowered nation capable of tackling complex challenges and seizing opportunities in the global arena. As Bangladesh strides towards its centennial year in 2041, the Vision 2041 initiative serves as a comprehensive roadmap for the nation's development. This ambitious plan envisions Bangladesh as a prosperous, equitable, and knowledge-driven country. With a focus on sustainable development, Vision 2041 aims to achieve key milestones in areas such as education, healthcare, infrastructure, and environmental sustainability, positioning Bangladesh as a global player in the 21st century.

Blue Economy

Central to Vision 2041 is the concept of a Blue Economy, recognising the vast potential of marine resources for economic development. Bangladesh's unique geographical location, with its extensive coastline and numerous rivers, presents opportunities for sustainable fisheries, aquaculture, and maritime trade. The Blue Economy framework emphasises responsible management of marine ecosystems, ensuring that economic growth aligns with environmental preservation and social equity. The United Nations proclaimed the Decade of Ocean Science for Sustainable Development (2021-2030) to address the challenges facing the world's oceans and seas. Bangladesh, as a maritime nation, actively participates in this global initiative.

By investing in oceanographic research, sustainable fisheries management, and climate resilience strategies, Bangladesh aims to harness the potential of its maritime resources while mitigating the impact of climate change on vulnerable coastal communities.

Rear Admiral Mohammad Musa, Vice Chancellor of BSMRMU, briefs the Honourable Prime Minister Sheikh Hasina about the status and progress of maritime education and training in Bangladesh at the celebration ceremony of Golden Jubilee of the Territorial Waters and Maritime Zones Act 1974

Background

The maritime heritage of Bangladesh is indeed extraordinarily rich. The special skill in ship building, fishing and maritime trade of this area is known from around 2300 BC, when navigation in the world was commenced. In 17th century, the shipyards of Chattogram were reported to have built an entire fleet of warships for Ottoman Navy. During the Mughal Empire, Bengal was the leading producer of ships in the sub-continent.

We know about the fact of 'Frigate Deutschland', which was built in Chattogram in 1818. The German Maritime Museum has the remains

Honourable Prime Minister Sheikh Hasina and esteemed guests, gathered in unity to commemorate the Golden Jubilee of the Territorial Waters and Maritime Zones Act 1974. A tribute to the enduring legacy of the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman

A moment captured in time, the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman - the visionary architect of Maritime Bangladesh, whose legacy continues to inspire and guide the the nation towards Smart Bangladesh

of the ship stored for hundred years. Shipbuilding and maritime activities of this area continued during the British colonial period also. By the end of World War-1, sailors consisted of 20% of the British maritime forces were from this subcontinent, among which substantial number was from Bengal. They were known as 'Lascars' i.e. seafarer and sailors who would help the British trade ships also. A lot of those sailors were from Eastern India i.e. present Bangladesh who fought during the World War-1 and World War-2 as well.

Sacrifice of valiant Bengali sailors were recognised by naming a British corvette as HMIS BENGAL. It is worth mentionable that, during our great Liberation War the main logistic supply line of Pakistani occupation force was broken by the 'Operation Jackpot' at several ports where dozens of Pakistani ships were destroyed. This actually brought our liberation faster and could draw attention to international community.

Our visionary leader, the architect of our independence envisaged the maritime prospects and promulgated 'The Territorial Waters and Maritime Zones Act 1974'. It was enacted at a time, when the international community could not draw any convention in this regard. The United National Convention of the Law of the Sea came into light in 1982.

This reflects the foresight/ providence of our Father of the Nation in maritime sector. Moreover, one of the points of his 'Six Point Movement' was 'Navy headquarters should be in East Pakistan', reflects his concern in maritime sector.

The war-torn country was left with only destroyed infrastructures in every sector after our independence. The Mercantile Marine Academy, which was set up in 1962 at Chattogram, was abandoned by Pakistani administration. In 1973, the Father of the Nation founded, Bangladesh Marine Academy with British Technical Cooperation at Juldia, Chattogram. The academy earned IMO-UN whitelist in 2000 and was blessed with around 5000 highly skilled seafarers and maritime experts around the world. Our Father of the Nation started National Maritime Institute and Bangladesh Institute of Marine Technology. Bangladesh Marine Fisheries Academy was set up in 1973 to produce skilled human resources for marine fishing in our waters. All these initiatives were conceived to boost the maritime activities of Bangladesh. After 1975, no significant development and maintenance in maritime sectors had been observed. However, it took a long duration to understand the importance of maritime sector, until the Honourable Prime Minister Sheikh Hasina took over the power of this country. Already four more marine academies have been established in Barishal, Pabna, Rangpur and Sylhet to generate more maritime professionals.

Like her father, our current Prime Minister, Sheikh Hasina, gave due importance to our sea area and sea resources. As she took over the government, she started the arbitral process in respect of Myanmar and India under the UNCLOS in 2009 to claim our due share in the Bay of Bengal. The Arbitral Tribunal in the Hague sustained Bangladesh's claim of equitable solution to a full 200 nautical miles exclusive economic zone.

Bangladesh won more than 1,18,813 square kilometres of waters comprising of territorial sea, exclusive economic zone etc. extending out to 200 nautical miles across sizable area. It is noteworthy that Government of Honourable Prime Minister Sheikh Hasina ratified the UNCLOS in 2001 and thus Bangladesh became a full member of the convention in July 2001.

This has opened a new era for our development, economic growth generating employment and earning resources. We have shortage of resources on land, so we have to source from the sea. We have to keep the marine environment pollution free to get the benefits from the Bay of Bengal and beyond. The development and implementation of the Bangladesh Delta Plan 2100, coupled with initiatives for Blue Economy growth, are pivotal strategies that will propel Bangladesh towards becoming a developed country by the year 2041.

BSMRMU students immersed in discovery and innovation - a collage capturing the essence of scientific exploration in various labs and at open sea

The journey of Digital Bangladesh was started with nation's dream on the application of digital technologies to realise Vision 2021, which we commonly call 'Digital Bangladesh'. According to the National ICT Policy 2009, short-term, mid-term and long-term plans consisted of 306 action plans were identified for the realisation of Vision 2021. Then, our dream of 'Smart Bangladesh' from 'Digital Bangladesh' was announced on 12 December 2022 by the Honourable Prime Minister. This will be a reality in 2041.

A smart nation is conceptualised as, harnessing emerging technologies, networks, and data to create technology enabled solutions that contribute to nation building. There are four pillars of Smart Bangladesh concept as we know, Smart Citizen, Smart Government, Smart Society and Smart Economy. To achieve Smart Citizen, every citizen of the country will have adequate digital knowledge and know how to empower to make positive change in nation building and improvement. Smart Citizens will only be possible when we can provide smart education. Government services will be reachable to every citizen with least cost, time, and effort by using advanced modern technology in Smart Government. In Smart Society – every member of the society will be taken into account of the advancement. No one will be left behind. All economic activities will be smart and digitalised, using modern high-tech solutions in Smart Economy. Therefore, the needful for Smart Bangladesh are technology educated smart citizens, smart solutions, and services. So, we need to develop human resource with technology-oriented education who would have expertise in artificial intelligence and other modern technology enable to adopt 4IR, development of smart solutions and systems, innovation and business entrepreneurship are required. Increment of research and development is also required.

Specialised Maritime Education

Our government has emphasised on developing education sector by establishing specialised universities as per economical demand, higher education opportunity inside the country and international acceptance of our higher degrees. A remarkable number of specialised universities in different sectors such as - agriculture, engineering, medical, science and technology, aviation, maritime sector etc have been established already.

The pinnacle of maritime education has arisen by establishing Bangabandhu Sheikh Mujibur Rahman Maritime University in short BSMRMU in 2013. This is the only specialised university for maritime education in the country, third in South Asia and 12th in the world. The

Act of the parliament has empowered this university to conduct all higher education, research, teaching, exchange of knowledge in maritime sector.

BSMRMU is performing as an organisation for developing human capacity as echoed by our present education minister. We are conducting graduate, postgraduate, and higher-level teaching, research, knowledge development and knowledge dissemination on safe navigation management and administration, marine engineering and technology, oceanography, international maritime law, maritime strategy, maritime security, naval architecture and engineering, hydrography, marine resources, maritime legislative and any maritime related sectors. Under seven faculties five graduate and 10 post-graduate programmes are run in BSMRMU at present.

Our Faculty of Maritime Governance and Policy runs programmes for maritime law and policy, maritime safety and security, and strategic studies. Maritime science, port and shipping management, transportation and logistics management in maritime sector are taught under the Faculty of Shipping Administration. Thereby generating skilled human resources for marine and maritime sector. The Faculty of Earth and Ocean Science educates researchers and professionals in oceanography, hydrography, mining, fisheries and aquaculture, marine biotechnology, and environment. For those interested in the engineering side of maritime operations, the Faculty of Engineering and Technology offers programmes in engineering subjects related to the field, such as naval architecture, offshore engineering, and ocean engineering. Finally, the Faculty of Maritime Business Studies prepares students for careers in the business aspects of the maritime industry, including management, tourism, and hospitality management.

Monitoring and Ensuring Quality of Education

a. Ensuring Quality of Education. In this modern age the importance of ensuring quality of education is paramount. This domain has become more diverse and complex. In today's fast changing world, learners are not only recipient of knowledge but also, they must actively apply this knowledge in working field. Failing to do so, will jeopardise both the learners and teachers. Quality assurance in higher education is a critical aspect of ensuring that educational institution provides quality education and maintain academic standard through managing a variety of mechanism and organisation.

b. Outcome Based Education (OBE). Bangladesh Government has made a significant effort to develop Outcome Based Education or OBE. By the end of the educational experience, each student should attain a level in the process of education. Again, guidelines and standards from Accreditation Council for quality education will help to improve the quality of teaching, learning and research activities. Our effort to provide higher quality and international standard education is backed by these tools.

c. Monitoring the quality of higher education and research. We are also monitoring the higher education and research of affiliated academies. BSMRMU has affiliated all five government Marine Academies, one Marine Fisheries Academy and another private

Workforce of BSMRMU

Personnel	No
Professor	01
Associate Professor	02
Assistant Professor	24
Lecturer	21
Officer (Military)	30
Teacher (Contractual)	11
Officer (10th Grade and above)	43
Officer (Contractual)	04
Personnel (11th Grade and below)	125
Service Personnel (Others)	69
BSMRMU Permanent Campus Project	15

Engrossed in the pursuit of knowledge, students of BSMRMU absorb every word of the enlightening lecture in their classroom

marine academy. It is noteworthy that, Bangladesh Naval Academy and another private marine academy are in the process to be affiliated. Successful students are awarded with BSc Hons degree in Maritime Science, Marine Engineering and Marine Fisheries on completion of their academic curriculum.

d. Affiliated Marine Academy/ Raised the demand of mariners in job market. The bachelor's degree has raised the demand of our mariners in job market, so young boys and girls are more interested to serve in maritime sector especially as merchant mariners, marine engineers, and marine fisheries professional at sea. There are 468 cadets undergoing training in those academies and 462 nautical and engineering officers have passed out already. Government policy has allowed the private sector to operate marine academies also. There are three private owned marine academies and institutes in Bangladesh at present where ratings for marine profession are being trained. Every year about 750 marine officers and about 2000 ratings are coming out from these training institutes.

Challenges We Have

As a new university, we have some challenges too, to achieve our goal to be the centre of excellence in maritime education.

a. The establishment of permanent campus is going on, where other specialised fields of study will be opened. Thus, it will endeavour to emerge as a centre of excellence in maritime higher education within the shortest possible time.

b. We need capacity building by raising the number of experienced faculties at the same time. Our students need to go to sea and offshore islands for sample collection and research work.

c. Dedicated Offshore Research Vessel (ORV) is required for smooth research work. We are outsourcing that locally, sometime Bangladesh Navy, specially BNHOC is providing us support.

d. We have to strengthen our capacity in research works and scrutiny the training syllabus.

e. We have established various laboratories for students, but still, we have to establish more laboratories and procure modern equipment suiting the training syllabus.

Human Resources Generation

Bangladesh has to go a long way in various sectors of maritime Blue Economy such as marine fishing, minerals exploration and exploitation, use marine renewable energy, shipping, port and maritime logistics, maritime tourism, education, and research etc. We need qualified and professional human resources to work in these sectors. BSMRMU has been preparing necessary human resources to work. Already 362 graduates have passed out from this university. Some of our students are already pursuing higher studies abroad – USA, Australia, Türkiye etc. We send our students for internship programme to many marine industries and business organisations such as Chittagong Dry Dock Limited, Khulna Shipyard Limited, Dockyard and Engineering Works Limited, Design firms, freight forwarding and cargo handler – DSB Logistics, QNS Logistics, Akij Shipping Lines, Bashundhara Logistics, marine insurance companies – Marine Insurance, Intra Port, terminal operators- Saif Powertech. A sizeable number of our graduates are also serving with good reputation in these organisations. Our expectation to the policy makers for job opportunity for our graduates in government organisations such as Bangladesh Shipping Corporation (BSC), BIWTA, BIWTC and seaports of Chattogram, Matarbari, Mongla and Payra.

BSMRMU students aboard a ship, bridging theory and practice. A study tour that vividly illustrates their deep connection to the maritime industry

Industry-Academia Collaboration

On December 05, 2021, Prime Minister Sheikh Hasina urged the young generation to become entrepreneurs instead of chasing after jobs wrapping up academic life. She said, 'My call to the young generation is that instead of running after jobs on completion of academic life, you should put concentration on becoming an entrepreneur and provide job to others, and all of you should prepare yourself in this way'. The Honourable Prime Minister also informed that her government had also allocated separate funds in the budget for the 'Start Up Programme' so that the young generation could take this opportunity. The world is changing amazingly fast. To sustain in this ever-changing world higher education should promote innovation and drive sustainable development. Moreover, it is emphasised on industry-academia collaboration where industry, academia and government would work together. This collaboration significantly can contribute to the economic growth of a nation. It is also essential to prepare more diverse workforce for economic growth. This will help to achieve the SDG 2030 goals and Vision 2041.

Accordingly, this university is not only providing education to the students, but also preparing them as entrepreneur. BSMRMU has

BSMRMU students, hands-on with electronic instruments in the lab - a snapshot of the practical application of their academic knowledge

inaugurated the first maritime business incubator, Startup BLUE. Startup BLUE is a collaborative programme designed to help new startups, especially in Blue Economy to succeed. Here BLUE stands for 'Building Leaders to Uphold the Economy'. It is the only Blue Economy Business incubator in the entire world. This incubator creates leaders to harness the blue economy by proactively engaging in the startup's journey from inception to exit, to empower and enable founders to contribute significantly to a better world. At Startup BLUE, we nurture and build Blue Economy startups through innovation that can be launched and scaled up. A Business Plan Competition organised by Business Incubator took place last year. The event was aimed to foster entrepreneurship and innovation, saw the presence of distinguished guests, and highlighted the creative business ideas of aspiring entrepreneurs. Relation between academia and business leaders is required to continue developing our effort to maritime related business.

Alignment of Research Work with Policy

We have three institutes running at BSMRMU. Our Institute of Bay of Bengal and Bangladesh Studies (IBBBS) focuses on the research activities in maritime sectors of Bangladesh. After acquiring a vast area in maritime sector, Bangladesh has a scope to contribute herself in the national economy, education, and research arena. In BSMRMU, IBBBS boasts an academic environment that is highly competitive and conducive to research. The institute deals with the postgraduate students as well as faculty members for different research purposes. The undergraduate students who participate in different research activities with the concerned departments have access to it. The aim is to provide a research environment that stimulates intellectual curiosity, critical thinking, and independent critical thinking skills. It also organises short certificate course like "Port and Shipping Studies" for the professionals of government and non-government organisations, who want to enrich their knowledge through partnership and sharing with networking provided by the institute. Our other two institutes – Institute of Renewable Energy and Marine Resources and Institute of Disaster Management are also conducting similar activities in respective fields.

BSMRMU has collaboration and cooperation with several world renowned and reputed maritime universities, research organisations and institutes both home and abroad. We conduct seminars, joint research, project work, visits, and experiment with them. The faculties and students of BSMRMU conduct numerous research works in maritime sector such as ship breaking and recycling, marine environment and pollution control, marine biotechnology, marine employment, port and shipping management, maritime business, marine fisheries etc. BSMRMU publishes Bangladesh Maritime Journal regularly where different writings on maritime issues are covered. As a university, BSMRMU frequently conducts international seminars on contemporary maritime issues where maritime professionals around the world take part and exchange their ideas. Our students, faculties and maritime professionals are benefitted by participating in the seminars.

