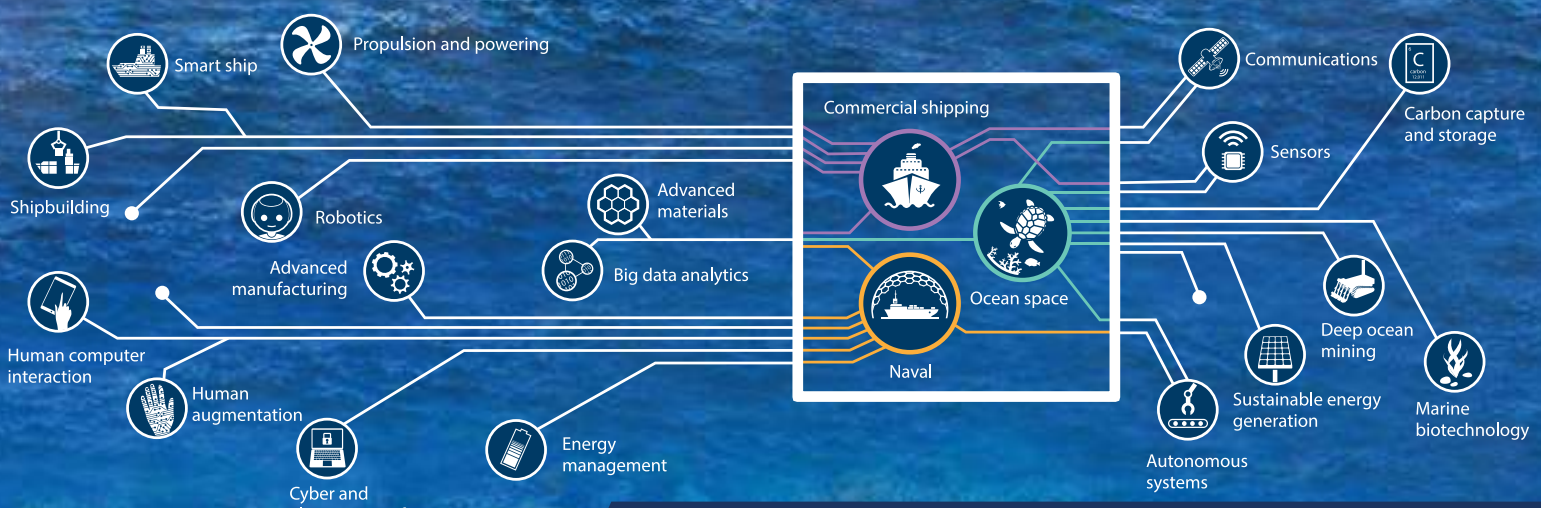
PAAL

Vol 04, Issue 02, July 2021

Marine Technologies : Revolutionizing Ocean Knowledge



A publication of
PATRONISED BY BANGLADESH NAVY
BIMRAD
Bangladesh Institute of Maritime Research and Development

Volume 04, Issue 02, July 2021

PAAL

A Publication of Bangladesh Institute of Maritime Research and Development

Patronised by Bangladesh Navy

Registered Under the Societies Registration Act XXI of 1860, No. S 12926/2018

Editorial Communique
Bangladesh Institute of Maritime Research and Development
Naval Headquarters Complex
Banani, Dhaka-1213

Tel: +8802 9835182, 9836141-9 Ext: 2395
Email addresses: office@bimradbd.org
office.bimrad@gmail.com
Web address : www.bimradbd.org
: www.paalbd.org

Editorial

Marine Technologies: Revolutionizing Ocean Knowledge

Why do we know more about the moon's surface than we do about our ocean floors? The main reason for our lack of direct observations of our ocean floor is technological. The surface of the earth or the moon is directly illuminated by light and radio waves. On the contrary, the deep ocean is completely dark. The intense pressure of the deep ocean and to see through water makes it challenging to explore. The mysteries of the ocean accumulated more when we get to know that it contains the largest mountain range on earth, canyons far grander than the Grand Canyon. That is why the ocean is still a mysterious domain for all of us. However, the advent of marine technologies in the 21st century is revolutionizing, and it's enabling us to open up ocean knowledge, though yet to go a long way. Exploration of the ocean to get the maximum benefit out of it directly involves the technology and the economic strength of a nation.

In the aftermath of Bangladesh's independence, the country was suffering from multitudes of challenges. The massive cost of rebuilding the country was draining the state resources. Amidst all the uncertainties, the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman, understood the crucial role of the maritime sector in national development. The territorial waters and maritime zones act 1974 was the symbol of Bangabandhu's efforts to reclaim Bangladesh's maritime legacy. Today, Bangladesh is again making a giant leap towards realizing Bangabandhu's dream. Major policies and initiatives have been taken to develop and restructure Bangladesh's maritime economy in a sustainable manner, a testament to the government's interest in integrating maritime sectors in the country's overall growth strategy.

The theme of this issue of PAAL is "*Marine Technologies: Revolutionizing Ocean Knowledge.*" The theme has been selected in the quest for knowledge in discovering the ocean and the growing use of sophisticated technologies in the ocean economy and maritime industries. The issue contains a number of articles and opinion pieces on the utility, implications and applications of technologies in maritime sectors. The issue's cover story articulates a general trend of various technologies that lead to ocean exploring and sustainable ocean uses of different marine sectors. Other articles concentrate on subjects such as model of future artificial intelligence-based maritime communication, submarine proliferation in Asia, focused action and policy adoption to achieve the benefit of blue economy, drone surveillance, optimum management of fishery resources through innovative technology, and so on. All the segments written in this issue have emphasized the growing integration of advanced technologies in the maritime economy. Apart from that, the issue accommodates other regular sections: BIMRAD Feats and Marine News. A feature article on Dockyard and Engineering Works Limited is included to give the readers a glimpse into the history and activities of one of the finest maritime institution in the country. Overall, the objective of the issue is to advance the role of technology in maritime policymaking.

Moreover, this issue of PAAL covers a unique story directly from coastal Bangladesh. Our coastal correspondent penned a special report on the impact of climate change in the coastal region. This issue also contains a special story on research collaboration between Bangladesh Navy and Bangladesh Oceanographic Research Institute (BORI).

We are confident that this issue of PAAL would fulfill our objective to impart new knowledge and perspectives to our readers. We also thank our readers for being with us in this troubling time of the pandemic. We wish everyone a safe and healthy life.

Your conscientious opinions and reviews will make our effort worthwhile.

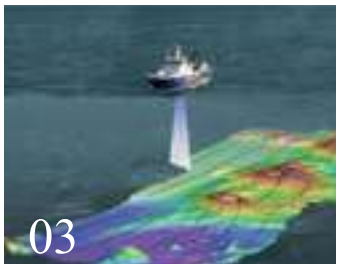
We always consider your opinions valuable and beneficial.

Thanking you
Editorial Board

"We not only want to protect our sea areas, but also use marine resources so that we can achieve economic prosperity. We've adopted the concept of Blue Economy and keep working on it."

- Hon'ble Prime Minister Sheikh Hasina

In this issue...



Cover Story

Articles/ Features

Marine Technologies: Revolutionizing Ocean Knowledge

Captain M Minarul Hoque, (H), BCGM, psc, BN

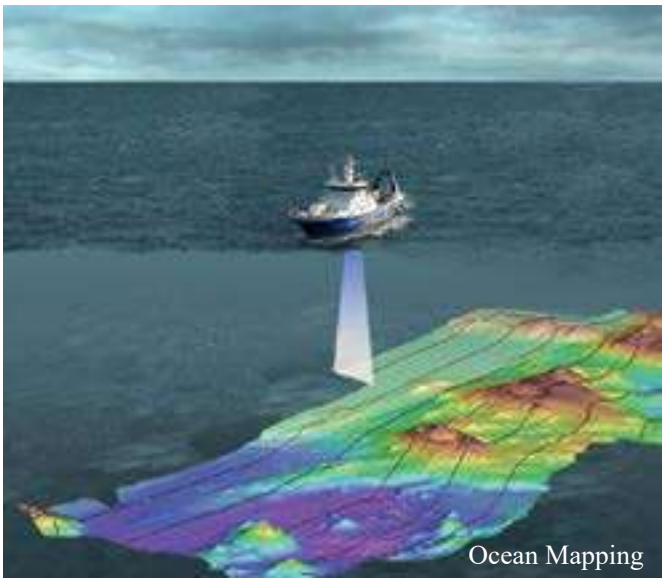
Introduction

Throughout history, humans have been directly or indirectly influenced by the oceans. Ocean waters serve as a source of food, rich minerals and a massive highway for commerce and transportation. The oceans cover over 70% of the earth's surface and support the greatest biodiversity on the planet. Oceans are also one of the largest carbon reservoirs in the Earth System, holding up to 54 times more carbon than the atmosphere. Scientists have successfully snapped a black hole, landed rovers on Mars, and sent spacecraft to the moon's dark side. Yet, one of the most unexplored realms is within our planet, and that is the Ocean. The intense pressures in the deep ocean make it extremely difficult to explore. However, marine technology development is accelerating and will continue to do so in the future, which will pave the way to understand the ocean more. Today's technologies allow us to explore the ocean in increasingly organized, scientific, and non-invasive ways. With increasing scientific and technical advancements, our ability to observe the ocean ecosystem and its inhabitants are allowing us to understand and appreciate this unknown region better than ever before.

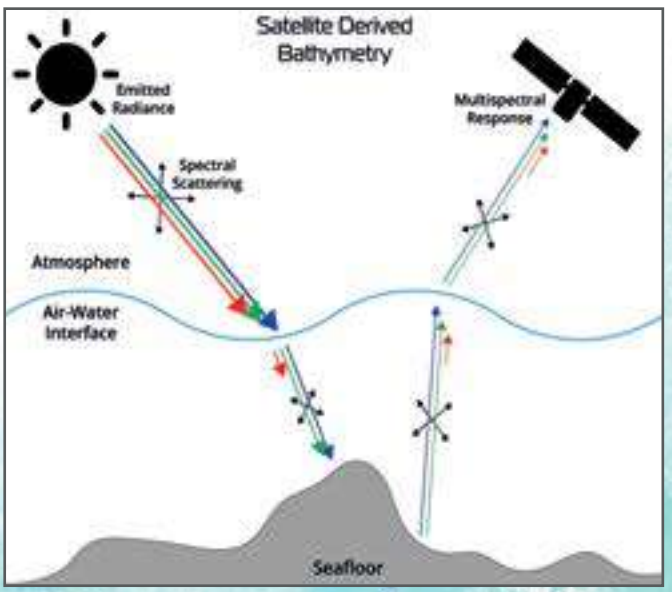
Exploring the Oceans

More than 80% of our ocean is unmapped, unobserved, and unexplored. The ocean is the lifeblood of Earth, covering the maximum area of the planet's surface. We need to gather more and more data about the ecosystem, biodiversity and bathymetry of those bodies. A coordinated international effort is needed to bring together all existing data sets and identify areas for future surveys. Such an initiative is Seabed 2030. It is a collaborative project between the Nippon Foundation of Japan and the General Bathymetric Chart of the Oceans (GEBCO). Its goal is to compile all available bathymetric data and make the definitive map of the world ocean floor available to everyone by 2030.

Mapping water depths dates back to Egyptian methods from 1800 BC. However, the last 100–150 years have seen enormous advancements in the technologies and methodologies to map water bodies. Advances in Multi-beam Echo Sounders, Sonar technology, have revolutionized human understanding of the seafloor, with immense benefits to navigation, resource mapping, and fisheries.


Ocean Mapping

Ocean monitoring and observations have become easier as several ground-breaking technologies emerged in this field. Many of the coastal areas are too remote or too dangerous for survey ships to ply. To gather bathymetric information on such areas, satellites are used and it is known as *Satellite*



Derived Bathymetry (SDB). It is the most recently developed method of surveying shallow waters. SDB relates the surface reflectance of shallow coastal waters to the depth of the water column. It can be used as a reconnaissance tool for planned bathymetric surveys as well as to fill gaps in existing survey data coverage. In certain situations, SDB is a more viable option than traditional methods for surveying coastal environments.

To identify hazards to navigation, i.e. rocks, wrecks, shoals and underwater structures, several technologies have been developed. They not only help to make navigation safer but also assist in understanding the evolution of the marine environment, movement of water and sediment with archaeological values. One such technology is *Synthetic Aperture Sonar (SAS)*. It is an emerging type of Sonar that uses an artificial or synthetic array to capture high-resolution images. SAS can be used for imaging cultural heritage sites like shipwrecks, classifying habitat or biological organisms, and characterizing seafloor sediment makeup.

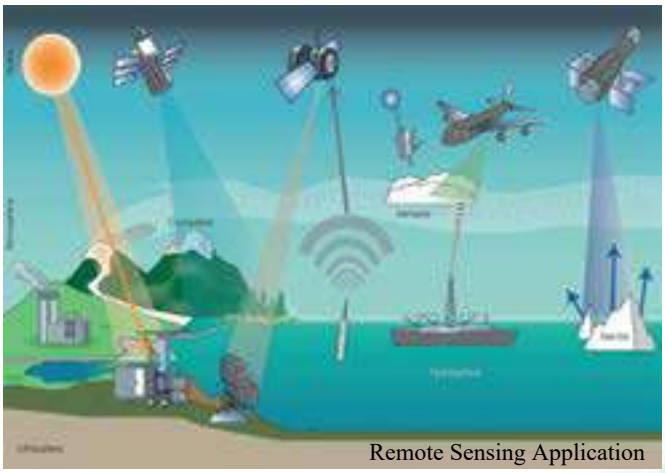
Autonomous technologies are also being developed to fill the gaps of survey coverage of the oceans quickly. *Autonomous Vessels* are being tested in civilian, military and hydrographic sectors. A fleet of Autonomous Hydrographic Survey vessels can be extremely helpful to reduce the gap in bathymetric coverage of the world's oceans.

Oceanography, also known as oceanology, is the study of the physical, geological, chemical, biological and environmental aspects of the ocean. It is an important science, which covers a wide range of topics, including ecosystem dynamics, ocean currents, waves, and geophysical fluid dynamics, plate tectonics and the geology of the seafloor; and fluxes of various chemical substances and physical properties within the ocean and across its boundaries. Since the earth's water bodies are far greater than landmass, the oceans also play a significant role in the global climate. So, oceanography inextricably links with

ASIMET Buoy

Meteorology. No single nation or technology is capable of observing or understanding the vast oceans or global climate alone. A large array of systems and technologies has been developed to monitor the global phenomenon of oceanography and meteorology around the world oceans. Newer, better connected and intelligent technologies are enabling stand-off observations of the world's ocean environment around the year. Few examples of such global observational technologies are ARGO buoys, Air-Sea Interaction Meteorology System (ASIMET), Geostationary Satellites & Observatories etc.

Remote Sensing (RS) has become an essential tool for the management of the marine environment. Researchers are able to use satellite data to assist in mapping out marine regions, including sea grasses, corals, mangroves, wetlands, and even shallow benthic environments. Satellite data currently enable the researchers to determine significant wave height, ocean currents, change in the marine environment and ecosystem. *Geographic Information System (GIS)* technology has made it possible to organize and integrate this data, produce maps, and conduct scientific analysis in order to improve our understanding and assist us in making vital decisions.



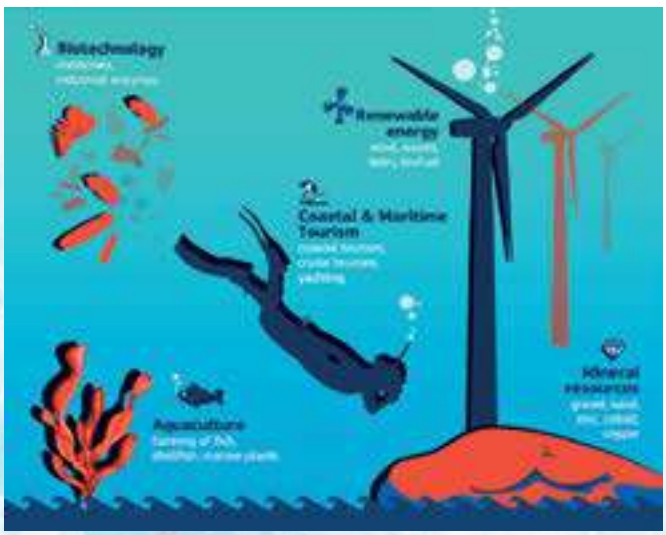
Remote Sensing Application

The deep ocean domain is complex in nature. So far, we have learned about our planet's underwater habitats through the use of satellites, shipboard sensors and divers. These technologies scratch only the surface of the oceans. Over the last few decades, scientists have developed *Submersible/ROV* technologies capable of meeting the many challenges that the deep sea imposes upon explorers. It allows us to dive to depths where utter darkness, crushing pressures, and freezing temperatures prohibit Self-Contained Underwater Breathing Apparatus (SCUBA) operations. Submersibles alone enable us to explore the abyssal depths and contribute a significant portion of oceanography, especially marine biology and marine geology.


Submersible

Using the Oceans Sustainably

Oceans are vast reservoirs of food, energy, and other resources, representing a unique opportunity for innovations in pharmaceuticals, the development of industries, and sustainable solutions. As such *Marine Biotechnology* seeks to harness the ocean's vast potential with the application of modern technological tools. However, we must use the technologies with particular consideration for preserving and nurturing the marine ecosystems. The consequences of disturbing the fragile maritime environment will last longer and will be detrimental to our planet's existence. Marine biotechnology enables us to identify, extract and use applications in various sectors to benefit society, ranging from food/feed to pharmaceutical and biomedical industries. This sector of the ocean space industry is expected to grow about 10% per annum in the coming years.



Marine Resource Exploration and Exploitation is basically focused on the search for hydrocarbons. Apart from traditional oil and gas industries, new sources of mineral resources are being sought from the oceans. Technologies used to explore the ocean include submersibles, remotely operated vehicles (ROVs), diving/scuba gear, buoys, mega corers, water column samplers, and sonar for mapping. With the latest high-resolution geophysical exploration technology, scientists are now able to detect oil and gas deposits in the seabed and other geological layers to a depth of 12 kilometers. As a consequence, in recent years, numerous substantial new deposits have been discovered or newly surveyed.

Technology still lacks in regards to the viable use of *Deep Ocean Mining* mineral deposits. Deep-sea mining addresses the recovery of resources from the ocean floor for commercial purposes. Offshore operations involves the extraction of minerals such as nickel, cobalt, zinc, copper, silver, gold, and manganese nodules using specialized subsea equipment. Advances in offshore and underwater technologies such as the use of autonomous systems, deep-sea vehicles, cutters and collectors etc. will enable the economic harvest of valuable minerals from the ocean floor in near future.

We all are aware of the hazards of fossil fuel. Fossil fuels (coal, oil, natural gas, gasoline) are polluting the environment and have serious long-term consequences for the earth like sea levels rising, acidification of the oceans, and frequent storms. The world needs a cleaner, renewable form of energy or Green Energy. The rapid deployment of renewable energy includes advancing economic development, improving energy security, enhancing energy access and mitigating climate change. The ocean is a vast source of *Marine Energy*. The ocean waves, currents, tides, salinity, and temperature differences can be used to generate electricity to power homes, transport and industries. Several potentially viable ocean-based alternative energy technologies are in use or will be used in the near future to lessen the dependency on fossil energy.

