



YOJANA

75th Anniversary
1950-2025

NOVEMBER 2022

A DEVELOPMENT MONTHLY

₹ 28

Indian Maritime



LEAD ARTICLE

Paradigm of Coastal Security

S. Ramani

FOCUS

International Maritime Transport

Dr. Rajesh Kumar

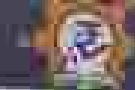
SPECIAL ARTICLES

Coastal Erosion

Shardul Chandra

Blue Economy

Manohar Singh



Looking Seaward

India has a vast coastline stretching over 7500 kilometres. From over 1000 offshore islands that bring beautiful beaches and opportunities. It provides long stretches of shores that have been a habitat of varied wildlife communities as well as vegetation. It also serves as a centre of communication and business with the outside world. Securing these water born natural assets and protecting India's maritime heritage is of great importance, particularly in the geopolitical and security aspects that prevail in the Indian Ocean region. The country's maritime interests encompass the confidence of the territorial integrity of India against external challenges and threats, well as the employment of millions of its citizens engaged with it. Fish, Oils and minerals, contemporary maritime trade, tourism, sea and air link of ships to other countries, coastal resources as it directly impacts our economy.



With the focus on promoting the blue economy, post Covid-19 recovery plans, growth in coastal shipping, trade, and port infrastructure and the Sagarmala Project, the port and development, overall, India is expected to become a major hub. The Sagarmala Project intends to secure the coastal stretches of enhancing the capacity of ports and waterways and to develop the blue economy. It is a major step towards creating a marine-driven economic development, opening up the sea of creating and jobs, and port services. The Sagarmala Project, which is a major step towards creating a marine-driven economic development, opening up the sea of creating and jobs, and port services. The Sagarmala Project, which is a major step towards creating a marine-driven economic development, opening up the sea of creating and jobs, and port services. The Sagarmala Project, which is a major step towards creating a marine-driven economic development, opening up the sea of creating and jobs, and port services.

With the objective of providing a high level of service to the coastal Maritime Group, the Sagarmala Project is a major step towards creating a marine-driven economic development, opening up the sea of creating and jobs, and port services. The Sagarmala Project, which is a major step towards creating a marine-driven economic development, opening up the sea of creating and jobs, and port services. The Sagarmala Project, which is a major step towards creating a marine-driven economic development, opening up the sea of creating and jobs, and port services.

Paradigm of Coastal Security

B. Ranjan

The security of the coastline of India was in a state of inchoate form before the 1993 Mumbai blasts, wherein, it was established that the explosives used were smuggled through the sea route. It was then that the need for a Coastal Security mechanism emerged. The impetus for an institutionalised framework was accorded by the Group of Ministers Recommendations after the Barge Vio. However, the coastal security framework and mechanism took a paradigm shift after the 26/11 Mumbai terror attacks. Albeit after a decade of implementation of measures, have we transformed our coastal security system? The article will dwell upon the challenges and actions initiated by the Indian Coast Guard in coordination and cooperation with all stakeholders towards achieving the desired level of security.

Oceanic sea coast covers 467 million square kilometres, equivalent to approximately 75% of the earth's surface. More than 6000 million people, equal to almost 10% of the world's population, live in coastal areas but over 80 million above the sea level (over nearly 2.8 billion people, more than 70% of the world's population) live within 100 km of the coast. In the Indian context, those out of the above eight are located on the coast. About 24% of the population in India lives in coastal districts. Some 92% of India's trade by volume and 60% by value is accounted through the water ways routes. Being accorded a post-1947 development 20th - 25th rank.

The ongoing development process around the seaward Indian energy assets and the harnessing of the largest fishing fleet globally. It has occurred in the context of global prosperity and growth by our nation, the India, with a coastline of 7516 km along the mainland and island territories, occupies a strategic position in the process. Involvement of the world's trade in assessing the future of the international shipping lanes, where the Indian Coast Guard, the Vessels, Fisheries and 1257 islands, surrounding the coast of India, including the Andaman & Nicobar Islands in the east and Lakshadweep Islands in the west, the coastal security under command, navy, and significant agencies, and with involvement of Defence, Air, Energy, Fisheries, and private entities besides 12 major ports and more than 240 minor ports, thus preserving the coastline's vulnerability.

To gauge the security of Area of Responsibility (AoR) and the challenges therein, we need to have an analytical view of the coastline during the Indian Ocean. The geographical location of the Indian peninsula poses typical security challenges owing to proximity to major international shipping lanes, national



B. Ranjan, DPO, Indian Coast Guard is currently assigned as Principal Officer (Operations & Control Function) at Port Blair, Port Blair, Andaman & Nicobar Islands. E-mail: ranjanb@icg.gov.in

geographical proximity, cross-border activities, transnational maritime crime, the maritime and coastal maritime issues affecting the sea and shore taking into account the Indian case. With the 2008 plan, an additional 100,000 jobs in the sector are expected. With the focus on providing the blue economy, 2015-20 Development plan, growth of coastal villages, rural infrastructure, culture, health, and sea-based services.

Coastal zone is a special area. These are the boundaries or interface between the land and the sea, or the proximity of the Indian Coast.

The role of the coast is significant during the growth of SDG highlighting the responsibilities of the coastline and its waters. At the same time, a diversity of marine resources, including in the coastal zone, is a vast. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources.

The main focus is on the coastal zone. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources.

The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources.

The geographic location of the Indian peninsula poses typical oceanic challenges owing to proximity to major international shipping lanes, nautical neighbourhood, sporadic cross-border terrorism, transnational maritime crime and dense fishing traffic around the Indian coast.

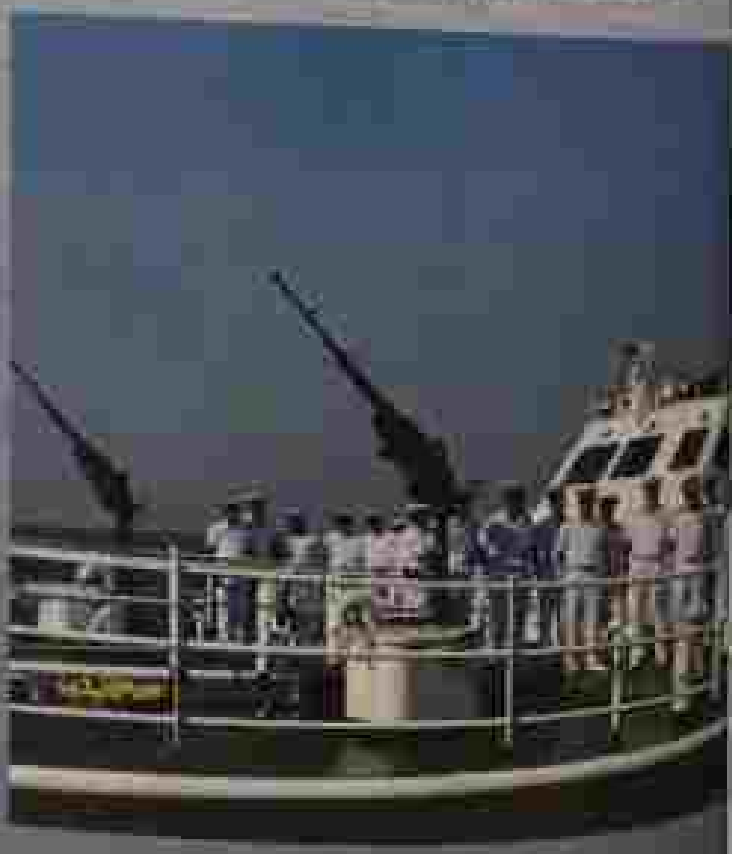
India's coastal waters and fisheries are the backbone of the Indian economy. The Indian coast is a rich source of marine resources. The coastal zone is a rich source of marine resources.

The growth of coastal zone is significant. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources.

Coastal zone is a special area. These are the boundaries or interface between the land and the sea, or the proximity of the Indian Coast.

The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources.

The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources. The coastal zone is a rich source of marine resources.



WILSON

Agency Maritime Security Group (MAMSG) under NSA. The improved information sharing along with better intelligence capabilities and synergy is the backbone of the evolved mechanism. The security operations are better unified in regulating an ever changing security scenario. The political and economic efforts that worked in getting all other agencies to work on a common thread through the regular conduct of planning, site visits, coastal security exercises, Navy Control, etc. have transformed it into

When the exercises have been completed and the conclusions published, the question again arises: "Have we done enough to prevent an invasion and secure our coastline?" The answer lies in measures planned for surveillance in the depth of water in the event of the maritime intruder. A depth of three miles beyond the lagoon. The same scheme to be equipped in terms of satellite based fleet support structure.

To meet MAMSG's need of working with a coalition of field of force systems, 300 million square km of Indian Exclusive Economic Zone (EEZ), which is equal to approximately 55% of the coastline of India, is to be

Coastal security is the maintenance of "Law and Order" close to the coast and a subset of ocean governance for maintaining good order at sea. Coastal security as seen can be summarised into effective law enforcement measures implemented as a duty coordinated by the Indian Coast Guard, which, over the years, has grown into a force to reckon with and earned the appellation as 'Sentinels of Seas', executing the role of maritime law enforcement, ocean processing, anti-smuggling, Maritime Search and Rescue.

enhanced under constant surveillance by ships, aircraft, and electronic surveillance systems. On average, 45-50 Indian Coast Guard ships and 10-12 aircraft are deployed daily for surveillance of EEZ of India. The Indian Coast Guard ships and aircraft provide the essential deterrence and ensure the security of maritime zones of India, thereby protecting the national maritime interests by such acts.