There are 26 sectors involved in Blue Economy and numbers of government ministries, departments and organisations working for Blue Economy, SDG 14, Vision 2041 and Bangladesh Delta Plan 2100 such as Maritime Affairs Unit of Ministry of Foreign Affairs, General Economics Division of Planning Commission, Ministry of Shipping, Ministry of Expatriates' Welfare and Overseas Employment, Ministry of Education and Blue Economy Cell of Energy and Mineral Resources Division etc. They are formulating polices for execution. However, it will be more effective if academic research could be incorporated with their effort. So, collaboration between academia and policy makers is needed.

State of Education for Marine Profession

Bangladesh has a huge opportunity for employment in marine profession. Having 2.15% of world population, we have only 0.272% of mariners in service worldwide as per UNCTAD (United Nations Conference on Trade and Development) Statistics (BIMCO-ICS Seafarer Workforce Report, 2021 edition). Whereas Philippines have 13.34%, China 7.09%, India 5.99%, even Pakistan and Sri Lanka have larger ratios of mariners serving worldwide. This shows that our mariners are less preferable, and we are generating fewer mariners. The employer always chooses the best available human resource for their business. Now, it is evident that we have to increase the demand of our mariners by enhancing their professional quality. World-class standard training and education can develop the quality of our mariners both officers and ratings.

One of the many reasons of lesser demand of Bangladeshi seafarers is – lower standards of human resource for this profession. It was found by the contemporary researchers that there are other causes such as – shortage of national flag vessel to complete 12 months sea training of cadets on completion of 02 years training from marine academies and reputation of our mariners in the global market. There are separate government authorities to look after these two issues. However, in the case of maritime education and training, to enhance the quality of our mariners BSMRMU can contribute a lot. We need to do the following activities:

a. Assessing the demand of employer.

b. Enhancing quality of education and training – modern simulator-based training.

c. Standardisation of training and education

d. Frequent review of syllabus.

e. Networking with employer.

Suggested Roadmap

Bangladesh has a huge opportunity and scope to develop in maritime sector. Many efforts are going on to prosper in this sector – from establishing maritime training institutes, marine academies to university like BSMRMU. To maximise the benefit from maritime sector following are recommended:

a. Association/ Alignment of academic research with government policy. Policies or projects and efforts are taken to achieve some objectives. SDG-14 aims to protect and ensure the sustainable use of oceans need to work on reducing marine pollution, end ocean acidification, ending overfishing and conserve marine and oceans systems etc. Academic researchers can contribute by their research in respective fields for generating policies and projects. Similarly, it is applicable for Bangladesh Delta Plan and Blue Economy.

b. Employment of Maritime Professionals. A workforce educated in the maritime sector has been found to perform better than a generally educated workforce in various maritime professions. The maritime business sectors like shipping, freight forwarding, maritime logistics and business organisations prefer maritime educated candidates. Maritime graduates may be employed in various maritime sectors such as the seaports, shipyards etc.

c. Development of Marine Education and Training. We have to provide global standard training to our future mariners. Required modification should be done to increase the standard of training by including modern simulators and qualified instructors. Training curriculum should be reviewed regularly to be up to date.

d. Achieve Recognition. We have to achieve recognition of International Maritime Organisation (IMO) and other renowned/ established maritime education and research institutions worldwide.

e. Industry-Academia Collaboration. Dedicated support is needed by our business leaders to promote maritime business. Specially, entrepreneurs in maritime sector need your support heavily. It will open new business opportunity for you as well.

What Do We Need Now?

- Maritime and Marine profession with educated/ associated background.
- Dedicated faculty and researchers.
- Collaboration with foreign partners without hampering national maritime interest.
- Patronising and support by Government, Non-Government, and private maritime stakeholders.
- Global Recognition.

Conclusion

Bangladesh's maritime journey, spanning ancient civilisations to contemporary times, reflects a story of resilience, vision, and commitment. From the Father of the Nation till the nation's leaders, past and present, have recognised the strategic importance of maritime affairs and navigated challenges to position Bangladesh as a significant player on the global maritime stage. As the maritime sector continues to evolve, the commitment to excellence in education, research, and sustainable development, exemplified by institutions like BSMRMU, is crucial for Bangladesh to maximise the benefits of its maritime potential in the years to come. Through strategic planning, international collaboration, and a focus on education, Bangladesh is poised to play an increasingly influential role in the maritime landscape, contributing to global trade, economic growth, and environmental sustainability.

The bright history of our maritime excellence is blurred with the passage of time. But, in the recent past much effort has been taken to revive this country as a maritime nation. This revolution was initiated by our great Father of the Nation, Bangabandhu Sheikh Mujibur Rahman by enacting 'The Territorial Waters and Maritime Zones Act, 1974'. After a short break, this was again initiated by his very competent daughter, our Honourable Prime Minister, Sheikh Hasina. Taking the challenge of delimiting our right at the Bay of Bengal and great Samudra Joy, establishment of BSMRMU, new marine academies etc has opened our avenue for maritime excellence. We have to give importance to the oceanic activities to achieve SDG-14. Vision 2041, Blue Economy, and Bangladesh Delta Plan 2100 all these plans and efforts need support of maritime excellence.

BSMRMU along with marine academies and marine training institutes, research organisations can generate required skilled human resources. New business entrepreneurships are to be promoted and supported by our business leaders. BSMRMU are participating in development of marine training and education. Strong cohesion is required among maritime academia, policy makers, business communities and other stakeholders to bring success in maritime sector. We have to increase the demand of our mariners by enhancing their professional quality.

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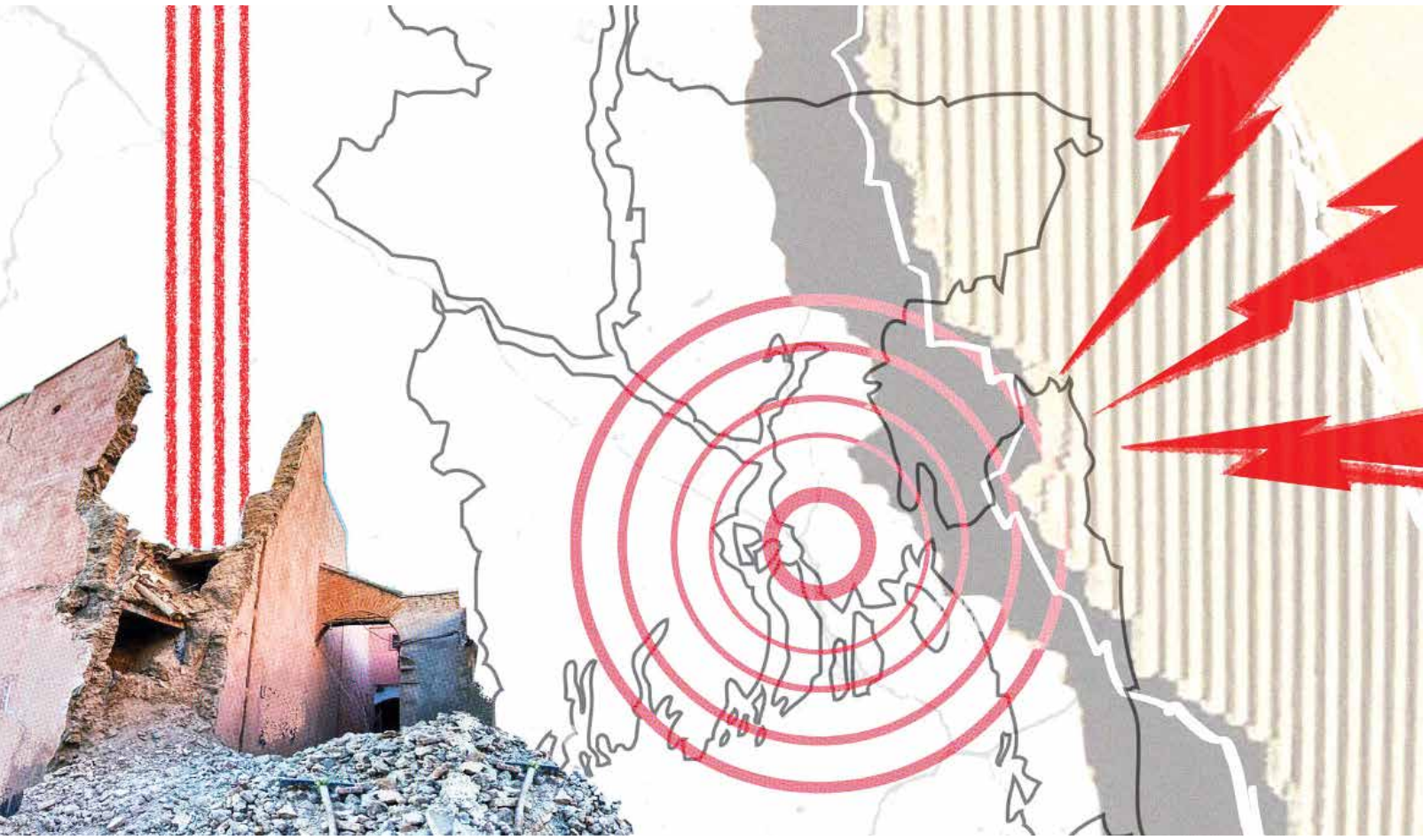
A glimpse into the dynamic learning environment of BSMRMU that fosters innovation and growth



Dhaka's December 2023 Earthquake

A Vulnerability Alarm for Underground Civil Construction

Dr Aftab Alam Khan

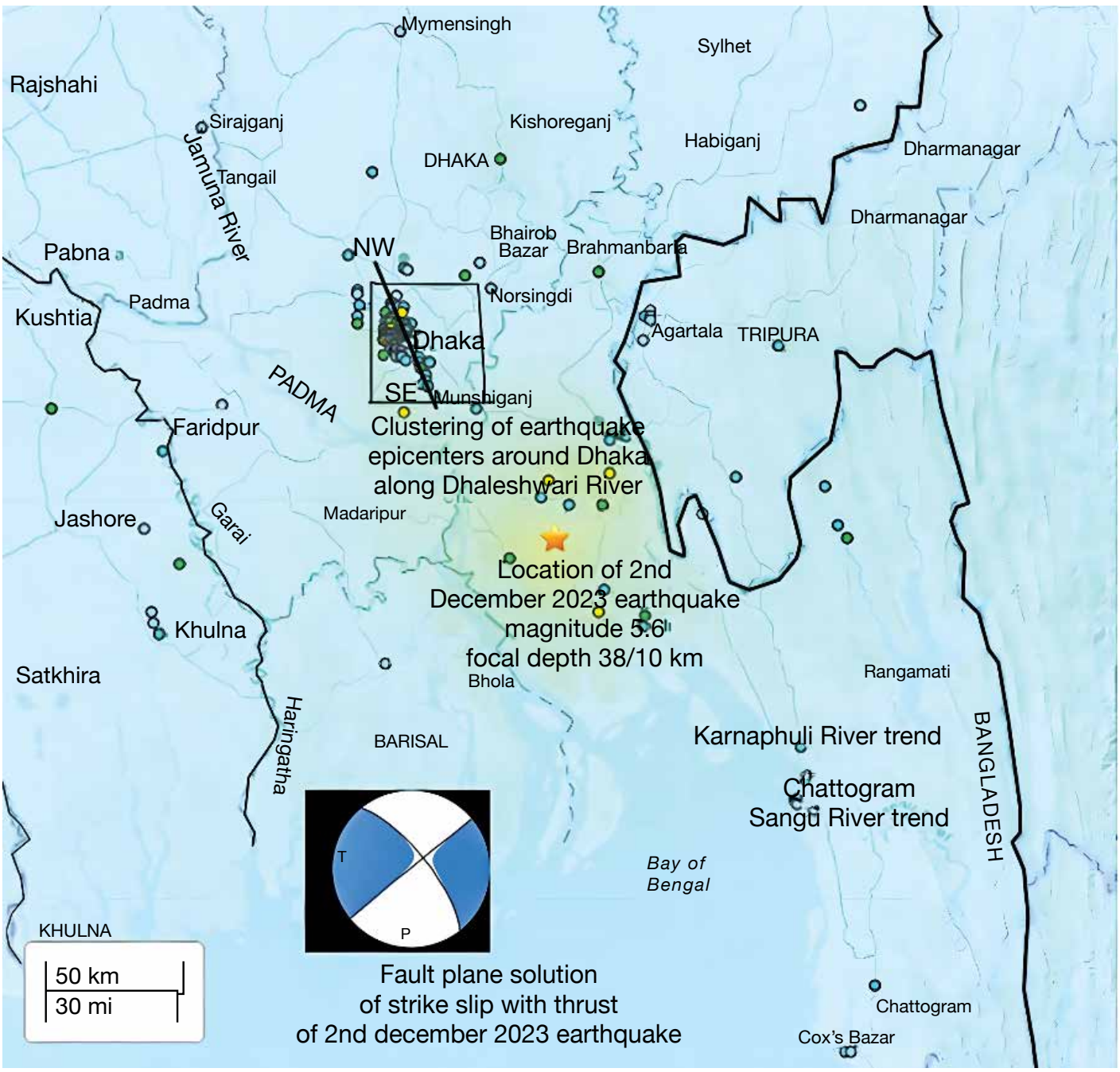
"MRT Line-5 Northern Route" with objective of constructing a 20km underground metro rail service connecting Hemayetpur to Vatara by the year 2028 is in progress. But the earthquake of 2nd December 2023 raised grave concern for the people who are studying and researching on earthquake risk vulnerability in Bangladesh. I would like to differentiate earthquake devastation in two segments: the earthquake, and the devastation. Earthquakes are natural those occur due to various geological factors. Hence, earthquakes will continue to occur as long as the Earth exists. If earthquakes continue to occur, then what can be done? Earthquakes can never be prevented rather it can be roughly predicted and alarm can be issued to minimise destructions caused by an impending earthquake through proper physical planning and honest execution of the planning to minimise the loss of lives and properties. In reality, an earthquake is intrinsically related to a fault and its rupture. It is further intimately related to the tectonic plate margins. But not all the faults in all the tectonic plate margins are the same and will rupture in same way due to an earthquake. The simple mechanism of an earthquake to occur is the way accumulation of tectonic force (strain accumulation) and its release progress. Each part of the continental region is characterised by diverse types of rocks and geological conditions.

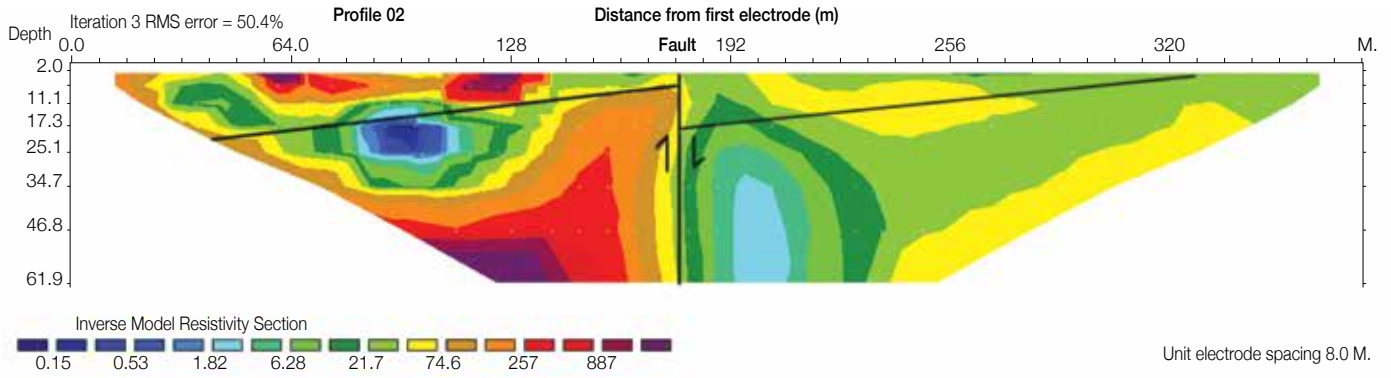
United States Geological Survey (USGS) reported that the 2nd of December 2023 earthquake occurred inside Bangladesh had a

magnitude 5.6 and focal depth 10 km. Other reports from different portals claimed that this earthquake has originated at a focal depth of 38km. Hence, there arises controversy about the focal depth reliability. However, those who have felt this earthquake must have experienced extraordinarily strong ground shaking. Students' dormitory of Dhaka University suffered serious damage during the earthquake. Due to strong ground shaking glasses of the windows of the dormitory were broken, plaster of the roof shielings was fallen. A 5.6 magnitude earthquake with 38 km focal depth cannot have such strong ground shaking and construction damage. So, most likely the focal depth (the origin of the earthquake) of this earthquake has to be 10 km and not 38 km. Dynamic behaviour in the interior of the earth plays an important role in the occurrence of an earthquake. Propagation of various elastic (seismic) waves from an earthquake focus (origin) generates differential movements both in vertical and horizontal planes of a fault whether such fault is hidden or exposed, active, or inactive. For a hidden and inactive fault which is reactivated due to the propagation of seismic (elastic) waves. Dhaleshwari River is a major fault buried under huge pile of sediments that may reactivate if a liquefaction zone is developed during a tremor.