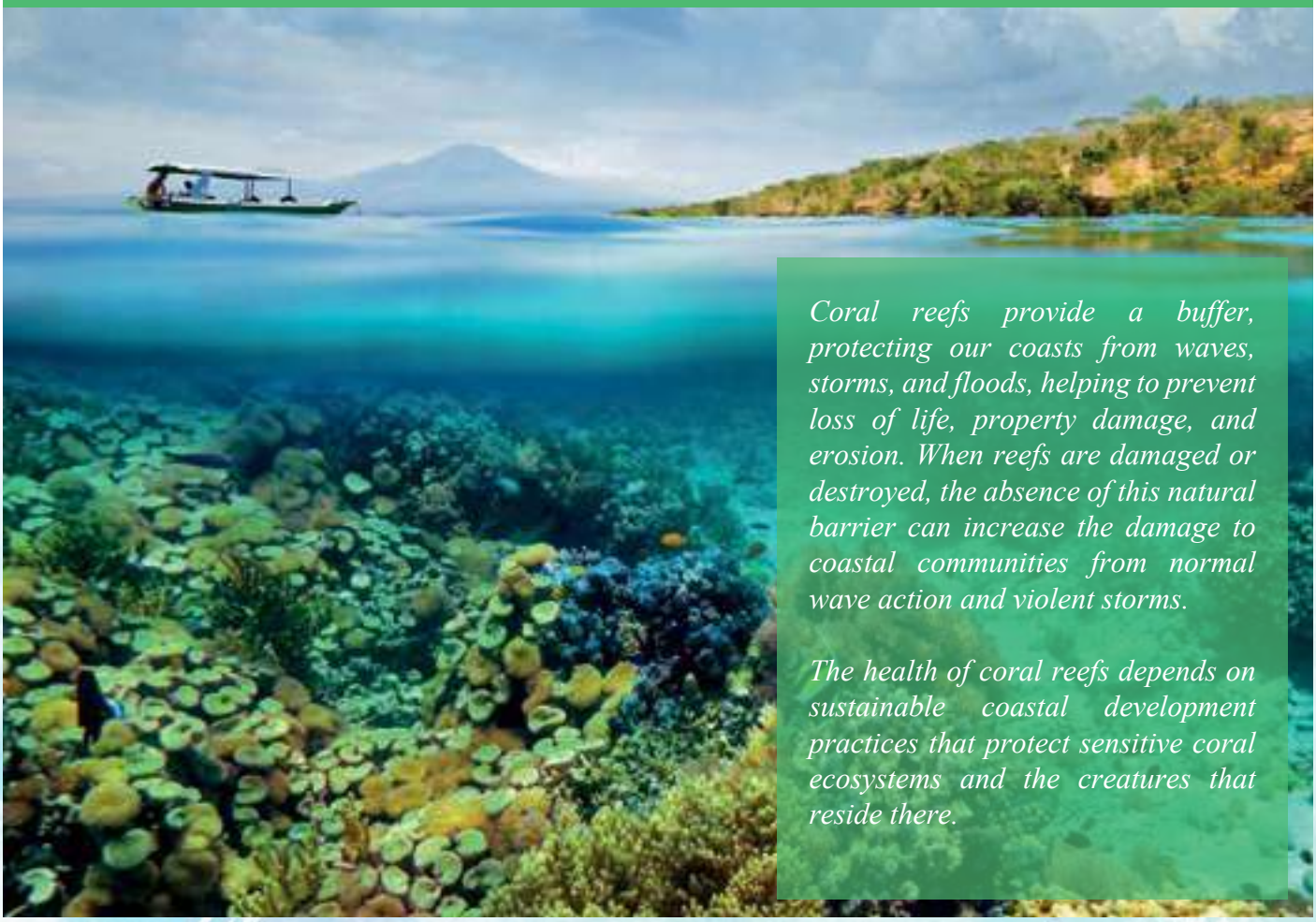
As the world economy continues to expand, the coming digital revolution will help the shipping sector to meet future challenges. So, what will ships look like in the next 30 years? The Global Maritime Technology Trends 2030 identified the eight transformational technologies - *Advanced Materials, Big Data Analytics, Robotics, Sensors, Propulsion and Powering, Communications, Shipbuilding,* and *Smart Ships* which will have a profound impact on ship system design and operation in the next 15 years. Maritime shipping is well expected to remain as the primary means of trade transportation in the foreseeable future, and situational awareness systems are being developed for mariners to augment navigational safety and reduce crew fatigue.

Conclusion

The world is in the midst of a global technology revolution. Advances in computer and information technology, as well as advances in marine technology and other fields, have been growing in recent decades, with the potential to bring about significant transformations in all aspects of life. Today's technology allows us to investigate the ocean in a scientific and sustainable manner. With continuing scientific and technological advances, we are now better equipped to observe the ocean environment and its residents. As per the UN's Sustainable Development Goals 14 (SDGs 14), governments have agreed on an ambitious global agenda, i.e. conserve and sustainably use the oceans, seas and marine resources for sustainable development. SDG 14 sets out a wide-ranging set of targets for better stewardship of ocean resources – to prevent and reduce marine pollution; sustainable management and protection of marine and coastal ecosystems; address the impacts of ocean acidification; regulate harvesting and end overfishing, IUU fishing and destructive fishing practices; conserve coastal and marine areas etc. Technologies can help to solve the environmental challenges and to improve operational efficiency in the maritime world of the 21st century. There is an increasing need to develop sustainable technologies for ocean space exploration, exploitation and conservation. Therefore, we must continue to develop environment-friendly marine technologies to explore and use the oceans for the existence of our planet. We must not forget, the ocean is important for the entire human race and we must emphasize its use only for the benefit of mankind.

Writer: Captain M Minarul Hoque, (H), BCGM, psc, BN is the Director General of BIMRAD.

How do Coral Reefs Protect Lives and Property?



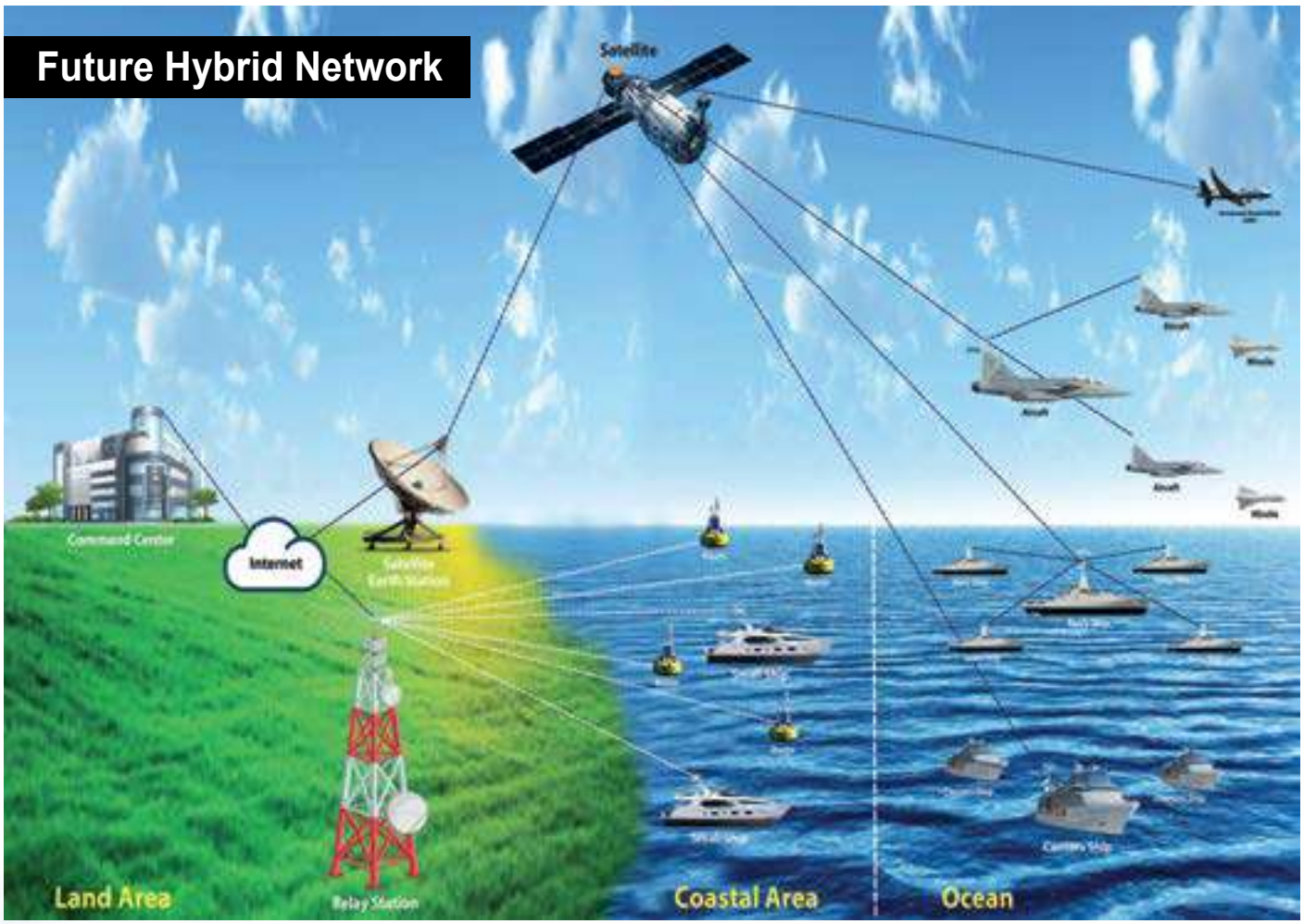
Coral reefs provide a buffer, protecting our coasts from waves, storms, and floods, helping to prevent loss of life, property damage, and erosion. When reefs are damaged or destroyed, the absence of this natural barrier can increase the damage to coastal communities from normal wave action and violent storms.

The health of coral reefs depends on sustainable coastal development practices that protect sensitive coral ecosystems and the creatures that reside there.

Article

Modern Maritime Communication Augmenting Maritime Operations and Resource Explorations

Commander M Rasheduzzaman Rashed, (L), BN



Introduction

Every aspect of our lives is becoming dominated by technology, and new technology offers a simple, quick, informative, intelligent, and effective solution. Maritime operations, such as maritime communication, dynamic integration, resource exploration, maritime trade & shipping, navigation, environment monitoring, disaster management, surveillance, search & rescue, ocean mapping, climate change impact, and many others, are all being shaped by rising tides of maritime technology. The recent changing geopolitical and geo-economic aspects of the maritime security & surveillance environment are even more complex. Threats become covert and more dynamic. Ensuring maritime security is an essential enabler for optimum exploration of blue opportunity, economic stability and growth of a coastal nation. For assuring marine security, operation, resource exploration, and dynamic integration, high-speed, wideband, reliable, accurate, full coverage sensor centric communication network, data fusion & processing, artificial intelligence, and real-time robust video communication become dominating factors.

The radio-based ship-to-ship and ship-to-shore communication is limited only to the target group with a narrow frequency band. Satellite-based marine communication is very costly and limited to voice calls, data services for satellite email & internet access, weather and

oceanographic data access for navigation, GMDSS, Inmarsat C, satellite phone, fishing and emergency services. However, currently, ships are also using satellite vessel tracking services like Personal Locator Beacons, and more recently, satellite emergency notification devices like SPOT and DeLorme InReach on a limited scale. Satellite communication services are currently limited to emergency service and low bandwidth only due to high cost. To satisfy the impending maritime needs, communication must be wideband, high speed, robust, accurate, and low cost. These kinds of trend-setting maritime communication models are still in the works. As a result, this article will offer a hybrid marine communication architecture that will enable a smart, intelligent, high-speed communication solution to support safe and efficient maritime operations and resource explorations.

History of Maritime Communication

In old age, marine communications were limited to the semaphore and flashing services only. The first telegraphic Morse code messages were passed in 1844 between Washington and Baltimore. However, by the 1890s practical wireless sets were built by Marconi. British Admiralty purchased 50 sets of Marconi's products and installed 42 sets on-board ships and eight sets at shore stations from Dover to Scilly Islands. British Admiralty required to communicate simultaneously with a large number of ships spread over the worldwide oceanic area. By the end of the 19th Century, the British Empire owned over 60% of intercontinental radio communication service. The first significant contribution of marine radio communication was the rescue operation of the RMS Republic in 1909, where 1,500 lives were saved. In addition to the rescue operation of the RMS Republic, the rescue operation of the RMS Titanic in 1912 brought the field of marine radio to public consciousness.

Present Trend of Maritime Communication

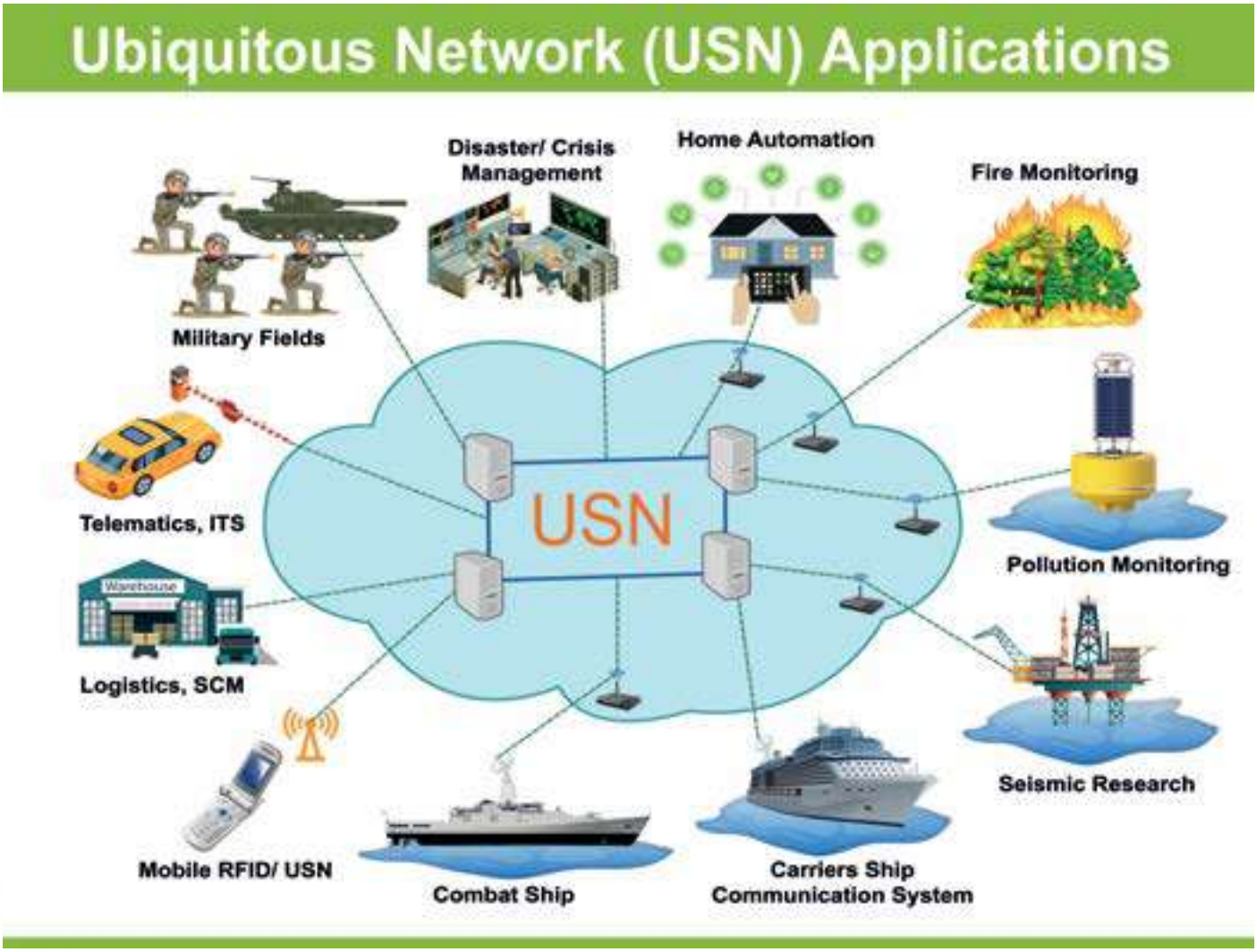
Currently, diversified maritime communications are being used by maritime stakeholders. Legacy voice, data and encrypted message communication from ship-to-ship and ship-to-shore through on-board radio sets and VSAT supported communication are the primary means of maritime communication. Geo-positioning and navigation of the vessel through Electronic Chart Display and Information System (ECDIS) and Global Positioning System (GPS), Automatic Identification System (AIS), Long Range Identification and Tracking (LRIT), Maritime Mobile Service (MMS), Vessel Traffic Schemes (VTS), VHF Data Exchange System (VDES) support the safe navigation and monitoring. Resource explorations, oceanographic data transfer, pollution monitoring, ocean floor mapping, surveillance, disaster communication, search and rescue, port security, and storing, accessing, managing, and disseminating environmental data and information are all possible with maritime communication. The use of Information Technology (IT) in communication has cleared the road for electronic devices to be used in a variety of applications.

Future Trend in Maritime Communication

Maritime communication will be more widely used to enhance maritime security through long-range Vessel Traffic Management System (VTMS), AIS and maritime surveillance. It will enable the ships to navigate accurately and safely using electronic Navigation (eNAV) system, artificial intelligence and other navigation devices. Moreover, in future, wideband maritime communication will facilitate the resource exploration, seismic survey and real-time hydrographic data transfer to the shore/ on-board ships laboratory for further data processing. The fisheries department will be able to track the fishing vessel and monitor whether they are fishing in the authorised area or not. The system will offer to monitor the performance of the equipment and devices on-board ships from a remote location, and even maintenance supervision can be conducted remotely by the manufacturer expertise. The network-centric communication system will provide high-quality real-time video, voice, and data communication to Maritime Headquarters and Command ships, as well as other law-enforcement agencies, to allow for enhanced assessment and decision-making.