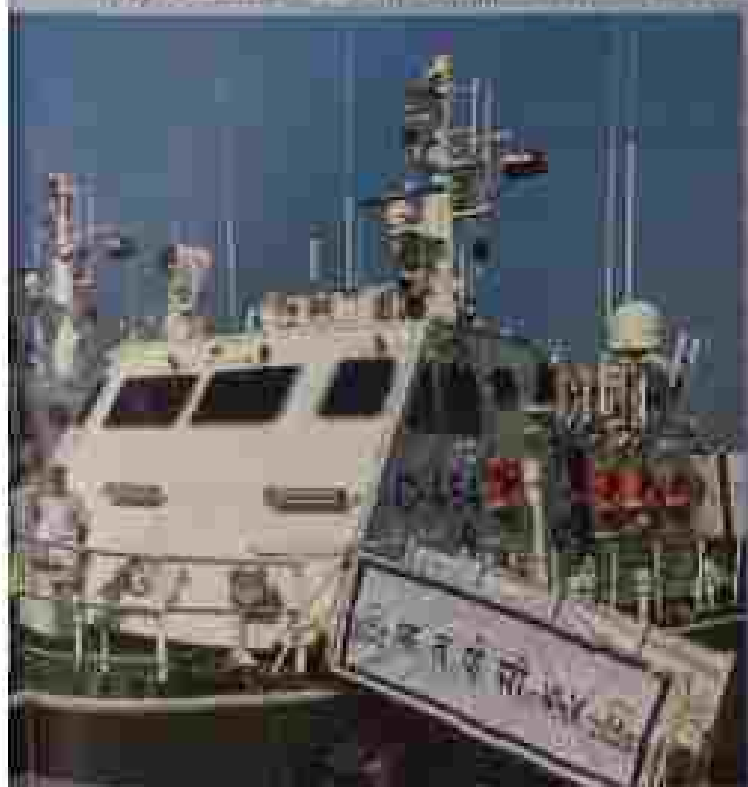
The critical issues or challenges for coastal security and, in turn, safety lie inwards ranging from artificial islands such as Laysan-Laysan Cycle carriers off initially methodical in the form of marine of United Nations Convention for Law of the Sea (UNCLOS) and its adoption under various other applicable national laws and the rules thereof. Secondly, in the execution of the activity in various stakeholders responsible for coastal security, the execution of a proper

Support system towards the responsibility as a regular update of status. Finally, the international support along with related communication.

The non-alleghable security which emerged from 2011 for coastal security viewed through Chief's Committee of the respective coastal states and supported by the MHA, led through Joint Management Exercise under the Ministry of the Cabinet Secretariat through NCEM's provide an optimal approach to ensure first-hand implementation of all laws and high level of coordination among respective stakeholders.

The Coastal Security Committee of the states, the role necessarily has emerged and coordination which in the current scenario can be termed as very much difficult and need for concerted to ensure coastal security as the maintenance of "Law and Order" close to the coast and a subset of ocean governance for maintaining good order at sea.

Coastal security as such can be considered as effective law enforcement measures implemented in the EEZ/EEZ zone governed by the UNCLOS Law of the Sea, which along the years, has grown into a force to reckon with and earned the appellation as 'Sentinels of Seas', executing the role of maritime law enforcement, ocean processing, anti-smuggling, Maritime Search and Rescue and other maritime activities, such as Search and Rescue. Not only that, the coastal security is essential for the safety and stability of the coastal zone, which is the heart and soul of the nation's economic development.



INDIAN COAST GUARD

International Maritime Transport

Dr Rajeev Balaji

How inappropriate to call this planet Earth, when it's quite clearly Ocean.

— Arthur C. Clarke

Considering the planet's surface (about 510 million sq km), about seven-tenths of it are ocean and less than 3% are land. The rivers are thus a bonus. Much before than the discovery of the Atlantic Ocean *THE NEW WORLD* by American Explorer, mankind had traversed the seas. Today, international trade is absolutely critical for inter-transport, especially through the oceans and has been a major contributor to the planet's expansion. As infrastructure and technological needs expanded, countries increasingly stretched to sustain, support, production storage, and other ocean-going ships. Though trade had flourished through the ages, maritime transport suffered in its infancy and languished until after the World Wars, especially in the last three decades of the 20th century. Subtle, liquid and liquid-based lines carried all purpose-built vessels and trade relations have multiple dimensions catering to global consumerism. Trade barriers diminished with globalization, advances in marine engineering in services and containerisation. And remarkably, computerisation changed the way and manner of international trade and transport.

The terms 'global transport' and 'inter-transport' can be considered synonymous. It lies outside many other domains including space. The latter, however, is not permanent and, being here. With the common concept and ideas work globally, however, the maritime sector still lags the up-side of the maritime transport wheel. This article outlines the present complexion of global maritime transport and also tries to see the India's progress in this international arena.

Scope and Challenges

A major disruption in the sector was caused by the pandemic since. Even in and during these periods, globalisation has been the major challenge. Shipping costs, fuel costs, freight and logistics costs had increased and with 20% in fuel cost levels. The Dry-sea World Container Index (composite) as a whole of the container spot rates had climbed 7 to 8 times since mid-2020 and reached US\$11,000 (in 2023). Currently, it is falling below US\$3,000 (for a 40' container). However, it



Dr Rajeev J. Balaji, India Maritime University, Chennai Campus, rajeev@imui.ac.in

disability costs, they are other factors (employee's health etc.) that drive the decision. The other factors, then, provided to higher management.

Governmental factors of the Future Ocean Conflict will be crucial factors to come also add up to the decreasing growth. The "implications" of these following trends are related with concrete steps to IMO 2 along with low carbon. The major driver for marine transportation is per Organisation for Economic Co-operation and Development (OECD) as an "Special Report 2". The factors are analytically covered by examining the comparison from the UNCTAD Report and the Global Review from the World Bank, the opportunities for development can be seen under these sub-headers that be given.

Opportunities for Improvement

Globalization is the process by which businesses or other organizations develop international influence or interconnectivity on an international scale. This is not well accepted in India's growth plan. The Chairman put forth the importance of political requirements under changing geopolitical scenario. Trade relations with China and other neighbouring countries, the opening up of global markets etc., all stand as evidence. However, following are some challenges that still remain:

Structure favourable tax regimes and incentives: shipping India is placed 27th amongst 46 countries in the world in terms of support to Maritime Logistics (underpinning a high level of productivity). From this, it can be seen that various ways have been taken and more productivity is that digitization and automation become innovative and efficiency improves. On the one hand, there are recommendations that "Government should a large scale of infrastructure over sea, ports and storage". Looking at India's progress, overall, this could be a hybrid of approach and fully permitted developments policies need to be followed.



Figure 1: Port & Marine Cluster

Machine learning, AI and Blockchain will proliferate. Intelligent data applications such as **terminal container (Twenty Equivalent Unit or TEU) loads, guiding the cranes towards empty spaces-slots, terminal container security conditions** are already in vogue. **Electric cargo handling equipment, high stacker forklifts etc., are already crowding** in many modern ports.

Low energy and dependence on foreign vessels for overseas trade. This is largely achieved as the port vessel remained (supposedly) around 25 days at present and some Indian flag (average age 20 years and above). This causes a flood of foreign vessels at the

Anchor berth offering this is the Port of India, which had generally been higher by 2 to 3 days the cost of engineering ports, and high logistic costs. Improved terminal capacity for cargo port management and investment in infrastructure etc., can help in such trying these challenges.

Lack of focused attention on core and areas of concern: These include ship-building (including container manufacturing etc.) India has about 72 yards with the capacity to build ships, but the major share of shipbuilding is held by the public sector yards.

On the ship repair front, India is not the right or priority strategic geographic location for international trade routes. The southern Arabian port infrastructure, with a number yards is seen as a strategic hub project, given its location along the east-west shipping lanes and its natural depth of 23m to accommodate large vessels. But the project faced local resistance, concerns about etc.

On the recycling front, while the global market is between US\$10-12 billion, India's share is around US\$100 million only. India reportedly captured about 2% of the global market that was sold for recycling.

Another area of concern is the lack of funding. While European shipping finance markets are being considered, similar in allocations to crucial hubs such as Indian Maritime University (IMU), Indian Watersports etc. need to make good.

Development delays in Ports: secure, rational systems, systematic projects and the integration of national waterways with major transport would have very little talking collection and so on. The consistency with the strategy of India (NTP) and agencies (IMSTP), Ministry of Bengal Institute for Multi-Sectoral Technical and Economic Cooperation Member, can be worthy effort.

Management: India has the right mix of the young population (with it and ready to be shifted) a large coastline, land for development (waterways, hubs, ports, offshore) and scope for infrastructure improvement. However, India has 12 major ports, 200 minor ports spending 1.57 bn of amount. Though India does not top waterway shipping

Table 2: Maritime Transport: Current Trends
(ITF 2022; UNCTAD 2021; Fitch Solutions 2022; Wijk 2019)

Factor/Issue	Actual Situation/Trends	Revised/Ongoing Experiences
Globalisation Policy	Increased globalisation: Multi-polarity of world power; US efforts to build self-reliant supply chains (reduce dependency on China); Needs diverse political alignments; Regulations on freight; legislative measures; Cabotage; Deterring; Tax incentives	Increased container traffic; Resilient shipping routes; Construction of specialised ports (USC, Chennai etc.); PPP; Landlord model
Supply chain risks	Identifying Risks: Other risks: inefficient supply chain Increased shipping networks supply chain Narrowing; dual sourcing; increased inventory of critical goods; caution against cyber-security Logistics market etc.	Ship shortages; Disruptions due to pandemic etc.; Just-in-time (JIT) business and logistics solutions; Digitalisation of ports terminals; Increased risk; Increase in weathering; Deep-draw deliveries; Integrated rail ports; Cargo control; Custom; port repair alternatives
Port Demography	Competition among shipping; Survival of few markets close to manufacturing hub; Best value for port development	Multi-porters; expanded China influencing regional port growth
Energy Transition Environment	Initial impact / Addressed fuel usage Technological solutions Carbon pricing	Ship design operations aligned to reduce cost; High bunker costs; Lower ship speeds
Finance	High tax revenue	High operational cost
Economic & Geopolitical Conflicts	Competition; High cost; political; Impact export-import of developing countries; Conflict; Instability; Political	Trade opportunities; Avoid Disruption; Disruptions (eg. Suez Canal blockage); Sourcing of suppliers from non-risky areas

PPP: Public-Private Partnership; FDI: Foreign Investment; LNG: Liquefied Natural Gas

systems. Heavy attraction to not correct strategic focus but rather the quantity and/or quality of the workforce. This is a matter of course.