A total of 10 contract packages have been set to complete Dhaka underground MRT Line-5 from Hemayetpur to Bhatara by 2028 as report goes. As a part of contract package one, the land development

The map below exhibits several valuable information pertaining to the earthquake potentiality of the Dhaleshwari fault





Shallow depth earthquake source in and around Dhaka megacity especially it provides warning about the recurrence of 1885 Manikganj Earthquake.

work of the depot area in Hemayetpur has been almost completed. How MRT Line-5 is concerned to the 2nd of December 2023 Earthquake? The purpose of this article is to let people aware that the MRT Line-5 route especially the Hemayetpur-Aminbazar segment is very vulnerable to the earthquake damage due to the reactivation of Dhaleshwari River which is flowing on the Dhaleshwari fault zone and the Hemayetpur-Aminbazar segment is close to the fault within 10 km radius of the Dhaleshwari Fault is highly potential for generating ground shaking acceleration up to 0.35g, the value is definitely very high from damage point of view. Since an earthquake occurs due to the reactivations of a fault which is likely to generate ground shaking acceleration up to 0.35g in soft sediment. The acceleration due to gravity 'g' value decreases with depth that reduces ground shaking. But the main concern with the Dhaleshwari river which is connected to Modhupur tectonic high and is bounded by the series of en-echelon fault system, a kind of normal (gravity) fault that causes sudden subsidence along the fault zone during an earthquake. If a liquefaction zone is developed along the fault alignment, the fault movement will be greatly enhanced. Dhaleshwari Fault is further a great concern because out of four major earthquakes inside Bangladesh in the past 250 years, 1885 Manikganj Earthquake having epicentre location 24°N 90°E has occurred due to the activation of Dhaleshwari Fault. This earthquake has generated ground shaking acceleration 0.2g maximum of 1g (980 cm/sec^2) in the epicentre region which is equivalent to VIII intensity in MMI scale. This type of earthquake can produce average peak ground velocity 20-30 cm per second with partial damage in specially designed structures, heavy damage in ordinary structures with collapse. This type of earthquake can damage to poorly built structures, throw panel walls out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls, sand, and mud ejection for liquefaction ground are common. Recurrence of major historical earthquakes is of significant importance in assessing earthquake hazard. The recurrence of 1885 Manikganj Earthquake that triggered 50 km northwest of Dhaka is of imminent threat to Dhaka city. It is not only 1885 Manikganj Earthquake, the 1762 Bengal-Arakan Earthquake located in the Chittagong Hill Tracts, (epicentre is unknown) pose serious threat to Karnaphuli river fault. The 1918 Sri Mangal (Habiganj) Earthquake and 1930 Dhubri Earthquake all of 7-8 magnitude are of great concern in Bangladesh. In addition, 1897 Great Assam Earthquake (magnitude >8) with its devastation all over Bangladesh located right over the Oldham Fault, a branch of Dauki Fault demarcating Shillong Plateau and Sylhet sub-basin is the most damaging earthquake which is waiting for recurrence with its recurrence period about 200 years. From GPS measurement it was found that Dhaka has a slip rate of 39mm per year towards N50°E by the compressive force on to the Dhaleshwari Fault resulting in extension/stretching towards S40°E. This measurement also fits well with the recent analysis of the data recorded by the USGS on the 2nd of December 2023 earthquake. The figure below is a demonstration of the earthquake status related to Dhaleshwari Fault. Good background information of historical earthquakes is especially important to assess earthquake damage vulnerability of an area.

1. Clustering of substantial number of smaller magnitude earthquakes around Dhaka show a distinct NW-SE trend definitely aligned with the Dhaleshwari River.

2. Inset fault plane solution clearly evident of N50°E directed compressive stress field and S40°E directed tensional stress field for the Dhaleshwari Fault. Future reactivation of the Dhaleshwari Fault is likely to generate stress field as stated.

3. The nature of the differential movement of the Dhaleshwari Fault shows prominent strike-slip (horizontal) with minor thrust (vertical) component.

4. Dhaleshwari River fault has been determined by the application of electrical tomography shown below. The tomography clearly shows an offset of about 39m.

5. Recurrence of the Dhaleshwari Fault is determined as 132 years.

6. Considering fault rupture depth of 10 km and fault offset of only 4m (it may be greater), the maximum magnitude of the earthquake in recurrence will be 7.3.

Earthquake of December 19, 2001, located 23.6°N 90.4°E of magnitude 4.8 or 4.5 and focal depth 10 km and couple of low magnitude earthquakes in the mid Seventies located near Dhaka are the evidence of shallow depth earthquake source in and around Dhaka megacity especially it provides warning about the recurrence of 1885 Manikganj Earthquake. Recurrence of an earthquake in an earthquake prone area cannot be prevented rather it would only be predicted by issuing warning to minimise loss of lives and properties.

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How the Red Sea Crisis
Affected Global Maritime Trade?

Md. Mostafa Aziz Shaheen

The Red Sea is among the most significant waterways on international maritime routes. The Suez Canal, which links the Indian Ocean and Mediterranean Seas through the 30 km-wide Bab-El-Mandeb Strait, is an essential passageway that facilitates around 12% of worldwide trade. Containerised products comprise approximately half of the ocean shipment that travelled through the canal. Additionally, crude oil shipments from the Persian Gulf to North America and Europe pass through this vital route. As a result of escalating tensions and attacks that have disrupted business flow and raised concerns about the broader impacts on economic stability and global trade, recent events have brought the Red Sea to the forefront of public attention.

Comprehension of the Conflict

Houthi militants in Yemen, whose assaults on commercial vessels traversing the lower Red Sea have escalated since mid-November. Houthi actions can be seen as a form of resistance and retaliation against perceived aggression. They argue that their maritime attacks are a response to Israel's military initiatives in Gaza. By targeting maritime vessels, they aim to exert pressure on Israel and the international community to cease what they perceive as unjust actions. They might also view these actions to draw global attention to their cause and the ongoing conflict in Yemen. The Houthis have employed drones, missiles, and attempted hijackings to retaliate against Israel's military initiatives in Gaza, which have targeted maritime vessels. As a result of these actions, maritime authorities and shipping companies have been alarmed, and maritime traffic through the region has been halted or rerouted.

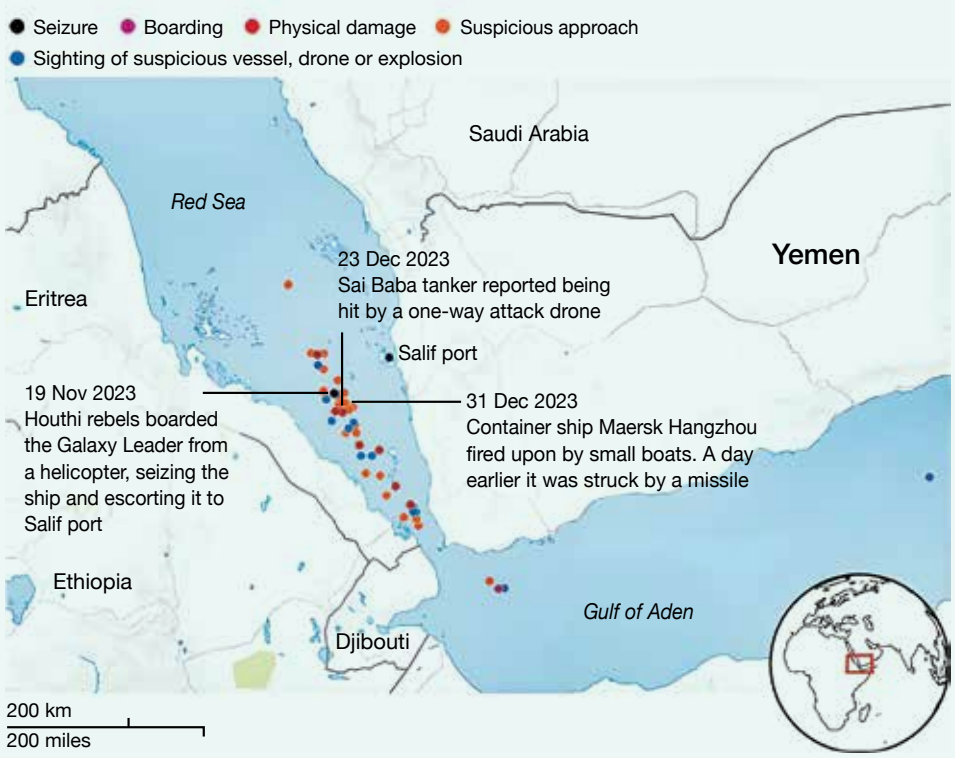
Strategic Importance of the Red Sea

The strategic importance of the Red Sea must be understood to fully realise the gravity of the situation. This narrow waterway plays a vital role in facilitating the cross-border transportation of products and supplies, amounting to billions of dollars annually. The effective transit of a wide range of commodities through the Red Sea is crucial for their transcontinental delivery, including consumer electronics and petroleum products. An alarm in this critical pathway has far-reaching consequences for the worldwide economy, influencing supply chain dynamics and fuel prices alike.

Players Involved

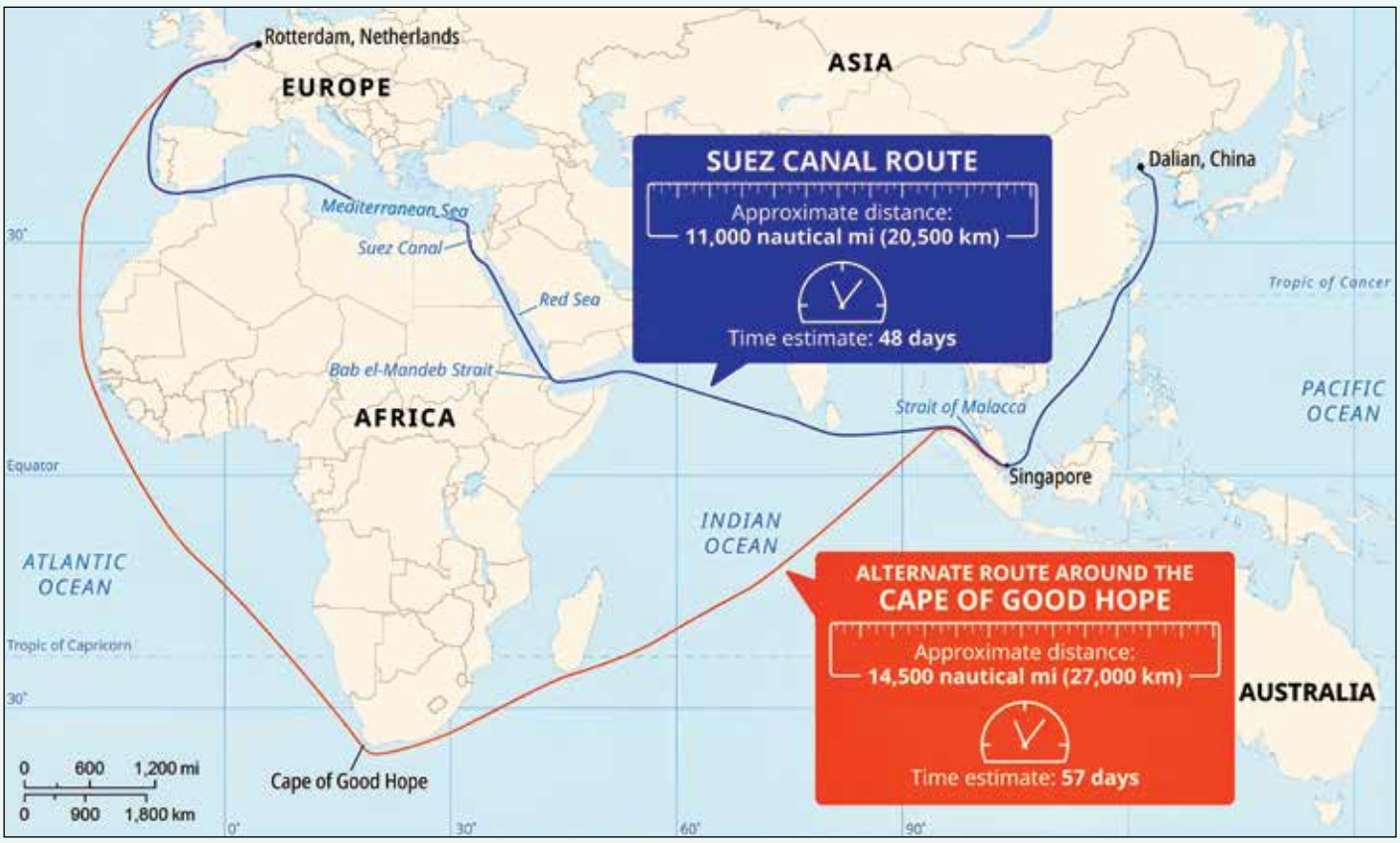
Houthi militants, an Iranian-backed Yemeni insurgent organisation, are at the centre of the conflict. International maritime powers—including the European Union and the United States—have been incensed by their choice to escalate conflicts in the Red Sea. With the objective of protecting shipping lanes and discouraging additional attacks, the United States has taken the lead in establishing a maritime coalition in reaction to the increasing dangers. The complex geopolitical dynamics in the region are nevertheless highlighted by the absence of significant regional actors like Egypt and Saudi Arabia.

Reported incidents in the Red Sea and Gulf of Aden, 25 November 2023 - 1 January 2024



Implications for Maritime Trade

Already across the maritime industry, the consequences of the Red Sea crisis are being felt. According to statistics, One-quarter of bulk carriers, which transport large amounts of dry cargo like grain or cement, and a quarter of tankers, which transport oil or natural gas, have avoided South Africa's Cape of Good Hope, according to Peter Sand, chief analyst at Xeneta, an ocean and air freight data firm. Container ships take two weeks to travel East-West, whereas slower bulk carriers and tankers take 18 days. To avoid the tempestuous waters, prominent shipping conglomerates,



These times assume an average vessel speed of 16 knots. Routes shown are illustrative

including Maersk and MSC, have chosen to alter the course through the Cape of Good Hope, the southern tip of South Africa, resulting in substantial disruptions and delays. Rerouting shipments around the Cape of Good Hope increases the distance between Europe and Asia by approximately 3,000–3,500 nautical miles (6,000 km), as reported by the Dutch bank ING. As a result, forecasters said Suez Canal fleet capacity dropped more than 60% in the three weeks from December 18 to January 7 compared to previous year. As vessels chose safe passage, TEUs decreased from 3.3 million to just around 1.3 million. Xeneta reports a 124% spike in maritime freight shipping charges between the Far East and North Europe since the crisis began in mid-December 2023. Rates between the Far East and US East Coast are up 45% and into the Mediterranean are up 118%.

The potential extension of shipping durations may subsequently affect turnaround times at major European centres and ports in the United Kingdom, including Rotterdam, Antwerp, and Hamburg. Shipping companies face challenging choices that have the potential to affect their financial performance and the worldwide supply chain, as insurance premiums continue to rise and fuel costs escalate because of longer alternative routes.

Implications for Global Suppliers and Consumers

The international economy and consumers are significantly impacted by the Red Sea crisis, which extends beyond the maritime sector. Redirecting ships could cost USD1 million in fuel for every round trip between Asia and Europe, and insurance expenses are growing, raising shipping costs. Diesel and jet fuel tankers from the Middle East and Asia are being redirected, and container supplies of consumer goods, commodities, apparel, and food may be delayed. Costs for a wide variety of necessities, including electronics and common domestic items, could increase due to the possibility of protracted disruptions and bottlenecks in the supply chain. In the context of already burdened economies, the imposition of additional costs on consumers in the form of escalating shipping costs and protracted delivery schedules could potentially amplify inflationary forces.

