India has a long coastline and is a major maritime nation. Ports and natural harbours are necessary for maritime trade and commerce. Port and harbours are surrounded wetlands that provide tranquil conditions\(^1\). These coastal lands nurture various flora and fauna. Globalisation, competition and technological development increased world trade activities. Due to this ports and harbours are facing various environmental problems. Because of this wetlands near to the port are facing severe threats of destruction.

Development of trade and commerce requires environmental friendly port facilities. But how can this be achieved without compromising the wetlands and allied ecosystems is a major problem faced by the authorities. If construction of new ports or developmental activities in port takes place, this affects the most important sandy beaches surrounding the port. Beaches are peculiar ecosystems which is vulnerable to many pressures due to development. Due to construction activities beach erosion will take place at higher level. Anything built on the beach to protect the coast, stops the movement of sand which occurs through natural process and destroys the beach. Winds and waves in this place play the role of brining sand to the beach and removing. This recharges the ground water. This ecosystem service is completely lost and ground water becomes deteriorated in quality. This leads to destruction of fragile flora and fauna in coastal area\(^2\).

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Another major threat evolving from the port development is pollution. Pollution of ports and harbours occurs due to different factors. Port activities such as ship based operations, ship building, repairing, cargo handling, loading and unloading of noxious and hazardous substances near port and sometimes their storage leads to port pollution. Ship recycling activities are another threat. Oil pollution from ships, activities such as cleaning, bunkering, sewage disposal and ballast water disposal leads to pollution of ocean. All these cumulatively affect the rocky areas, sandy beaches, coral reefs, mangroves, estuaries, lakes and lagoons near the ports and harbours.

Pollution in one place affects the entire ocean current. World community was aware of this danger. Maritime nations have jointly carved out various restrictions and conservation measures regarding the use of port and harbours as well as the ship related activities\(^3\). India is signatory to many of them. Apart from this, there is plethora of Indian legislations to protect marine wetlands environment\(^4\). Still the pollution is increasing and it devastates the ecology of coastal wetlands. It is highly necessary to adopt a sustained port management to conserve and preserve the sensitive ecosystems associated with the coastal zones. Analysis of various legislations for port management and maintenance of clean environment in port is necessary in this context. Along with this the present status of its implementation also need study. It is necessary to rationalize the measures for adoption of sustainable development of trade without destroying the resource base.

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Overview of Indian Ports and Harbours

The Indian Port sector is broadly divided into two categories, major and minor. There are 13 major ports and 189 minor ports in India. Major ports come under the Ministry of Shipping. Major ports require environmental clearance from the Ministry of Environment and Forests. These are governed by the Major Ports Trust Act, 1963. These Port Trusts are administered by a Board of Trustees. The minor ports are governed by the Indian Ports Act, 1908 and come under the jurisdiction of different state governments.

Sea trade in India shows an intensive increase through years. Shipping ministry is processing various programmes for the port development. These include Sagar Mala, a project which envisaged the setting up of new ports along the coastline. In 2005, the national maritime development programme was formulated by the ministry of shipping. But later a new plan was announced to...

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5 The Indian Constitution, 1950, Schedule VII, List I.
6 The representation comprises members from government, labour and industry. The Chairman of the Board is usually a member of the Indian Administrative Service. All the minor ports do not function throughout the year.
7 The Constitution of India, 1950, Schedule VII, List III.
8 Sea trade intensity of India’s GDP is reportedly below 30%. Maritime transport accounts for 90% by volume and 70% by value of the country’s international trade. The total volume of traffic handled by all the Indian Ports during 2009-10 was 849.9 million tones. The growth in cargo handled at Major and minor Ports have shown an increase.
9 “Sagar Mala” is a strategic, customer oriented initiative of the Government of India to evolve a model of port led development whereby India’s long coastline will become the gateway of India’s prosperity. It envisages transforming the existing Ports into modern world class Ports on the one hand and developing new world class Ports, based on the requirement, on the other hand. Sagar Mala aims to develop Ports, hinterland and efficient evacuation systems through road, rail, inland and coastal waterways resulting in ports becoming the drivers of economic activity in coastal areas.
10 P.Manoj, “The Sagar Mala Project”, 27 Frontline (August 2012).
11 Herein after referred to as NMDP.
12 The National Maritime Development Programme formulated Sethusamudram Ship Channel Project.
replace the National Maritime Development Programme\textsuperscript{13}. This new plan is still under implementation\textsuperscript{14}.

**Ecological Sensitivity of Ports and Harbours**

Major wetlands near port and harbours are mangroves, mudflats, salt marshes, coral reefs, sea grass beds and lagoons. These are highly productive. They support extensive fisheries and associated livelihoods. Among this, commercially important fin fish, shellfish, corals, larger reptiles and mammals have been found\textsuperscript{15}. These ecosystems act as nesting ground for migratory birds. Many ports are located in or near creeks which may have environmental location near turtle nesting sites, leading to creek diversion or closure. It may also have social issues of proximity to fishing hamlets and fishing grounds\textsuperscript{16}. Physical alteration and destruction of habitats, especially of mangroves and mudflats, is a major threat to biodiversity\textsuperscript{17} rich coastal wetlands.