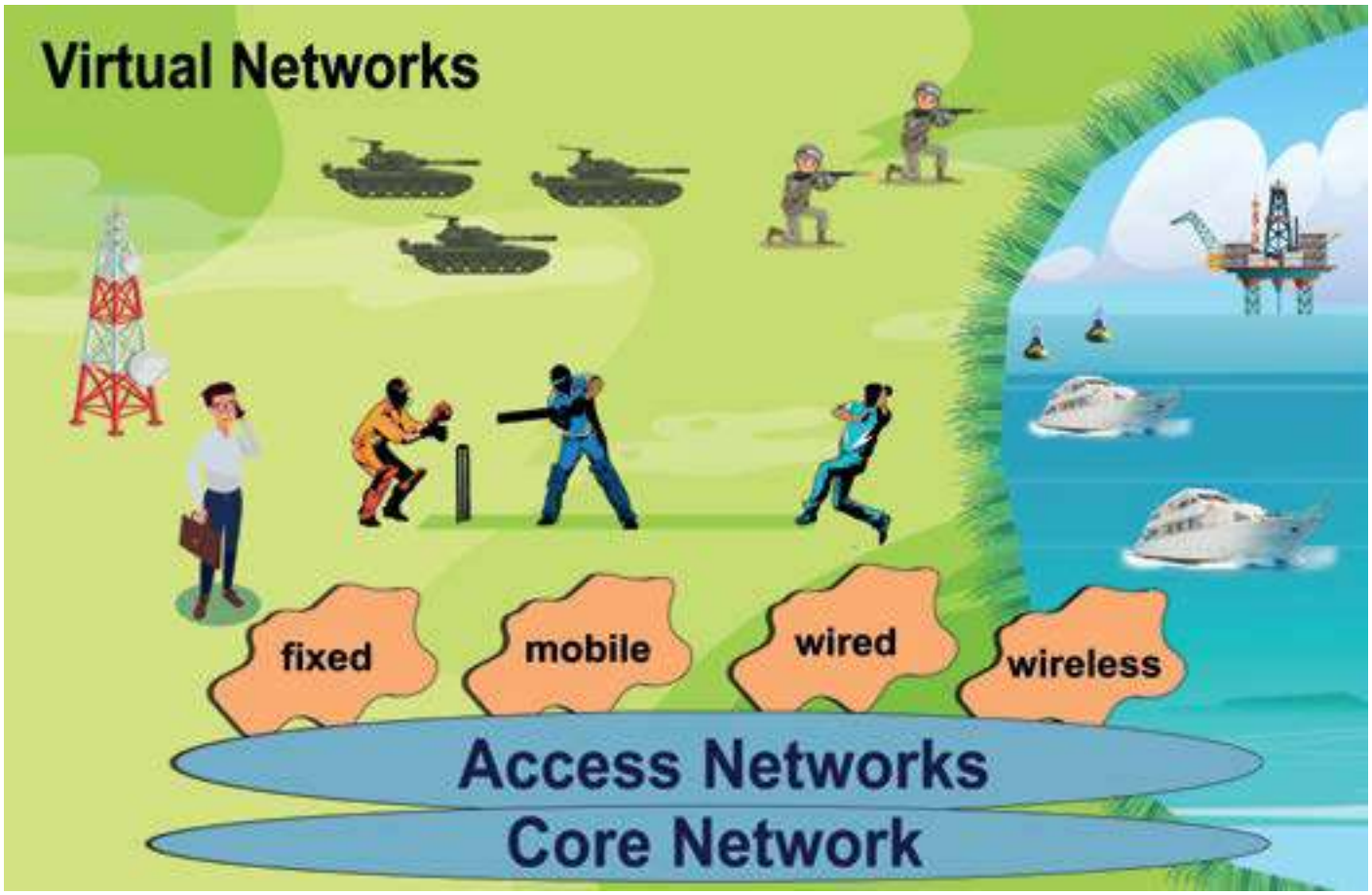
Proposed Maritime Communication Architecture

We require a durable, high-quality, integrated, secure, and cost-effective communication system to augment diversified marine communication. The communication architecture will be hybrid with combinations of both terrestrial and satellite communication. However, the current static frequency allocation schemes cannot accommodate the requirement of higher data rate devices. So, we need a system that will dynamically sense, measure, and learn the environment and intelligently allocate available networks, bandwidth, frequency, power, and modulation. This intelligent radio system is called Software Defined Radio Network (SDRN), and the more recent version is known as Cognitive Radio Network (CRN) which is especially helpful for disaster communication and military operations on foreign soil.



Future communication will be ubiquitous, meaning network for any devices, anywhere, anytime. The system will interface several access networks with one core network to enable the Internet of Things (IoT) facilities. The upcoming 5G internet facility will also strengthen connectivity and cybersecurity for shipping companies and vessels. It will facilitate vessels and autonomous ships with low latency connectivity for a remote operation like search and rescue.

Now, let's focus on satellite communication. Earth stations are a vital element in any satellite communication network. The function of an earth station is to receive a signal from or transmit information to the satellite network in the most reliable manner maintaining high signal quality through both Ground Earth Station (GES) and Earth Station on-board Vessels (ESVs). The fixed band satellite signal, received by the ground earth station, can cover the coastal area through a terrestrial transceiver fitted with a tower near the coast. ESVs offers Fixed Satellite Service (FSS) frequencies on various large vessels such as passenger ships, seismic research and petroleum exploration ships, naval ships, aircraft, oil and gas drilling platforms for the exchange of high-speed data essential to their operations. An ESV utilises an extremely reliable stabilised platform and proven Very Small Aperture Terminal (VSAT) technology. The vessel fitted with ESV can also share its communication network with the surrounding target group for high-speed communication, including remotely control the weapons launched from on-board ships/ aircraft for homing the target. The launch of Bangladesh's first communication satellite, Bangabandhu-1, has created numerous options for vessels travelling across the country's seas and rivers to be connected to the internet. The interconnection is projected to assist Bangladesh's inland river ports, ferry terminals, and other riverside establishments. The link is supposed to aid the vessels in avoiding mishaps while also allowing crew members to surf the web, watch television, and engage in other communications activities.



Likely Challenges

The prime challenge will be designing hardware to attain the desired high speed, wide operating range, high quality, secured communication and cost-effective service to meet the future diversified maritime communication demand. The system will require very high-speed processors to process the wideband signal and need a special antenna to cover an extended operating range. Moreover, the future trend of cooperative sensing, signal fusion and intelligence decision for accurate and interference-free high-quality signals will be a real challenge. The communication will also be challenging to maintain security from cyber-attack or attack from any malicious user due to the wide range of diversified use. It will be a real challenge to protect the communication system from a malicious user who can modify its air interface to mimic the system or user. Of course, it will also be a challenging task to offer low-cost service maintaining quality.

Conclusion

Technology is dominating every aspect of our daily life. Similarly, intelligent and electronic devices incorporated diversified use of marine technology that touched the entire gamut of the maritime domain. Artificial intelligence-based smart navigation, crew recreation, port security, vessel and cargo tracking, sensor-based communication network for pollution monitoring, hydrographic real-time data analysis, resources exploration, fish stock assessment, and surveillance have all made marine life easier and faster. Real-time high-quality video link from warship to ship/shore command-and-control station will also enable remote naval operation, including online monitoring of the status of the equipment and condition of crew members. We require a high-speed, wideband, secure, low-cost hybrid communication infrastructure to serve all of these smart communication needs. Future communication could be supported by Software-Defined Radio, IoT under 5G network support, terrestrial, and satellite communication. However, we anticipate significant difficulties in building hardware for broad data sensing, acquisition, online transmission, analysis, and subsequent best decision. We eagerly anticipate Bangladesh's efforts to create modern marine communication in order to safeguard maritime security and maximise resource exploration.

Writer: Commander M Rasheduzzaman Rashed, (L), BN is the Research Director (Science & Technology) of BIMRAD.

BIMRAD

বাংলাদেশ ইন্সটিটিউট অফ মেরিটাইম রিসার্চ এন্ড ডেভেলপমেন্ট

Bangladesh Institute of Maritime Research and Development

Home of MaritimeThink Tank

PAAL Online Edition: www.paalbd.org

Article

Submarine Arms Proliferation in Asia

Commodore Mohammad Abdur Razzak, NUP, ndc, psc, BN (retd)

In 1981-1982, eight Asian countries had 147 submarines in their naval inventories. Out of 147 submarines, 144 were conventional, coastal and mini-submarines and 3 were nuclear attack submarines.

In four decades since 1981, the number of countries with submarine arms rose to fifteen. They together operate a total of 290 submarines. Out of 290 submarines, 20 are nuclear submarines, 180 are conventional and 90 are coastal and mini-submarines.

Out of the 20 nuclear submarines, People's Liberation Army Navy (PLAN) accounts for eighteen submarines (90%) and Indian Navy (IN) 2 (10%). In the conventional submarine category PLAN operates 76 (42%) of Asia's conventional submarine force. South Korean Navy (ROKN) operates 24 subs (13%), Japan Maritime Self Defence Force (JMSDF) and North Korean Navy 20 subs each (11%) and IN operates 15 subs (8%). North Korea is the major user of coastal/mini submarines (60) followed by Iran (27) and Pakistan (3).

In the regional context, only Indonesia in South East Asia (SEA) had submarine arms with two boats in 1981-1982. Indonesian Navy's submarine arms began with one Whiskey Class submarine in 1960. Currently, the navy operates four diesel-electric submarines. Three more boats are expected to join the navy by 2024. Out of ten SEA countries, currently five (Vietnam, Malaysia, Singapore, Myanmar and Indonesia) have conventional submarines.

Vietnam has a submarine fleet of six Kilo-class submarines. These can carry anti-ship torpedoes and missiles and land attack missiles. Vietnam's Prime Minister said in 2017 that the submarine acquisition was neither a race nor a threat to regional countries but to increase the capability of protecting its waters and islands. Six subs together provide coverage to Vietnam's east coast and offshore islands.

Royal Malaysian Navy (RMN) inducted submarines in 2009 with two Scorpène Class attack submarines from France. Weapon systems include anti-ship missile and torpedo. The

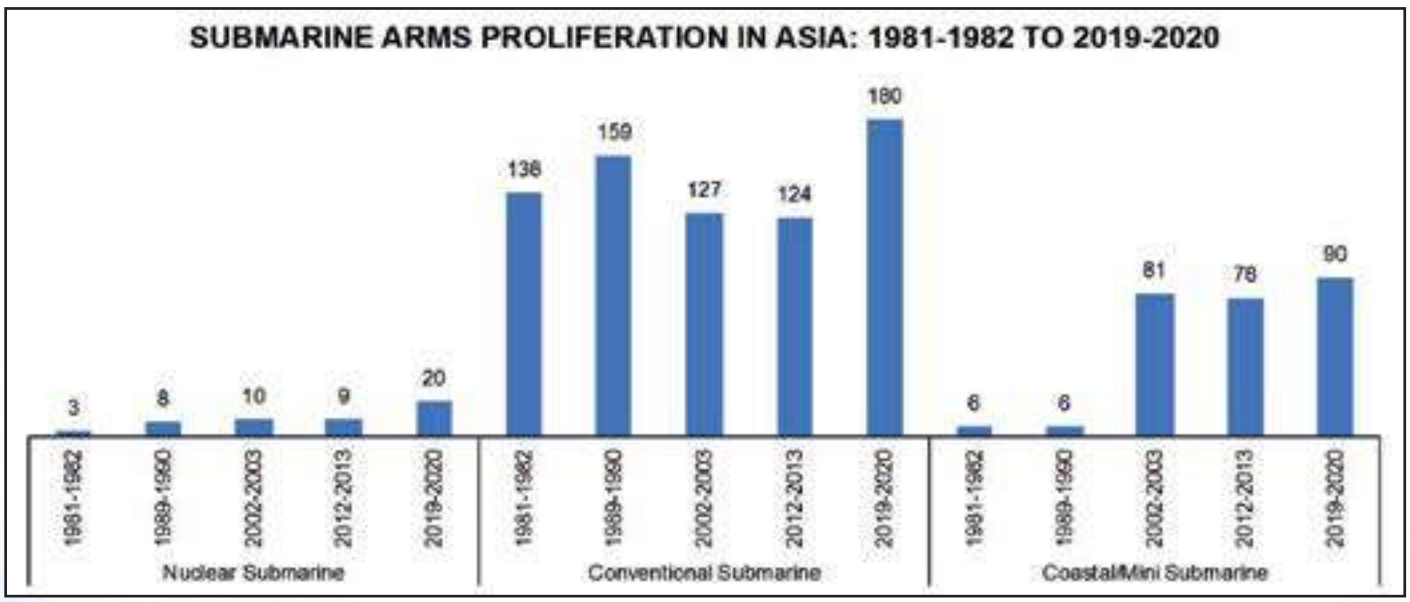
Chief of the RMN announced in 2018 the plan to procure two more submarines as part of its Transformation Plan 2040. According to the RMN Chief, these submarines will be beneficial in protecting maritime claims and security in the South China Sea.

The Republic of Singapore Navy (RSN) has acquired four boats from Sweden between 2001 and 2013. Two Challenger-class subs weapon system include wire-guided torpedo and two Archer-class includes WASS Black Shark heavyweight torpedoes. Two more submarines are expected to join RSN by 2024. Myanmar is the latest SEA country to commission one submarine on 24 December 2020. It has a plan to have a fleet of three submarines by 2030. Taiwan in the SEA region operates four submarines.

Out of five maritime countries in South Asia, three possesses submarine arm. Pakistan Navy (PN) acquired its first submarine from the USA in 1964. In 1981-1982 PN had six submarines but currently operates five diesel-electric

IN currently operates fifteen diesel-electric and two nuclear submarines. Nuclear submarines include one Ballistic Missile Submarine (SSBN) and one Nuclear Powered Attack Submarine (SSN). India conceived the idea of a nuclear submarine in the 1960s. India in 1988 took INS CHAKRA-I (Akula II class nuclear submarine) on ten years lease from the former USSR to gain operating experience. Indian Navy, in collaboration with France's Naval Group, is building six new Scorpène-class submarine at the Mazagon Dock Ltd. (MDL).

India has also a couple of programmes to upgrade its existing submarine fleet. ARIHANT's sister boat ARIGHAT was launched in 2017 and expected to join the navy in 2021/2022. IN signed another 10 year lease contract with Russia for CHAKRA-III to join the navy in 2025. IN's strategic naval development programmes like nuclear submarine and aircraft carrier have been suffering from *'policy, financial and technology deficits'* which have persistently kept the gap between desire and practicality.

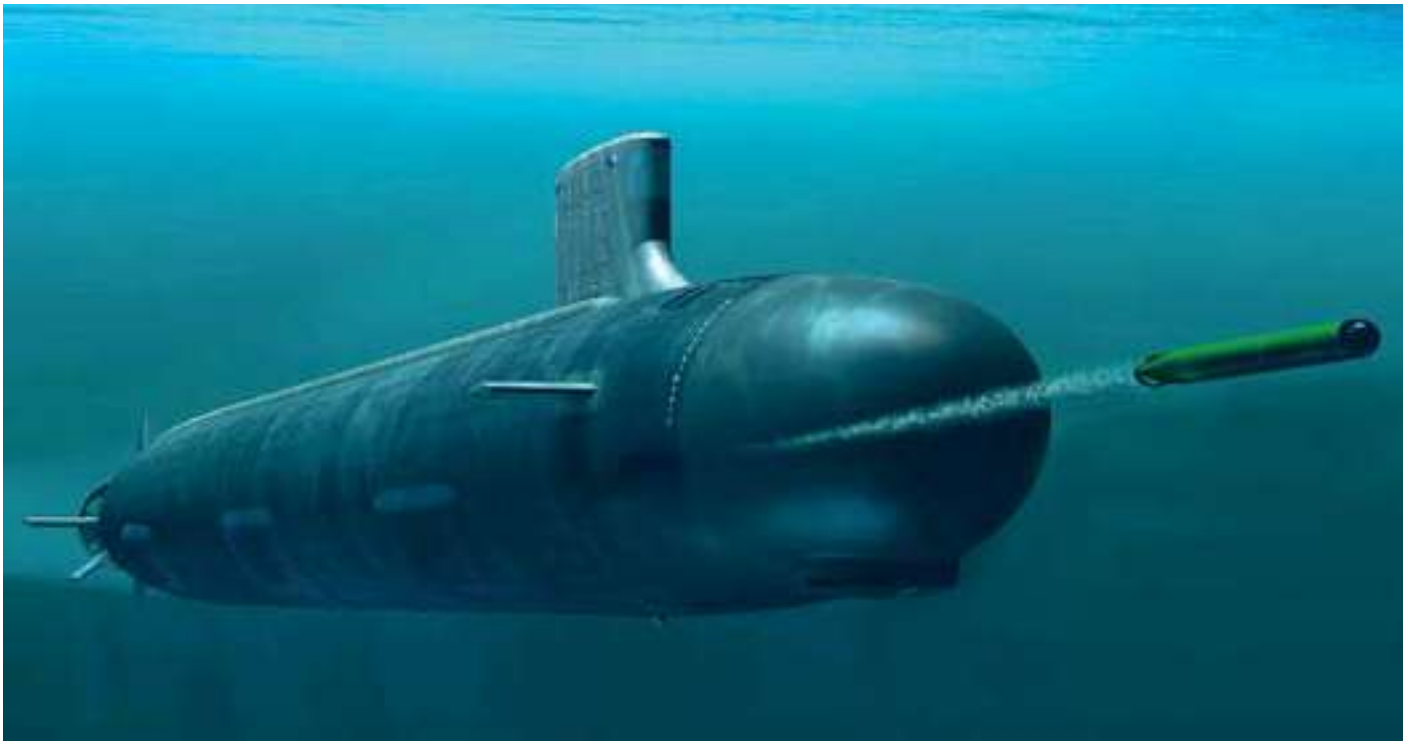


submarines and three mini-submarines. Pakistan signed a contract worth USD 5 billion credit scheme with China to buy eight attack submarines. The first four are planned to join the navy in 2023. Bangladesh Navy (BN) acquired its first submarine in 2017 and currently operates two boats.

China and India, the two largest countries in Asia inducted submarine arms in the 1950s and 1960s, respectively. China followed naval development strategy diametrically opposite to India. India focused on the simultaneous development of the two strategic arms – aircraft carrier centric task force and submarine fleet. China had focused on developing submarine arms and positioned PLAN in submarine arms far ahead of India. PLAN made the entry to nuclear technology in 1967 and completed the first submarine in 1974.

In the Persian Gulf region, Iran has a fleet of four diesel-electric submarines and 27 coastal/mini-submarines. Iran has been facing heightened challenges for the last couple of decades from the USA and Israel. Diesel-electric submarines operate in the deeper waters of the Persian Gulf, the Gulf of Oman and the Arabian Sea. Mini-submarines are for deployment in the shallow waters in the Persian Gulf. Both the Islamic Republic of Iran Navy and Islamic Revolutionary Guard Corps Navy operate mini-submarines.

Israeli Navy had three submarines in 1981-1982. Currently, it operates five Dolphin-class diesel-electric attack submarines received from Germany. Israel joined submarine club in the 1950s with British S-class submarines and one of the oldest operators of submarines in Asia. Two of the five



submarines are equipped with Air Independent Propulsion (AIP) system. There is suspicion that Israeli navy has modified submarines to fire cruise missile with nuclear warhead.

North Korean Navy reportedly has a submarine fleet of eighty-three boats. Twenty are conventional submarines and two have the capacity to fire ballistic and cruise missiles with nuclear warhead. Sixty boats are coastal and mini-submarines to deliver Special Forces into neighbouring coasts. These boats can also fire torpedoes. There is inference that actual availability of submarines or small boats for operational deployment could be much smaller number than projected in the inventory.

Japan is the oldest country in Asia to operate submarine. On 7 December 1941, the day Peral harbor was bombed, Imperial Japanese navy had 37 submarines in active service and 29 under construction. Nothing was left to float at the end of the war. After the war, Imperial Japanese Navy was designated Japan Maritime Self Defence Force (JMSDF) limiting its operation to 1,000 nautical miles. The operational limit was waived in 1991. JMSDF has 21 attack submarines in the fleet.

Asian navies' submarine inventory revealed increase in the number of countries and submarine since 1981-1982. Submarine arms had maximum proliferation in SEA, from two in 1981 to eighteen in 2019-2020.

Conventional submarines had a 36% proliferation from 138 to 180. Increase in nuclear submarine is 3 to 20 (566%). China has seen the largest increment in nuclear submarines numbers. During 1981-1982, China had only 3 nuclear submarines and it had no ballistic missile submarine. Now, it has eighteen nuclear submarines including 7 ballistic missile submarines. India did not have a nuclear submarine in 1981-1982, now it has two. Nuclear submarine matrix tends to go up at a quicker pace both in China and India. In the context of changing strategic scenario in the Indo-Pacific resulting from China's rapid expansion of fleet, Indian Navy approached Modi government to make change in the 30 year submarine building plan which was approved by the Cabinet Committee on Security (CCS) in 1999. Indian Navy proposed to add six nuclear submarines and drop six conventional submarines from the approved list.

Most navies in the SEA, the Persian Gulf and South Asia are likely to remain import dependent with occasional ventures to build submarine. Submarines in these navies are poised to offer significant deterrence against incursions into respective maritime domain. Submarines will be in demand due to its inherent strategic value in offence, defence and deterrence. Changing geopolitics underscoring the competition for maritime economy, availability of technology and countries stable economic growth are likely to be catalysts in the proliferation of submarine arms in the future.