Navigating Uncertain Waters

Stakeholders in the maritime sector are compelled to adjust to an ever-changing environment due to the escalating difficulties they encounter. Shipping companies endeavour to minimise risks and guarantee the continuous flow of products through the implementation of stringent security measures and the investigation of alternative shipping routes. In addition to focusing on maritime commerce and regional stability, it is imperative that governments and international organisations intensify their endeavours to tackle the underlying factors that contribute to the conflict and advocate for peaceful resolutions.

The write-up is prepared with the newspaper article assistance of the Guardian, CNN and Wefreight.

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BSMRMU Vice-Chancellor Meets President, Discusses University Growth

The Vice-Chancellor of Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU), Rear Admiral Mohammad Musa OSP, NPP, rcds, afwc, psc, PhD, paid a courtesy call on the President of Bangladesh and Chancellor of BSMRMU, H.E. Mohammed Shahabuddin, at Bangabhaban on July 17th, 2023.

During the meeting, Vice-Chancellor Musa extended greetings to the President on behalf of BSMRMU and presented a commemorative crest. He further briefed the President on the university's progress in education and research activities, including the ongoing development of its permanent campus.

The President, acting as the Chancellor, offered valuable guidance for BSMRMU's continued growth. He emphasised directions to further enhance the university's academic offerings and streamline the establishment of the permanent campus. Recognising Bangladesh's potential in the blue economy sector, the President expressed his strong optimism for BSMRMU's future role in developing highly skilled maritime professionals.

This fruitful meeting signifies the government's commitment to supporting BSMRMU's development as a leading maritime education and research institution. By fostering strong leadership and strategic planning, BSMRMU is poised to become a key driver in propelling Bangladesh's maritime industry forward.

BSMRMU Celebrates Sheikh Russel Day

Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) marked the 60th birthday of Sheikh Russel, the youngest son of the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman, with a series of commemorative events.

The day, known as Sheikh Russel Day, began with a delegation led by the Vice-Chancellor, Rear Admiral Mohammad Musa, paying homage to a portrait of Sheikh Russel at the university. The Vice-Chancellor also inaugurated a wall magazine dedicated to Sheikh Russel Day, prepared by the students.

As part of the day's celebrations, saplings were planted across the university premises. The event was further enriched by the participation of students in poetry recitation and essay competitions organised in the auditorium.

Rear Admiral Mohammad Musa, gracing the occasion as the chief guest, distributed prizes among the winners of the competitions. The event was attended by the Treasurer, Registrar, Deans, Faculty members, Students, Officers, and Staff of the university.

The celebration of Sheikh Russel Day at BSMRMU not only commemorates the life of Sheikh Russel but also fosters a sense of community and cultural appreciation among the students and staff.

BSMRMU Honours Martyred Intellectuals Day with Wreath-Laying and Discussion

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRU) commemorated Martyred Intellectuals Day on December 14th, 2023, by paying homage to the slain intellectuals of 1971.

A delegation from BSMRMU, led by Vice-Chancellor Rear Admiral Mohammad Musa, visited the Memorial of Martyred Intellectuals in Dhaka's Rayerbazar. They laid a floral wreath at the memorial and observed a solemn silence to honour the memories of these martyrs.

The university further held a discussion session in the university auditorium. The Vice-Chancellor himself graced the occasion as the Chief Guest and delivered a speech. Faculty members, students, staff, and officers actively participated in the session. The event was also live streamed on BSMRMU's official Facebook page, allowing a wider audience to join the commemoration.

The programme concluded with a special prayer offered for the eternal peace of the martyred intellectuals. Through these events, BSMRMU acknowledged the immense sacrifices made by these intellectuals during Bangladesh's Liberation War, ensuring their legacy is remembered and celebrated by future generations.

BSMRMU and China's NOTC Join Forces for Maritime Development

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) of Bangladesh and China's National Ocean Technology Centre (NOTC) signed a cooperation agreement on August 9th, 2023. This agreement paves the way for collaboration in various maritime fields.

The signing ceremony was held in China. Rear Admiral Mohammad Musa, Vice-Chancellor of BSMRMU, and Peng Wei, Director General of NOTC, officially solidified the partnership.

This agreement opens doors for BSMRMU and NOTC to work together in crucial areas like:

- **Marine Spatial Planning:** Collaborative efforts will focus on optimizing the use of Bangladesh's maritime space, ensuring sustainable development.
- **Blue Economy:** The partnership aims to leverage ocean resources for economic growth while maintaining environmental balance.
- **Maritime Education and Research:** Collaboration in these sectors will enhance knowledge exchange and promote advancements in the maritime field.

This strategic partnership between BSMRMU and NOTC holds immense potential for Bangladesh. By combining expertise and resources, both institutions can empower Bangladesh to unlock the full potential of its maritime sector, contributing significantly to the nation's economic prosperity and sustainable development.

BSMRMU and CSIR-NIO Ink MoU to Boost Oceanographic Research

Bangabandhu Sheikh Mujibur Rahman Maritime University, Bangladesh (BSMRMU) and the CSIR-National Institute of Oceanography, Goa, India (CSIR-NIO) have signed a Memorandum of Understanding (MoU) to foster collaboration in the field of oceanography.

The MoU was signed by Rear Admiral Mohammad Musa, Vice-Chancellor of BSMRMU, and Prof. Sunil Kumar Singh, Director of CSIR-NIO, on July 7, 2023.

The agreement aims to facilitate the exchange of scientific and technical information and documentation, as well as the exchange of scientists, researchers, specialists, and scholars between the two institutions. It also paves the way for the joint organisation of scientific and technical seminars, workshops, and symposiums.

Furthermore, the MoU will enable the implementation of joint scientific and technological projects and the use of each other's major facilities. It also includes provisions for organising training courses to enhance the skills and knowledge of the involved parties.

This collaboration marks a significant step forward in strengthening the ties between the two institutions and promoting research and development in the field of oceanography. The partnership is expected to yield significant advancements in maritime studies and contribute to the broader scientific community.

Paying Solemn Tribute to Bangabandhu on National Mourning Day

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) commemorated the 48th martyrdom anniversary of Bangabandhu Sheikh Mujibur Rahman and National Mourning Day-2023 with a series of events.

Led by Honourable Vice-Chancellor Rear Admiral Mohammad Musa, a delegation from BSMRMU paid their respects by placing floral wreaths at the portrait of Bangabandhu at the Bangabandhu Memorial Museum in Dhanmondi, Dhaka. The team observed a moment of solemn silence honouring the Father of the Nation's legacy.

The university also organised a commemorative programme on campus. The Vice-Chancellor graced the occasion as the Chief Guest. Faculty members, staff, and students actively participated in the programme, which included:

- **Documentary Screening:** A documentary showcased the life and achievements of Bangabandhu Sheikh Mujibur Rahman.
- **Book Display:** A special exhibition displayed books related to Bangabandhu's life and the Liberation War of Bangladesh.
- **Student Competitions:** Students participated in the competition of photo exhibitions, quizzes, essay writing, and poem recitation, expressing their creativity and knowledge on Bangabandhu's life and activities. Prizes were awarded to the winners.
- **Special Prayer:** A special prayer was offered for the eternal peace of Bangabandhu and the other martyrs of August 15th, 1975.

Through these solemn and engaging activities, BSMRMU instilled a sense of respect and appreciation for Bangabandhu Sheikh Mujibur Rahman's vision and sacrifices among its students and staff. The commemoration served as a reminder of his enduring legacy and its continued influence on the ongoing and future development of Bangladesh.

On Charting Course for the Future at 9th Annual Senate Meeting

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) held its 9th Annual Senate Meeting on December 21st, 2023, at the university's Conference Room. Rear Admiral Mohammad Musa, BSMRMU Vice-Chancellor and Senate Chairman, presided over the meeting.

The programme commenced with the Senate Chairman's expressing gratitude to the outgoing members and extending a warm welcome to the newly appointed ones. This exchange marked a significant moment in BSMRMU's governance.

Following the introductions, the university Treasurer assumed centre stage, presenting a revised budget for the fiscal year 2022-2023 and a new budget proposal for the upcoming fiscal year. These budgetary considerations lay the groundwork for BSMRMU's financial stability and future endeavours.

Another key agenda item involved the unanimous approval of BSMRMU's Annual Report covering the period from July 2022 to June 2023. This report serves as a comprehensive overview of the university's accomplishments and progress over the past year.

The Senate members actively participated in the meeting, expressing their satisfaction with BSMRMU's overall development trajectory. Their positive feedback reflects the university's successful implementation of strategic plans and its commitment to excellence in maritime education and research.

The 9th Annual Senate Meeting served as a pivotal platform for BSMRMU to reflect on its achievements, chart a course for the future, and reaffirm its commitment to fostering a world-class maritime education institution in Bangladesh.

Celebration of Victory Day with Patriotism and Cultural Flair

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) commemorated the glorious victory of Bangladesh in the Liberation War of 1971 with a day filled with patriotic fervour and cultural vibrancy.

The programme commenced at sunrise with the ceremonial hoisting of the National Flag.

BSMRMU's Victory Day programme offered a variety of activities:

- **Documentary Screening:** A captivating documentary on the Liberation War and the pivotal events leading to Bangladesh's victory was presented.
- **Creative Competitions:** Students demonstrated their talents through poem recitations and essay writing competitions, expressing their understanding of the war's significance. Prizes were awarded to the winners, recognising their outstanding performances.
- **Cultural Extravaganza:** BSMRMU's Cultural Club presented a vibrant cultural programme, enthralling the audience with traditional music, dance, and patriotic renditions.
- **Live Stream:** The entire programme was streamed live on BSMRMU's official Facebook page, allowing a wider audience to join the festivities and celebrate this historic day.

Vice-Chancellor Rear Admiral Mohammad Musa graced the occasion as the chief guest and led the university celebrating this momentous event. Faculty members, Students, university Officials, Staff, and the university Treasurer and Registrar were all present, contributing to the celebratory atmosphere.

Through this well-rounded programme, BSMRMU fostered a sense of national pride and historical awareness among its community. The day's activities served as a powerful reminder of the sacrifices made during the Liberation War and the importance of upholding the values of freedom and justice.

35th and 36th Syndicate Meetings Held

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) convened its 35th and 36th Syndicate Meetings on July 30th, 2023, and November 16th, 2023, respectively, both at the university's temporary campus. Vice-Chancellor Rear Admiral Mohammad Musa presided over the meetings, which addressed various academic and administrative matters.

The meetings resulted in several key decisions, including:

35th Meeting: Approvals for recruitment, faculty and staff upgradation and promotion, permanentisation, study leave, exemptions from employment, revised budgets for fiscal years 2023-24 and 2024-25, revised annual procurement plans for the same fiscal years, a revised curriculum for the B.Sc. in Naval Architecture and Offshore Engineering, a revised fee structure for honours and masters programmes, and finalised exam results for the university.

36th Meeting: Approvals for recruitment, upgradation, permanentisation of faculty and staff, contractual appointments and extensions, recruitment of part-time teachers, study leave, formation of the Institute of Renewable Energy & Marine Resources, a Memorandum of Understanding (MoU) between BSMRMU and the University of Portsmouth, the academic calendar, and finalised exam results for the university and affiliated institutions.

These meetings underscore BSMRMU's commitment to both academic excellence and effective university administration.

The University Welcomes New Cohort at Orientation Programme

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU), Bangladesh's sole public maritime university, hosted an orientation programme on August 3rd, 2023, for its incoming students. The programme welcomed new students from various disciplines, including:

- 6th Batch of BSc in Naval Architecture and Offshore Engineering (NAOE)
- 7th Batch of BSc in Oceanography
- 5th Batch of both BBA in Port Management & Logistics and LLB in Maritime Law
- 4th Batch of Marine Fisheries

The ceremony was graced by Rear Admiral Mohammad Musa, Vice-Chancellor of BSMRMU, as the Chief Guest. Commodore Sheikh Firoz Ahmed, the university's Registrar, delivered the welcome address. The programme also saw participation from university officials like the Treasurer, Deans, faculty members, staff, and current students. Notably, parents of the new students were also present, expressing their satisfaction with BSMRMU's management and academic quality.

The orientation programme provided a warm welcome to the incoming cohort, familiarising them with BSMRMU. A documentary showcased the university, followed by sessions outlining university rules and regulations, security protocols, examination procedures, and financial considerations.

This orientation programme serves as a significant step for BSMRMU in shaping the future of Bangladesh's maritime industry. By equipping these new students with specialised knowledge and fostering a supportive environment, BSMRMU paves the way for a generation of highly skilled maritime professionals.

On Forging International Partnerships to Bolster Maritime Education

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) has taken significant strides in forging international collaborations to enhance its educational offerings and research capabilities. Here is a glimpse into their recent partnerships:

University of Portsmouth (UK): A signed Memorandum of Understanding (MoU) in July 2023 establishes a framework for joint research activities, collaborative academic programmes, student and faculty exchanges, and participation in seminars and conferences.

CSIR-National Institute of Oceanography (India): Another MoU signed in July 2023 facilitates the exchange of scientific information, researchers, and joint projects. It also allows for the use of each other's facilities and the organisation of training courses.

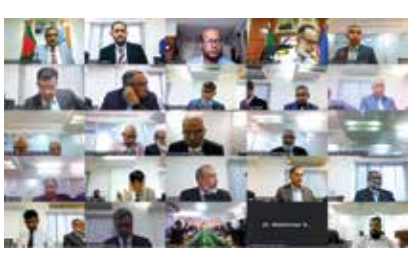
National Ocean Technology Centre (China): A cooperation agreement signed in August 2023 focuses on "Promoting Marine Spatial Planning Advancing Blue Economy Development." Additionally, a BSMRMU team participated in a training workshop organised by NOTC in December 2023.

The International Association of Maritime Universities (IAMU): BSMRMU submitted an online membership application on December 31st, 2023. This global network fosters collaboration in maritime education and research, aiming to cultivate highly skilled maritime professionals worldwide.

Universiti Malaysia Terengganu (Malaysia): A Letter of Intent signed in November 2023 paves the way for joint conferences, seminars, workshops, research projects, and mutual assistance in teaching and student development.

These international collaborations position BSMRMU as a key player in the global maritime education landscape. By fostering knowledge exchange, research opportunities, and student mobility, BSMRMU equips its students with the necessary skills and international exposure to excel in the maritime industry.

On 40th and 41st Academic Council Meetings



The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) held its 40th and 41st Academic Council Meetings on September 14th, 2023, and December 7th, 2023, respectively, both at the university's temporary campus. The meetings, presided over by Vice-Chancellor Rear Admiral Mohammad Musa, addressed a range of academic matters.

Key decisions included:

40th Meeting: Approval of a combined ashore and onboard training programme, thesis topics and supervisors for Bangladesh Marine Academy (Chattogram), the academic calendar, an extended registration period, and finalised exam results for the university and affiliated institutions.

41st Meeting: Approval of a revised curriculum for the B.Sc. (Hons) in Marine Fisheries, updated scholarship rules, the resumption of Genetic Engineering and Marine Biotechnology programmes, thesis topics and supervisors for Bangladesh Marine Academy (Chattogram) and Marine Fisheries Academy, the academic calendar, an extended registration period, and other important decisions.

These meetings highlight BSMRMU's ongoing commitment to academic development and ensuring a well-rounded educational experience for its students.

The University Gears Up for Growth at 10th Planning, Development, and Evaluation Committee Meeting

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) held its 10th Planning, Development, and Evaluation Committee meeting on August 16th, 2023, outlining a roadmap for the university's future advancement. Here is a glimpse into the key decisions and initiatives discussed:

• **Strengthening Curriculum:** The committee prioritised accelerating the development of the Outcome-Based Education (OBE) Template. Discussions were also conducted on the significance of establishing a BCS Maritime Cadre within government services, as well as revitalising the activities of the Institute of Renewable Energy & Marine Resources.

• **Embracing Internationalisation:** Recognising the potential of a globalised maritime industry, the committee explored plans to launch educational programmes catering to foreign students. This initiative, set to commence upon BSMRMU's permanent campus relocation, will broaden the university's reach and foster international collaboration.

• **Addressing Space Constraints:** To accommodate the university's growing needs until the permanent campus is complete, the committee-initiated steps to secure additional floor space. They are seeking financial and administrative approval from the University Grants Commission (UGC) to rent supplementary space, ensuring sufficient facilities for a thriving academic environment.

• **Infrastructure Development:** Discussions revolved around the construction of a roadside drain by the Chittagong Development Authority (CDA). This crucial infrastructure project will improve water drainage on the permanent campus, ensuring proper water flow management.