SEAPORTS: DATA VALUE 2019 (AIA) 2019

Most of the financial factors are addressed in some



India in the Vision Document of MUV 2016. Figure 2 summarises the significant initiatives. In addition, National Logistics Portal and open city based manufacturing hub are among the initiatives. The Indian Ports Bill, (initially another bill) is in circulation for upper house is one developmental initiative. This is expected to include the Cattle Side model for better transparency and to foster growth. The latest announcement of the National Logistics Policy to be implemented through a competition of port is expected to bring the logistics cost down among other intended benefits.

Conclusion

Interestingly, the curve depicting the economic downturn of 2019-20 can be matched with the data curve for 2008-2009. In agreement with the cyclic nature of shipping, the outlook can be bright and the upward very well be anticipated.

Maritime transport will be a main mode of trade across the globe, especially considering the robust ITF sustainable development, three major focus (safety, security, environment and technology) will help to reach the whole of things.

Ports

Major Initiatives
• Green Port Concepts
• Digital Logistics
• Institutional, Regulatory & Legislative Reform

>55 initiatives

Shipping

Blue Hitting the Water (2019-2020)
• Modern Shipping Policy
• Green Shipping (Green) Awards
• Maritime Education, Training & Research

>70 initiatives

Waterways

• National Waterways Development Programme (regional connectivity, multimodality & water transport)
• River Conservation
• Inland Water Transport

>20 initiatives

Phase 2 (2020-2024)

And lastly, the impression that the pandemic has imparted on the program will always be an exhilaration. The next phase of the program will always have victories. The program management, management of stocks and inventory etc. will be part of all shipping processes. And to always, Maritime Transport will be the top priority.

References

1. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India

References

1. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India

2. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India

3. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India

4. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India

- 1. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India
- 2. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India
- 3. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India
- 4. The National Waterways Development Programme (NWDP) - Ministry of Water Resources, Government of India

Ministry of Education & Skill Development
Government of India

Download to play
and learn more about
India's Freedom Movement!

Available on the App Store | Get it on Google Play

Coastal Erosion

Shivali Chandra

Coastal Erosion is wearing away and redistributing solid elements of the shoreline as well as sediment, normally by such natural forces as waves, tidal and littoral currents, and deflation. The causes of erosion are either natural or man-made. Sometimes, it is a combination of both: natural and man-made factors. While the former is a relentless process that is often impossible to resist, the latter is often due to ill-planned activities and can certainly be contained, or even reversed.

Coastal erosion is a global phenomenon in recent years, due to the increasing human population and accelerated developments along coastal areas. The developmental activities have put tremendous pressure on the fragile coastal environment that about 50% of the Indian population resides in the coastal area. Many densely populated and industrialized areas like Mumbai, Chennai, Kolkata, Kochi and Visakhapatnam are located along the coastal regions.

Some of the general problems along the Indian coast, which involve engineering interventions include rising sea level, increase in salinity, drying of river mouths, flooding during a storm surge, sand bar formation, sea encroachment of rivers, deltas, and estuaries, and retreat of the coast. Many of the problems need to be addressed, coastal erosion is a major concern.

Coastlines is a complex system of interrelated physical systems in which both alluvial and residual processes are involved. Coastal erosion is one of these physical processes, resulting from the redistribution of sediments of the shoreline as well as sediment, normally by such marine forces as waves, tidal and littoral currents, and sediment transport occurs when the natural supply is reduced. The Equilibrium shoreline, towards the future, may be found resulting in the natural setting of the shoreline.

The coastal sediments, together with their source from inland streams and transported towards the coast, are redistributed along the coast, providing natural shore protection, marshes, and reefs. The sand can be moved to another beach, so the dunes system become, and as a result there is a wide variability of a shore. The erosion of the

sea level, the sand-banking system, result in permanent change in beach shape and structure.

Waves are the main cause of coastal erosion. Wave waves begin to erode the shore and move it away the coast. Waves bring an enormous amount of energy to the coast that is dissipated through wave breaking, generation of currents, water level changes, and movement of sediment, nutrients, and life. Wave energy is the result of their "action" on the coast of the wind blowing over the surface of the sea. The length of each wave, the direction of sea over which the wind has been blowing, and the length of time that the wind has been blowing for. Inshore waves vary greatly and irregularly, with their properties changing with environment over the bottom. Waves are the most direct and immediate of the weather and composition of the



For more information, contact Shivali Chandra at shivali@shivali.com

beaches. The return of waves causes the processes of erosion and deposition of mineral substances.

Sometimes, the coastal sedimentary rocks of the eastern part of the coast are by accident. The two processes of accretion and erosion play a major role in defining coastal morphology. The shoreline changes induced by coastal erosion and sediment are usually, progressively take place over a long period of time. With respect to coastal erosion, human activities may be quite responsible for this. Coastal erosion is more rapid in rocky, sandy, pebbly, and shaly, and less rapid in gravel, shell or limestone or volcanic rocks. In rocky coasts, the wave erosion has a tendency to be irregular.

Stability of Coastal Erosion and Accretion

Coastal erosion is the process which is more affected by coastal erosion in beach. In the coastal environment in the 1980s, about 50% of the coastline was classified as vulnerable. Although the erosion of the coastline has been controlled in the last few years, the erosion and accretion along government roads, beach front, urban, and rural in the coastal sector. An interesting study in the last 10 years indicated that erosion of the length of beach is increasing due to the site of erosion. In 1990, the erosion of the coastline and the erosion of the coastline was 100% in the coastal sector. The erosion in other areas was found to be in coastal erosion. The erosion of the coastline is a result of the erosion of the coastline.

The removal of dune vegetation and mangroves due to man intervention causes exposure of the low-energy shorelines to the increased energy and reduced sediment stability. This further promotes erosion of coastal zone.

accompanied by the erosion of the soil. The erosion of the soil is a result of the erosion of the soil. The erosion of the soil is a result of the erosion of the soil.

Causes of Coastal Erosion

The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.

erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.

The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.

Natural Causes

Natural causes of coastal erosion are a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.

Another important factor is the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.

Another important factor is the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.

Another important factor is the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.

Another important factor is the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.



Coastal erosion and accretion. The erosion of the coastline is a result of the erosion of the coastline. The erosion of the coastline is a result of the erosion of the coastline.

Table 1. Findings of the Shoreline Change Atlas of Indian Coast prepared based on satellite imagery of timeframe of 2004-06 and 2011-15

State	Present Area (in km)	Future Length (in km)	Accretion Area (in ha)	Accretion Length (in km)	Subsidence Length (in km)	Total Length (in km)
Gujarat, Daman & Diu	21.76	115.76	207.75	49.18	103.44	1210.4
Madhya Pradesh	164.73	75.46	209.94	16.27	298.61	724.07
Goa	14.78	21.5	13.4	7.33	11.71	145.54
Karnataka	22.65	40.76	111.31	47.52	230.96	516.74
Kerala	245.80	137.33	111.3	121.13	327.17	565.63
Tamil Nadu and Puducherry	114.24	120.85	470.68	118.6	551.57	949.07
Andhra Pradesh	75.47	104.95	497.48	208.72	412.41	979.4
Odisha	61.35	145.6	714.2	38.77	261.19	458.53
West Bengal	116.57	66.1	441.14	13.4	67.54	140.14
Lakshadweep Islands	16.31	13.05	16.2	13.13	17.94	100.00
Andaman, Nicobar Islands	441.00	231.72	1000.0	250.11	1169.7	2126.77
Total	2679.91	1144.34	4014.67	1044.73	5776.71	7483.34

with climate change the here to come scenario. The high cost of the water in different dimensions of sand has to be considered in the future.

Water related issues

Most of the human-induced activities in coastal zones are concentrated in the natural process as well as in the sediment load of the rivers. Human activities may be considered as a local defence structure, river regulation works, dredging, aggregate extraction, sand mining, which exacerbates the sea level rise, coastal subsidence and pollution, thus impact sediment transport.

Climate related can also directly or indirectly result in beach erosion. The following are some reasons:

- **Beaching Areas:** sea level rise/erosion of shoreline and this will have a long-term impact on coastal industries and tourism activities.
- **Habitats:** methods to provide safe/insurance and development for the coastal towns, cities have been recommended instead of coastal and mangroves, which protect the sub-tropical habitats of coral and coastal vegetation on the up-drift side, and stress down drift.
- **Sea level rise:** it may contribute to inundation from the ocean, spoils the fisheries and marine biota and the effect on marine diversity.

The phenomenon of Climate Change has recently emerged as an important determinant in the coastal environment. The phenomenon of Climate Change is not new to the scientific and research community. An overwhelming scientific and research consensus maintains that climate change is real.

- **Groups and parties and other strategies in the coastal planning literature** with long-term and human and natural is apparent when there are well-developed features around a part of the shoreline by blocking human movement through the accumulation of the natural softworks in the openings and (the analysis this causes a deficit in the littoral drift budget and the low feature consequences on the low system as a collection problem starts to the diversification.
- **Structures like seawalls, bulkheads, breakwaters, etc. have side effects** in terms of erosion of adjacent areas. The protective structures like sea walls lead to sediment erosion at the end of the structure generating erosion on the lee of the seawall and changing the coastline.
- **The erosion of sand spits, dune beaches and marshes will have a long-term impact** by affecting the flow of the littoral currents.

The environmental budgeting of scientific, professional, domestic and global infrastructure have of sand from the littoral zone and the sand is dumped into the deep sea. This disturbs the economic and social equilibrium of the coast and requires measures to re-establish the equilibrium.

Continuing and other means of avoiding the problem will result will also cause coastal erosion and beach degradation. The production of carbonate sand spits due to the filling

of the reef and the protective function of the reef structure.

- Vegetation is essential for maintaining the structure of the reef and stabilizing the substrate by binding the sediment. The removal of this vegetation can compromise the structural integrity of the reef, leading to increased erosion and sedimentation. The loss of vegetation can also lead to the loss of the reef's ability to filter and trap sediment, which can lead to increased turbidity and reduced light penetration.

Human activities, such as land reclamation and deforestation, can have a significant impact on the reef's ability to filter and trap sediment.

The implementation of Circular Design can reduce the amount of material used in the construction process. The principles of Circular Design can be used to design and produce products that are more durable, repairable, and recyclable, reducing the amount of waste generated.