Writer: Commodore Mohammad Abdur Razzak, NUP, ndc, psc, BN (retd) is a retired officer of Bangladesh Navy.

Is Bangladesh Planning for Blue Economy?

Dr. Haseeb Md. Irfanullah

Back in 2018, Bangladesh for the first time met all criteria of graduating from the United Nations' least-developed country category. The country has maintained its performance in the 2021 triennial review. It now looks forward to entering into the lower-middle income country group in 2024. The on-going pandemic, however, has jeopardised Bangladesh's many development achievements, like poverty alleviation. In August 2020, Bangladesh Bureau of Statistics confirmed that, due to the pandemic, 29.5 percent of Bangladeshi were poor in June — the poverty rate was 20.5 percent before the pandemic.

Nevertheless, despite the corona crisis, according to the International Monetary Fund (IMF), Bangladesh had 3.8 percent GDP growth in 2020. Although in April 2020, the IMF predicted only 2% GDP growth for Bangladesh, the country surprised the world by achieving the third highest GDP growth in the world, only behind Guyana and South Sudan. As the world was passing through the second pandemic wave in April 2021, the IMF predicted 5% GDP growth for Bangladesh this year.

In March 2020, as the pandemic was about to unsettle the world, the Government of Bangladesh published the Making Vision 2041 a Reality: Perspective Plan of Bangladesh 2021 −2041 (PP2041). It is a follow up plan of the Perspective Plan of Bangladesh 2010−2021: Making Vision 2021 a Reality, which aimed at materialising the 'Vision 2021' — the vision of transforming Bangladesh into a middle-income country. As we are on track to achieve that goal, the government has prepared its second perspective plan to make Bangladesh a high-income country by 2041.

The final chapter of the PP2041 talks about sustainable environment, climate resilience, and blue economy. To explore and unlock the potentials of blue economy in Bangladesh-owned 118,813 sq km of the Bay of Bengal, the Plan envisages appropriate policies and investments in a number of areas. I summarise below the major strategies proposed in the PP2041.

Policies and Strategies: Bangladesh will develop a policy framework to harness the potential of blue economy. Based on that, appropriate incentive and regulatory policies for

encouraging private investment in blue economy will be adopted. A strategy will be developed to address the lack of knowledge and assessment of marine resource constraints by building national capacity and expertise as well as by seeking international technical assistance.

Fisheries: A monitoring, surveillance and control regime will be established for artisanal fishing boats. Institutional coordination between Department of Fisheries and Mercantile Marine Department will be improved for easier registration and licensing. In addition to ensuring small-scale artisanal fishers' full access to marine resources, small-scale artisanal fishing cooperatives will be motivated and facilitated for deep-sea fishing. A science-based management plan will also be prepared for sustainable marine fisheries.

Regional and International Cooperation: Bangladesh will continue its on-going initiatives with India, China, and the European Union for research and joint investments in blue economy.

Conservation: Degraded marine and coastal ecosystems will be restored and sustainable managed; sustainable and commercial farming, harvesting, processing, and export of seaweeds (marine algae) will be promoted; more marine protected areas (MPAs) will be established; fishing ban will be enforced for conservation and sustainable use of fisheries resources; and institutional capacity and infrastructure will be built to survey, monitor, and mitigate wide range of marine pollution.

Employment: To meet the increasing needs and opportunities for coastal and off-shore jobs, skilled workforce, like engineers, navigators, merchant mariners, fisheries technologists, biotechnologists, and marine resource surveyors, will be trained through private and public marine academies, research institutions, and universities.

Tourism: Coastal tourism will be promoted through, for example, tourism campaigns, establishing joint coastal tourism programmes with neighbouring countries, providing investments and tax incentives to tour promoters and operators, and developing year-round tourism boat fleet.

Energy Exploration: Bangladesh also aims to explore energy sources through off-shore drilling and exploration.

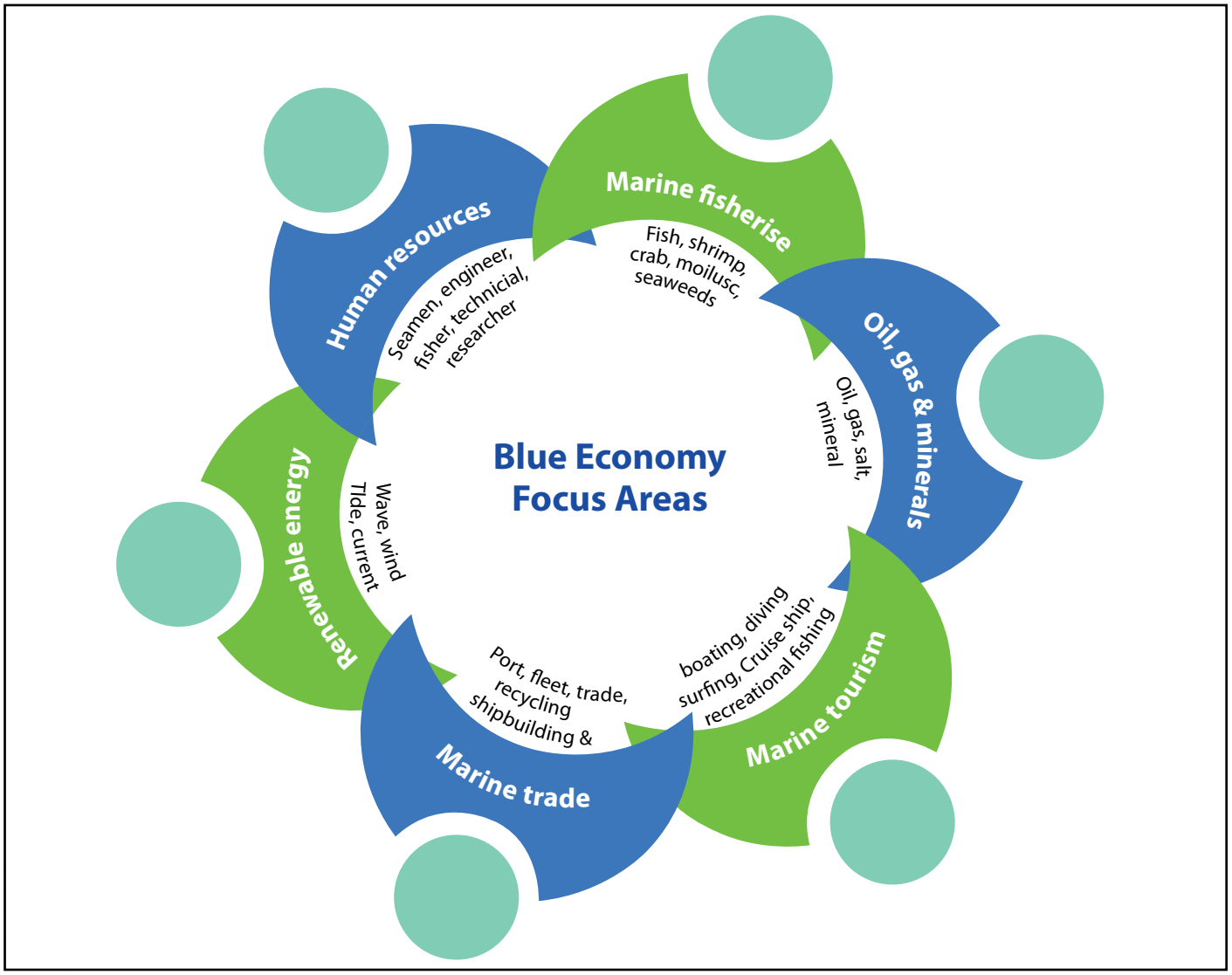
In addition to the PP2041, Bangladesh's Eight Five Year Plan (July 2020−June 2025) (8FYP) also considers blue economy. The sectors directly related to coastal and marine ecosystems and resources, such as fisheries, shipping, environment, forest, energy, and mineral resources, have strategised exploration and management of specific marine resources in the 8FYP. This Plan also discusses and strategises 'blue economy' as a concept on several occasions. During the 8FYP period, for example, the Bangladesh Coast Guard aims at implementing its Coast Guard Goal 2030, which would ensure the protection of our marine resources — an integral part of blue economy. One of the 8FYP strategic objectives of the fisheries sub-sector is to harness the potentials of blue economy, along with stock assessment of marine fisheries and promoting sustainable use of it. In the telecom sector of Bangladesh, satellite technology is expected to support blue economy, especially in aquaculture, fisheries, coastal tourism, maritime transport, and research. Under the local government sector of the 8FYP, the importance of supportive policies to strengthen fishing activities, including harnessing the potentials of blue economy, is mentioned.

Under the environment and climate change sector of the 8FYP, blue economy is discussed as a specific activity to improve green growth in Bangladesh. Given the potentials of the Bay of Bengal as a source of untapped valuable resources and its position in international trade and commerce, the 8FYP envisages that "the Government will explore the potential of the Blue Economy through a sustainable mechanism and identify adequate policies which will help formulate an optimal investment plan which can contribute to sustainable and inclusive economic growth, employment, and well-being while preserving the health of the ocean." The 8FYP also notes that the Bangladesh Climate Change Trust (BCCT) developed long-term, medium-term, and short-term plans under blue economy. From the funding window of the BCCT, two projects were being taken for capacity building, awareness raising, and socio-economic development under the banner of blue economy.

In 2018, the Government of Bangladesh completed the formulation of Bangladesh Delta Plan 2100 (BDP2100). Since Bangladesh neither developed blue economy nor substantially invest in it, the BDP2100 outlines blue economy strategies and measures in the water resource management chapter of the Strategy (Volume 1).

To have focused actions, the BDP2100 identified several high priority sectors, with possible actions, namely i) shipping, ship building, and ship recycling; ii) marine fish stock survey, shallow- and deep-sea fishing, fishing in international waters, marine aquaculture and mariculture, and maintaining biodiversity to ensure long-term fish availability; iii) coastal tourism; iv) renewable energy; v) land reclamation; vi) manpower and capacity development; vii) science and research; and viii) governance.

In the last decade, several new institutions were established, such as Bangabandhu Sheikh Mujibur Rahman Maritime University, Dhaka (established in 2013), Bangladesh Oceanographic Research Institute (BORI), Cox's Bazar (in 2015), and Bangladesh Institute of Maritime Research and



Development (BIMRAD), Dhaka (in 2018), along with oceanography or related departments at several general and specialised universities. The resolution of maritime boundaries of Bangladesh with India and Myanmar, prompted the government to launch the Blue Economy Cell in January 2017, under the Energy and Mineral Resources Division. Recent media reports suggested little progress by the Cell over the last four years to take Bangladesh's blue economy agenda forward. In some government documents, for example, in Bangladesh National Report on Istanbul Programme of Action (IPoA) 2011−2020, the formulation of Blue Economy Action Plan is mentioned, but details on it are limited.

This article has shown how 'blue economy' is recently being addressed in three complementary short, medium and long-term development plans of Bangladesh. The wide range of opportunities within blue economy touches upon many major as well as cross-cutting sectors — fisheries, conventional and renewable energy, shipping, trade and commerce, tourism, coastal ecosystems, marine biodiversity conservation, regional and international cooperation, climate change, science and research, security, and law enforcement. Blue economy is therefore a concern of many ministries, divisions and departments of the Government of Bangladesh as well as many private entities, academic institutions, and NGOs.

To take concerted and collaborative efforts in blue economy and translate our development plans into action, we need a strong, autonomous, well-resourced coordinating government agency to lead the way. Only then our Bay of Bengal would be able to accelerate our voyage to the 'Vision 2041'.

Writer: Dr. Haseeb Md. Irfanullah is an Independent Consultant working on the Environment, Climate Change and Research System.

Believe in Quality, Time and Customer Satisfaction

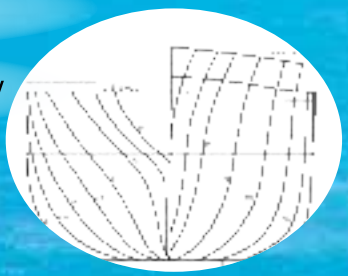
Shipbuilding

Chittagong Dry Dock Ltd.

Bangladesh Navy

An ISO 9001:2015 Certified Company

Jetty Service and Berthing Facility



Ship Design

Heavy Steel Engineering

Ship Repair & Renovation

Import & Export

44 Years Experience in Business

Area of Business

- Shipbuilding
- Ship Design
- Ship Repair & Renovation
- Heavy Steel Engineering
- Jetty Service and Berthing Facility
- Import and Export
- Consultancy
- C&F

Unique Facilities

- Only Dry Dock in Bangladesh
- The largest Ship Repair facilities with 183 meter grave dock that can dock vessels up to 22,000 DWT
- Strategic location - within Chittagong Port premises
- Good communication in all three modes of transportation (Road, Sea & Air)
- Sufficient depth of water (9.5 meter) for lunching large vessel
- 342 m long Jetty for berting and outfitting of ships
- Direct access to the sea
- Facility to load and unload all types of cargo at own Jetty
- Experienced and skilled work force

Vision: To become the leading shipbuilding company in Bangladesh

Chittagong Dry Dock Ltd, East Patenga, Chattogram
● Telephone: 031-2501112 ● Fax: 031-2501123 ● E-mail: drydock.bd@gmail.com ● Web: www.cddl.gov.bd ●

Article

The Significance of Unmanned Ariel Vehicle (UAV) in Maritime Surveillance and Reconnaissance

Rubiat Saimum

'Drone' has become a 'buzzword' in public discourse. The term has been popularized in mainstream media because of its extensive use in anti-terror operations in high-risk conflict zones worldwide. While colloquially the term drone is used more often, the technical term for such aircraft is 'Unmanned Ariel Vehicle' or UAV. Historically, UAVs have been deployed on battlefields for more than a century. UAVs' first known use for military purposes occurred in 1849 when Austria attacked Venice with an Unmanned Ariel balloon. Several types of UAVs were also in operation during the cold war. However, the UAVs became a regular element in warfare in the first Gulf War- a total of 522 drones were launched during the conflict over 1600 flying hours. Today, a third of the total aircraft are UAVs of different types. With the modernization of technologies, UAVs are rapidly replacing conventional aircraft. The implication of UAV deployment on the battlefield has become quite evident in the 2020 Nagorno-Karabakh war when Azerbaijani forces equipped with Turkish and Israeli drones secured a decisive victory over the strategically positioned Armenian forces in rugged mountainous terrain. It is quite possible that drones would be the primary weapon of warfare in the complex battlefields of future.

However, UAVs can serve multiple military purposes in both war and peacetime. One of the significant functions of UAVs is maritime surveillance and reconnaissance. There are specific types of drones that are designed to conduct extensive maritime surveillance and mapping. The UAVs can gather critical data about security, IUU fishing, illegal activities and marine biodiversity in oceans. More importantly, these data can be collected using UAVs in a single mission. Maritime agencies globally are already using UAVs in large numbers. The European Maritime Safety

Agency (EMSA) has deployed drones to support border control, pollution monitoring and the detection of illegal activities such as fishing and drug trafficking. Maritime industries are also utilizing drones for various security and surveillance purposes. Martek marine, for example, has established its own marine aviation division to detect and monitor marine pollution, illegal drug trafficking and illegal fishing activities.

In the military sector, the usage of UAVs has become extensive. The US military has built over the years the largest UAV infrastructure globally with weapon systems, datalink and advanced ground control. Currently, more than 9000 different types of UAVs are in operation with the US military. In particular, the US navy and marine forces employ UAVs for several military functions such as electronic attack, drone strikes, suppression or destruction of enemy air defence, network node or communications relay, combat search and rescue, and intelligence gathering.

The US navy is already developing a next-generation fighter-sized Unmanned Combat Aerial Vehicle (UCAV) as part of the US Navy carrier demonstration (UCAS-D) programme. Other countries such as the UK, France, and China are also increasingly using their drone fleets for maritime operations. Even countries that previously lacked a sophisticated defence industry are significantly investing in UAVs. The Turkish drone program is a clear example. Within just a few years, the Turkish defence industries have developed a wide range of military drones. Their deployment in conflict zones of Syria, Libya and Caucasus have elevated Turkey's status as a 'drone superpower'.

Three particular reasons can be identified for the recent fixation over drones: Firstly, the UAV are cost-effective means for surveillance and reconnaissance. An average military drone can cost about 4 million USD compared to an average fighter jet or maritime patrol aircraft, which may cost somewhere from USD 20 million to USD 400 million. For many cash strapped countries, UAVs thus provide an alternative to high-end hardware.

Secondly, UAVs' technology is relatively easy to obtain or can be developed domestically using indigenous technology. The necessary engineering know-how behind UAVs has become more available globally. Hence, any country with minimal industrial and scientific capability can build and maintain a sizeable drone fleet.

Thirdly, UAV deployment has drastically decreased the possibility of casualties in critical missions. During the Cold War era, reconnaissance flights were reasonably common but were dangerous nonetheless. From 1946-1990, 23 aircraft were lost, and 179 servicemen were killed during this kind of operations. However, with the advent of the drone age, the number of service members killed in those

complex operations has been reduced considerably, thanks to drone warfare's remote nature.

Bangladesh has many potentials in using UAVs in military and non-military sectors. We have a vast maritime territory of 1 18,813 sq. km. However, it is difficult for a developing country to monitor vast areas without adequate surveillance and reconnaissance systems. The lack of monitoring and surveillance can also precipitate a significant economic loss. Bangladesh is 47th on the list of countries prone to IUU fishing. Foreign fishing vessels are regularly poaching fish in Bangladesh's EEZ illegally.

Despite stern actions taken by Bangladesh Navy and Coast guard, it has been challenging to curb down illegal fishing activities. UAVs can resolve this issue for Bangladesh in a very cost-effective manner. Bangladesh has the technical and industrial capabilities to establish an indigenous UAV program. These UAVs can be used for both military and non-military purposes. These can be used to support surveillance and monitoring missions and scientific missions such as mapping the Bay of Bengal, gathering data to preserve bio-diversity and track the impacts of climate change.

Bangladesh has already drafted a law to regulate drone usage in the country. The draft Drone Registration and Flying Act 2020 has categorized the drones into four types. The military drones are placed in the fourth category, while drones under 5Kg are placed under category one. While the law is an excellent step to shape drone usage in Bangladesh, it has banned drones for commercial purposes. Such regulations for security purposes are warranted. Nevertheless, commercial actors should be allowed to use drones in a limited manner provided that they register their vehicles with relevant authorities and notify them about their flying hours. The commercial usage of drones by fishers, shipping companies and scientific organizations are economically beneficial, and it would encourage Bangladeshi entrepreneurs to develop a domestic drone manufacturing industry.

Writer: Rubiat Saimum is a Research Officer of BIMRAD.

WHAT IS OCEAN ACIDIFICATION?

HOW DOES IT WORK?

The ocean **absorbs lots of CO_2** from the atmosphere.

The amount it absorbs is the same as **every person on earth** throwing a **bowling ball** of **CO_2** into the ocean — **every day.**

Different things happen to CO_2 once it's in the ocean.

Some of the **CO_2** combines with **water** to form **carbonic acid**, which then breaks apart, releasing a **hydrogen ion.**

H^+

Hydrogen ions make the ocean more acidic.

HISTORICALLY CO_2 addition and removal were **in equilibrium.**

BUT TODAY the rate of CO_2 addition is

100X FASTER

The ocean is already

34% MORE ACIDIC

WHAT'S LIKELY TO HAPPEN?