• **Promoting Quality and Innovation**: The meeting acknowledged the vital role of the Startup BLUE Startup Ecosystem IQAC (Internal Quality Assurance Cell). By undertaking various quality assurance activities, including monitoring teaching practices, this committee upholds academic excellence within BSMRMU. Recognising its potential impact, the committee emphasised its support for Startup BLUE, which provides essential training programmes to nurture innovative startups and empower them to become successful maritime enterprises, contributing significantly to the national economy.

• **Strengthening Alumni Relations:** The committee underscored the importance of fostering strong ties with BSMRMU's alumni network. They resolved to expedite activities related to the Alumni Association, including holding regular biannual or annual meetings. This renewed focus on alumni engagement opens doors for valuable mentorship opportunities and allows BSMRMU to leverage the expertise of its graduates for continuous improvement.

The 10th Planning, Development, and Evaluation Committee meeting signifies BSMRMU's unwavering commitment to growth and progress. By prioritising curriculum development, internationalisation, infrastructure advancements, quality assurance, and alumni relations, BSMRMU positions itself as a leading institution in Bangladesh's maritime education sector, poised to empower future generations of maritime professionals.

IBBBS Holds Short Course on Port Safety and Security Management

The Institute of Bay of Bengal & Bangladesh Studies (IBBBS) at the Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) successfully conducted a short course on "Port Safety and Security Management" from August 25th to 28th, 2023. This initiative aimed to enhance maritime education and research, focusing on safe cargo transportation, uninterrupted supply chains, and effective goods management within the maritime sector.

The course, delivered by esteemed resource persons, covered a comprehensive curriculum of thirteen modules. It attracted fifteen participants from various government and private institutions, with many more expressing interests in future offerings.

The closing ceremony featured Rear Admiral Mohammad Musa, the Honourable Vice-Chancellor of BSMRMU, as the Chief Guest. He distributed certificates to participants and commended their commitment to improving the country's shipping and port management sectors. Emphasising the value of the training, the Vice-Chancellor highlighted the crucial role these participants will play in the nation's maritime development.

The success of this short course paves the way for IBBBS to establish "Port Safety and Security Management" as an annual programme, ensuring a continuous stream of qualified professionals contributing to Bangladesh's maritime industry.

Seven Academies Renew Affiliation with BSMRMU Until June 2024

According to the BSMRMU Act-2013 and the Bangabandhu Sheikh Mujibur Rahman Maritime University's College, Academy, and Institute Affiliation Statute, 2018, seven academies have renewed their affiliation with the university. The renewed affiliation will be effective up to June 30, 2024.

This renewal signifies the continued commitment of these academies to uphold the standards and guidelines set by the Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU). It also ensures that the students of these academies will continue to receive quality education that aligns with the university's curriculum and standards.

The renewal of affiliation is a testament to the strong partnership between BSMRMU and the affiliated academies, and their shared goal of advancing maritime education in Bangladesh.

Vice Chancellor of BSMRMU Conducts Inspection Visit to Bangladesh Marine Academy, Rangpur

An inspection team led by the Honourable Vice Chancellor of Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU), Rear Admiral Mohammad Musa visited the Bangladesh Marine Academy in Rangpur on October 19, 2023.

The Vice-Chancellor began his visit by observing a parade of cadets and taking the salute. He also planted a sapling, symbolising growth, and prosperity.

The inspection team toured various facilities at the academy, including training facilities, classrooms, the cadet's block, laboratories, and workshops. The visit provided an opportunity for the Vice-Chancellor to gain firsthand knowledge of the academy's operations and infrastructure.

Rear Admiral Mohammad Musa engaged in a productive exchange with the faculty members, discussing various issues related to the academy's development. He provided valuable direction and guidelines aimed at enhancing the academy's performance and standards.

The Vice-Chancellor also chaired a cadet's talk programme, fostering open dialogue and interaction with the students. He concluded the visit by awarding prizes to the winners of various competitions, recognising their achievements and encouraging their continued efforts.

The visit underscores BSMRMU's commitment to ensuring the highest standards of maritime education and training at its affiliated academies.

BSMRMU and BORI Join Forces to Unveil Maritime Potential

The Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) and the Bangladesh Oceanographic Research Institute (BORI) solidified their commitment to maritime research and academic collaboration through signing a Memorandum of Understanding (MoU) on September 10th, 2023.

The MoU signing ceremony, held at the BORI Seminar Hall in Cox's Bazar, was graced by Mr. Ziaul Hasan, Senior Secretary of the Ministry of Science and Technology, as the Chief Guest. BSMRMU Vice-Chancellor Rear Admiral Mohammad Musa attended as the Special Guest. The MoU was officially signed by Commodore Sheikh Firoz Ahmed, Registrar of BSMRMU, and Md. Moinul Islam Titas, DG (Addl. Charge) of BORI.

Expressing his hope for the MoU's impact, Captain M Manzur-ul-Karim Chowdhury, Dean of Faculty of Earth and Ocean Science of BSMRMU, highlighted its potential to foster cooperation in maritime education and research. He emphasised that this collaboration would play a pivotal role in implementing Bangladesh's Blue Economy policy, which aims to harness the ocean's resources for sustainable economic growth.

Further enriching the day, a seminar titled "Exploring the Depths: Unveiling the Potential of Marine Resources from the Bay of Bengal" was organised alongside the MoU signing. Renowned speakers presented valuable research papers, fostering a platform for knowledge exchange and propelling advancements in maritime exploration and resource utilisation.

This strategic partnership between BSMRMU and BORI signifies a remarkable step towards propelling Bangladesh's maritime sector forward. By combining their expertise in education, research, and resource exploration, both institutions can empower Bangladesh to unlock the immense potential of the Bay of Bengal and contribute to the nation's economic prosperity.

Marine Academies Celebrate Passing Out Parade

The Bangladesh Marine Academy, Chattogram, Pabna, Barishal, Sylhet, Rangpur, and the Marine Fisheries Academy, Chattogram, celebrated their Passing Out Parade in the last week of December 2023.

The event marked the culmination of rigorous training and academic pursuits of the cadets at these academies. It was a moment of pride and joy as the cadets marched with precision and discipline, ready to embark on their maritime careers.

The parade was graced by the presence of Deans and other high officials from the Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU), who were present as invited guests. Their presence added to the significance of the event, symbolising the strong ties between the academies and the university.

The Passing Out Parade is a time-honoured tradition that signifies the transition of cadets from their academic life to their professional roles in the maritime sector. It is a testament to the hard work, dedication, and commitment of the cadets and the faculty who have guided them.

Bangladesh International Marine and Offshore Exhibition (BIMOX-2023) Showcases Maritime Innovations

The "Bangladesh International Marine and Offshore Exhibition (BIMOX-2023)" was held at the International Conference City Bashundhara (ICCB), Dhaka from October 12 to 14, 2023. The event highlighted the identity, activities, and objectives of various universities, with a special focus on maritime innovations.

Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) set up a stall where they displayed educational activities related to the use of various lab instruments of the Oceanography, Marine Fisheries, and Naval Architecture Department. Instruments such as the CTD Sensor, Algae Torch, Multi-parameter, RTK GPS, PH Meter, and others were exhibited.

In addition to the display of lab instruments, students presented various business ideas and projects under the initiative "Startup Blue". This platform provided an opportunity for students to highlight their innovative ideas and receive valuable feedback.

The event was graced by the presence of Mr Khalid Mahmud Chowdhury, State Minister of Ministry of Shipping, and Vice-Chancellor Rear Admiral Mohammad Musa. The stall also attracted many high officials from various organisations, maritime stakeholders, teachers, and students.

The exhibition served as a platform for sharing knowledge, fostering innovation, and promoting collaboration in the maritime sector. It highlighted the significant role of maritime education in driving the growth and development of the industry.

Governing Body of Bangladesh Marine Academy Convenes to Discuss Developmental Issues

The Governing Body of the Bangladesh Marine Academy held a meeting on July 23, 2023, at the conference room of the Ministry of Shipping. The meeting was attended by representatives from the Marine Academies of Sylhet, Pabna, Rangpur, and Chattogram.

The Inspector from the Academy/Institute participated in the meeting as a representative of the university. The meeting was a platform for open dialogue and discussion on various issues concerning the development of the academies.

The meeting aimed to address the challenges faced by the academies and to brainstorm solutions to enhance their growth and progress. The discussions were focused on improving the quality of education and infrastructure at the academies.

The meeting marked a significant step towards the betterment of the Marine Academies and their contribution to the maritime sector of Bangladesh.

BSMRMU's Internal Faculty Seminar Series Continues to Foster Scholarly Discussion

The Institutional Quality Assurance Cell (IQAC) of Bangabandhu Sheikh Mujibur Rahman Maritime University, Bangladesh (BSMRMU) continues its tradition of organising the Internal Faculty Seminar series. The sixth phase of the seminar series is currently ongoing, with sessions held weekly since its commencement on December 6, 2023.

The seminar series, which began in 2017, provides a platform for faculty members to present their research works or other topics related to their respective programmes. The fifth phase of the seminar series has been successfully completed, and the sixth phase is progressing smoothly.

The Internal Faculty Seminar contributes significantly to the professional development of faculties and serves as a unique platform for scholarly discussion among all participants. The seminars held from July to December 2023 covered a range of topics:

On August 21, 2023, Asst. Professor Sunanda Majumdar of the Port & Shipping Management department presented on "Developing a Transport Mode Choice Model for Matarbari Freight Transportation".

On October 2, 2023, Lecturer Mostafa Aziz Shaheen, also from the Port & Shipping Management department, discussed "Compliance of MARPOL Convention in Port Areas: Bangladesh Perspective".

On October 16, 2023, Asst. Professor Swarna Datta from the Bangla department presented on "Folk culture in Vibhutibhushan Banerjee's Pather Panchali novel".

On December 6, 2023, Lecturer Mohammad Saifur Rahman of the Oceanography & Hydrography department presented a "Comparative Study of Monthly and Seasonal Variability of Sea Surface Height (SSH) and Sea Surface Temperature (SST) over Bay of Bengal and Arabian Sea".

The seminar series underscores BSMRMU's commitment to fostering a culture of continuous learning and intellectual growth.

Workshop on "Smart Bangladesh" Held at BSMRMU

A dynamic workshop was held BSMRMU to facilitate a meaningful discussion on advancing towards a "Smart Bangladesh". The event took place on December 27, 2023, and saw the participation of a diverse group of attendees.

The workshop was led by Dr Khondaker Abdullah Al Mamun, Professor, Department of CSE, United International University (UIU) & Director – IRIIC. As the resource person, Dr Mamun brought his extensive knowledge and expertise to the table, guiding the participants through the various aspects of the topic.

The Honourable Vice-Chancellor Rear Admiral Mohammad Musa graced the event as the chief guest. His presence added to the significance of the workshop, emphasising the university's commitment to fostering innovation and technological advancement.

The event also saw the participation of the Honourable Treasurer, Registrar, all Deans, Heads of the Departments, the Director of ICT Centre as Innovation Officer, distinguished Faculty Members, Officers, and Students. Their involvement ensured a rich and diverse exchange of ideas, contributing to the depth and breadth of the discussions.

The workshop served as a platform for brainstorming and collaboration, bringing together different stakeholders to discuss the path towards a "Smart Bangladesh". It underscored the university's commitment to fostering innovation and contributing to the nation's progress.

Marine Fisheries Academy, Chattogram Holds 5th Governing Body Meeting

The fifth meeting of the governing body of the Marine Fisheries Academy, Chittagong was held on December 28, 2023, at the conference room of the academy. The meeting was a significant event, marking the continued commitment to the development and progress of the academy.

The Inspector from the Academies/Institutes joined the meeting as a representative of the Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU). Considering the ongoing global situation, the representative participated in the meeting via an online platform (Zoom App), ensuring the continuity of the academy's operations and decision-making processes.

The meeting served as a platform for discussing various strategic initiatives, academic matters, and future for the academy. Further details of the meeting and the decisions taken are awaited. The event underscores the academy's commitment to fostering a collaborative environment and promoting excellence in maritime education.

BSMRMU Conducts Training on "National Integrity Strategy"

A training session on the "National Integrity Strategy: Role of Educational Institutions" was held at Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) on December 28, 2023. The training was organised under the supervision of the Institutional Quality Assurance Cell of BSMRMU.

The session was conducted by Captain Saad Emon Eshtiaque, Controller of Examinations. The training aimed to enhance the understanding of the National Integrity Strategy and its implications for educational institutions.

Selected teachers and officers of the university attended the training programme as trainees, gaining valuable insights into the topic. The event also saw the participation of the Treasurer, Deans, Registrar, Directors, and Senior officers of the university.

The training session underscores BSMRMU's commitment to fostering a culture of integrity and ethical conduct within the institution. It also highlights the university's role in promoting national integrity through education and training.

Marine Cadet Admission Examination Committee Meetings Attended by BSMRMU Representative

An Assistant Inspector from the Office of the Academies/ Institutes participated as a representative of BSMRMU in various meetings of the Marine Cadet admission examination management committee.

The meetings were held to discuss and plan the admission process for the academic year 2023-24. An admission circular was published on October 13, 2023, announcing the opportunity for 714 cadets to gain admission into government and approved private marine academies.

The participation of the BSMRMU representative in these meetings underscores the university's commitment to ensuring a fair and transparent admission process. The meetings served as a platform for discussing various strategic initiatives, academic matters, and future for the academies.

The admission of new cadets marks a significant step forward in strengthening the maritime sector of Bangladesh and fostering the next generation of maritime professionals. Further details of the admission process and the decisions taken in the meetings are awaited.

Prime Minister Opens Landmark Patenga Container Terminal, Ushering in New Era for Bangladeshi Shipping

Prime Minister Sheikh Hasina has inaugurated the newly-built Patenga container terminal (PCT) at the Chittagong Port on 14 November 2023. The terminal, entrusted to RSGT Bangladesh, a subsidiary of the globally renowned Red Sea Gateway Terminal International (RSGTI), signifies a paradigm shift towards foreign-managed port operations. This collaboration, formalised through a concession agreement on December 6, 2023, represents not just a one-time financial transaction but a long-term strategic partnership. It paves the way for a continuous influx of FDI into the sector, fostering knowledge exchange, technology transfer, and the adoption of international best practices.

The PCT is not merely a physical structure; it is a testament to Bangladesh's commitment to innovation and efficiency. Equipped with cutting-edge technology, including four advanced ship-to-shore cranes, the terminal boasts an initial annual capacity of 250,000 TEUs. However, this is just the first wave. The terminal is designed for scalability, with the potential to double its capacity upon the introduction of additional equipment and the ability to handle three vessels simultaneously. This transformative development, hailed by Honourable Prime Minister Sheikh Hasina as a "beacon of hope" for economic growth, promises to significantly enhance the capacity of Chittagong Port, Bangladesh's premier maritime gateway.

Bangladesh Elected to Key Role in International Maritime Organisation

Bangladesh secured victory in the 'C' category during the International Maritime Organisation (IMO) Executive Council elections. At the 33rd session of the United Nations shipping-related specialised agency in London on 1 December 2023, Bangladesh was elected to the new 40-member IMO Council for the year 2024-25.

In the 'A' category, the focus is on countries most interested in providing international shipping services, while the 'B' category comprises nations keen on international seaborne trade. The 'C' category includes countries not selected in 'A' or 'B' but with special interests in maritime transport or navigation. These twenty countries represent all major geographical regions worldwide.

This year's 'C' category council member elections feature twenty-five competing countries. Bangladesh secured its position with an impressive 128 votes out of 168 valid votes.

Bangladesh Prioritises Domestic Energy Exploration to Reduce Reliance on Imports

The government is prioritising the exploration of domestic energy sources to minimise reliance on imports, driven by significant price surges and scarcity on the international market. According to the Power Division, there will be a concerted effort to maximise output from currently operational mines within the nation. Additionally, the search for gas will be expanded in areas with similar geological features to those mines, with an aim to boost the availability of domestic gas by approximately 600 to 1000 million cubic feet per day.

Nasrul Hamid, the State Minister for Power, Energy, and Mineral Resources, has indicated that the reserves at the Bibiana field could see an increase of up to one and a half trillion cubic feet. This potential was identified following exploratory work in a new zone allocated to Chevron Bangladesh, with expectations of an imminent announcement regarding this development.

Two years prior, the Chevron Bibiana field was producing 1,200 million cubic feet of gas daily; however, this figure has now dwindled to 140 million cubic feet. Following governmental approval, Chevron initiated explorations in the vicinity of the Bibiana gas field, instilling new hope with the expanded exploration area.