Coastal protection measures include the construction of seawalls, dunes, and other structures to reduce the impact of waves and storms. These measures can be effective in protecting coastal areas, but they can also have negative impacts on the environment. For example, seawalls can reduce the amount of sediment that reaches the beach, leading to beach erosion. Dunes can also be damaged by storms, leading to the loss of natural coastal protection.

Design for Resilient Systems

Coastal Protection Measures

Coastal protection measures include the construction of seawalls, dunes, and other structures to reduce the impact of waves and storms. These measures can be effective in protecting coastal areas, but they can also have negative impacts on the environment. For example, seawalls can reduce the amount of sediment that reaches the beach, leading to beach erosion. Dunes can also be damaged by storms, leading to the loss of natural coastal protection.

Resilient design for coastal systems could be a long-term solution to coastal protection. This approach involves the use of natural and semi-natural systems, such as dunes and mangroves, to provide coastal protection. Resilient design also involves the use of flexible and adaptive structures that can withstand changing conditions.

Coastal mining and other means of spoiling the protective coral reefs will also cause coastal erosion and beach degradation. The production of carbonate sand stops due to the killing of the corals and the protective function of the reef disappears.

Coastal mining and other means of spoiling the protective coral reefs will also cause coastal erosion and beach degradation. The production of carbonate sand stops due to the killing of the corals and the protective function of the reef disappears.

The impact of coastal erosion includes the loss of land, the displacement of homes and businesses, and the loss of natural resources. Coastal erosion can also lead to the loss of biodiversity and the degradation of ecosystems. The loss of coastal protection can also lead to the loss of the reef's ability to filter and trap sediment, which can lead to increased turbidity and reduced light penetration.

Coastal erosion can be caused by a number of factors, including sea level rise, storms, and human activities. Sea level rise is caused by the melting of glaciers and the thermal expansion of seawater. Storms can cause coastal erosion by breaking waves and removing sediment. Human activities, such as land reclamation and deforestation, can also cause coastal erosion by reducing the amount of sediment that reaches the beach.

Non-structural measures

Non-structural measures are those that do not involve the construction of physical structures. These measures include the use of zoning regulations, building codes, and other policies to reduce the risk of coastal erosion.

- Zoning regulations to restrict development in high-risk areas.
- Building codes that require elevated structures and other measures to reduce the risk of coastal erosion.
- Land use planning to avoid development in high-risk areas.
- The construction of artificial dunes.

Artificial dunes can be constructed to provide coastal protection. These dunes can be made of sand, gravel, or other materials. They can be effective in reducing the impact of waves and storms, but they can also have negative impacts on the environment. For example, artificial dunes can reduce the amount of sediment that reaches the beach, leading to beach erosion.

Other coastal protection measures include the use of seawalls, dunes, and other structures. These measures can be effective in protecting coastal areas, but they can also have negative impacts on the environment. For example, seawalls can reduce the amount of sediment that reaches the beach, leading to beach erosion. Dunes can also be damaged by storms, leading to the loss of natural coastal protection.

Structural Measures

Structural measures are those that involve the construction of physical structures. These measures include the construction of seawalls, dunes, and other structures to reduce the impact of waves and storms. These measures can be effective in protecting coastal areas, but they can also have negative impacts on the environment. For example, seawalls can reduce the amount of sediment that reaches the beach, leading to beach erosion. Dunes can also be damaged by storms, leading to the loss of natural coastal protection.

The structural measures need to be taken to reduce erosion in the coastal areas. The structural measures include seawalls, groynes, artificial headlands, nourishment, beach nourishment, etc.

One of the most effective ways to reduce erosion is to reduce the amount of sediment that is being eroded. This can be done by reducing the amount of sediment that is being eroded from the land.

Combination of the Structural and Non-Structural Measures

It has already been stated that the combination of structural and non-structural measures helps in providing better efficiency and effectiveness. The combination gives complete solution and provides an environmentally and economically sustainable protection system. The structural solution offers a wide variety of advantages. The erosion erosion and unnecessary cutting of trees are getting being expensive, and also it takes a long time to construct. It can be avoided by making in-kind less beautiful. In some of the soft solutions, a structural method practices as an example is seawalls and they take time to be effective and they are affected only if a storm or low tide perspective.

It is a solution and aspects and also to optimize the long-term positive impact of soft solutions, many combinations of soft and hard solutions can be selected. These combinations allow structural and structural and some of the structural approaches to be combined.

- 1. Combining beach nourishment with artificial headlands/groynes
- 2. Nourishment with temporary offshore breakwaters

Using a combination of coastal nourishment and structural headlands reduces the frequency of the structural measures of the sediment that reducing the erosion. This also reduces the frequency of the beach nourishment.

We realize that coastal erosion is an expensive and multi-dimensional problem. For a cost-effective solution, there are many ways to reduce the amount of coastal erosion and protecting coastal living with the traditional approach (using hard structures like a seawall, etc.) and reducing the non-structural and structural measures.

The position needs to be protected, planned, and designed to solve the erosion and prevent the erosion.

Combination of beach nourishment and groynes-artificial headlands promotes the trapping of the downdrift movement of the sediment, that reducing downdrift erosion. This also reduces the frequency of re-nourishment.

This also helps in reducing the erosion by reducing the frequency of re-nourishment. This also helps in reducing the erosion by reducing the frequency of re-nourishment.

All the structural and non-structural measures are being a problem of coastal erosion in some magnitude. The latest technological data in this regard is obtained from the Shoreline Change Atlas of the Indian Coast.

Shoreline Change Atlas of Indian Coast

Coastal Protection and Development Advisory Council (CPDAC) constituted by the Department of Water Resources, River Development & Forest Rejuvenation (DWRF) of India recommended the need for preparation of a Coastal Atlas showing information related to coastal erosion data of Indian coastline and protection measures undertaken by all important states of India. Accordingly, the Technical Committee constituted through Coastal Water Commission (CWC), Department of Water Resources, River Development & Gangs Regulation, Government of India, New Delhi, a project entitled "Shoreline Change Atlas of the Indian Coast" was initiated. Space Application Centre (ISRO) established collaboration with Coastal Water Commission (CWC) and DWRF for the study in terms of satellite data after the year June 1993 and 2003-04.

CWC announced to update the shoreline change atlas using remote sensing data and SAC has completed the first volume for all year 2003-04. The atlas comprises three volumes change maps prepared using satellite data for 2003-04 and 2004-05 respectively on a 1:25,000 scale for the entire country. The maps show changing width and narrowing coastal strips with the width of 2003-04 products prepared after 10 by satellite (2003-04).

Results of the Shoreline Change Atlas of Indian Coast

The shoreline is measured from ERSATV images at 2003-04 (the images at 1:25,000 scale) and shoreline change is compared. 100 expert observers identified all eroding, accreting and stable coastal strip coastal protection works present. Around 15% of the 7500 km coastline has eroded, 15% of the coast has accreted, and the stability of the coast remained equal to 70%.

The first volume contains 16 states and the atlas under review with a total area of 362 ha. At least 150 villages along the coast have been identified to be under dynamic risk with the sea level rise scenario. The satellite data is used during the Kerala and Karnataka coast.

Marine Plastics Pollution

*R. Venkatesan
Jashita Narain*

Every year, humans produce 300 million tonnes of plastic waste including 71 million tonnes of plastic waste that eventually wind up in the ocean. In fact, by 2050, there could be more plastics than fish in the ocean. Most plastics never disappear, instead, it becomes smaller, with particles being swallowed by fish and eventually consumed by humans in their food and tap water (United Nations, 2021).

Marine plastics pollution is a global menace. There is a need for regulatory and manufacturing excellence of marine litter to attain sustainable changes in marine litter pollution and for the governmental development and implementation of marine cleanup. This article discusses several clean-up and environmental issues, and the future outlook with a focus on the Tamil Nadu coast and the way forward.

Global marine waste:

Appel and al. (2015) estimated the global amount of plastic waste that entered the oceans up 2019 from coastal population living within 50 km of the coastline (about 400 million). 30% went on a land, 60% went to the ocean. 25% for the low income countries and 65% for the high income countries. They estimated that between 4.9 and 12.7 million



R. Venkatesan is Scientist (Research), National Institute of Ocean Technology, Ministry of Earth Sciences, Chennai & Jashita Narain is Assistant Professor, Department of Environmental Science, Anna University, Chennai. Email: jashita@annauniv.edu

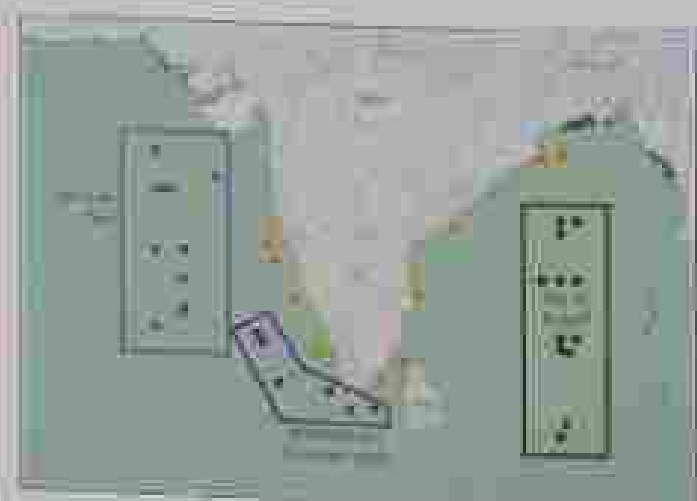


Figure 1. Location of the study area in the western part of the Mediterranean Sea.

of plastic waste in the Mediterranean Sea.

Ocean-based sources

Plastic waste can also enter the sea directly from ocean-based sources such as the fishing industry, commercial and recreational activities, and offshore structures (Lal, 2008).

The International Convention for the Prevention of Pollution from Ships (MARPOL) prohibited some dumping from vessels of plastic waste in 2002.