Evidence about the effects of ocean acidification is building, but scientists are uncertain about the extent of the changes. Here are some likely scenarios:

It will be **more difficult** for many animals to **build shells.** One reason for this is less carbonate in the ocean water – a necessary building block in skeletons and shells. Animals like corals and mollusks are at risk.

The shells of **very small algae could also be affected.** As these form the base of the marine food web, their dwindling numbers might **change ocean ecosystems completely.**

WHAT CAN WE DO ABOUT IT?

We can't stop ocean acidification entirely, but we can do our best to mitigate the impacts and protect those affected.

1. As individuals, we can **reduce our carbon footprint** and buy products that support sustainable fisheries and aquaculture.

2. As societies, we can harness knowledge about marine biology through **research** – and focus on **monitoring** and **forecasting** changes.

3. Support initiatives and policies that **reduce carbon emissions.**

4. **Protect vulnerable societies,** such as island communities that depend on reefs for protection and seafood for protein.

By **2100**, the ocean will probably be **150% more acidic**

This will likely change **entire food webs**, and might lead to species going extinct.

In a worse-case scenario, ocean acidification and warming could mean our grandchildren know only **dead reefs** covered in algae and abounding with **jellyfish**... This is likely when ocean acidification is coupled with warming of the surface waters.

Some organisms might **benefit from ocean acidification**, like certain sea grasses.

FIND OUT MORE:

- Cooley, S. et al. 2012. Frequently Asked Questions about Ocean Acidification. US Ocean and Biochemistry Program and the UK Ocean Acidification Research Programme. Version 2.
- Loffoley, D. and Baxter, J.M. [eds]. 2015. Tackling Ocean Acidification – Improving prospects by planning ahead. 15 pp.
- Doney, S.C. et al. 2009. Ocean Acidification: The Other CO2 Problem. Annual Review of Marine Science. Vol 1: 169-192.

Opportunities to Improve Fisheries Management through Innovative Technologies and Advanced Data Systems in the Bay of Bengal

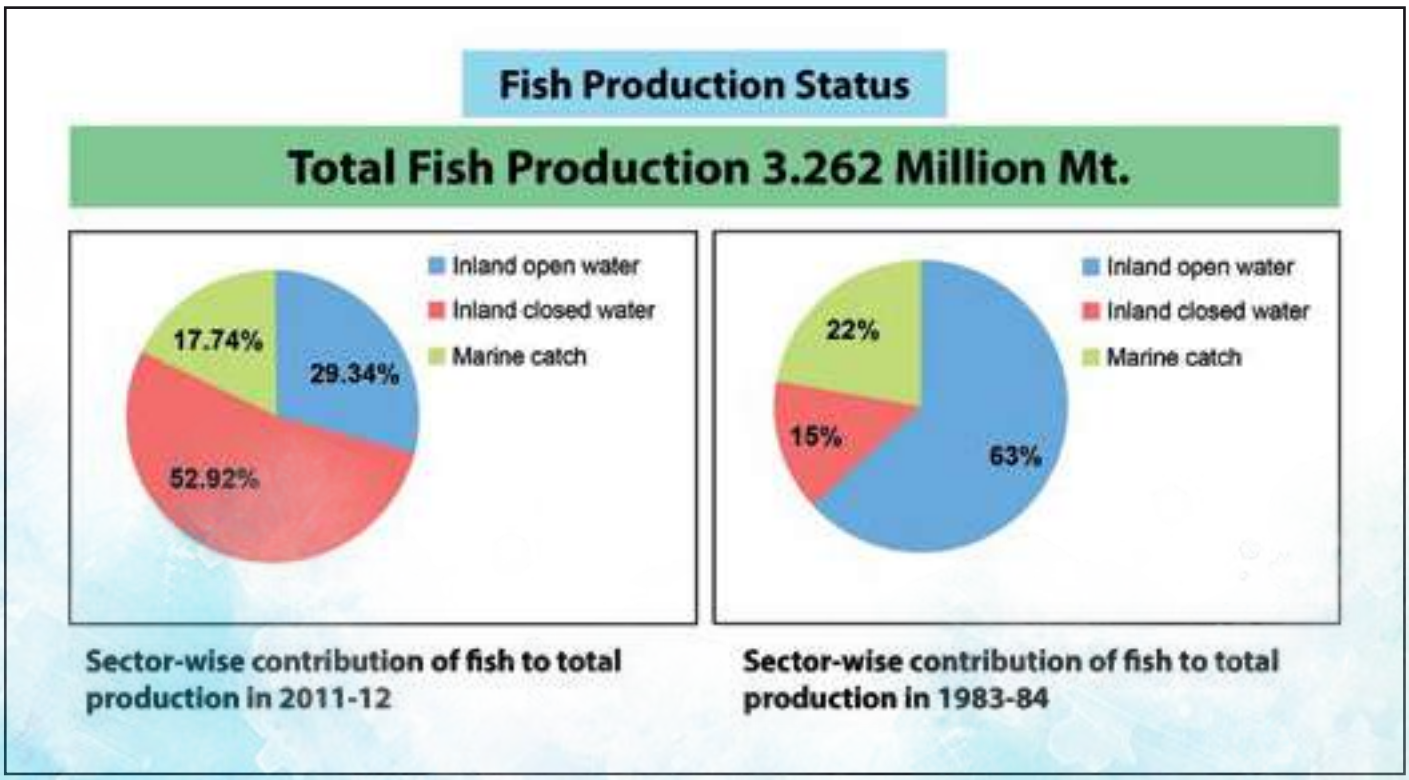
Afifat Khanam Ritika

Bangladesh is blessed with an approximate 710 km long coast with nearly 118,813 sq. km. of maritime area. Bangladesh's coastal zone has 35.1 million people that is 29% of the total population. The majority of the people who live along the coast in this area rely on fishing as their primary source of food and sustenance. The marine zone's natural system generates a multitude of natural living (Fish, seaweed, crustacean and other commercially important living species) and non-living resources (Oil, gas, minerals, etc.).

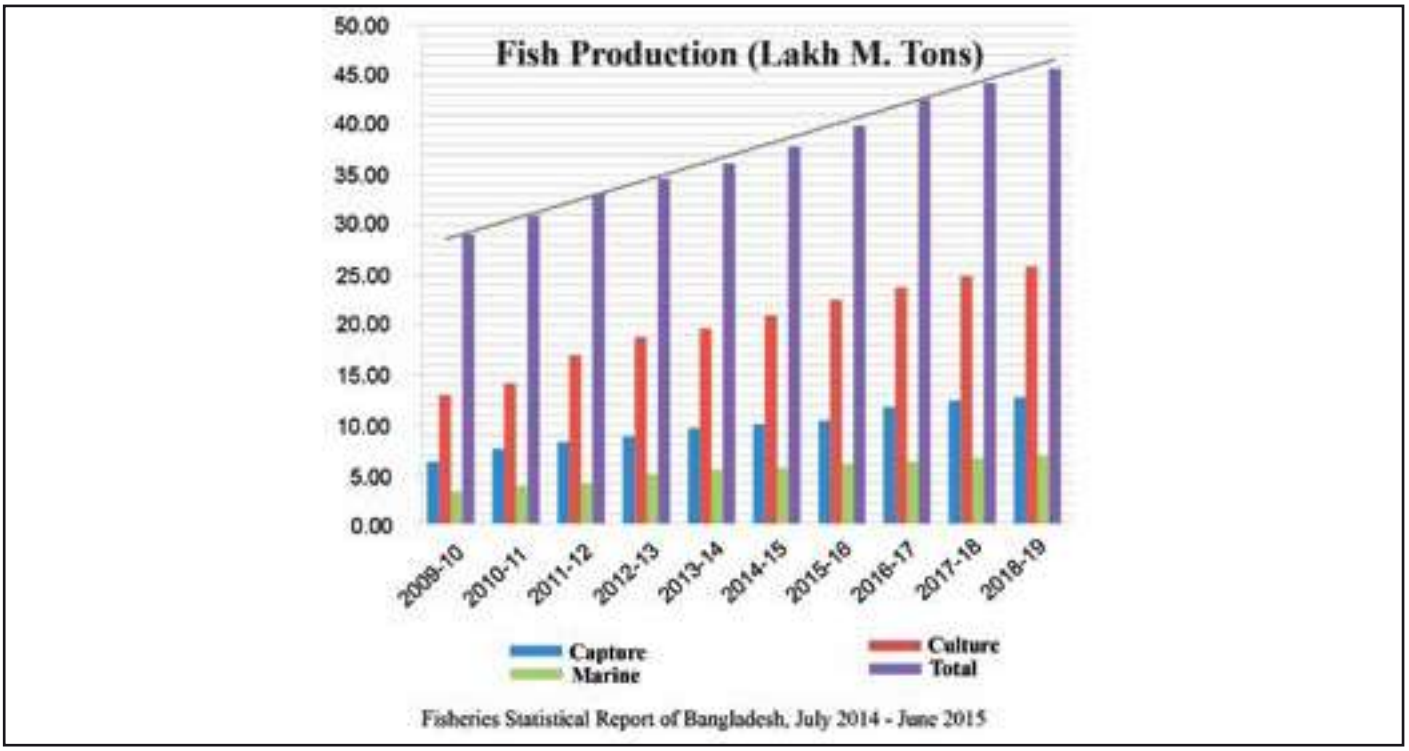
But among all marine resources, marine fisheries are the most prominent sector to exploit and enrich the country's economy with less effort. Marine fisheries contribute at least 20% of total fish production in Bangladesh and 90% of which comes from artisanal fishing. Bangladesh has ranked 11th in marine fish production in 2018. Though there is no concrete explanation on this ranking. It can be assumed that this may occur due to the large variety of fish species and rich stock in the Bay of Bengal as Bangladesh is still backward compared to technological competence with the developed country.

If we see the marine contribution in the country's total fish production, it reduced from 22% in 1983-84 to 17.74% in 2011-12. That does not mean that marine production is declining. In 2019-2020 the marine production increased 0.8%. The marine production was 3.62 lac MT in 2011-2012 and increased to 6.37 lac MT in 2019-2020. Since it is less than the other sectors, so, the other sectors are taking place at a higher rate in country's total fisheries production over time.

The aquaculture production is gradually increasing due to dissemination of improved technological packages and supportive/ need- based extension services at farmer's level. A slight growth in the production from both inland capture and marine fisheries was also noticed during the recent past years with some exceptions. Although marine production is increasing over time, it is much lower than the expectations.



Bangladesh is estimated to catch only 0.70 million tons of fish every year out of the total 8 million tons of fish available in the Bay of Bengal which is inadequate considering the huge potential.



So, where is the gap?

Technology and Science!!

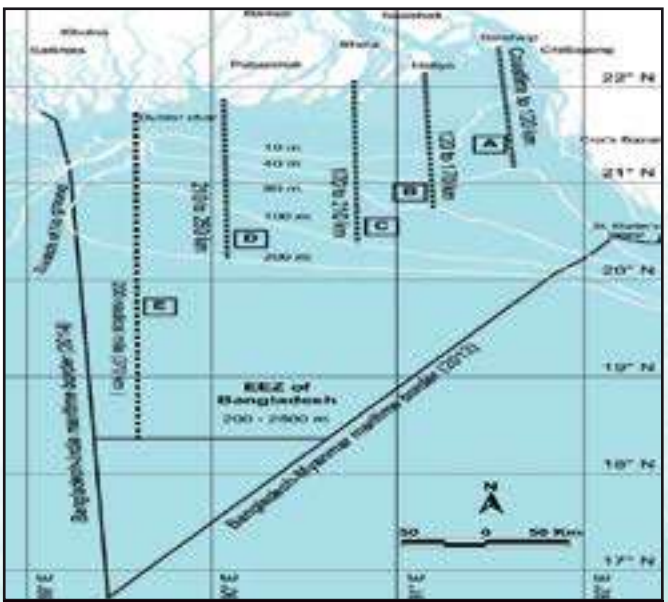
Bangladesh marine fishing is effectively limited to continental shelf region up to 200 m, but most fishing boats and vessels operate in the coastal areas within 40 m depth because of insufficient facilities and advance fishing technology.

The fishing grounds could be divided into five distinct zones(A-E), of which the nearest two zones (A and B) are subject to active fishing, and the remaining zones (C, D and E) have the potential to provide new business opportunities (Blue economic development in Bangladesh: A policy guide for marine fisheries and aquaculture, p. 11 by M. Shahadat Hossain, 2017). According to the Bangladesh catch history, starting from the coastline, up to a depth of 40 m and a distance of 120 km is used by the artisanal fishers. The fishing zones extending up to 80 m depth and 170 km distance are for trawling. All other zones are either lightly fished or unexploited at present.

Intensive harvesting from the same region with different types of destructive and unplanned gear is responsible for extinction of many commercially important species. Overfishing and no capability for extending fishing zones are warned of capture reduction.

For any planned or sustainable catch, the first and foremost requirement is enough data with advance fishing technology. The country is fishing blindly; there is no enough data on fish stock assessment. Marine fisheries surveys in Bangladesh's marine waters dated back to 1857, and the latest survey is about 25 years old. Fisher community/ fishing companies are not getting interest on technological modernization considering cost and catch profit.

No established method has been used in the last 25 years to collect data for a tangible idea on marine catch or stock in Bangladesh. Fishery dependent data collection for necessary information is generally conducted by various fisheries



Marine fishing zones of Bangladesh

stakeholders, including fishers, fisheries managers, fish buyers and processors, or even third parties such as consumers or non-profit agencies. Such data are recorded via logbooks and vessel trip reports, on-board observers, landing records, port sampling or dockside surveys, point of the first sale, telephone surveys or experiential knowledge, and recorded at the capture site landing sale or even later by the survey. For Example- The yearbook of fisheries statistics of Bangladesh that publish yearly report on fish, collect data through each arrival of a fishing trawler from their fishing trip and fisheries companies every month.

The process of moving and processing data from the point of the collection into management decision-making is often slow or non-existent, with time lags regularly exceeding the pace of rapidly changing ocean conditions and their impact on fish stocks (National Research Council 2000). Depending on the late report, any concrete management decision, catch effort or stock assessment is not possible in reality.

To avoid the above stumbling block, the author has proposed an idea using a high tech system to collect timely data from the fishing vessel.

seems expensive, but in the long term, the return will be beneficial.

If we use high tech for timely data collection, it will help to manage the marine fisheries in several ways like:

- Assessing the condition of the stocks on an area or ecosystem basis and in connection with the fishery its support.
- Developing and implementing regulations to explore the fish stocks in a sustainable manner.
- Monitoring the biological, economic and social effects of the implemented rules and regulation.
- Development of advanced, cost-effective technology for bulk catch.
- Development of Management Strategies for sustainable catch.
- Achieving the goal of SDG-14.

Achieving effective fisheries management is increasingly vital as overfishing threatens fish stocks in our marine capture, reducing biodiversity, altering ecosystem

High Tech System for Fisheries Dependent Data Collection from Fishing Vessel (Author)

The above figure presents an advanced method in which, using a sensor and video recording, the data on vessel catch will be collected and sent to the network system. The system will collect into the satellite communication, and responsible authority will reserve, store, and analyse the data after receiving it. The management authority will then collect the synthesised data or scientific body for decision making on management strategy (MPA, Closure, Ban period, catch limitation, gear restriction or others). So, this could be an instant real data collection method where physical manipulation or any other error will be excluded. Maybe it

functioning and jeopardises the food security and livelihoods. Fisheries management is a complex socio-political process, and there is no silver bullet to improve our marine fisheries sector. However, access to accurate, consistent data about how a fishery is doing and what, where and how much of a species are being caught is a fundamental component for establishing effective fishery management and also develop innovative technology, regardless of the fishing sector or management system.

Writer: Afifat Khanam Ritika is a Research Officer of BIMRAD.

Assistance to Maritime Research Activities of BORI by Bangladesh Navy

BIMRAD Correspondent

The Bangladesh Oceanographic Research Institute (BORI) was founded in 2015 after the Bangladesh Oceanographic Research Institute Act 2015 was passed by the parliament. BORI plays an essential role in creating sea related research and producing skilled workforce. Bangladesh Navy has provided material, manpower, and operational support to this research facility from its inception in order to boost Blue Economic development. Recent support to BORI by Bangladesh Navy to the research titled "*Potential Nutritional Evaluation of 20 Seaweeds, Experimental Extraction of phycocolloids from 6 Seaweeds Available around St Martin's Island and Continuation of Taxonomical Baseline Study*" is a part of the Navy's continued support to the research project. The researchers of BORI led by Abu Sayeed Muhammad Sharif, Senior Scientific Officer, Biological Oceanography Division, were assisted by providing a diving team with experienced divers for seaweed sample collection, including underwater video & still photography. It is mentionable here that similar support was provided to BORI in 2019 as well.

The Biological Oceanography Division (BOD) of BORI started the above mentioned seaweed research in 2018, addressing the Blue Economy and SDGs to ensure sustainable use of ocean resources, especially seaweed for national economic growth. BOD has already set short-term and long-term goals in seaweed research and technology development aiming at industrial impetus, socio-economic development, and creating alternative employment opportunity. There is a huge potential for seaweed for its multi-dimensional uses around the globe. It can also contribute to our national economy. The BOD is working with 04 (Four) targets in this fiscal year, according to the BOD, R&D 2020-21 programme, with a conciliation of long-term and short-term goals. These are as follows:

- To uncover Phycocolloids (agar/carrageenan) content from selected seaweed.
- Proximate analysis of seaweed to find nutrition value selected seaweed.
- Physico-chemical parameters (water and

sediment) of the study to understand seaweed habitat.

• Continuation of seaweed taxonomic baseline study (occurrence and distribution that includes underwater and laboratory photography).

It is important to complete the project successfully with sufficient precise data. In the present research project, collecting an adequate quantity of targeted seaweeds is very important. BORI Technical Committee decided to engage the assistance of Bangladesh Navy by seeking the cooperation of a diving team to gather seaweed samples based on BN divers' diving expertise in various challenging circumstances.