Bapex has identified two gas fields in Bhola, yet despite having the capacity, it has been impractical to transport gas from these locations. Nevertheless, with the discovery of additional gas, the government is keen on establishing a new pipeline, a commitment made by Prime Minister Sheikh Hasina prior to the elections. This initiative aims to foster industrial growth in Barisal and Khulna by utilising Bhola gas.

Furthermore, Bapex plans to drill five additional wells in Bhola, with the prospect of extending exploration to nearby areas should these wells prove fruitful. The organisation also anticipates discovering new gas reserves across the expansive island.

The Power Division has outlined plans to drill fifty new wells between 2025 and 2028, with a total of one hundred wells by 2030. This endeavour is expected to significantly enhance domestic gas production, potentially increasing it by 600 to 1000 million cubic feet per day.

Bangladesh Charts Course for Maritime Leadership: PM Inaugurates Matarbari Deep Sea Port Channel

The Honourable Prime Minister Sheikh Hasina inaugurated the 14.3 km man-made navigation channel of the Matarbari Deep Sea Port and commenced the construction of the port's inaugural terminal on 11 November 2023. Honourable Prime Minister revealed the inauguration plaque for the Matarbari Channel and initiated the first terminal at a ceremony held in the Matarbari Deep Sea Port Project vicinity. The event was chaired by the State Minister of Shipping, Mr Khalid Mahmud Chowdhury, with the presence of the ministry's senior secretary, Mustafa Kamal, and the Chairman of the Chittagong Port Authority, Rear Admiral Mohammad Sohail, who delivered the welcome address.

The ceremony was attended by cabinet members, senior secretaries, heads of three forces, and high-ranking officials from both public and private sectors.

Following the port's development, it will accommodate direct berthing for container ships, ranging between 8,000 to 10,000 TEUs. The Matarbari Port Development Project, marking the nation's first deep seaport, entails an investment of approximately BDT 17,777 crores and is scheduled for completion by 31 December 2026. The Coal Power Generation Company Bangladesh Limited (CPGCBL) officially transferred the responsibility of the constructed channel, part of the Matarbari Ultra Super Critical Coal Fired Power Project, to the Port Authority on 20 September 2023.

World Bank Fast Tracks Funding for Chittagong Port's Bay Terminal Project

The World Bank is set to expedite funding for the construction of the breakwater and channel of the Bay Terminal project, aiming to boost the capacity of Chittagong Port, announced Abdoulaye Seck, the World Bank's Country Director for Bangladesh and Bhutan. He made this statement during a dialogue with members of the Chittagong Chamber on 1 November 2023 at the World Trade Centre in Chittagong.

Abdoulaye Seck explained, "This meeting was convened to gather insights from the private sector, which will inform the social and environmental feasibility analysis prior to financing the Bay-Terminal project." He highlighted that the project's successful implementation would transform Chittagong into a significant logistics centre by enhancing maritime connectivity. Moreover, it would benefit the ongoing connectivity initiatives linking Chittagong with India's landlocked northeastern territories, including Bhutan and Nepal.

He further remarked that Bangladesh is on course to attain middle-income status by 2026 and aims to become a developed nation by 2041. Concurrently, Bangladesh's import and export volumes are on the rise. The World Bank is supporting the country's progress through the financing of various projects, assessing the needs of end-users, especially from the private sector.

US Company Inks 15-Year Deal to Supply LNG to Bangladesh

The government is set to finalise a contract with Excelerate Energy Bangladesh Limited, an American firm, for the provision of liquefied natural gas (LNG) to the private sector. Under the terms of this agreement, the company is committed to supplying LNG over a 15-year period starting from 2026. The Cabinet Committee on Public Procurement sanctioned the draft of the forthcoming contract on 25 October 2023, as conveyed to the media by Syed Mahbub Khan, the Additional Secretary of the Cabinet Division, following the committee meeting chaired by Finance Minister AHM Mustafa Kamal.

LNG, once imported, undergoes a conversion process for injection into gas pipelines. Currently, two floating terminals located at Maheshkhali in Cox's Bazar are operational for this conversion, one managed by Excelerate Energy and the other by Summit Group. The government is assessing long-term LNG supply proposals from these entities, following policy approval by the Cabinet Committee on Economic Affairs last August.

Excelerate Energy is expected to deliver between one million to 1.5 million tonnes of LNG annually under a 15-year agreement spanning from 2026 to 2040. The pricing formula for the LNG will be 13.35% of the crude oil price plus an added USD 0.35 per unit.

Moreover, an increase in the capacity of Excelerate's floating terminal has received approval, enabling the terminal to process sixty million cubic feet of gas daily, up from the current fifty billion cubic feet.

Additionally, the procurement committee has sanctioned the acquisition of a cargo ship of LNG from Singapore's Vital Asia Pvt Ltd under the 'Prompt Increase in Supply of Electricity and Energy (Special Provisions) (Amendment) Act-2021'. This procurement will cost USD 17.55 per unit, with the total for 3,360,000 units (MMBTU) of LNG amounting to BDT 762 crore thirty-seven lakh.

In related developments, the Cabinet Committee on Economic Affairs has given provisional approval to import 1.5 million tonnes of crude oil from Saudi Arabia and the United Arab Emirates (UAE) in 2024, utilising a Direct Purchase Mode (DPM), thereby circumventing the tender process. Bangladesh annually imports approximately 6.5 million tonnes of fuel oil, of which about 1.5 million tonnes are crude, with the rest being refined.

Greece Sets Sail for a Sustainable Future with "Year of Maritime Education"

Greece, a global leader in shipping with a rich maritime heritage, has declared 2024 the "Year of Maritime Education." This initiative, announced by Minister Christos Stylianides, underscores the country's commitment to fostering a skilled and sustainable maritime workforce.

With Greek shipowners controlling a huge portion of global tonnage, the need for a highly qualified workforce is paramount. The industry faces a double challenge: crew retention and the need to upskill existing seafarers to operate vessels powered by alternative fuels and modern technologies. The "Year of Maritime Education" aims to address these challenges by introducing legislative measures that prioritise maritime education and training.

Greece remains the world's top shipping nation, controlling 21% of global tonnage with over 5,500 vessels according to the Union of Greek Shipowners. Greek interests control more than 70% of the EU's strategic shipping fleet, playing a vital role in ensuring European food security and energy independence.

By prioritising maritime education, promoting green shipping practices, and investing in infrastructure and technology, Greece is charting a course towards a sustainable and prosperous maritime future. The "Year of Maritime Education" marks a significant step forward, ensuring a skilled and environmentally conscious workforce that can navigate the evolving maritime landscape.

Qatar and DNV Join Forces to Propel Maritime Education

The University of Doha for Science and Technology (UDST) and DNV Hellas S.A. signed an agreement to boost maritime education in Qatar. This partnership aims to prepare students for the challenges and opportunities facing the maritime industry.

DNV Hellas, through its regional maritime academy, will share its knowledge and expertise with UDST. This includes developing curriculum and training courses, providing insights into current industry issues, and collaborating on joint projects. UDST, Qatar's leading university for applied sciences, will integrate DNV's training into its Marine Engineering programmes and offer internship opportunities for students.

Both institutions see this collaboration as crucial for building a skilled workforce in the maritime sector, particularly as it undergoes a transformation driven by decarbonisation and digitalisation. Dr Salem Al Naemi, President of UDST, highlighted the partnership's role in achieving excellence in maritime education. He believes DNV's global experience will enrich their programmes and prepare students for the complexities of the industry.

Ioannis Chiotopoulos, a senior vice president at DNV Maritime, emphasised the importance of this agreement for Qatar's maritime industry and its alignment with Qatar's Vision 2030. He expressed his enthusiasm about working with UDST to develop the next generation of maritime professionals in Qatar.

The agreement offers several benefits to UDST students. They will have the chance to participate in DNV's training courses, gain industry insights through UDST's Marine Engineering Programme Advisory Committee, and participate in internships with DNV to gain real-world experience.

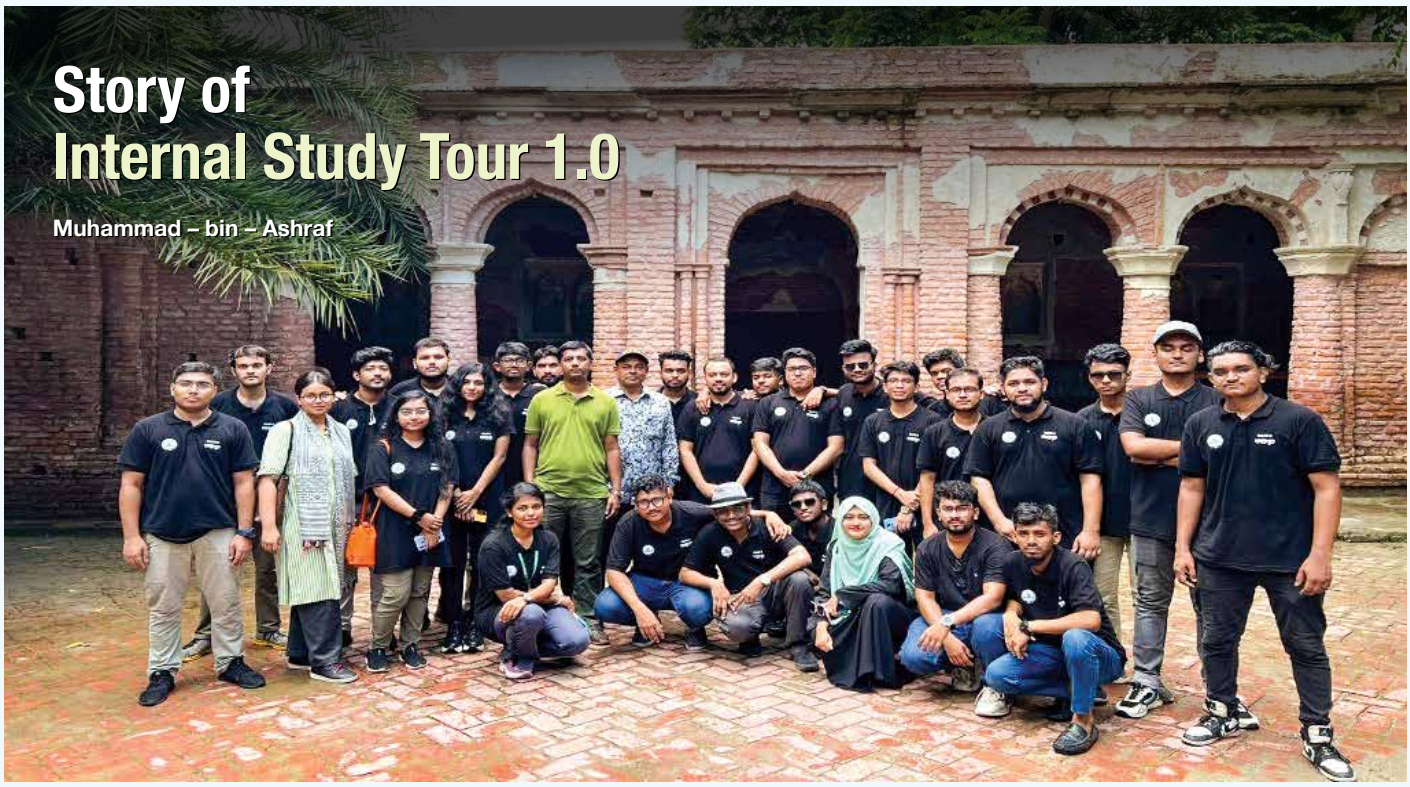
Looking beyond education, the MoU opens doors for joint initiatives like organising events focused on relevant maritime topics such as decarbonisation, digitalisation, and cybersecurity. Additionally, both institutions can work together on research projects of interest to the maritime industry.

This collaboration between UDST and DNV is a significant step forward for maritime education in Qatar. By combining academic excellence with industry expertise, this partnership has the potential to equip future generations of maritime professionals with the skills and knowledge needed to navigate the evolving maritime landscape.

Maersk and Indian Training Institute Launch Rating Course for Women in Maritime

Maersk, a global shipping leader, is partnering with the Indian Maritime Training Institution Rahaman to provide a new rating course specifically designed for women. This programme aims to break down barriers and open doors for women in the maritime industry by offering them the qualifications needed to begin successful careers at sea.

The rating course equips graduates with the skills and knowledge to work as trainee ordinary seamen/sea women, trainee wipers, or trainee cooks on Maersk vessels. This initiative marks a significant step towards increasing gender diversity in the maritime workforce, which has traditionally been male dominated. The application deadline for the course was November 25th, 2023, and its success could pave the way for future programmes that empower women to navigate exciting careers in the shipping industry.



Story of Internal Study Tour 1.0

Muhammad – bin – Ashraf

"University life can be monotonous." "The only relaxation in university life is found in books." "University is filled with exams, lab work, and stress" - these are common sentiments expressed by many university students. The challenges are even more pronounced for engineering students. However, to make these four years memorable, any form of excursion is often at the top of their to-do list. In line with this, the 5th batch of students from the Department of Naval Architecture and Offshore Engineering embarked on their first Internal Study Tour - IST 1.0, from July 29, 2023, to August 2, 2023, in the Khulna, Bagerhat region. The tour was supervised by Commodore M Munir Hassan, (E), BN (retd), a professor in the Department of Naval Architecture and Offshore Engineering, and Dr M. Abul Hossoin, an Assistant Professor of Physics. Here are some brief anecdotes from their journey.

The Journey Begins

Our journey to Khulna commenced from the university campus at 8 o'clock on July 29, 2023. We enjoyed our bus ride by singing and dancing. We took a detour in Gopalganj to pay our respects at the cemetery of the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman. We visited the "Bangabandhu Library", "Bangabandhu's House", and "Sheikh Rasel Park". Afterward, we proceeded to Khulna.

Upon reaching Khulna at 2:30, we checked into a hotel. After freshening up and having lunch, we took some rest. In the afternoon, we visited Khulna University (KU) and enjoyed the natural beauty of Khulna.

The Second Day

On the second day, we visited the Sundarbans. Initially, we went to Bagerhat, the sector headquarters of the Bangladesh Coast Guard. We gained insights about the Bangladesh Coast Guard and learned the rules for visiting the Sundarbans.

Following an engaging session, we proceeded to the Coast Guard jetty in Bagerhat, where two boats were ready to transport us to the Sundarbans. The boat ride to the Sundarbans was filled with adventure. Upon arrival, we explored the area and observed various wildlife including deer, crocodiles, monkeys, and snakes. Unfortunately, we didn't have the chance to spot a tiger. We were advised against venturing too deep into the jungle. After some exploration, we returned to Bagerhat by boat and then traveled back to our hotel on the university bus.

The Third Day

This day was dedicated to an official tour of Mongla Port. We had an informative session with the Mongla Port Authority. It was a proud moment when we saw the development that occurred during the tenure of our Vice Chancellor, Rear Admiral Mohammad Musa, when he was the head of the Mongla Port Authority.

We then visited Mongla Port and observed its operations. Unfortunately, we didn't get to see any ships at the jetty. We also

A photo gallery of the internal study tour in different maritime places of Khulna

visited the Bagerhat Shat Gombuj Mosque, a UNESCO recognized historical site in Bangladesh, and the cemetery of Khan Jahan Ali.

The Fourth Day

On this day, we visited Khulna Shipyard (KSY), a significant part of our field of study. We had a session with the Khulna Shipyard Authority and toured the entire shipyard. It was an enriching experience to see a ship being built from scratch. We gained practical knowledge about the shipbuilding process and learned how to succeed in this sector. After visiting KSY, we went sightseeing at Khulna University of Engineering and Technology (KUET).

The Last Day

On the final day of the trip, we visited the Rampal Power Plant in Bagerhat, the largest coal-dependent power plant in Bangladesh. We had an interactive session about the power generation process. Unfortunately, due to a coal shortage, the power plant was shut down at the time of our visit. However, it was still a great experience. After visiting Rampal, we returned to Dhaka, arriving safely by evening.

Conclusion

A study tour plays a crucial role in a student's life. As students of Naval Architecture and Offshore Engineering, we witnessed the potential and bright future of the maritime sector. It is our responsibility to uphold its dignity and contribute to its growth. More such tours should be organized so that students can gain practical knowledge.