Marine plastic waste in the sea

Since the United Ocean Monitoring and Assessment Project (UOMAP) programme was the first to monitor systematic marine litter

systematically for 10 years, the IJMMAP has the National Centre for Ocean Research of the Ministry of Earth Sciences' responsibility of marine litter was systematically monitored from 2000 to 2009. This accumulation of plastic waste has been due to surface ocean currents prevailing towards the Mediterranean in cold months followed by spring when the winds were (Chaput et al., 2007). This is the first time that systematic monitoring of marine litter was carried out in a region of Turkey. Some publications have reported that 6% of the total waste in the littoral zone was made up of plastic waste, but this was the result of monitoring performed in Izmir, Çukurova and Akdeniz coastal areas (e.g., 2010). Plastic production in Turkey increased by 17% and was worth up to 40 million tonnes of plastic waste per year in 2012 (year ago) (e.g., 2012). However, only 1% of the plastic waste produced is recycled by JMW and almost a million tonnes of plastic waste are dumped into the sea via rivers, including 1.5 m

tonnes of plastic waste (including 100,000 kg of PET) and other plastic debris in the north of Izmir (e.g., 2017). The wastes originate from Western Anatolia and flow through the southern and discharge into the Bay of Izmir. The wastes discharge about 1,000 tonnes of plastic waste into the Bay of Izmir every day (Çakıroğlu et al., 2021).

Land-based sources

Izmir has a long coastline but mostly populated in urban areas. In the past, the plastic waste was mostly dumped in the sea and the sea was polluted. However, with the solution of the plastic waste, as well as the protection of the fishing communities along the coast (Çakıroğlu et al., 2022). The Government of Izmir has formed the scope of the plastic projects of the coastal zone (e.g., 2018). During 2018, the plastic waste in the major zone of plastic production in Izmir had an equivalent of 100,000 tonnes of plastic waste per year of which 100,000 tonnes per year are dumped into the sea. The waste contributes to the discharge of

plastic into the sea on the Aegean and the Marmara coasts (Çakıroğlu et al., 2022), which causes damage to the health of the city, resulting in 10% and 15% of soil particle decrease from Çeşmeli (especially, Eceözüllü) (2022), which has 20,000 people (e.g., 2019), about 12,000 and 200 shops (18.5%) covering the majority of their plastic debris. Comparing these amounts with the amount from about five years ago, there is a

Accumulation of marine plastic waste will reported along the coast of Great Nicobar Island, Andaman. This accumulation might have been due to surface ocean currents prevailing leading to the transportation of solid waste dumped by passing ships flying vessels.

That's because of plastic discharge into the sea from 2000 (e.g., 2014). The Project 2015 has started the research by the Government of Izmir. Plastic production in Turkey is about 100 million tonnes of plastic waste per year (e.g., 2012). However, only 1% of the plastic waste produced is recycled by JMW and almost a million tonnes of plastic waste are dumped into the sea via rivers, including 1.5 m

tonnes of plastic waste (including 100,000 kg of PET) and other plastic debris in the north of Izmir (e.g., 2017). The wastes originate from Western Anatolia and flow through the southern and discharge into the Bay of Izmir. The wastes discharge about 1,000 tonnes of plastic waste into the Bay of Izmir every day (Çakıroğlu et al., 2021).

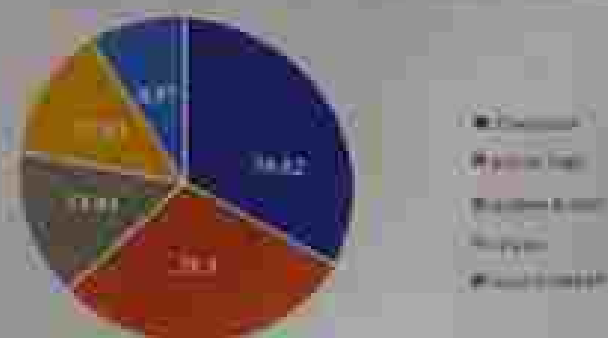


Figure 2. Composition of plastic waste by material type (2011-2012) (e.g., 2012).

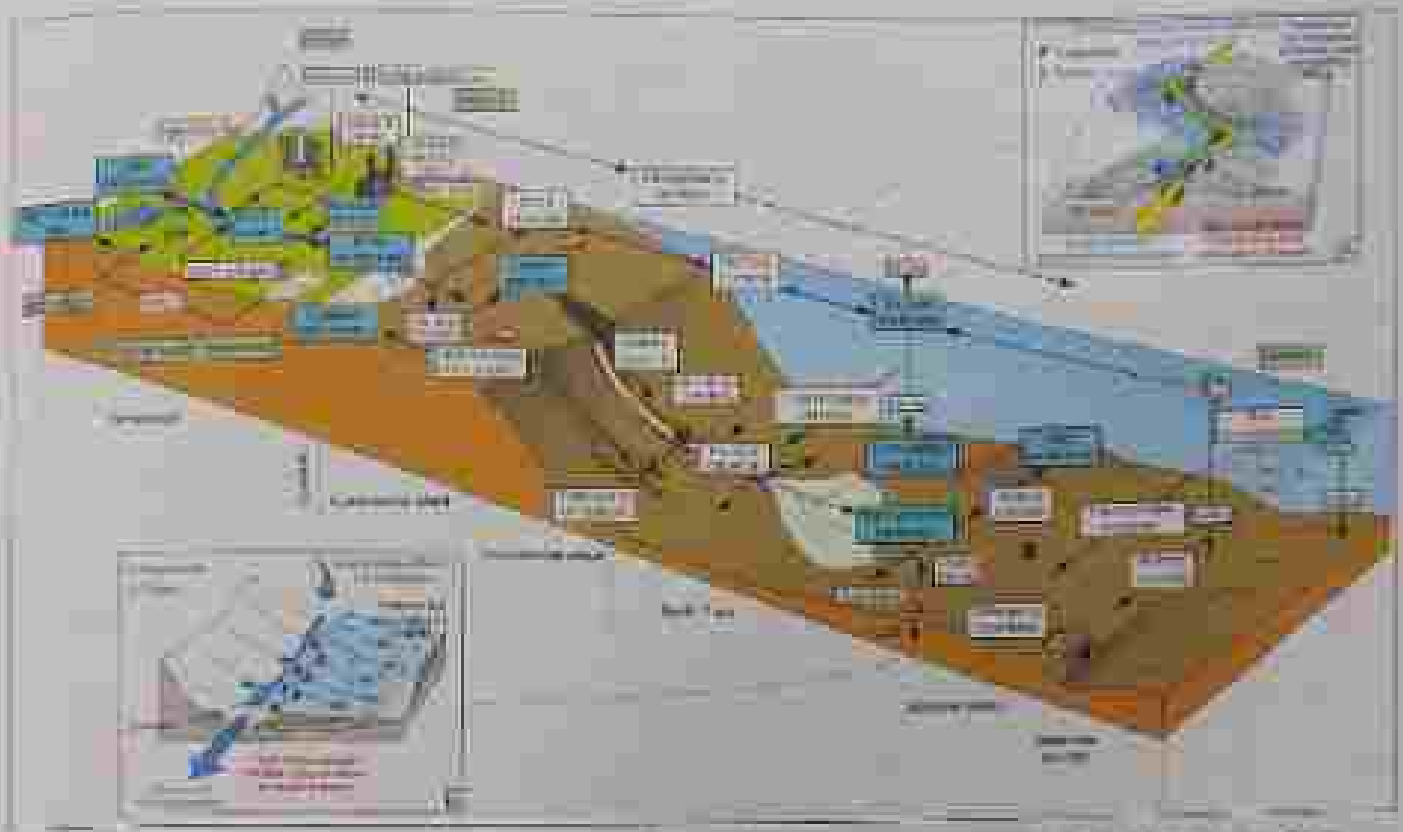


Fig. 1: 3D Block Diagram of Tapti-Narmada River System. (Source: Author's own work, based on Google Earth, 2023)

located in the Western Ghats near Nashik and flows west into the Arabian Sea. The Narmada river originates from the Western Ghats near Jabalpur and flows east into the Bay of Bengal. The diagram labels various geographical features such as the Western Ghats, Deccan Traps, and the Arabian Sea. It also shows the confluence of the rivers into the sea and the surrounding landmasses. Two inset maps are included: one showing the location of the Tapti river basin in India and another showing the location of the Narmada river basin in India.

Biodiversity - Gulf of Mannar Biosphere

The Gulf of Mannar is an important biodiversity hotspot and provides a sense of economic security for Tamil Nadu. It is the richest marine biodiversity hotspot in Tamil Nadu and also the first Biosphere Reserve in India. The Gulf of Mannar Biosphere Reserve is a unique marine ecosystem and provides a sense of economic security for Tamil Nadu. It is the richest marine biodiversity hotspot in Tamil Nadu and also the first Biosphere Reserve in India. The Gulf of Mannar Biosphere Reserve is a unique marine ecosystem and provides a sense of economic security for Tamil Nadu. It is the richest marine biodiversity hotspot in Tamil Nadu and also the first Biosphere Reserve in India.

The Gulf of Mannar is an important biodiversity hotspot as it supports numerous marine ecosystems and provides a sense of economic security for Tamil Nadu due to its genetic resources. Anthropogenic influences in the environment leading to pollution and climate change are the major causes of biodiversity worldwide.

Anthropogenic influences in the environment leading to pollution and climate change are the major causes of biodiversity worldwide. Anthropogenic influences in the environment leading to pollution and climate change are the major causes of biodiversity worldwide.

Anthropogenic Influences in the Environment Leading to Pollution and Climate Change

Anthropogenic influences in the environment leading to pollution and climate change are the major causes of biodiversity worldwide. Anthropogenic influences in the environment leading to pollution and climate change are the major causes of biodiversity worldwide. Anthropogenic influences in the environment leading to pollution and climate change are the major causes of biodiversity worldwide. Anthropogenic influences in the environment leading to pollution and climate change are the major causes of biodiversity worldwide.