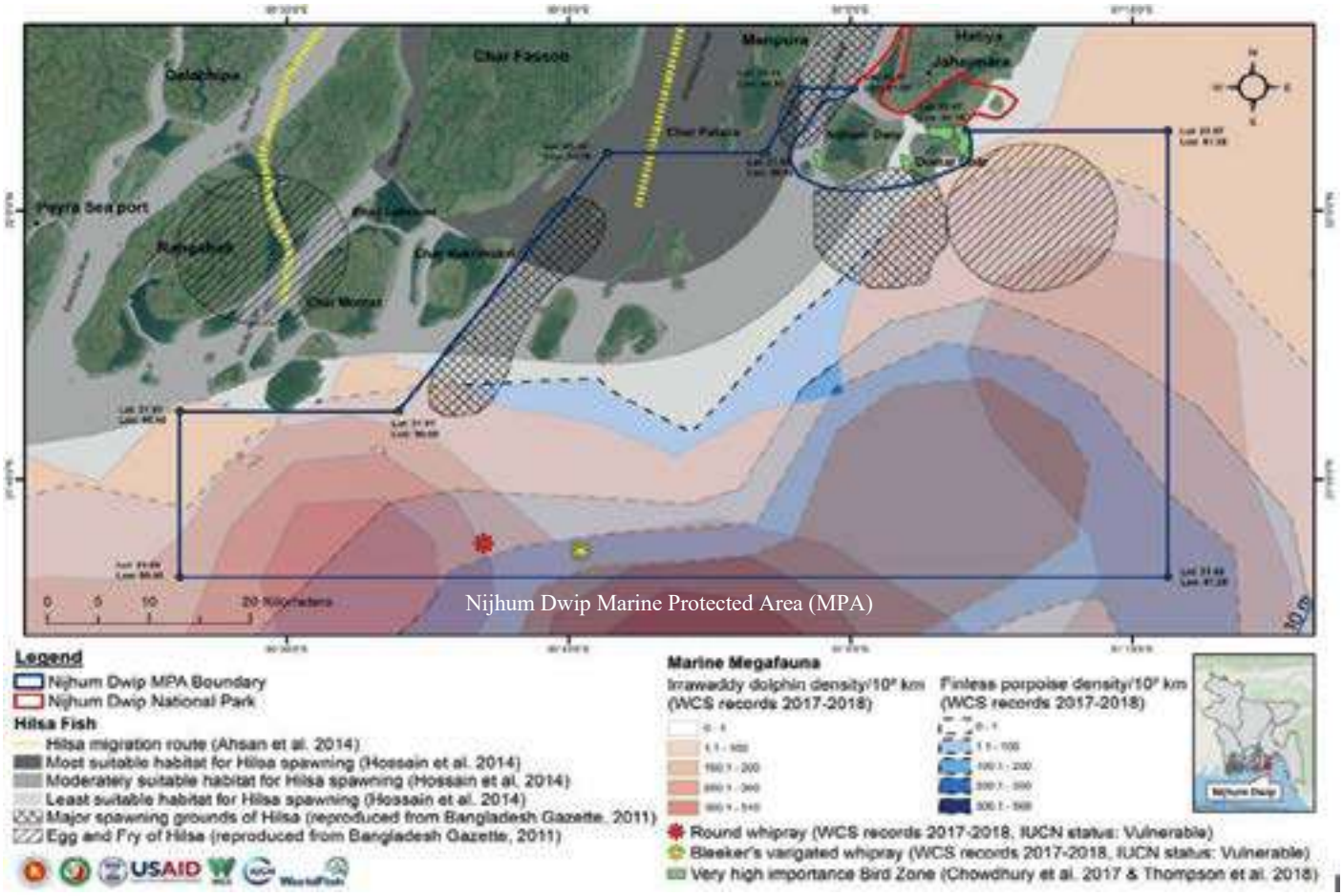
Accordingly, a diving team of Bangladesh Navy participated in sampling activity in January and February 2021. In January, a team consisting of five navy divers with supporting equipment participated in sampling, while seven divers took part in February. A total of 8 days of sampling was done each month. Bangladesh Navy divers assisted the seaweed research team in collecting samples from surface and bottom water, bottom sediment, and available seaweeds in the study area during the sampling mission. It includes collecting targeted seaweeds samples from 8-10 sampling sites around Saint Martin's Island. During the course, BN divers collected the samples by diving and snorkelling within the designated study areas. The BOD Seaweed Research Team (SRT) expressed their gratitude to Bangladesh Navy for extending such expert support and especially to the BN divers for their sincere assistance in the sampling activities. Such collaborative activity enriches the understanding and knowledge between BORI and Bangladesh Navy and creates an environment for capacity building for both organisations. Bangladesh Navy remains committed to support all maritime R&D organisations to propel the development of Blue Economy activities for sustainable economic development of our country.

Are Corals Animals or Plants?

Coral, a sessile animal, relies on its relationship with plant-like algae to build the largest structures of biological origin on Earth.

Nijhum Dwip MPA for Balancing Biodiversity Conservation and Livelihoods

Dr. M. Nahiduzzaman



Introduction

As per IUCN, a Marine Protected Area (MPA) is considered as "any area of intertidal or sub-tidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or the entire enclosed environment." Marine Protected Area (MPA) is widely used around the world as a tool of sustainable management of the marine resources. It is assumed that MPAs can enhance ecosystem resilience, conserve biodiversity, enhance fisheries and secure the human wellbeing.

Bangladesh has an area of 1,18,813 sq. km of the Exclusive Economic Zone (EEZ) under the provisions of UNCLOS and the recent verdicts of international courts over the maritime zones in the Bay of Bengal. Bangladesh is committed to declare 10% of the EEZ as Marine Protected Areas (MPA) by 2020 to achieve the targets under the Convention on Biodiversity Target 11 and United Nations Sustainable Development Goal - SDG 14. Bangladesh so far reached 4.7% of its EEZ and still need additional 5% of EEZ to be declared as the marine protected area to meet the international commitments.

Bangladesh has three marine protected areas to conserve aquatic biodiversity. First one, the Ministry of Fisheries and Livestock under Marine Fisheries Ordinance, 1983 declared 698 sq. km area as the Marine Reserve (now Marine Protected Area) in 2020 in the middle ground of South Patches in the Bay of Bengal to protect and preserve the breeding grounds of fauna. Second one, the Ministry of Environment, Forest and Climate Change announced a

1,738 sq. km. area in the Swatch of No-Ground as protected under the Wildlife (Conservation and Security) Act, 2012, which would restrict fishing and other offshore commercial activities. The area located in the southern side of the Dublachar Island in the Bay of Bengal, is a key breeding and spawning ground of dolphins, whales, sharks and turtles. Third one, the Ministry of Fisheries and Livestock declared 3188 sq. km. area of Nijhum Dwip seascape as MPA under the Marine Fisheries Ordinance, 1983 in 2019.

Why Nijhum Dwip was Declared as MPA?

The Nijhum Dwip Marine Protected Area (MPA) covers a 3,188 sq. km. area in the western portion of the Meghna River mouth in the Hatiya Upazila to the Rabnabad Channel that includes the Rangabali, Manpura, Char fasson, and Galachipa upazilas under Noakhali, Bhola and Patuakhali districts. The Nijhum Dwip MPA is a biological hotspot for productive fisheries, including Hilsa which provides direct employment for 0.5 million fishers in Bangladesh. In addition to that hilsa provides livelihood supports to 2.5 million people who are involved in the hilsa value chain. There is a major Hilsa spawning ground below Nijhum Dwip and a nursery ground near Domar char. The area of major spawning ground is about 153 sq. km. and the nursing area is about 345 sq. km. It is evident that other fishes also breed in this shallow area of Hilsa spawning and nursing grounds due to its wide range of habitat diversity including mangrove channels, mudflats, sandy beaches, large river mouths and open estuary. Moreover, the area is considered as one of the major migration routes of hilsa through Shabajpur and Ramnabad channels. ECOFISH research showed that one of the major genetically distinct ecotypes of hilsa found in brackish-saline (Southern Estuarine-Marine) waters . So, hilsa is the central focus of the Nijhum Dwip MPA with focus on conservation of megafauna biodiversity.

Nijhum Dwip MPA ecosystems offer a biodiversity 'hotspot' supporting a large variety of iconic marine megafauna including 15 species of globally threatened or near threatened dolphins, porpoise, sharks, rays and marine turtles. During a survey in December 2017 to January 2018, WCS observed 69 sightings of 102 finless porpoises, 59 sightings of 93 Irrawaddy dolphins and 4 sightings of 46 Indo-Pacific humpback dolphins . Both dolphin species were not evenly distributed in the waters in and around the Nijhum Dwip MPA with a large portion of Irrawaddy dolphin and finless porpoise sightings occurred outside of its southern or offshore boundary. Ganges river dolphin or Ganges dolphin, also known as the South Asian fresh water river dolphin (Platanista gangetica) considered 'Critically Endangered' has been encountered in the Hatiya channel near the Nijhum Dwip.

The Nijhum Dwip MPA covers 3,188 sq. km. (dark blue) and excludes Nijhum Dwip National Park (dark red), showing priority hilsa migration routes, suitability of hilsa spawning habitat, major spawning grounds and egg and fry of hilsa from the Bangladesh Gazette (2011); high density and low-density areas of Irrawaddy dolphin occurrence, and high density and low-density areas of finless porpoise occurrence (map prepared using ArcGIS 10.4) (source: WorldFish, IUCN, WCS)

Nijhum Dwip Island is one of the key shorebird sites in the East-Asia- Australasian Flyways. The islands supports threatened species like Indian Skimmer (Rynchops albicolis) considered 'Critically Endangered', Spoon-billed Sandpiper (Calidris pygmaea) considered 'Critically Endangered', Normann's Greenshank (Tringa guttifer) considered 'Critically Endangered', Black-bellied Tern (Sterna acuticauda) considered 'Critically Endangered', Great Knot (Calidris tenuirostris) considered 'Endangered', Black-headed Ibis (Threskiornis melanocephalus) considered 'Vulnerable'. Besides, Eurasian Curlew (Numenius arquata) considered 'Near Threatened', Black-Tailed Godwit (Limosa limosa) considered 'Near Threatened', Bar-tailed Godwit (Limosa lapponica) considered 'Near Threatened', and River tern (Sterna aurantia) considered 'Near Threatened' are also recorded from the Nijhum Dwip clusters.

Nijhum Dwip MPA Declaration and Its Objectives

Nijhum Dwip MPA is based on results from studies on biodiversity, ecology, socio-economy and fisheries conducted by IUCN under the USAID funded ECOFISH project in collaboration with the DoF and WorldFish Bangladesh. The research findings from marine mega-fauna surveys conducted by the Wildlife Conservation Society were also taken into consideration for this declaration. The government of Bangladesh also considered the best available scientific data on threatened biodiversity, fisheries and marine ecosystem and consulted at various level with different stakeholders including academicians, researchers, managers, policymakers, practitioners and community people. Based on the scientific data and a series of consultation, the Department of Fisheries (DoF) under the Ministry of Fisheries and Livestock (MoFL) declared Nijhum Dwip MPA for enhancing biodiversity protection, increasing fisheries production and safeguarding threatened species and their priority habitats in coastal and marine waters.

The main objectives of declaring the Nijhum Dwip MPA are: (1) Protect Hilsa brood stock and juveniles, habitat and migration routes through improved fisheries management and protecting priority habitat; (2) Sustain productive

fisheries and fishers livelihoods and provide economic benefits for local communities; (3) Conserve marine biodiversity, including threatened fish, dolphins, porpoises, sharks, rays, turtle and sea/shore birds, and priority marine habitats for these species' groups, and (4) Support the national blue economy initiatives focusing on marine living resources and ecotourism for the benefit of the local communities and the nation as a whole.

The Benefits of MPA

The Nijhum Dwip MPA is a multiple-use protected area and there will be mix of extractive and non-extractive usage zones. The MPA will be divided into multiple zones considering the priority habitats for hilsa spawning and migration, threatened rays, and the distribution of threatened dolphins and porpoises and other economic activities. These zones will be managed by initiating a data-driven and stakeholder-inclusive Marine Spatial Plan (MSP). Moreover, Nijhum Dwip MPA Marine Spatial Plan will be prepared considering the local context, economic activities, conservation priorities, and marine resource use pattern. Through the proper management of the MPA, the priority hilsa spawning, nursery grounds and its migratory routes will be protected. About 73 fish species including at least six threatened fish species, along with at least 30 species of globally threatened or near-threatened cetaceans, sharks, rays, marine turtles, endangered mammals and avifauna will be protected. The marine protected area can maximize fisheries yield and safeguard marine resources, improve livelihoods through different economic activities and improve ecosystem resilience in the face of climate change.

Nijum Dwip MPA Governance

The Department of Fisheries has developed the Nijhum Dwip management plan to effectively manage the MPA with its stakeholders. The goal of the management plan for the Nijhum Dwip MPA is to provide a sustainable, practical and accountable framework for protecting marine biodiversity, sustaining productive fisheries and improving local livelihoods. The management plan adopts an ecosystem-based, people-oriented, adaptive co-management and participatory governance approach that includes rigorous monitoring to ensure sustainable management for achieving the objectives of the MPA. A Marine Spatial Planning (MSP) has been drafted to designate specific management zones according to the distribution of biodiversity and foreseeable human activities in the MPA.

The Ministry of Fisheries and Livestock (MoFL) through the Department of Fisheries (DoF) will lead management in the MPA. The existing Hilsa governance system will be adopted by the DoF in MPA management with local level conservation and economic activities viewpoint. A four tiers co-management structure is proposed in the management plan in light of the existing Hilsa management. Bangladesh has experience in hilsa fisheries governance through the Hilsa Fisheries Management Action Plan (HFMAP). Recently, the ECOFISH project of the Department of Fisheries and WorldFish has introduced and piloted the first-ever riverine adaptive co-management in 6 hilsa sanctuaries in coastal rivers. The data shows that the hilsa production and fisher's income have been increased through this coordinated and integrated hilsa governance approach. So, the lessons learned from the hilsa co-management system could be utilized for the effective governance of Nijhum Dwip through an ecosystem approach with multi-disciplinary stakeholders' engagement.

Livelihood Consideration

During the implementation of the Nijhum Dwip Management plan, the livelihood of the fishing communities should be considered with due importance. Otherwise, there will be a challenge in implementing this MPA management plan. The IUCN and WorldFish under the ECOFISH project identified a Direct Impact Area (DIA) in the adjacent districts of the MPA boundary. The assessment found that the Nijhum Dwip MPA has a direct impact on the lives and livelihoods of the people living in 28 unions geographically covering five upazilas (Hatiya, Manpura, Char Fasson, Galachipa, and Rangabali). Therefore, the MPA management should consider compensating the fishers for their anticipated loss of income. The government initially can provide both food and cash assistance to the poor fishers of the DIA. In addition to that, massive awareness-building programs can be initiated to make the resource users responsive to the MPA management for harnessing the maximum benefits.

Conclusion

Implementation of the Nijhum Dwip MPA management plan will ensure the sustainable utilization of the fisheries resources, conservation of the megafaunas, improvement of fisher's livelihood, and conservation of the ecosystem. It should be a process of 'trial and error' considering research data acquisition and building the relationship with government and partners, identifying the best possible engagement processes, institutional structures, and management strategies associated with this MPA to optimize both fishers livelihood and ecosystem resilience. For doing that, sustainable financing is required for achieving the MPA goal and objectives of the management plan.

Writer: Dr. M. Nahiduzzaman is a Scientist of WorldFish, Bangladesh.

KHULNA SHIPYARD LTD

BANGLADESH NAVY

- Our works are classified by GL, NKK, CCS, Lloyd's
- Our quality is ISO 9001:2015 Standard
- First War Ship Builder in Bangladesh
- We are committed to work schedule

YOUR TRUSTED PARTNER

www.khulnashipyard.com

Feature

Glorious History of
Dockyard and Engineering Works Ltd

BIMRAD Correspondent

Birth of the Oldest Dockyard in Indian Sub-Continent

Shipbuilding was one of Bengal's first industries to flourish. Bengal was skilled at building boats and seagoing vessels for both domestic and foreign markets. Many Asian and European countries used to build their ships from local docks of Chattogram. Ibn Battuta, a celebrated geographer, traveller and scholar, came to Bengal in the 14th century and went back in a wooden ship built in a dock located at Sonargoan, Dhaka. Chattogram, according to European traveller Caesar Frederick, was the centre of building ocean-going vessels in the middle of the 15th century. Moreover, in the 17th century, the Sultan of Turkey had a fleet of ships built in Chattogram. The golden period of shipbuilding of Bengal was under the tenure of the Mughal Emperors. During that period, Bengal took the lead in building ships and boats over other regions ruled by Mughals. The Mughal Naval Force had built a large number of ships at Chattogram. The British Navy deployed Chattogram-built warships in the legendary Battle of Trafalgar in 1805. Following the tradition, the German Navy also had a wooden hull frigate 'Deutschland' built at Chattogram in 1818. Through an international tender, the Food and Agriculture Organisation (FAO) of the United Nations sponsored a contract for the delivery of eight food-grain carrying vessels to Bangladesh Inland Water Transport Corporation (BIWTC) in 1979. The contract was secured by High-speed Shipyard, Narayanganj.

Narayanganj was an important business hub in the subcontinent during the British government's tenure. Well-connected river routes made Narayanganj port a potential business hub. Hundreds of ships used to berth here for goods transportation. Many of those harboured ships required to be repaired because of the long voyage. In response to this need, the British government proposed creating a dockyard in Sonakanda, Narayanganj, from an economic standpoint. Since necessity is the mother of all creation, the first dockyard in the Indian Subcontinent, 'Narayanganj Dockyard Limited,' was established in 1922 and became operational in 1926.

Journey of Narayanganj Dockyard Through Time

This yard had a very promising expansion during the British era, but it began to fall after the withdrawal of British authority. Following British departure in 1947, the fate of Bangladesh (then East Pakistan) was tied to Pakistan, and the dockyard was ceded from Royal Indian Marine Services (RIMS) to Pakistan Industrial Development Corporation (PIDC). In 1956, the name of 'Narayanganj Dockyard Limited' was changed to 'Dockyard and Engineering Works (DEW)'. Following the Great Liberation War of 1971, the government of Bangladesh entrusted the operation of the dockyard to the Bangladesh Steel and Engineering Corporation (BSEC). However, the yard's golden fortune faded with time, and it began to become a losing concern due to a variety of factors including a shortage of capital, insufficient work orders, rising bank interest, labour union concerns, illegal acts by CBA executives, a lack of leadership, and a lack of vision. Due to losses, it was laid off on 21 December 2002, and afterwards handed over to the Bangladesh Privatisation Board as a sick industry. Finally, in 2006, DEW was handed over to the Bangladesh Navy (BN) to restore its former glory.

A Story of Revitalization

The decision of handing over DEW to Bangladesh Navy was the major breakthrough in the history of its revitalisation. One of the major factors of being laid off was- lack of work orders. Being an enterprise of Bangladesh Navy, this dockyard started its production by repairing naval ships for Bangladesh Navy. After accomplishing quality ship repairing, this organisation started getting work orders of building new ships. Eventually, the Bangladesh Army, for whom the 'SHAKTI SHANCHAR' was built, as well as the Bangladesh Coast Guard, BIWTA, and BIWTC, paid attention to this dockyard. This quick makeover may appear magical, yet the magician is none other than Bangladesh Navy. Its strong leadership and effective administration, as well as a team of experienced and talented personnel, were the driving forces behind this success.

Once a dormant industry, it has now become one of Bangladesh's most productive. In the financial year 2019-2020, DEW consumed approximately 2,070 tons of steel (which is the indicator of productivity of a dockyard). At present large number of shipbuilding projects are under progress and it is expected that this steel consumption will reach 2,900 tons (approx.) in financial year 2020-2021 and 3,100 tons steel in financial year 2021-2022. In the financial year 2019-2020, yearly turnover was BDT 1,611 crore, out of which BDT 216 crore was deposited to government fund as Income Tax & VAT. Finally, net profit of DEW in financial year 2019-2020 was BDT 77.65 crore.

Proud to be the First Warship Builder of Bangladesh

The country's first warship was built at Dockyard and Engineering Works Limited, Narayanganj in 1972. The "PABNA CLASS" was the designation given to ships built to serve as Riverine Patrol Crafts. It was the brain child of the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman. It was only because of him that warships could be built soon after independence. The first one was named BNS PABNA (1972), thus a total of five ships were built and they are BNS NOAKHALI (1972), BNS PATUAKHALI (1974), BNS RANGAMATI (1977), and BNS BOGRA (1977). The principal particulars of these PABNA CLASS ships are Displacement: 75 tons, Length: 75 feet, Breadth: 20 feet and Draught: 5feet, Personnel Carrying Capacity: 33 persons and Fire Power: One 40 mm Bofors gun. All of these ships are still in use, albeit with the Coast Guard rather than the navy.

Vision, Mission and Objectives

The vision and mission of DEW are:

a. **Vision**. The vision of DEW is to become the leading dockyard of the country for particular dimension vessels and Engineering works.

b. **Mission**. The mission of DEW is to Build and Mend products with better quality and technology. Ensure timely delivery and after sales service.