Muhammad – bin – Ashraf

Student
Department of Naval Architecture and Offshore Engineering
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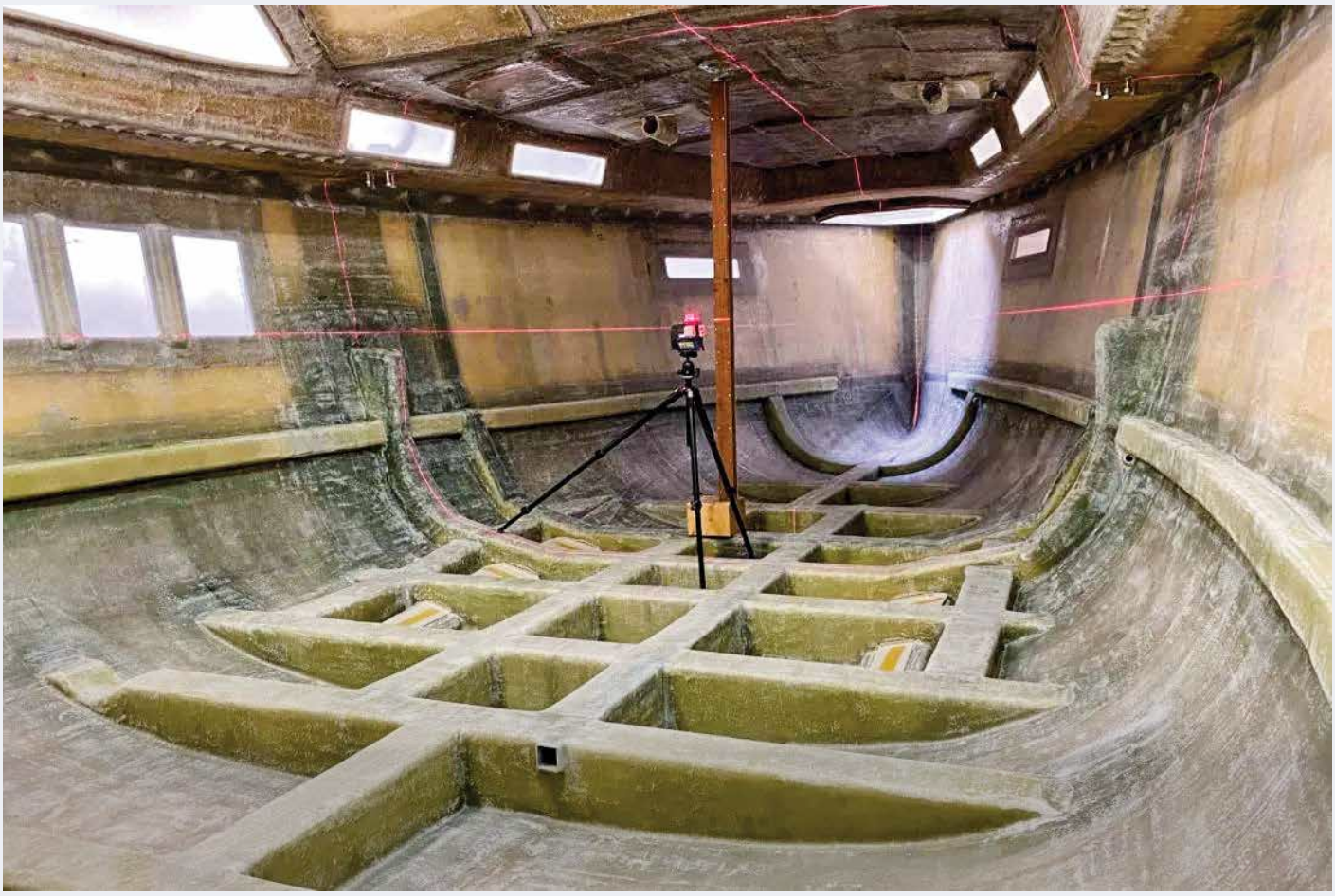

GRP Hulls

Prospects and Challenges

Tasnim Tabassum Tusti

Introduction

Glass-reinforced plastic (GRP) has become a widely adopted material in the marine industry, and GRP hull is currently catching the eye of many shipping company owners especially boat manufacturers as it offers a wide range of benefits like lightweight, strong, and durable making it a popular choice. It is used particularly for boats and pleasure yacht hull construction. Glass Reinforced Plastic, commonly known as fiberglass, is a composite material made up of a matrix of polymer resin reinforced with glass fibres.

In GRP hull construction, wooden mould is used as a frame for hull build according to the desired design. Then a pigmented gel coat is applied to the mould for the outer finish and a fiberglass mat (GSM 300/450), or woven roving is used for layering onto the gel coat. the fiberglass with resin (polyester or epoxy) is impregnated, allowing the resin to cure and harden, either at room temperature or with added heat. The later process includes demoulding, trimming, finishing, and assembling.

GRP Hull in Perspective of Bangladesh

Khulna Shipyard Ltd. (KSY) of Bangladesh has a boat workshop where GRP-based hulls are constructed and some projects on GRP-hull are already finished. From perspective of Bangladesh, the use of GRP (Glass Reinforced Plastic) for boat hull construction can offer several advantages given the country's geography and maritime activities.

First, the structural strength of the hull made of glass fibre is greater than MS steel providing excellent strength-to-weight ratios, ensuring a sturdy hull without unnecessary weight. With the given tropical climate with high humidity corrosion is a great concern for Bangladesh. also, GRP's resistance to corrosion makes it a suitable material for boat hulls in such conditions also it is durable in saline environments if used in coastal areas. It is also suitable to be used to navigate in shallow water due to its lightweight. GRP has a lower maintenance cost than traditional steel hulls thus making it convenient for small boats.

Challenges

But every blessing comes with a challenge! The initial cost of transitioning to GRP construction, the availability of the materials, the need for skilled labour and artisanry, and addressing environmental considerations related to fiberglass production, and non-recyclable are some of the concerns relating to GRP hull. The resin production or raw material manufacturing might have a negative impact on the environment leading to air pollution and inhaling or encountering dust or particles of fiberglass might cause respiratory problems along with skin sensitivities.

The question might arise if glass fibre hulls take in place of steel ships will it have an impact on the shipbreaking industry of Bangladesh as it is the most revenue of the blue economy comes from? Bangladesh currently holds a prominent position in global shipbreaking, generating an average annual revenue of approximately 12,750 crore BDT. However, the use of GRP hull will not instantly shut down the ship-breaking industry. GRP is mostly used in boat hull construction, and it requires feasibility tests and other factors to consider like a good number of experts skilled in fiberglass repairing, local materials availability, etc. Therefore, large vessels like cargo, oil-tanker or container ship hulls are still using steel for construction. In the far future, the ship-breaking industry might have an impact but that completely depends on the usage range of GRP hulls in Bangladesh. Strategies may be devised to mitigate potential losses caused by the increased use of GRP hulls, but the industry is expected to persist, adapting to changing trends in ship construction materials.

Conclusion

To promote the widespread adoption of fiberglass hulls, it is imperative to implement strategies that mitigate production drawbacks. This includes prioritising effective waste management, supplying workers with protective equipment such as respiratory-safe masks and gloves, and offering comprehensive training to ensure their safety. Additionally, conducting thorough feasibility analyses on GRP-based hull construction specific to the context of Bangladesh is essential.

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GRP hull construction at KSY

The Plastic Sea
A New Discovery in the World Ocean

Md. Towhidur Rahman

Introduction

The Chittagong Port serves as the primary national gateway for Bangladesh, facilitating more than 90% of the country's imports and exports and approximately 98% of its container trade. The entity holds significant importance in the logistics network of the nation. It forms an essential component of the sub-regional transportation framework that links the northeastern region of India, Bhutan, and Nepal to Europe, North America, and Southeast Asia. Modernisation of Chittagong Port is necessary to realise the goal of the Bangladesh government for a smart Bangladesh by 2041. This article aims to examine the strategy for modernising the port and the potential contribution it may make to the economic growth of Bangladesh. In order to collect information on the topic, the research relied on secondary data sources such as academic publications, papers, reports, and websites. According to the results, modernising the Chittagong Port will likely result in various positive outcomes, such as higher economic development and competitiveness, better regional connections, and enhanced environmental sustainability.

Chittagong Port Recently Completed Projects:

I. Strategic master plan for Chittagong port.

II. Chittagong Port trade facilitation project (CPA Component)

III. Construction of backup facilities behind Berth No. 4 and 5 of the new mooring container terminals.

IV. Installation of Vessel Traffic Management Information System (VTMIS)

V. Procurement of one high-power tug (4500 BHP)

Ever heard of a place called “The Plastic Sea”? Imagine scuba diving and finding more plastic bags than fish. Sounds crazy, right? Well, this “sea” is not a physical location, but rather a metaphorical one you create by thinking about the following:

Plastic is everywhere – in our shopping bags, food containers, even our cars and phones. But when it ends up in the ocean, it can last for centuries, breaking down into tiny bits almost impossible to clean. This plastic pollution becomes a deadly trap for marine animals. They mistake it for food, filling their stomachs with plastic and starving, or they get entangled and drown. A survey of ‘The Pew Charitable Trusts’ shows that an estimated 15 million metric tons of plastic enter the world’s ocean and waterways each year, threatening marine life and polluting shorelines. That is the equivalent of two waste-carrier trucks emptying a load of plastic rubbish into the sea every minute. The main sources of plastic debris found in the ocean are land-based, coming from urban and stormwater runoff, sewer overflows, littering, inadequate waste disposal and management, industrial activities, tyre abrasion, construction, and illegal dumping. Ocean-based plastic pollution originates primarily from the fishing industry, nautical activities, and aquaculture.

Under the influence of solar UV radiation, wind, currents and other natural factors, plastic breaks down into small particles called microplastics (particles smaller than 5 mm) or nano plastics (particles smaller than 100 nm). The small size makes them easy for marine life to ingest accidentally. The most visible impacts of plastic debris are the ingestion, suffocation, and entanglement of hundreds of marine species. Marine wildlife such as seabirds, whales, fish, and turtles mistake plastic waste for prey; most then die of starvation as their stomachs become filled with plastic. They also suffer from lacerations, infections, reduced ability to swim, and internal injuries. Floating plastics also help transport invasive marine species, thereby threatening marine biodiversity and the food web.

Plastic waste damages the aesthetic value of tourist destinations, leading to decreased income from tourism. It also generates major economic costs related to the cleaning and maintenance of the sites. The build-up of plastic litter on beaches can have a negative impact on a country’s economy, wildlife, and the physical and psychological wellbeing of people.

To mitigate our plastic-waste problem, many organisations and researchers are working globally. ‘The Ocean Cleanup’ is a mentionable organisation that charges toward better ocean health. Dutch inventor Boyan Slat founded The Ocean Cleanup at the age of 18 in his hometown of Delft, the Netherlands. It is a non-profit organisation, developing and scaling technologies to rid the world’s oceans of plastic.

Now let us talk about what we should do as an individual -

You can play a crucial role in preventing plastic pollution in the ocean and making a positive impact on the environment. Here are some actionable steps you can take:

Reduce your plastic footprint:

Refuse: Say no to single-use plastics like bags, straws, utensils, and water bottles. Carry reusable alternatives wherever you go, such as cloth bags, metal straws, reusable cutlery, and insulated water bottles.

Reduce: Purchase products with minimal packaging and in bulk when possible. Avoid unnecessary plastic items in your daily life.

Reuse: Repurpose plastic containers and bags instead of throwing them away. Get creative and find new uses for old plastic items.

A dead fish among rubbish on Freedom Island, Philippines. Freedom Island is an ecotourism area which contains a mangrove forest and swamps providing a habitat for many marine species.

Advocate for change:

Support businesses: Choose brands that offer plastic-free packaging and sustainable alternatives. Encourage restaurants and cafes to use reusable dishware and avoid plastic straws.

Raise awareness: Talk to your friends, family, and colleagues about the issue of plastic pollution. Share information and resources on social media and encourage others to adopt sustainable practices.

Engage in direct action:

Participate in beach cleanups: Join or organise beach cleanups in your local area to remove plastic debris from the environment.

Volunteer with environmental organisations: Support organisations working to address plastic pollution and protect marine life. You can offer your time, skills, or even donate to their initiatives.

Educate yourself and others: Stay informed about the latest research and solutions related to plastic pollution. Share your knowledge with others and inspire them to act.

Remember, every small step counts! By adopting these practices and promoting responsible plastic use, you can contribute to a significant collective effort to combat plastic pollution and create a healthier future for our oceans.

That is all you must be concerned about to visualise the Plastic Sea. If the situation is left going on, the existence of such a Plastic Sea is not so far in the future of this planet. So, let us make the wave of change together!

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Seawater Quality Parameter Analysis through Remote Sensing and GIS

M. R. Ashikur

Background

The ocean covers 72% of our planet's surface (approximately 363 million square kilometers), accounting for the great majority of its surface area. Nearly 2.4 billion people live on the world's outskirts, within 100 kilometers of the coast, and this figure is growing. In addition to having the most dynamic and productive environment, the shoreline region is home to human populations, companies, and tourist spots. Furthermore, the seawater quality (SWQ) parameter has a significant impact on coastal residents and animals. As we approach the end of the twentieth century and the beginning of the twenty-first, the relevance of the SWQ parameter is more important than ever. Some important SWQ parameters in the Bay of Bengal (BoB) include sea surface temperature (SST), sea surface salinity (SSS), sea surface chlorophyll (SChl), total suspended solids (TSS), turbidity (NDTI), chemical oxygen demand (COD), biological oxygen demand (BOD), total dissolved solids (TDS), dissolved oxygen (DO), total phosphorus (TP), and hydrogen potential (PH) (Ashikur et al., 2021).

SST is a critical physical metric for understanding, monitoring, and forecasting ocean-atmosphere interactions (Tuan et al., 2020). On daily, seasonal, decadal, and climatic timeframes, SST fields regulate upper-ocean circulation and thermal structure. Accurate and error-quantified observations of SST in the form of climate data records (CDRs) are also required to understand the role of the ocean in both short- and long-term climate variability (Chen et al., 2020). The SSS is a critical quantity in the study of both physical oceanography and the hydrological cycle. It, together with the SST, determines the density of the surface water, which influences the vertical flow produced by the thermohaline component of ocean circulation (Dinnat et al., 2019). Chlorophyll is a green pigment that can be found in all green plants as well as cyanobacteria. It is in charge of light absorption, which supplies the energy required for photosynthesis (Cooper, 2022). The amount of chlorophyll observed in surface water can be used to estimate the amount of primary production occurring on the ocean's surface (Selao et al., 2019). Because the presence of suspended particles generates turbidity in water, turbidity is commonly measured to assess TSS content. TSS always scatters sunlight, whereas SChl maintains regulated absorption (Saberioon et al., 2020). However, Fig. 1 shows the Coastal region of Bangladesh.

Seasons influence how many and how few SWQ parameter experiences are offered. This is due to the fact that the SWQ parameter changes between the Summer and Winter seasons. Finding the spatial and temporal patterns of SWQ parameters, identifying distinct species related to hydrological conditions, and evaluating environmental quality indicators should all be part of monitoring (Bhadja & Kundu, 2012). Mamun et al. 2019 conducted research on water quality parameters in Fiji surface water in 2019. In their research, they presented the GIS interface design, findings, and discussion. Ashikur et al. 2021 conducted research on SWQ parameters in the BoB in 2021 considering the spatial and temporal distribution of SSS, SST, TSS and SChl over the BOB. Fig. 2 shows the contribution of remote sensing and GIS technologies to coastal and marine environmental management.

GIS and Remote Sensing (RS)

A GIS is a collection of computer-based methods for gathering, processing, manipulating, organizing, analyzing, and displaying spatial or geo-referenced data pertaining to locations on the surface of the Earth. The term "GIS technique" refers to the integration of all systems that can be used to develop a decision support system (DSS) for issues that are related to time and space. For data analysis, picture processing, modeling, simulation, and data optimization, the system needs some components. GIS can improve comprehension of the ocean by organizing data spatially coupled with tabular or attribute data, and it simulates an ocean inside of a computer. GIS and RS methods have been applied to various types of analysis since the 1970s. Nowadays, it is more common to collect and analyze the SWQ Parameter using GIS and RS approaches (Ashikur et al. 2021). Remotely sensed datasets have the advantages of being updated more frequently and covering a broader area. As a result, we have synoptic and reliable data sets for integrated analysis (Y. H. Kim et al., 2020).