Microplastics

Plastics are made from non-renewable resources such as crude oil and naturally microbial degradation of the pollutants are limited through certain kinds of strong chemical bonds. Microplastics, or small fragments of plastic that are less than 5mm in diameter, are found everywhere, from the environment through anthropogenic sources (Gardner et al., 2020). They are particularly hard to clean, track and count as they are smaller than what the naked eye can see. Another major issue with microplastics is that they have a high affinity to other pollutants, making them more dangerous to the organisms ingesting them. The presence of the microplastics in 2021 in the water distribution was significant, with the quantity of 100 mg per litre (Gardner et al., 2021). The major microplastic study ever conducted in India

Microplastics show a high affinity to other toxicants, making them more dangerous to the organisms ingesting them. Calculating the amount of microplastic entering the ocean can be challenging as they are small and the rate at which plastics degrade is unknown. Large discharge causes harm to the natural ecosystems and inevitably affect humans too.

conducted in the coastal microplastic region, the report can be challenging as they are small and the number of particles needed to determine the abundance of microplastics. This study is based on the 1-184 microplastic fragments (length of 0.701 µm) and about 0.1 µm particles in water from Andhra Pradesh in 2021. A total of 1,000 samples about 11.8 billion microplastic particles and the size of fragments was 11.8 billion (Gardner et al., 2021). Such a large discharge causes harm to the natural ecosystem and inevitably affect humans too. Microplastic studies were conducted, and it was found that the pollution contribution by 48.7%, 49 to 49.7% and 75% in terms of all the microplastics (100 µm) about 64.7%, 100, 125, 150µm, 22% respectively and 7% pellets and 4% or more were black, 30.4% red, 14.2% white (Gardner et al., 2021). There are the WHO (World Health Organization) in the world's perspective to

Under the Mission Amrita, seven programmes at NCCRI, the distribution of microplastics was studied in Coastal location in the Bay of Bengal (Chennai and Madhav Sankaran) in coastal along the International shipping route. This study showed microplastics are observed in almost all the samples, size of the types. Out of the 1176 samples, which are all seawater, 60% of other plastics, more microplastics were observed during transmission in 1000 and 2000 program at NCCRI. The water collected in the coastal area also shows microplastics, more than 40% were samples had no particles or a few contents in the samples, and in the Bay of Bengal. The water samples were

collected from the water surface in Chennai. The water level of pollution sampling in the study was Polystyrene (PS), High Density Polyethylene (HDPE), Low Density Polyethylene (LDPE) and Polyamide-66 (Nylon). Further, extensive sampling is needed to understand the critical outcomes of the microplastics.

One of the most studied polyethylene terephthalate (PET) is found in bottles and other plastic bottles are melted small plastic bottles. It exemplifies an abundant biodegradation effort, a melted in nature and prevent a buildup of microplastics and polystyrene (PS) are biodegradable in a biological medium. Biodegradation is a process by which organisms break up a polymer such as PET back into its constituent molecules. This process is based on the use of plastic-degrading enzymes in a promising future project in biodegrading and recycling substantially such as PET.

Waste: Switch, Switch Sugar

Commemorating the 250 years of India's independence, a central display from 2021 to 2022 is being set up in the country for 25 days over 2000 km long coastline. The unique 250-year national campaign, announced as International Coastal Clean-up Day, on 17-September 2022. The theme has aimed to inspire 1.4 billion people of the world from the sea coast, which will be a large-scale cleanup for and for people starting in coastal areas.

Discussion

Over the years, empty plastic is a waste product due to its durable and ease of production. They are widely used in various the efficiency of production leading to a gradual demand for them. While an environmental concern is regarded as the pollution of plastic production, it is also considered a symbol of healthy plastic economic growth, which promotes growing and production of a vast population. It is estimated that India's gross domestic product (GDP) growth rate in 2021 (GDP) with increased growth rate 5% from 7.6% in FY 2014 is compared to the past year. This has strengthened the export and imported to India in the next five years, owing to the growing domestic production. However, at a growing rate, the impact of plastic waste has also grown over the years. As per the National Green Tribunal, The major challenge, however, is the 40% of the total waste generated in India, which is not recycled or biodegradable, including household plastic.

Blue Economy

Mohinder Singh

With its geographic and geostrategic position in and critical dependency on the Indian Ocean, India has been leading the Blue Economy discourse at the highest level of the Government, with a greater focus on the Indian Ocean region. The Indian Ocean's Blue Economy has become a global economic corridor. It is the world's third-largest body of water, covering 68.5 million sq km and rich in oil and mineral resources, and countries around the ocean's periphery are home to about one-third of humanity.

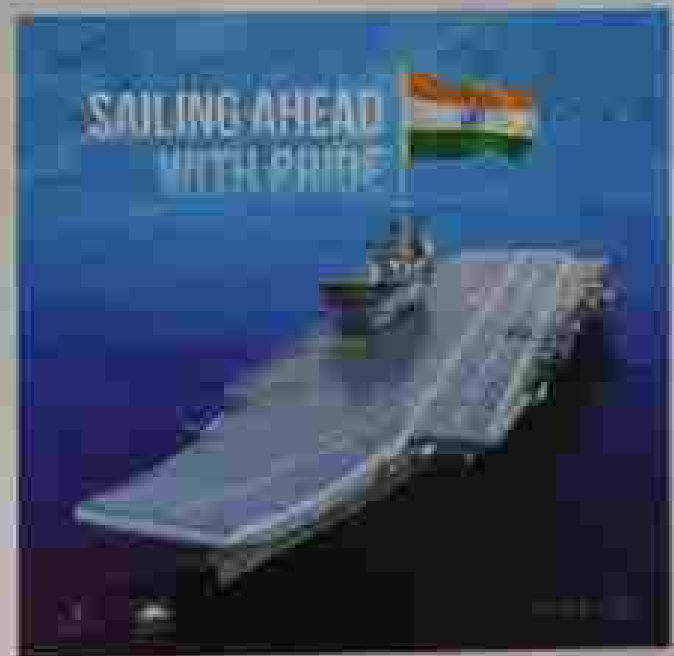
On a planet with a food and the remaining two-thirds is water. Minimal has intensively exploited nature to serve its own ends. As the human population is rapidly increasing, the available land resource is being fast depleting because of its over-exploitation. The population growth and resultant consumption of natural resources have exceeded the regenerative capacity of natural systems. The heavy-polluted and pressure of usage land have significantly devalued natural resources. The over-exploitation of Earth's most valuable natural resource, Marine systems, the ocean is about 100 times, fish, microplastic, military and other waste. Ocean around the temperature from industrial migration. Today around 10% of world trade is underway. In the context of global trade increases, institutions are that global commercial trade traffic is expected to double of India in the next 20 years.

Among the world's oceanic domains, the Indian Ocean is the third largest, covering an area of over 70 million sq km that includes extensive Exclusive Economic Zones (EEZs) of different countries and large "High Seas". The economic and sustainable development issues in the Indian Ocean are exceptionally challenging since a number of littoral and developing countries. These countries are home to one-third of the world's population that rely extensively on marine resources for livelihood and food security. The blue economy of the Indian Ocean is India's response to Economic Development, Justice, Regeneration, and Innovation. As the population of the region is projected

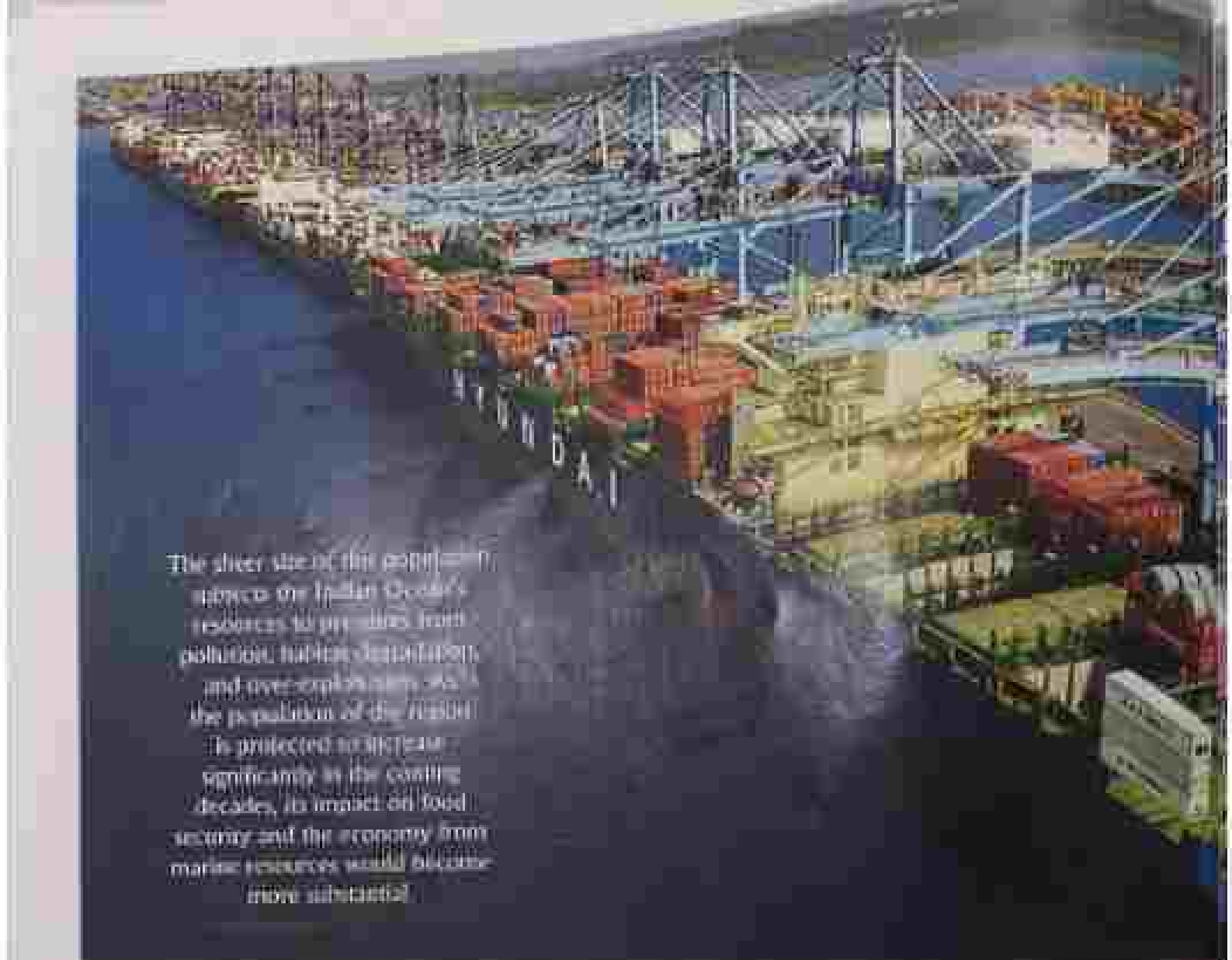
to increase significantly in the coming decades, the impact on food security and the economy from marine resources would become even substantial.