In pursuit of this vision and mission, every member of DEW is working hard relentlessly and committed to assist government in achieving the National Goal – 2021 & VISION – 2041 and 'Shipbuilding Industry Development Policy 2021'. DEW is now equipped with extremely capable and devoted management, highly skilled and motivated work force as well as state of the art machinery to overcome future challenges and achieve the pinnacle of excellence. In line with this roadmap the objectives of DEW are:

a. **Ensure Highest Quality of Workmanship**. At present DEW believes and follow the motto, 'Pursue for the quality of product, and the profit will follow'. With this motto at heart, DEW is committed to achieve excellence in workmanship.

b. **Maintain Timely Deliver**. Harmonious inter-departmental coordination, efficient management of logistic chain, elaborate & meticulous project management plan is the key to timely delivery of shipbuilding product. DEW has now mastered this art of efficient management to deliver all products within stipulated time frame.

c. **Deliver International Classification Society Certified Product**. DEW is an ISO 9001:2015 certified shipbuilding industry. DEW is also affiliated with Bureau Veritas (BV), DNV-GL, Lloyd's Register (LR), and China Classification Society (CCS). DEW gives the assurance of delivering high quality products certified by these international classification societies.

d. **Top Priority to Customer Satisfaction**. DEW is committed to make sure that its valued customers are satisfied by delivering high-quality products on time and providing a variety of service assistance during the project's building phase. DEW is also committed to provide continuous after sales service throughout the life cycle of the product.

Services Provided by DEW

DEW provides wide range of services to valued customers and they are:

- State of the Art Shipbuilding.
- Refit and Repair Support to Valued Customers.
- Engineering Support and Manufacturing of Machinery Components.
- Fabrication of Steel Structures.
- Construction of Boats & Components of Composite (GRP) Material.
- Civil Construction.
- Casting of Ferrous and Non-Ferrous Components.
- Dredging and Earth Filling etc.

Valued Customers

The client list of DEW is extensive, but among those our prominent clients are Bangladesh Navy (BN), Bangladesh Coast Guard (BCG), Bangladesh Army, BIWTA, BIWTC, CPA, MPA and many other Private Organisations.

Basic Features of the Yard

DEW is stretched over 21.78 acres of land area with a riverfront of 900 ft (approx.). It is capable to dock vessels up to 1,500 ton (light weight) of 88.4m (290ft) length. The production capacity of the yard is 2,070 tons (approx.) steelworks per year. The yard has 27,220 sq m (approx.) of open area and 3,000 sq m (approx.) enclosed area for shipbuilding. Another fabrication shed is under construction which will add another 5,400 sq m (approx.) of enclosed area for shipbuilding.

The yard's overall area is evenly allocated among production, infrastructure, and open spaces. Around 38% of total area is allocated for production, 36% is allocated for infrastructures and 26% space is kept free for greenery. It has a central warehouse having 1,173 sq m (approx.) and other stores (old) having 1,574 sq m (approx.) space for storing all types of goods necessary for shipbuilding. For shipbuilding and other production, DEW has Slipways and Wet Basin, Docking Section, Shipbuilding Shop, Composite Boat Building Shop, Outfitting Shop, Machine Shop, ICE Shop, Electric Shop, Carpentry Shop, Paint Shop, Foundry

Shop and Maintenance Shop. For Heavy lifting, DEW has 01x Portal Jetty Crane (20 ton at 30m distance), 02 x Mobile Crane (30 tons) and 02 x Fork Lift (05 tons).

Workshop Facilities

The following workshop facilities presently DEW have:

- Docking Section.
- Shipbuilding Shop.
- Composite Boat Building Shop (Area: 768 sq m).
- Machine Shop (Area: 1,300sq m).
- ICE Shop (Area: 530 sq m).
- Outfitting Shop (Area: 700 sq m).
- Maintenance Shop (Area: 223 sq m).
- Electrical Shop (Area: 506 sq m).
- Carpentry Shop (Area: 140 sq m).
- Paint Shop (Area: 125 sq m).
- Foundry Shop (Area: 680 sq m).

Quality Assurance

DEW has a dedicated Quality Control (QC) team consists of qualified Naval Architect, Mechanical Engineer, Electrical Engineer and specialised personnel to ensure the quality of purchased materials and finished products of this organisation. As an ISO 9001:2015 certified company, DEW maintains the philosophy of Total Quality Management (TQM). QC team works in coordination with surveyors of BV, DNV-GL, LR, CCS etc. to ensure highest quality of the product. For future improvement, a system of closed feedback loop is maintained. In this regard, highest priority is given to the feedbacks of valued customers.

Privileges Enjoyed by Our Employees

DEW always ensures the privileges for their employees. At present, it runs some of the essential supporting organisations and events to ensure the healthcare, education, welfare and recreation of its employees. The mentionable are:

- Flavour of Corporate Culture.
- Welfare.
- Medical and Health Care.
- Safety and Security.
- Accommodation Facility.
- School.
- Mosque.
- Games and Sports.
- Picnic.

Corporate Social Responsibility

As part of Corporate Social Responsibility (CSR), DEW provides training to the students of various government and private organisations such as poly-technique institutes, marine institutes, civil marine academy and many others in the premises of the yard.

Major Nation Building Projects (By DPM)

Mentionable major projects are Mongla-Ghasiakhali channel dredging work, Basic Infrastructure for Hi-Tech park at Sylhet (Sylhet Electronic City), ASHRAYAN-2 Project at Bhasan Char, Hatiya, Noakhali etc.

Upcoming Projects

DEW has a team of officers with vast experience and expertise in marketing and planning. DEW will undoubtedly win many more projects from its valued clients in the coming days as a result of its tireless hard work and persuasion. DEW is in the process of receiving new projects, such as 02 x HPB from BCG, 17 x Tug from BIWTA, and 03 x Diving Support Vessel from BN.

Awards

DEW has received numerous awards for its notable accomplishments. One of these notable accolades is earning the ICMAB's Best Corporate Award in the Special Category in 2014 and 2015. Later on, DEW again won the Best Corporate Award in miscellaneous services category, presented by ICMAB, in the year 2017. As a part of marketing strategy, DEW is participating in different marine EXPOs and events such as BIMRAD-2018, BIMOX-2019, etc.

Milestone Achievements

Inshore Patrol Vessel for Bangladesh Coast Guard

Fast Patrol Vessel for Bangladesh Coast Guard

Landing Craft Tank for Bangladesh Navy


Jet Propelled Harbour Patrol Boat for BCG (Aluminium)


RO RO Ferry (KERAMAT ALI) for BIWTC


Speed Boat (Sea Horse) for Bangladesh Army


Landing Craft Tank (SHAKTI SHONCHAR) - Bangladesh Army


Tug (BNT SHEBOK) for Bangladesh Navy

Composite High Speed Boat for BN & BCG

Major Ongoing New Building Projects

Keel Laying Ceremony of 10 X Tug Boat for BIWTA


Keel Laying Ceremony of 60 x Rescue Boat for DDM

Keel Laying Ceremony of 15 x Dumb Barge for BIWTA

Keel Laying Ceremony of 02 X VIP Speed Boat for BN

Keel Laying Ceremony of 02 X Work Boat for PPA

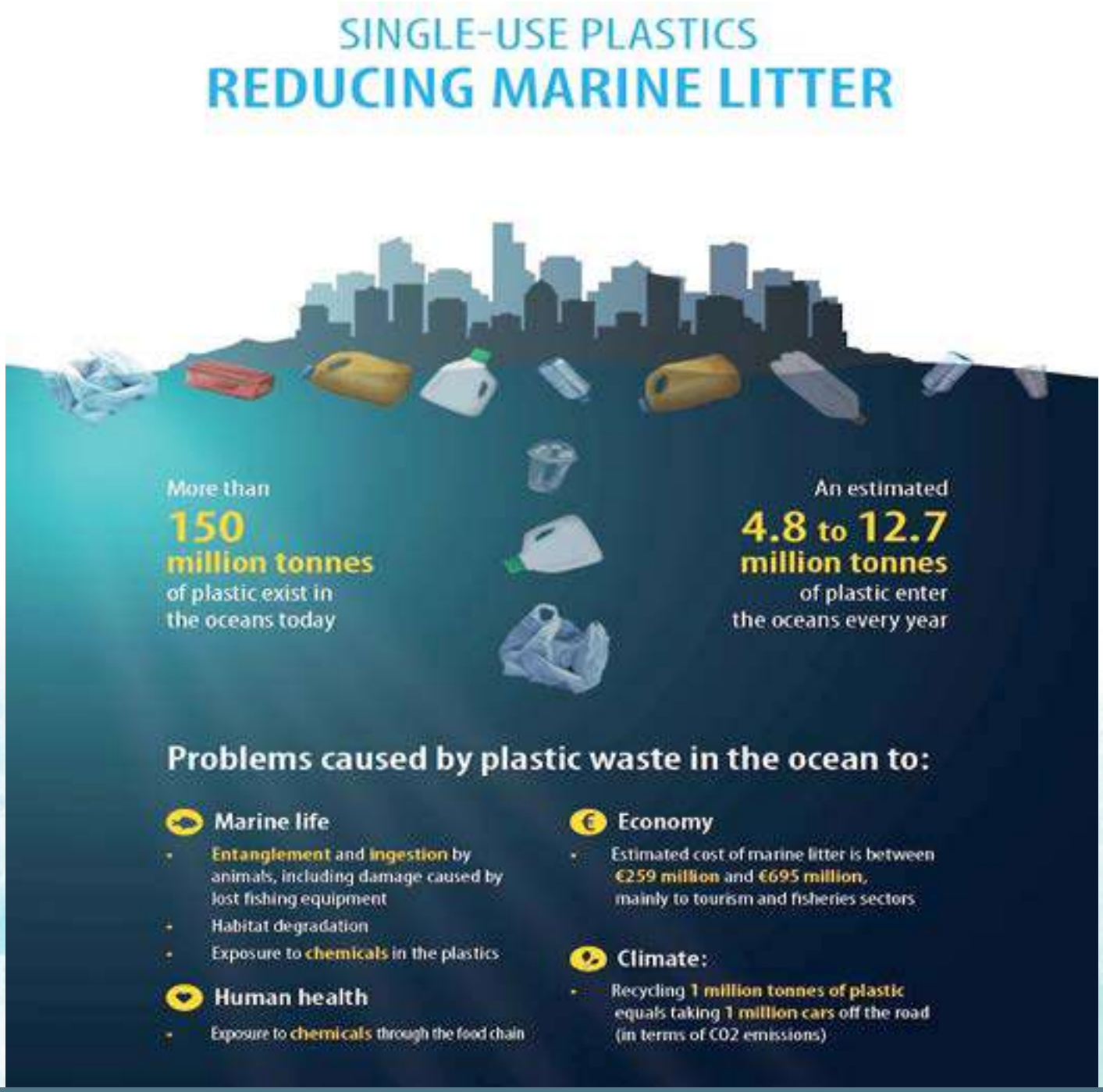
02 x IPV for BCG


06x HSB (Water Jet) for BCG


5x7 Ton BP Tug Boat

Final Message

DEW is one of the most stunning examples of how a dead industry can be brought back to life in the shortest possible time. The government of Bangladesh took the remarkable decision in 2006 to entrust the yard's management to Bangladesh Navy under the Ministry of Defence (MOD), allowing the dockyard to resume its journey. Thousands of people are working here, who get all types of facilities starting from medical to education of their children. In the last financial year 2019-2020, this yard has paid BDT 216 crore as VAT and IT to the govt., which is one of the biggest amount for any heavy industry of Bangladesh. DEW is grateful to those individuals and organisations that have aided it in its quest for progress. DEW requires sustained assistance from all levels of government, semi-government, and private sector entities in order to maintain the current rate of progress.



Bangladesh Elected as the Chairperson of IOCINDIO

Secretary of Maritime Affairs Unit, Ministry of Foreign Affairs, Rear Admiral Md Khurshed Alam, M.Phil., ndc, psc (retd) has been elected as the Chairperson of the IOC Regional Committee for the Central Indian Ocean (IOCINDIO) for the term May 2021-May 2023. He was elected during the final day of the virtual meeting of the Eighth Session of the IOCINDIO, held on 17-19 May 2021.

Dr Saif Mohammed Al Ghais from United Arab Emirates and Ms Maryam Ghaemi from Islamic Republic of Iran were elected as the Vice-Chairpersons during the session.

The IOCINDIO was established in 1982. Presently, it has 19 members namely Australia, Bangladesh, France, India, Indonesia, Iran, Iraq, Kuwait, Malaysia, Maldives, Myanmar, Oman, Pakistan, Qatar, Saudi Arabia, Sri Lanka, Thailand, UAE and UK. IOCINDIO is recognized as a facilitator in the Indian Ocean region to promote ocean knowledge, sustained observations and services through continued improvement of ocean governance towards a healthy ocean and to ensure sustainable prosperity in the region.

Bangladesh is also an active member of the IOC WESTPAC Sub-Commission and recently hosted the 13th Intergovernmental Session of the IOC Sub-Commission for the Western Pacific (WESTPAC-XIII), held virtually on last 27-29 April, 2021.

Bangladesh has Undertaken Pilot Project for Extraction of Tuna and Similar Pelagic Fish in the Deep Sea

Bangladesh has immense potential in tuna fishing in the ocean. Tuna is an economically valuable food commodity which has huge demand in Europe and North America. Bangladesh currently catches only a limited amount of tuna due to lack of deep sea fishing infrastructure.

To increase Bangladesh's tuna output, the government has undertaken a project called 'Pilot Project for Extraction of Tuna and Similar Pelagic Fish in the Deep Sea.' Under the project worth BDT 61.06 crore, three long liners will be procured by the Department of Fisheries to catch tuna and pelagic fish in the exclusive economic zone in the Bay located 200 nautical miles away off the shore.

The project will be concluded on 2023. It has been approved by the Executive Committee of the National Economic Council (ECNEC) on 18th August, 2020. It may be noted that Bangladesh became a member of the Indian Ocean Tuna Commission, an inter-governmental organisation responsible for management, conservation and appropriate utilisation of tuna and tuna-like fish on 2015.

Under the pilot project, tuna and similar pelagic fish will be caught in deep-sea and international waters. This will create trained and skilled manpower for deep-sea tuna and homogeneous fishing. Through this project, private investment in tuna and homogeneous fishing will also be encouraged. The project will be implemented by the Fisheries Department of the Ministry of Fisheries and Livestock.

Seaweed Farming is the New Trend in Cox's Bazar

Seaweed is the name given to the many species of marine algae and plants that grow in water bodies such as rivers, seas and oceans. They range in colours from red, green, brown and black and also vary in size, from microscopic to large underwater forests. Seaweed is found on the shores across the world, but are more commonly a staple in Asian countries.

Seaweed is becoming popular in Bangladesh recently. Farmers have recently achieved success in cultivating seaweed in the coastal areas of Cox's Bazar. The seaweeds produced here are being used in the production of a wide range of items, including food, medicine, cosmetics, fertilizers, biofuels and products to prevent environmental pollution.

Seaweed is being cultivated in the coastal areas of Nuniarchhara, Rejukhal, Charpara and Chofaldandi in Cox's Bazar. About 400 agricultural families are involved in this project worth about BDT 4 crore. Experimental cultivation of two species of seaweed first began at Saint Martin's Island in 2010. Bangladesh Agricultural Research Institute (BARI) has been cultivating seaweed in the coastal areas of Cox's Bazar since 2016, under the coordination of Bangladesh Agricultural Research Council (BARC) and funded by Agricultural Research Foundation.

Seaweed can be grown in both saline and semi-saline water and is relatively easy to grow. As a result, there is ample opportunity for seaweed to be used locally as well as for export. In addition to men, a significant number of women are engaged in seaweed production, processing and marketing. This has strengthened the financial position of their families as well as ensured the empowerment of women.

Saidul Alam, a seaweed farmer from Nuniarchhara area, said: "I started cultivating seaweed after receiving training from BARI. Now, I have achieved self-sufficiency by cultivating seaweed in the char areas at the mouth of the Bakkhali River." Nasima Begum, another seaweed farmer, said: "I cultivate seaweed using bamboo, cane, rope and floating plastic buoys. I acquired training from BARI. I sell seaweed worth BDT 80,000-1,00000 every season. This year, it was supplied to different areas of Bandarban's Lama, Alikadam and Thanchi."

BARI's Chief Scientific Officer Akkas Ali said, seaweed is an important vegetable from the sea. "It is used as a raw material in various industries, including food, medicine and cosmetics. It can be exported to international markets after meeting the local demand. Seeds are being produced in the laboratory for supplying to farmers."

Dhaka, Maldives to Have Robust Maritime and Air Connectivity

A signing ceremony for four MoUs was held after a bilateral talks between the two sides led by Hon'ble Prime Minister of Bangladesh Sheikh Hasina and Maldivian President Ibrahim Mohamed Solih at the Prime Minister Office on March 18, 2021.

Bangladesh and the Maldives have underscored the need to have robust maritime and air connectivity between the two countries. Both leaders have agreed to establish a direct commercial shipping link between Malé and Bangladesh's three sea ports and have directed their respective officials to work out a shipping agreement as soon as possible.

Prime Minister Sheikh Hasina expressed Bangladesh's interest to enter into a Preferential Trade Agreement (PTA) with the Maldives, within the purview of the WTO provisions.

The following instruments between Bangladesh and the Maldives were signed after the bilateral meeting:

- MoU on the Establishment of Joint Commission for Comprehensive Cooperation.
- MoU on the Establishment of Bilateral Foreign Office Consultations (FOC).
- MoU on Cooperation in the Field of Fisheries and Pelagic Fishing.
- Cultural Exchange Programme (CEP) for 2022-25.

Bhashan Char Rohingya Rehabilitation : Bangladesh's Effort Appreciated by UN

An 18-member UN delegation visited Bhashan Char Island on 17 March of this year to have a first-hand assessment of the housing facility for the Forcibly Displaced Myanmar Nationals (FDMNs) or Rohingya refugees.

Shortly after the UN's visit, a team with 10 diplomats including heads of missions of embassies and delegations from Turkey, the EU, USA, UK, France, Germany, Japan, Australia, Canada and the Netherlands also went to the island on 3 April to appraise the facilities.

All the members of the technical team opined that they are 'satisfied' with the facilities in Bhashan Char. The experts of the UN told, they will hand over a 10-page report of their annotations and they have already submitted a two-page abridgment. On April 16, they released the two-page synopsis after a month of the visit.

After the three-day study of Bhashan Char by the UN delegates, they recommended Bangladesh government to continue the relocation process to the island in a 'phased manner'. The team twigged three points – education for Rohingya children, increasing heights of the embankments and better communication system.

The Foreign Minister of Bangladesh A. K. Abdul Momen concerted to take the necessary measures to create a safe and secure environment for the Rohingya refugees until the

Bhashan Char Rohingya Facilities

repatriation takes place. The relocation is not the solution of the Rohingya crisis rather the over emphasis of the relocation and facilities inside Bangladesh is protracting the crisis and distracting the attention from the broader emphasis on the repatriation to Myanmar.

China-Bangladesh Cooperation Continues Amidst Covid-19 Pandemic

Despite enormous challenges caused by COVID-19 pandemic, Bangladesh and China have not stopped cooperation in marine spatial planning. Through the cooperative project of remote sensing interpretation of human activities, focused on the protection and utilization of Bangladeshi coastal zone, the two countries have completed a series of research reports on coastal resource exploitation, urban development and industrial layout. These scientific findings will significantly promote the Blue Economy of Bangladesh, building a good foundation for the realization of Bangladesh's Vision 2041.