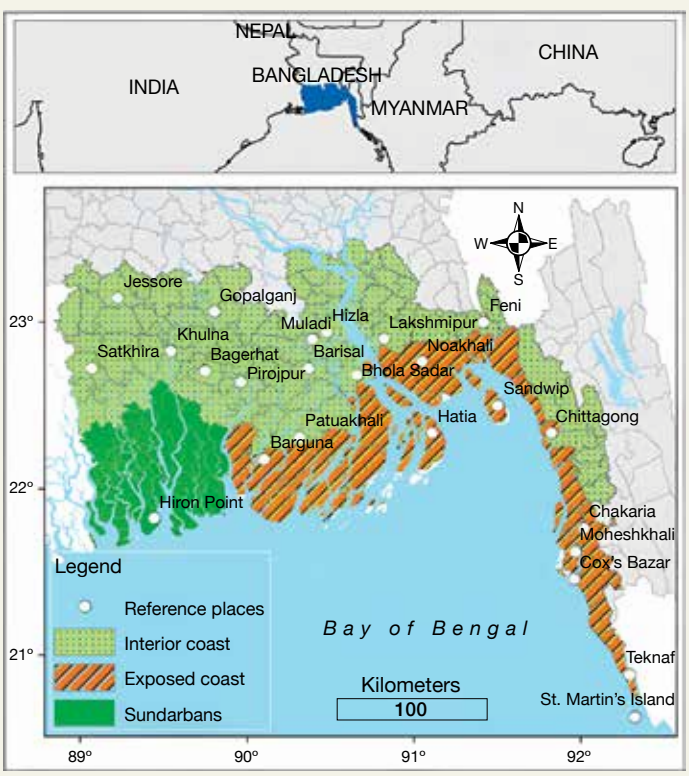


Fig. 1: Coastal region of Bangladesh. The figure shows the 19 coastal districts along with interior coasts, exposed coast and the BoB of Bangladesh (Sarwar, 2013)

By measuring the reflected and emitted radiation at a distance, generally from a satellite or airplane, remote sensing is a technique for identifying and keeping track of an area's physical properties (Fig. 3). Remotely sensed photos are captured by specialized cameras and help scientists "sense" the Earth and the ocean. Images of SWQ characteristics and physical features in the coastal region can be created using satellite cameras.

Data Description and Image Processing:

SChl, SSS, and TSS distribution and geographical and temporal fluctuation over the Winter and Summer seasons over a number of years can be investigated using Landsat imagery. To convert the pixel value into the reflectance value, certain techniques can be applied to the Landsat images. Radiometric corrections, also known as sun angle corrections, should be made in order to correct inaccurate reflectance values caused by the sun's location. A formula should be used to calculate the radiometric corrections. Radiometric calibration, radiometric correction, image cropping, and mapping the research region with its SWQ parameter will all be done using GIS and RS software.

Data from GIS and RS can be divided into global, regional, and local scales. A range of meteorological and non-meteorological services are provided by the world scale satellites. The medium resolution RS images, such as those from MODIS sensors and Landsat satellites, etc., are used to collect the regional scale data. The local scale satellites are typically employed for high-resolution surveillance in a constrained area. Multiple satellite platforms, including Landsat, SPOT, and others, have made multi-spectral and spatial data available, helping to provide details on numerous aspects of the coastal and marine environment. Diverse ocean color data from SeaWiFS, MODIS, and other sources provide details on biological features, and all data are divided into raster and vector categories. The Landsat band is displayed in Table 1 (Page 38) for various mapping purposes.

Data Analysis and Map Preparation:

The spatial analysis, statistical analysis, and consideration of the temporal analysis of the analyst's output data can all be carried out using GIS and RS methodologies. Plotting many stations allows for discussion of temporal changes in connection to the summer and winter seasons in various years for all station numbers. The RS and GIS software can be used to create spatial and temporal maps after the parameters have been analyzed (Table 2) (Page 39).

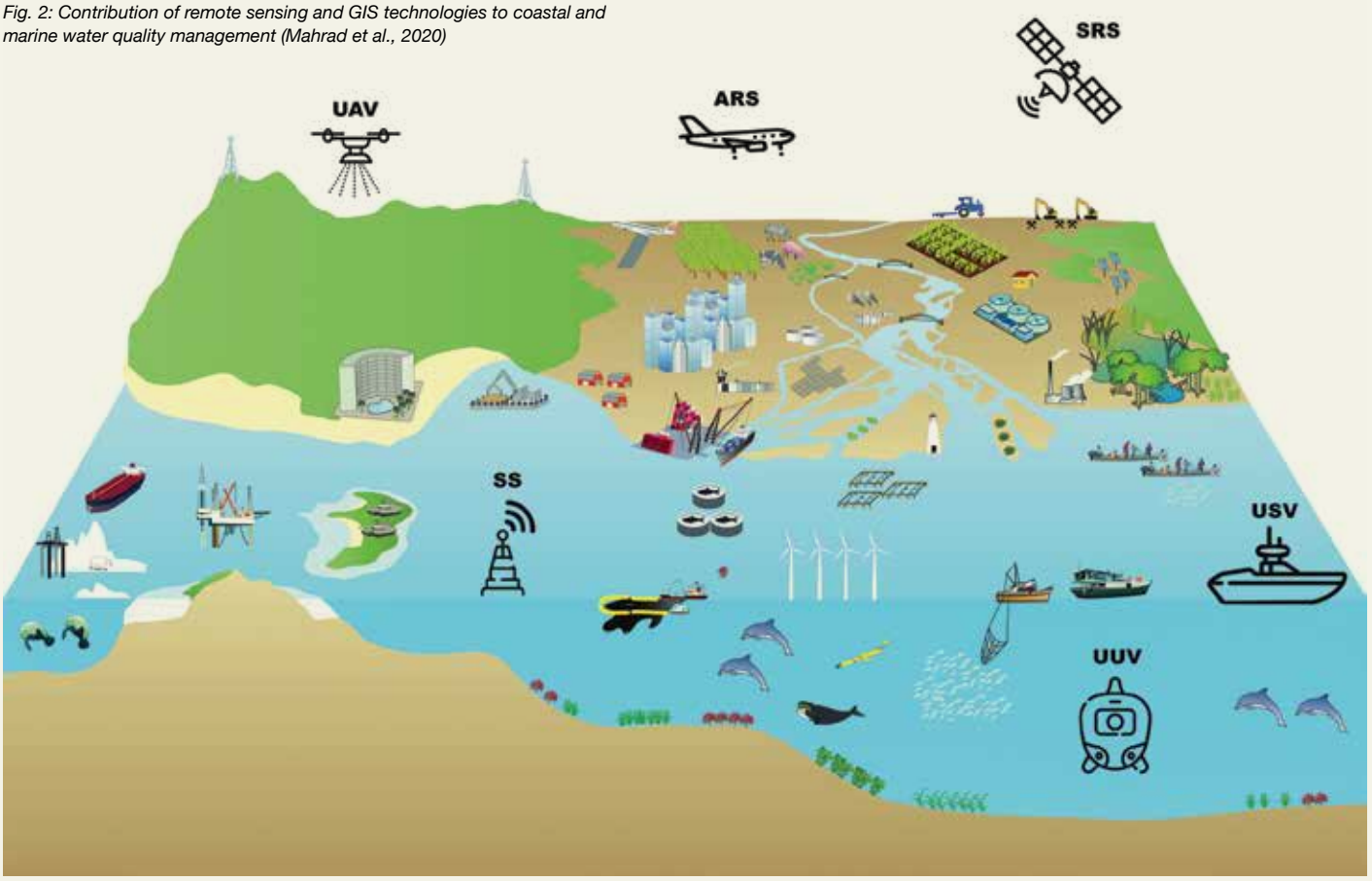
Contribution to the National Economy of Bangladesh

SWQ analysis can contribute to the national economy of Bangladesh in several ways:

Fisheries and Aquaculture: Bangladesh has a sizable fishing sector, and marine species' wellbeing and production are strongly impacted by the water's quality. The location and management of fish farms and shrimp hatcheries can be decided upon by the fisheries and aquaculture industries by using SWQ analysis. The development, survival, and overall productivity of fish and shrimp can all be improved by maintaining ideal water quality conditions.

Tourism and Hospitality: Coastal regions are popular with both domestic and foreign tourists in Bangladesh's expanding tourism

Fig. 2: Contribution of remote sensing and GIS technologies to coastal and marine water quality management (Mahrad et al., 2020)



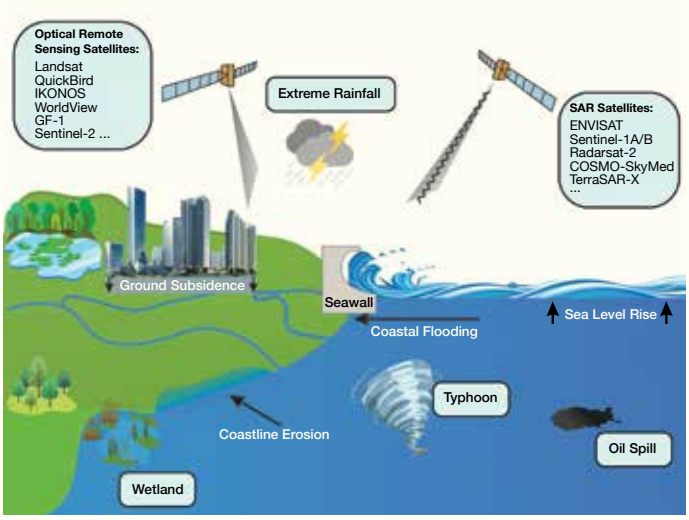


Fig. 3: Functions of satellite remote sensing in the coastal region. The figure shows the role of satellite remote sensing in exploitation of remote sensing technologies for the monitoring of coastal and river delta regions. (Zhao et al., 2022).

industry. SWQ analyses ensure that coastal waters are safe and maintained for recreational activities including swimming, surfing, and snorkeling. Accurate SWQ evaluation and monitoring can help to safeguard marine life, maintain the ecological balance, and maintain the natural beauty of coastal areas.

Industrial Development: For industries that use saltwater as a raw material or for cooling and processing, SWQ analysis is essential. To function effectively and sustainably, industries including refineries, thermal power plants, chemical production, and desalination facilities need high-quality water. Industries can apply suitable filtration and treatment procedures to guarantee the water fulfills the required criteria by assessing SWQ.

Environmental Protection: The effects of climate change, such as increasing sea levels, cyclones, and saline intrusion in coastal areas, are particularly dangerous for Bangladesh. Understanding the ecological health of marine habitats and spotting any indicators of pollution or contamination are made easier with the help of SWQ analysis. The impact on the ecosystem and marine life can be lessened by taking the proper action after identifying the sources of pollution.

In conclusion, research on SWQ is essential for the country of Bangladesh's fisheries, tourism, industrial, and environmental protection sectors. It promotes economic growth, employment, and sustainable development in the nation by assuring the security, sustainability, and productivity of coastal waters. According to this viewpoint, a crucial technological method to the analysis of the SWQ parameter is the GIS and RS technique.

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Table 1: Landsat 4-5 (TM), Landsat 7 (ETM+), and Landsat 8-9 (OLI-TIRS), Bands for mapping (USGS 2023)

Landsat-4-5	Landsat-7	Landsat-8-9	Band Description	Wavelength (µm)	Resolution (m)	Mapping
-	-	Band-1	Coastal aerosol	0.43-0.45	30	Coastal and aerosol studies
Band-1	Band-1	Band-2	Visible blue	0.45-0.51	30	Bathymetric and vegetation
Band-2	Band-2	Band-3	Visible green	0.53-0.59	30	Vegetation for assessing plant vigour
Band-3	Band-3	Band-4	Visible red	0.64-0.67	30	Vegetation slopes
Band-4	Band-4	Band-5	Near-infrared	0.85-0.88	30	Biomass content and shorelines
Band-5	Band-5	Band-6	Short wavelength infrared-1	1.57-1.65	30	Moisture content of soil and vegetation
Band-6	Band-6	-	Thermal Infrared	10.40-12.50	60 (30)	Thermal mapping and soil moisture
Band-7	Band-7	Band-7	Short wavelength infrared-2	2.11-2.29	60 (30)	Hydrothermal and mineral deposits
-	Band-8	Band-8	Panchromatic	0.50-0.68	15	Sharper image definition
-	-	Band-9	Cirrus	1.36-1.38	30	Cirrus cloud contamination
-	-	Band-10	Thermal Infrared-1	10.6-11.19	100	Thermal mapping and soil moisture
-	-	Band-11	Thermal Infrared-2	11.50-12.51	100	Thermal mapping and soil moisture

Table 2: Mathematical Algorithm Applied in GIS and RS System for SWQ parameter analysis (Updated 2023)

SL	Parameter	Algorithm
01	Sea Surface Chlorophyl	Log Chl = [2.41*(Red/Green)] + 0.187
02	Total Suspended Solid	TSS= 7.9038 * Exp (23.942 * Red)
03	Sea Surface Salinity	SSS= 29.983 + 165.047 (Blue) - 260.227 (Green) + 2.609 (Red)
04	Chemical Oxygen Demand	COD= 2.76 - 17.27 * (Blue) + 72.15 * (Green) - 12.11 * (Red)
05	Biological Oxygen Demand	BOD= 1.79 - 0.789 * Blue + 52.36 * Green + 3.28 * Red
06	Total Dissolved Solid	TDS= 171.139-88.528*(NIR)
07	Total Phosphorus	Ln (C_{TP})= 4.334 - 4.594 * (Blue / Green) + 1.103 * (NIR / SWIR)
08	Dissolved Oxygen	DO= -0.131xSST – 0.132xSST_{m-1} + 0.066xChl-a_{m-1} + 12.343
09	Potential of Hydrogen	PH= 11.987 + 422850000 * $(G)^{10}$ - 1263600000 * $(R)^{10}$ - 0.62664 * (1/NIR) + 0.052596 * (1/SWIR-1) + 0.016603 * $(1/NIR)^2$
10	Trophic State Index (TRIX)	10/12[($logM_{Chl-a}$+0.5) + ($logM_{DO}$+1) + ($logM_{TIN}$+0.5) + ($logM_{TP}$+0.5)]
11	Brightness Index	BI = Sqrt ($Green^2$ + NIR^2)
12	Colour Index	CI = (R–G)/(R+G)
13	Electrical Conductivity Predict	EC = 627.45 x $(NDSI)^2$ + 147.16 x (NDSI) + 9
14	Soil Salinity Predict	EC = 31.442–0.136×Z–0.113×SASI (Z elevation)
	Salinity Predict	Salinity = 12:53 + 1108.95 * NIR + 2.73 * NIR/R–717.86 * SI-2–295.7 * SAVI
15	Normalised Difference Salinity Index	NDSI = (Red – NIR)/ (Red + NIR)
16	Salinity Index-1	SI-1 = (Red * NIR) / Green
17	Soil Salinity Index-1	SSI-1 = Sqrt (Green × Red)
18	Soil Salinity Index-2	SSI-2 = 2×Green – (Red + NIR)
19	Soil Salinity Index-3	SSI-3 = Sqrt ($Green^2$ + Red^2)
20	Soil Salinity Index-4	SSI-4 = (Red – NIR)/(Red + NIR)
21	Soil Adjusted Salinity Index	SASI = Red/ (100 x $Blue^2$)
22	Vegetation Soil Salinity Index	VSSI = 2 * Green – NIR * (Red + NIR)
23	Intensity index 1	II-1 = (Green + Red) / 2
24	Intensity index 2	II-2 = (Green + Red + NIR) / 2
25	Normalised Difference Turbidity Index	NDTI = (Red - Green) / (Red + Green)
26	Bathymetry Calculation	Lyzenga model = Ln (Blue) / Ln (Green)
27	Land Surface Temperature	Lλ={(LMAX-LMIN)/(QCALMAX-QCALMIN)}*DN-1*LMIN BT={K2/ln(1+K2/K1)} LST_{0c}=BT-273
28	Normalised Difference Water Index	NDWI=(NIR-SWIR1)/(NIR+SWIR1)
29	Normalised Difference Vegetation Index	NDVI=(NIR-Red)/(NIR+Red)
30	Ratio Vegetation Index	RVI = NIR/Red
31	Soil Adjustment Vegetation Index	SAVI=(NIR-Red)/(NIR+Red+L)
32	Modified Normalised Difference Water Index	MNDWI = (Green - MIR)/ (Green + MIR)
33	Normalised Difference Buildup Index	NDBI=(SWIR1-NIR)/(SWIR1+NIR)
34	Enhance Bareness and Buildup Index	EBBI=(SWIR1-NIR)/(10√(SWIR1+TIRS1))
35	Contribution index	CI=Dt * S; Dt denoted the difference between the average temperature of the entire study area and the average temperature of each LULC type and S was the ratio of each LULC type to the entire study area

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