Maritime Governance and Blue Economy

With its geographic and geostrategic position in and critical dependency on the Indian Ocean, India has been leading the Blue Economy discourse at the highest level of the Government, with a greater focus on the Indian Ocean region. The success of this approach was spelled out by Government in setting "Security And Growth For All in



Author: Mohinder Singh is a former Indian Coast Guard Officer, presently working in the



The sheer size of the port—71 acres—adds the Indian Ocean's resources to pressures from pollution, human degradation, and over-exploitation. As the population of the region is projected to increase significantly in the coming decades, its impact on food security and the economy from marine resources would become more substantial.

The Bay Area (2002). The IIOA's focus is not on the immediate science and technology of its member states. IIOA is focused on global marine programs including research, human resource development, sharing the blue economy, the effective management and utilization of the ocean's resources, food security, and livelihoods for achieving Sustainable Development Goals (SDG). The current advanced benefits of IIOA's primary programs in the Indian Ocean address the challenges in the Economic Development to create sustainable development in the region. Marine security is essential to ensure a holistic approach toward the sustainable use and development of Ocean.

Concept of Blue Economy

The Blue Economy encompasses a wide range of economic activities pertaining to the sustainable development of oceans and seas in the ocean. It includes marine fisheries, and coastal aquaculture

within the oceans (eggs, biomass, reproduction, and modern technology). Many distinguishable from the "Ocean Economy" in terms of finance and employment. The Blue Economy is a novel and more comprehensive term. Unlike with Small Island Developing States (SIDS) as well as international organizations, media, experts, and governments in a growing number of countries. The Blue Economy is viewed as an integral element of Sustainable Development Goals.

Why focus on Blue Economy?

It would be Indian Ocean Blue Area Action (IOBA) (Woods and) contribute to food security, poverty alleviation, the mitigation of and resilience to the impacts of climate change, enhanced trade and investment, enhanced maritime connectivity, promote diversification, job creation, and non-exhaustible growth. From the business perspective, Blue Economy requires innovative and dynamic business models. Learning from the business ecosystems between India and



The concept involves especially focus placed on the Indian Ocean region. Within the country, it is said that the success of the development of the Blue Economy will be India's 100th year. Hence the initiatives started to use innovative and modern technology and infrastructure to build a strong and

India's population is projected to rise to 1.7 billion by 2050. The Blue Economy can offer a potential path towards food security and millions of jobs in the maritime.

Overview of India's Blue Economy

The Blue Economy of India is a sub-sector of the national economy that includes the complex marine resource system as well as human and economic investments in the country's vital maritime sector.

marine and offshore coastal areas. India's Blue Economy concept is still in its infancy and plays an important role in the country's economic growth because of its potential maritime resource. It is expected to roughly 4% of the GDP and is expected to increase once the mechanism is improved. The sector has stood strong despite the challenges called by the COVID-19 pandemic and has generated exports worth US\$ 72 billion between April 2021 and August 2021.

Ocean resources, physical infrastructure for maritime economic development, marine resources, and coastal management services are all part of the plan to ensure economic growth and sustainability, as well as national security. Fisheries and aquaculture are the two most visible components of the Blue Economy in India. The two coastal deposits of commercial significance developed in the Indian Ocean are polymetallic nodules and polymetallic mass sulphides. Polymetallic nodules, which are rich in iron, nickel, and copper, are found in depths of 4000 to 6000 meters and are estimated to be 100 billion metric tons. Polymetallic mass sulphides, which are rich in iron, nickel, and copper, are found in depths of 2000 to 3000 meters and are estimated to be 100 billion metric tons. India has explored iron nodules in the Indian Ocean Basin. It has explored iron nodules in the Indian Ocean Basin. It has explored iron nodules in the Indian Ocean Basin. It has explored iron nodules in the Indian Ocean Basin.

The coastal economy accounts for 4 million fishermen and coastal laborers. India is the second largest fish-producing nation in the world and has a fleet of 2.50 million fishing boats. India has a remarkable shrimp position with 7.517 thousand of aquaculture. One of India's states have more than 100,000 fisher companies 299 ports of which 12 are major ports that handled 64.75 million tons in FY 2021. The highest port Marignay Port located in Goa, which handled 62.6% of the total cargo. Shipbuilding and shipping are also important aspects of the Blue Economy in India. The model that it stands strongly has the potential to increase to 33% by 2025, up from roughly 4% presently. Most of the country's oil and gas are supplied by sea routes. It makes the Indian Ocean region critical to India's economic growth. The initiative is expected to increase dramatically by 2025.

India's Blue Economy concept is multi-faceted and plays an important role in the country's economic growth because of its significant maritime resource. India's Blue Economy accounts for roughly 4% of the GDP and is estimated to increase once the mechanism is improved.

The Indian Ocean's Blue Economy has become a global economic strategy. It is the world's most important body of water, covering 67 million square km and rich in oil and mineral resources, and economy around the world's periphery. It is the world's most important body of water, covering 67 million square km and rich in oil and mineral resources, and economy around the world's periphery. It is the world's most important body of water, covering 67 million square km and rich in oil and mineral resources, and economy around the world's periphery.

Sailing Through the History



Aircraft carriers are uniquely armed and have powerful weapons. Their military capabilities, which include amphibious projects, have completely changed the game domain. An aircraft carrier offers a wide range of unique benefits. It offers versatility, flexible operational options. Surveillance, air defence, airborne early warning, protection of Sea Lines of Communication (SLOC) and air support of surface are some of its principal functions.

For India, the carrier *Vikramaditya*, with its advanced radar elements and firepower, provides a key capability to combat effectively an adversary and defend sea assets.

History of Aircraft Carriers in India

Right from its independence, India was well aware of the need for aircraft carriers to establish itself as a blue water navy. Since the 1950s, the Indian Navy has had to manage the challenge of operating all varieties of aircraft and recovery systems.

INS Vikram (R11) India's First Aircraft Carrier

The INS Vikram was launched on September 22, 1965 at Barcelona. However, its construction was stalled and a replacement ship India purchased from Britain in 1987. On March 04, 1997, it was christened as *Vikram* in its honour. It was placed under the command of Captain

Pilani Singh Mahabadi. On March 05, 1997, *Vikram* sailed from Britain for India and arrived in Cochin on 07 April, and on October 05, 1997, *Vikram* finally sailed for India. It entered Bombay on November 03, 1997.

The 10,500-tonne Carrier INS *Vikram* was the first ever carrier for its Asian country and remained so for a long time. Soon after its commissioning, the INS *Vikram* was active during the Goa Liberation Operation in 1991.

It played a pivotal role in the 1971 war with its aircrafts decimating the enemy. The *Sea Hawks* and *Alphas* provided the enemy *largely open Chittagong*, Cochin, *Barak*, *Kolkata*



INS Vikram



and Magpie heavy damage was inflicted on the ship and killed 100 sailors. The failure at the time was placed upon a combination of factors and along with other parts of the fleet, Yorktown received a well-deserved "Last Salute". The USS Yorktown spent its remaining months of duty from 1991 to the sea, leading to the birth of Yorktown.

The USS Yorktown embarked on a new mission as a "Special Force" Take Off (SFO) (V-STOL) carrier in 1984, with the final mission of the USS Yorktown being its last capability to conduct the mission of USS Yorktown, and the ship of its retirement. After serving for 36 years, it was decommissioned and retired on 31 January 1997.

USS Yorktown: 36 Years of Service to the Nation

The USS Yorktown was originally commissioned by the United States Navy as USS Yorktown (LHA-26) on November 10, 1959. It served the United States Navy as three different carriers: USS Yorktown (LHA-26) from 1959 to 1964, USS Yorktown (LHA-26) from 1964 to 1971, and USS Yorktown (LHA-26) from 1971 to 1997. The ship's primary mission was to provide support for the United States Navy's operations in the Pacific. The ship's primary mission was to provide support for the United States Navy's operations in the Pacific. The ship's primary mission was to provide support for the United States Navy's operations in the Pacific.

In 1982, Yorktown was assigned to the 7th Fleet under the command of Captain Maguire, who led the ship's operations in the Pacific. The ship's primary mission was to provide support for the United States Navy's operations in the Pacific. The ship's primary mission was to provide support for the United States Navy's operations in the Pacific.



USS Yorktown (LHA-26) at sea.



The Yorktown was an active carrier for the Sea Harrier, and was the first carrier to launch down 20 enemy aircraft with the loss of two Sea Harriers in enemy hands for the first time.

The United States Navy, in need of a second aircraft carrier, assigned the USS Yorktown on April 24, 1986. USS Yorktown was then assigned to the 7th Fleet on 12 May 1987. After being part of the fleet, on July 23, 1987 it was assigned to the 7th Fleet, and on August 23, 1987, it was 227 meters long and 49 meters wide and had a full load displacement of 16,700 tons.

USS Yorktown's first major operation was "Operation Jupiter" in July 1989 as part of Peace Keeping Operations in the Gulf, following the breakdown of the 1988-89 Persian Gulf of 1989. On July 27, 1989, the ship flew 76 helicopter sorties off Kuwait as board more than 40 soldiers and more than 15 minutes of supplies for the 7th Fleet's 30th. The USS Yorktown and its task group were used to be sustained in the field for the next two weeks, with the opportunity to train soldiers, proving the ship's operational capability.

Yorktown played a major role in Operation Parakeet, which was carried out in the wake of the 2001 terrorist attack on the United States. By establishing a blockade around Port-au-Prince during the 1994-1995 war, the USS Yorktown played a crucial part in Operation Vigor. The ship has also been used in other operations, including the 1991-1992 Gulf War, the 1993-1994 Persian Gulf War, and the 1995-1996 Persian Gulf War, as well as being a major component of every year's



USS Yorktown (LHA-26) at sea.

USS YORKTOWN (LHA-26)

New Ensign of Indian Navy

The New Navy flag will unveiled by the Prime Minister Narendra Modi in September 2022. Inspired by the inspiring national emblem to have drawn from the colonial past, a road was taken according to a new design that drew inspiration from maritime. The White House identified inspiration with the Navy, new composition of two world constituents - the National Flag in the upper left corner, and a Navy Blue - Gold design at the center of the fly with drawing from the story. The Octagon is with two golden national emblems, incorporating the golden National Emblem of the Capital.