Bangladesh and China began international cooperation on marine spatial planning in 2017. Scientists from the two countries have jointly carried out a series of activities, including organizing technical seminars, launching training programmes, and completing on-site investigations from Chattogram to Cox's Bazar.

According to Teng Xin, Head of the Secretariat of the Marine Spatial Planning Academy supported by China Oceanic Development Foundation, "With cooperation, Bangladesh can make the progress that China made in the past 30 years in significantly less time."

In June, 2018, Chinese scientists from National Ocean Technology Center were invited to attend the international seminar on the theme "Marine Legal System and Sustainable Marine Resource Management for Blue Economy" in Dhaka.

In the following year, the administration of Bangabandhu Sheikh Mujibur Rahman Maritime University paid a visit to the Center. During the joint field researches, Chinese researchers have also brought multi parameter water quality monitor meters and quadrat frames to examine water quality and biodiversity in Bangladesh.

Recently, COVID-19 pandemic has brought great challenges to the cooperation between Bangladesh and China, suspending previous regular field surveys and academic exchanges.

Through trial and error, the two countries figured a way out focusing on the remote sensing interpretation of human

activities for the protection and utilization of Bangladeshi coastal zone. This endeavour mainly relied on the manual decoding of remote sensing images provided by satellites and was thus less restricted by the pandemic. This project will provide a better knowledge of the distribution of natural resources as well as the geographical layout of existing industries along Bangladeshi coasts. With this knowledge, researchers from two countries planned to design a system that lists the do's and don'ts for marine resource management in each specific area.

PM Sheikh Hasina Inaugurated Four Marine Academies

The Hon'ble Prime Minister Sheikh Hasina has inaugurated four new marine academies alongside various types of organisational infrastructure and over a hundred vessels under the purview of the Ministry of Shipping.

The four marine academies were established in Pabna, Barishal, Rangpur and Sylhet under instructions from the Hon'ble Prime Minister to make use of job opportunities for sailors on seafaring vessels and Bangladesh's participation in the international shipping business. The initiative has cost BDT 5.21 billion. Each year, about 400 cadets will graduate from these academies, with training available for seafaring marines.

First Ship Arrives at Matarbari Port

A cargo ship has sailed through the Matarbari channel for the first time, carrying materials for the construction of a coal-based power project at the under-construction deep-sea port in Cox's Bazar's Moheshkhali Upazila. The channel will be used for the development of the deep-sea port.

The vessel, 'Venus Triumph' bearing the flag of Panama, arrived at the jetty built for the Matarbari power plant on 29th December, 2020.

Arriving from Indonesia, the 120-metre long mother vessel with a 5.3-metre draught (submerged part of the ship) is the first cargo ship to cross the 14.5-km long Matarbari channel.

The Matarbari port, the first-ever deep-sea port of the country, will be operational by the end of 2025 or the beginning of 2026 and it will boost trade through the Chattogram port. It will include a 14.5km long, 250m wide and 18.5m deep-sea channel. Ships will now be able to enter the port jetty from the Bay of Bengal through this channel. Chittagong Port Authority (CPA) has set up six buoys to guide ships to the port jetty through this channel from the deep sea.

The project will be completed at an estimated cost of BDT 177 billion with Japan providing BDT 128 billion, while the government and the CPA will bear the remaining expenses. CPA has been implementing the project with the government's Roads and Highways Department.

COP26 President Designate Alok Sharma Visited Dhaka to Discuss Climate Issues

UK MP and COP26 President designate Alok Sharma arrived in Dhaka on 2nd June for a three-day visit to strengthen support for UK COP26 climate priorities ahead of hosting the crucial UN climate change summit in Glasgow in November, 2021.

Mr. Sharma formally met with Honorable Prime Minister Sheikh Hasina at her official Ganabhaban residence.

He participated in a meeting with Foreign Minister Dr A K Abdul Momen at the Foreign Service Academy. They jointly reaffirmed their commitment to enhance cooperation between Bangladesh and the United Kingdom in tackling climate change's causes and adverse effects. They agreed to demonstrate sustained leadership to tackle the climate emergency bilaterally and multilaterally.

The two countries agreed to exchange expertise, share technology, facilitate partnerships, and identify practical solutions to common climate challenges. They also reaffirmed their strong and steadfast commitment to strengthen implementation of UNFCCC and the Paris Agreement. The COP26 President-Designate underlined the importance of countries committing to achieving Net Zero emissions by the middle of the century, and for Nationally Determined Contributions (NDC) to be aligned with this.

The Foreign Minister of Bangladesh underscored the necessity of securing commitments from global leaders, especially the G20, to curb global emissions substantially, arrest global temperature. Foreign Minister of Bangladesh commended the UK's dynamic leadership of COP26 and their special focus on mitigation, adaptation and resilience, climate financing and international cooperation. He also praised the UK for being the first major economy to declare net-zero emissions by 2050.

COP26 President-designate welcomed Bangladesh's Mujib Climate Prosperity Plan and Decade 2030 for capturing growth and prosperity through maximal resilience.

Both sides recognized the importance of developed countries delivering their collective climate finance goal to jointly mobilise US$100 billion annually by 2020 through to 2025 from a wide variety of sources, public and private, bilateral and multilateral and in the context of meaningful mitigation actions and transparency on implementation, to address the needs of developing countries.

DOCKYARD & ENGINEERING WORKS LTD
NARAYANGANJ
BANGLADESH NAVY

Since 1926

We are the oldest shipbuilder in Bangladesh

Our work is certified by GL, BV, DNV and RINA

Our strength is a dedicated efficient workforce

We are managed by a true professional team

Our commitment is work quality with timely delivery

DOCKYARD & ENGINEERING WORKS LIMITED

Bangladesh Navy

Sonakanda, Bandar, Narayanganj, Bangladesh

Phone : 88-02-7661482
Fax : 88-02-7661027
E-mail : dewltdbd@yahoo.com
web mail : info@dewbn.com
web site : www.dewbn.com

BIMRAD Jointly Organized Webinar on 'Climate Change Impacts in the Bay of Bengal'

International Centre for Climate Change and Development (ICCCAD) conducted 'Gobeshona Global Conference 1' on the virtual platform on the theme 'Research into Action on Locally - led Adaptation' from 18-24 January 2021. The conference consisted of several separate sessions participated by numerous organizations and research institutions. Bangladesh Institute of Maritime Research and Development (BIMRAD) along with Centre for Bay of Bengal Studies (CBoBS), Independent University, Bangladesh (IUB) conducted a session on the theme of 'Climate Change Impacts in the Bay of Bengal: Vulnerabilities and Adaptation Options' on 21 January 2021at 9.00 -11.00 am.

Dr Khondoker Mokaddam Hossain, Professor, Institute of Disaster Management and Vulnerability Studies, University of Dhaka presented the keynote speech on "Impacts of Climate Change on Marine Biodiversity and Coastal Community: Mitigation and Adaptation Options for Bangladesh. Ms Elisabeth Fahrni Mansur, Professor Abdul Wahab and Rear Admiral (retd) Kazi Sarwar Hossain participated as expert panellists. The keynote speaker and panellists focused on the different aspects of climate change impacts on marine biodiversity, coastal livelihood, adaptation approaches and challenges to climate change, Bangladesh's national strategic plans and cooperation framework for the Bay of Bengal littorals to reduce climate change vulnerabilities.

Rear Admiral M Lokmanur Rahman, NBP, NGP, ndu, psc, the acting Chairman of BIMRAD graced the webinar as a session chair and delivered his valuable opening remarks. Commodore Jahangir Adil Samdany, (TAS), NGP, psc, BN, the former Director General of BIMRAD delivered closing remarks and thanked the participants. Ambassador Tariq A Karim (retd), Director, Centre for Bay of Bengal Studies, IUB moderated the entire session. Proficient maritime researchers and stakeholders participated in the webinar and exchanged views and thoughtful opinions to address the issues.

BIMRAD Jointly Organized Webinar on 'Emerging Challenges and Opportunities in the Bay of Bengal in Present World Context'

On 11 May 2021, Bangladesh Institute of Maritime Research and Development (BIMRAD) and East Asia Study Center (EASC), University of Dhaka jointly organised a webinar on 'Emerging Challenges and Opportunities in the Bay of Bengal in Present World Context'. At the outset, Rear Admiral M Lokmanur Rahman, NBP, NGP, ndu, psc, the acting Chairman of BIMRAD, presented his welcome speech. Dr Imtiaz Ahmed, Professor, Department of International Relations, University of Dhaka, presented the keynote speech on the topic 'The Emergence of Indian Ocean as the Center of Global Competition: The Implications for the Geopolitical Dynamics of Bay of Bengal.' Rear Admiral A S M A Awal, NBP, OSP, ndc, psc, MDS, MBA (retd), Dr Delwar Hossain, Professor, Department of International Relations, University of Dhaka and Commodore M Humayun Kabir, (TAS), ncc, psc, BN participated as expert panellists. The keynote speaker and panellists discussed the Law of the Sea and major geopolitical and geo-economic challenges and opportunities in the changing world order. They articulated that the webinar would create awareness on these significant maritime issues and promote cooperative solutions in resolving these present day challenges. Rear Admiral Muhammad Anwarul Islam, NGP, ndc, afwc, psc (retd) conducted the entire webinar as session chair and Captain M Minarul Hoque, (H), BCGM, psc, BN, Director General, BIMRAD delivered the concluding remarks and vote of thanks to the participants. Proficient maritime scholars, academicians, maritime researchers, and stakeholders participated in the webinar and exchange views and thoughtful opinions.

BIMRAD Acting Chairman Participated in the NESA/ NMF Bay of Bengal Maritime Workshop as Panellist

Rear Admiral M Lokmanur Rahman, NBP, NGP, ndu, psc, the Acting Chairman of BIMRAD participated in the *Bay of Bengal Maritime Workshop on 27 April 2021 jointly organized by National Maritime Foundation (NMF) and Near East South Asia (NESA) Center* as a panel discussant on the theme *'Regional Dynamics, Challenges and Opportunities in the Bay of Bengal'*. In his keynote speech, the acting Chairman of BIMRAD highlighted several issues such as energy security, economic integration, Rohingya crisis and its impact on the region, strategic competition in the Bay of Bengal and its implications. He also underlined the growing militarization and the changing security landscape in the Indian Ocean. In the speech, the acting Chairman urged for a strong partnership in the Bay of Bengal and Indian Ocean region among the regional and extra-regional nations and groupings to advance common interest areas such as trade, investment, disaster management, security and climate change.

A Joint Project is Signed between BIMRAD and AOSED

Bangladesh Institute of Maritime Research and Development (BIMRAD) along with An Organization for Socio-Economic Development (AOSED) took a joint initiative to offer training support to sea-going fishermen at Khulna Area.

To realise the initiative, an agreement was made on 1 November 2020, between AOSED and BIMRAD to develop a training module on 'Local Level Strategy of Reducing Climate Induced Loss and Damage of Seagoing Fishers' and conducting a Training of the Trainers (TOT).

The main purpose of this project is capacity development and awareness building among the sea-going fisher community in order to reduce the occupational hazard they use to face during their fishing season. The module will also address primary knowledge of climate change adaptation in the daily lives of traditional seagoing fishers.

BIMRAD Participated in the NMF-TOF Inaugural Bilateral Dialogue

On 04 May 2021, Inaugural NMF – TOF Dialogue co-hosted by The Ocean Foundation, Washington, D.C. and the National Maritime Foundation of India (NMF) on the theme "*Sustainable, Blue transition for the 'Ports and Shipping' Industry*" on a virtual platform. Captain M Minarul Hoque, (H), BCGM, psc, BN, Director General, BIMRAD, Commander M Rasheduzzaman Rashed, (L), BN, Director (Science & Technology) and BIMRAD researchers attended the webinar as participants.

Climate Change Impact on the Coast of Bangladesh: The Story of a Hanging Village

Rafiqul Islam Montu

Since early morning, Elias Hossain and his wife Morzina Begum had not stopped working. They understood that if they did not attach four bamboo poles, they would not be able to sleep inside the house at night. This is a story about using bamboo poles to respond to climate change. This is how the residents of Bangladesh's coast try to combat the devastating consequences of climate change. They combat natural disasters to stay alive.

These pictures were taken from Kalabogi village near Sundarbans in Dakop upazila of Khulna district, located at the west coast of Bangladesh. Hundreds of houses in this village hang with bamboo poles. These poles attach a wooden deck equal to the tide level. On top of these decks, climate vulnerable people have been making their homes for years after years. No, no one has taught the people of this area this technique of survival. They have learned from the disaster that if they want to live here, they have to build houses on bamboo poles. All the houses of this village were at one time built on the land. There was no need for such a hanging houses. Once there were also yards in front of the houses. The children used to play in those yards. There were vegetable gardens around the houses. But those golden days were taken away by the catastrophic cyclone Aila in 2009. Day labourer Elias Hossain, a resident of the hanging village, was saying that.

"Raising his index finger towards the river Shibsa, Elias said, Here you are watching the waves of the river; my house was there. The days were going well and people were more or less happy. There was a little land where I used to cultivate. But cyclone Aila came and destroyed our

happiness. We lost that little land in the river. Now, the traditional way of earning through agriculture is closed. We don't have houses on the land. In the end, I am building a hanging house like this. Because I have no where to go. There is no alternative but to stay here. The tide rises; So I raised the deck. Now this is our home."

Twelve years ago, cyclone Aila hit the west coast of Bangladesh with violent force. The remote areas of Khulna, Bagerhat and Satkhira districts were severely affected. Sutarkhali, Kamarkhola of Dakop upazila of Khulna and Gabura union of Shyamnagar in Satkhira suffered the most. Many people were forced to move from these areas. Later, some people were able to return to the area but it was not possible to return for many. The Sutarkhali union had been under salt water for about five years since Aila's incursion. There was no greenery. The same situation occurred in Gabura union of Shyamnagar. The whole union was devoid of green due to salt water intrusion.

According to local residents, the village of Kalabogi in Sutarkhali union carries the mark of cyclone Aila. They also said that the village was full of greenery before being hit by the cyclone. There was no hanging house. Every house had green plants. The people were well off by working in the diverse fields of Sundarbans and in the Shibsa River. However, cyclone Aila came and took away the good days from the residents. Kalabogi gets a new name 'Hanging Village'.

The village soil is washed away by the tidal wave caused by the cyclone Aila. Besides, the level of tidal wave continues to rise. Eventually, people started building houses which are adaptable with the high tide. The hanging village is located across wards 8 and 9 of Sutarkhali union. At least five hundred homes have been leading extremely inhumane lives for a decade.

With the catastrophic hit of Aila, lives began to change here. These people are more affected by the storm because they are living in a danger zone situated outside of the embankment. They do not need to be hit by big storms, they are severely damaged by the strong high tides of the rainy season. The village changed even more after the cyclone Amphan on 20 May last year. An entire hanging village was broken into two pieces by the strong blow of cyclone Amphan. Now part of the village has become an island. Around hundred families live on that small island near the Sundarbans. They have to go to the mainland by crossing the mighty Shibsa river. In the same way, cyclones like Aila keep changing the lifestyle of the people of this area. Since the hit of cyclone Aila in 2009, the name of Sutarkhali union appeared in local and foreign news many times. However, the pace of the development is yet to reach a satisfactory level.

The embankment was built after being hit by Aila. In the last few years, the embankment is facing a collapse. New embankments were constructed around Sutarkhali Union with the funding of the World Bank. However, more than five hundred families of Kalabogi remained outside of the embankment. This embankment was built far from the river due to the river bank erosion. But the interpretation of the erosion-prone people is somehow different. They said that no matter how strong the embankment was built, it will not last without stopping the erosion of the river. In order to make the area safe, we have to look at preventing the river bank erosion first. Why live here even after so many crises? In response to such a question, the residents of Kalabogi put a counter question - where will we go? What will we eat? They said that this Sundarbans and rivers were the only way of their livelihood. Besides, there is no place for them to stay since they have lost most of the things in the river.

The residents of Kalabogi village have come up with their own strategy to struggle against the climate change. With the changing climate and time when there was no other way to live in houses on the land, they built houses on the water in a special way. There are many stories of surviving disasters across the coast. If people do not have the opportunity to make hanging houses, they build the houses on a higherland. Some people pull ropes around the house to avoid disaster. To get out of the house easily in times of disaster,they also have exit strategy. Besides, each room has a large wooden box to store the necessary household items.

Ruhul Amin of Kalabogi village had a lot of land. All is lost in the erosion of the Shibsa river. With each disaster like cyclone, the erosion of the river increases and people become landless. Moniruzzaman of Kalabogi village is in the same situation as Ruhul Amin. His first house was situated near the Sundarbans. He had to move his house far as the river erosion increased. Most of the people in that area make a living by catching shrimp larvae in the Shibsa river and working in the Sundarbans.

However, their income declined since cyclone Aila hit their area. Work in the Sundarbans has become limited. There is a ban on catching shrimp larvae in the river. As a result, the economic crisis of the people of this village has increased. These people, mainly affected by natural disasters, have lost their jobs. Then there are other problems in life. After losing their land, they are facing a severe accommodation crisis.

Rafiqul Islam Khokon, executive director of Khulna-based private development agency Rupantar, said the area was at high risk after the cyclone Aila. Local residents lost land in the river erosion. As a result, their suffering has increased a lot. It has become difficult to take initiative to solve their problems. Because, land is needed to work on infrastructural

development. There is no such land in that area. As a result, in order to develop them, steps have to be taken to relocate them. Then we have to see what kind of benefits can be ensured for them.

Frequent natural disasters on the coast of Bangladesh are affecting public life. There is still disagreement over whether this is the impact of climate change. However, there is no doubt that disasters are crippling people economically, affecting their lives and livelihoods as well as changing the environment. Twelve years after cyclone Aila, the people here have been facing an extreme struggle. Now, they are handling struggle and solving their crises. Not only in Kalabogi, people in many places along the coast of Bangladesh are carrying the burden of natural disasters. They are running from the coast to the city in search of shelter and livelihood. They are already known as 'climate displaced'. A few of their stories can make headlines in the media. Scientists believe that climate change will increase 'climate displaced' people in the future.

A new study, which is published in the international journal named Scientific Reports, says rising sea levels could be even more dangerous in the future. As climate change increases sea levels, storm intensity and high tides will push people farther inland, a team of researchers says. The study says Virginia in the United States and parts of North Carolina, France, Germany, India and China, and Bangladesh are at particular risk.

Surveys have shown that there is a risk of much higher economic losses from sea level rise in this century. Sea level may rise further. Strong coastal storms can hit. The strength of the waves can increase. There may be high tides. The risk of periodic flooding could damage millions of people and trillions of dollars of assets worldwide.

Convener of the Bangladesh Disaster Forum, disaster expert Gowhar Naeem Wara said, "we are facing the climate changes in the last few years. The frequency of cyclones within the coastal area along with river erosions and tidal surges have been increased noticeably. Many coastal people are suffering due to the frequent disaster experience. Many have lost their lives and livelihoods. However, we have been trying to take appropriate action in favor of them. It is necessary to rehabilitate the climate victims".

Writer: Rafiqul Islam Montu is a Coastal Journalist.

BANGLADESH NAVY

Join Bangladesh Navy

Take Smart Decision

www.joinnavy.navy.mil.bd
Helpline: 01769-702215

BANGLADESH NAVY

Web : www.bimradbd.org

Naval Headquarters Complex, Banani, Dhaka-1213, Tel : +8802-9835182