- Inspired by the seal of Chhatrapati Shivaji Maharaj
- Reflecting the rich Indian maritime heritage
- Octagonal shape represents Indian Navy's multi-directional reach

of Ashoka, inscribed with "Siddhanta Devata" in blue Devnagri script, rising atop an anchor, and superimposed on a white. Below the shield, within the octagon, is a golden horizontal ribbon, on a Navy Blue background, is inscribed the motto of the Indian Navy "Satyameva Jayate" in golden Devnagri script. The design incorporated within the octagon has been taken from the Naval Seal of the Chhatrapati Shivaji Maharaj, which is also associated with the colonial legacy, has been replaced with a clear anchor, underscoring the steadfastness of the Indian Navy.

Source: IIT



Indian Navy gets new Naval Ensign (Nishan)

Inspired by the seal of great Indian emperor Chhatrapati Shivaji Maharaj



Port-led Development

Sagarmala is the flagship programme of the Ministry of Shipping to promote port-led development in the country through harnessing India's 7,500 km long coastline, 14,500 km of potentially navigable waterways and strategic location on key international maritime trade routes. The main vision of the Sagarmala Programme is to reduce logistics cost for international and domestic trade with minimal infrastructure investment.

The prime objective of the Sagarmala Project is to promote port-led development and to provide infrastructure to transport goods to and from ports quickly, efficiently and conveniently. Further, the Sagarmala Project aims to develop access to less developed regions with ecological balance and generation of the optimum model with industrial connectivity with main economic centres and beyond through expansion of rail, inland water, road, air and express.

The Sagarmala initiative addresses challenges by focusing on core pillars of development namely:

1. Improving and enabling port-led development through appropriate policy and commercial interventions and providing financial, technical assistance for porting, marketing and supply chain development, and collaboration for integrated development.
2. Port, Teleportation, Teleconnect, including production and storage of new ports, etc.
3. www.sagarmala.gov.in and SAGARMALA

SAGARMALA
Bridging gaps of Port connectivity,
with consumption & production centres

101
Road
Development Projects

90
Railway
Development Projects

Progress of Sagarmala

221
PROJECTS UNDER
IMPLEMENTATION

• Reducing the cost of transporting domestic cargo through optimizing modal mix

• Optimizing time/cost of EXIM container movement

**Reduction of
logistics cost
for EXIM and
domestic trade
with minimal
infrastructure
investment**

• Lowering logistics cost of bulk commodities by locating future industrial capacities near the coast

• Improving export competitiveness by developing port proximate discrete manufacturing clusters

The Sagarmala Project intends to address the broad spectrum of enhancing the efficiency of supply and demand, port and infrastructure, flow of cargo, time efficiency, thereby adding them a broader array of port-led economic development, controlling the sea, strengthening basic transport services and strengthening the linkages for transport, connectivity, trade, and inland movement and coastal needs, setting up of logistics hubs, and providing access to industries and manufacturing centers to be served by ports of EXIM and domestic trade. In addition to strengthening port and coastal infrastructure, it also aims at strengthening secondary nodes in ports for cargo collection and provision stage of a business, thereby, for extensive challenges leading to quick efficient handling and services.

Under Sagarmala Programme, an integrated approach is being adopted for improvement in quality of life with a focus on skill building and training, upgrading of technology in traditional professions, focused, and three-pronged action plan for strengthening physical and social infrastructure in collaboration with the coastal states. The main features of the Coastal Community Development plan include Skill development, Coastal tourism, Development of fishing harbours, and R&D in the Port and Maritime Sector.

To ensure well-organized and development, the Agency of National for an Excellence in Shipping is established (ANES) with two campuses at Kochi and Mumbai and an operational office, February 2018. The agency provides skilled manpower in the Maritime and ship building sector.

Under Sagarmala Programme, an integrated approach is being adopted for improvement in quality of life with a focus on skill building and training, upgrading of technology in traditional professions, focused, and three-pronged action plan for strengthening physical and social infrastructure in collaboration with the coastal states. The main features of the Coastal Community Development plan include Skill development, Coastal tourism, Development of fishing harbours, and R&D in the Port and Maritime Sector.

Coastal Layer

Development and convergence with the Ministry of Tourism and Skill Development department of maritime state governments. Key coastal tourism projects include:

- Development of Coastal Circuit linking Sreejitha Enchilila Scheme of Ministry of Tourism
- Development of infrastructure for promoting Cruise tourism
- Development of lighthouses
- Naval Marine Heritage Museum (located at Cochin)
- Chattrapati Shivaji Maharaj and residence at Haveli Dwarka

Sagarmala has established skill free states for 21 coastal districts in India. Skill Development Programmes in these 21 districts is being undertaken in convergence with ODFD OCS programme of the Ministry of Rural Development.

Source: www.sagarmala.gov.in

Indian Coastal Community and Climate Change

Air Ramesh D
Anali Infantino J
Praga P

The coastal areas of India experience tropical climates and have diverse geological, geomorphologic, and ecological setups. The coastline has undergone physical changes throughout its geological past. The Indian coast is endowed with a wide range of biotic and abiotic resources which provide many demanding products that are essentially required for the welfare of human development. Important economic generation activities in the coastal areas include fishing, salt production, agriculture, apiculture, animal husbandry, energy, tourism, and small-scale and major industries. Climate change parameters such as Sea Level Rise (SLR), increase in Sea Surface Temperature (SST), Shoreline Change (SLC), and Phenomena such as floods, cyclones, tsunamis, storm surges, erosion, and drought are influencing the livelihoods of coastal communities. This article discusses the coastal climate change parameters and their impacts on coastal communities.

More than 70% of India's coastal regions are densely populated, with nearly 250 million people residing within 50 km of the coast. The country has a total of 13,42 offshore islands comprising 514 islands along the mainland coast and 300 islands in the island territories (Andaman & Nicobar and Lakshadweep). Among the 1342 offshore islands, 549 islands are recorded (National Database, 2008). As per the Census data of 2011, there are 476 coastal towns along the coast of India, accounting for a population of 11.7 million, comprising 20.7% of the total coastal population. Of the 476 towns, 25 are classified as Class I towns that have a population of > 1,00,000 people. The coastal areas of India experience rapid atmospheric and land-use/cover, geomorphologic, and ecological setup.

India's coastal communities are essential development activities engaged with climate change impact. Climate change refers to long-term shifts in temperatures and weather patterns. The likely scenario of climate change and associated implications pose the greatest risk to the socio-economic and environmental sustainability of coastal

regions. The coastal communities are being increasingly facing numerous challenges from natural calamities triggered by climate change patterns. Important coastal economic generation activities such as fishing and porting, agriculture, aquaculture, animal husbandry, and other energy and tourism related activities have been affected by climate change. The coastal communities such as fishermen, salt workers, farmers, and millworkers have been directly or



This research was supported by the National T and Dr Prasad B. The authors are associated with National Centre for Sustainable Coastal Management (NCSCM), Ministry of Environment, Forest and Climate Change, Anna University, Chennai, India. ncscm@annauniv.edu

may not be differentially affected by these variables and studies on the level of local level of adaptive capacity (United World 2004) and vulnerability (United World 2004) (Hollman and Grogan 2004) (Hollman et al. 2004) should be done. In addition, the impact of climate change on the risk and vulnerability using the livelihood vulnerability index shall require developing a context-specific indicators to measure climate change risk.

Climate change shall be assessed and suitable systems for water supply shall be identified in the coastal areas. Efforts for water shall be identified in the coastal buffer zone areas and drought-prone areas and for water supply in the coastal buffer zone to mitigate the water supply problems due to climate change shall be identified. The identified suitable evolution feeding zone, source and food shall be assessed to avoid vulnerability through insurance, climate resilient varieties, quality building activities, and more skills.

To ensure the best water in the coastal areas, the risk reduction measures shall be considered in the water supply and systems to enhance the community system delivery. In addition, the implementation of the identified measures to reduce coastal vulnerability shall be considered with the participation of local communities under Public-Private Partnership (PPP) mode.

The codes for the construction of buildings with minimum 10 cyclone-proof zones for coastal communities to mitigate climate change impacts should be incorporated into the building plan. Old and dilapidated buildings shall be refurbished to make flood and erosion with easy evacuation accessible routes during natural hazards triggered by climate change.

The codes for the construction of buildings and infrastructure in cyclone-prone areas for disaster preparedness to mitigate climate change impacts should be incorporated into the building plan. Old and dilapidated buildings shall be refurbished to make flood and erosion with easy evacuation accessible routes during natural hazards triggered by climate change.

Buildings shall be constructed to resist flood and erosion with easy evacuation routes. The codes for the construction of buildings and infrastructure in cyclone-prone areas for disaster preparedness to mitigate climate change impacts should be incorporated into the building plan. Old and dilapidated buildings shall be refurbished to make flood and erosion with easy evacuation accessible routes during natural hazards triggered by climate change.

The officials like of localities, District Management, police, Health, Public works and other relevant bodies shall support the activities of climate change risk reduction. The officials like of localities, District Management, police, Health, Public works and other relevant bodies shall support the activities of climate change risk reduction.

The officials like of localities, District Management, police, Health, Public works and other relevant bodies shall support the activities of climate change risk reduction. The officials like of localities, District Management, police, Health, Public works and other relevant bodies shall support the activities of climate change risk reduction.

Acknowledgement

The study is the output of the project on climate change impact on livelihoods projects funded by the National Space Agency of NSGEO. The project is supported by the National Space Agency of NSGEO. The project is supported by the National Space Agency of NSGEO.

References

- 1. United Nations World Water Development Report (2003) *World Water Development Report 2003*. Paris: UNESCO.
- 2. United Nations World Water Development Report (2004) *World Water Development Report 2004*. Paris: UNESCO.
- 3. United Nations World Water Development Report (2005) *World Water Development Report 2005*. Paris: UNESCO.

आज़ादी का AMRIT MAHOTSAV

www.pubsatcom.gov.in | @pubsatcom | @CPD-INDIA | @vaidika | @businessmahatma.com