**Major Threats to Coastal Ecosystems from Port**

**i) Break Waters and Dredging**

Port has a natural harbour. But the preference for larger ships has resulted in the extension of the harbour seawards by building requisite protective structures like breakwaters\textsuperscript{18}. These structures are often built without full understanding of the long shore current patterns. This has resulted in changes in the adjacent

\begin{footnotes}
\footnotetext[14]{Ibid.}
\footnotetext[16]{See the Marine and Coastal Biodiversity in http://www.cbd.int/idb/2012/?ttl1#ttl1 accessed 1-08-2012.}
\footnotetext[18]{See the UNEP Global Environment Outlook GEO-4 in http://www.unep.org/geo/geo4/media/(2007).}
\end{footnotes}
shoreline through erosion. Simultaneously, the water spread of ports as well as their increased depths has enabled ships of larger capacity to berth. This means that dredging to maintain channel depths is an absolute necessity. Capital dredging and maintenance dredging is carried out to ensure the requisite depth of port and harbours. This requires the removal of large quantities of sediment and relocating them. These sediments are used to reclaim land which could be used for port activities. These activities interfere with the long-shore littoral drift. The main impact of the port development on the physical environment of the coast is accumulation on the up drift side of the long shore drift but more importantly, erosion of the down-drift side of the coast. The impact is most prominent and severe on coastlines having high rate of long-shore sediment transport. Two major sources of impacts of port development in the marine environment specifically related to the littoral zone and littoral transport are due to breakwaters and related coastal structures and dredging. Activities in ports take place on both the landward side and in the water area. Breakwaters, groynes and other coastal structures are constructed in the offshore area to create serene conditions.

**ii) Removal of Sand for Construction Activities**

Sand is extensively used in the construction industry. It may be mined from river beds, resulting in reduction in sand quantities reaching the river mouth and promoting erosion. Mining sand also can promote saline intrusion into

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freshwater aquifers. Beach sand is also mined for minerals\textsuperscript{24}, leaving large wastelands, polluted shores and eroded beaches. Illegal beach sand mining is mainly for supply to the construction industry. There have been shoreline changes in the form of erosion that have had serious implication on livelihoods and settlements as well as mangrove cover and mudflats\textsuperscript{25}.

\textit{iii) Wastes from Port}

Wastes may be generated due to ship-related factors, cargo-related factors and land transport activities. It may also come from shrimp or prone cultivation. Dumping of waste at sea is another cause of pollution of port and harbours. It covers deliberate disposal of waste or other matters from vessels, ports, harbours, platforms or other manmade structures at sea. The increase in shipping activities at port add higher concentration of sewage to the harbour and shipping routes\textsuperscript{26}. This sewage input changes the ecosystems of coastal area. This increases the nutrient concentration of the outfall area. This may destruct the particular ecosystem\textsuperscript{27}.

\textit{iv) Bunkering}

Bunkering is defined as the action or process of supplying a ship with fuel. This operation is also known as refueling. This is a very normal activity taking place in ports and can cause oil spills over there. This kind of pollution and its fate and distribution can create potential harmful effects on the environment such as water quality and sediments quality. It can also affect health of both human and wildlife.


\textsuperscript{26} See the Global Program of Action for the Protection of the Marine Environment from Land Based Activities. See www.gpa.unep.org visited on 20-07-2014.

\textsuperscript{27} EC Regulation on Shipment of Waste, the European Parliament and of the Council (14\textsuperscript{th} June 2006).
fisheries and recreational pursuits. The persistent toxic constituents of fuel, such as heavy metals, can become stored in the sediments and taken up into the food chain affecting the whole ecosystem.

v) Ship Scraping and Recycling

The death of ship leaves no option to owner but to dispose it through recycling. This industry poses another threat to marine ecosystem. Due to this large amount of non degradable wastes are disposed into the sea. This pollutes the marine environment. Ship scarping is hazardous. But recycling is considered as the basic principle of sustainable development. Majority of these industries are located near the coastal areas and thus add momentum to pollution. The polluting materials disposed by this industry are materials like iron, copper, steel and plastics. Ships also contain other hazardous wastes such as lead, cadmium, arsenic, zinc, chromium, sealants, various types of asbestos and several thousand litters of oil. These are all categorised as hazardous waste under the Basal Convention, 1989. These industries are increasing alarmingly in Indian coastal areas. Thus the ministry has given special emphasis to ship recycling industries in the proposed maritime policy. Asia’s largest ship breaking industry is located in Surastra region of Gujarat. According to Gujarat Maritime Board a total of 415 ships were dismantled at the Alang facility. A lot of guidelines under the Hong Kong Convention, guide the ship recycling industries.

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vi) Socio- Economic Impacts of Ports

Ports also cause high socio-economic impacts. On the top displacement of the local population\textsuperscript{32} i.e. displacement of fishers living on common property without proper land rights or subsistence and agriculturists takes place\textsuperscript{33}. They may be moved to inland and may lose their lands or access to the sea. Restriction of access to fishing boats inside a port area and ship traffic are some important problems. Losses of beaches occur due to positioning of breakwaters. That results in shoreline erosion. Seawalls and groynes placed to protect the shoreline may result in restriction of access to beaches\textsuperscript{34}. Many ports also promise provision of a fishing harbour. This can result in traditional craft having to compete with trawlers and mechanized vessels. The preferred location of ports is creeks and estuary mouths\textsuperscript{35}. They are often located near important fish breeding areas.

vii) Ballast Water Pollution

Ballast water system helps in the safe operation of ships\textsuperscript{36}. The ballast water discharge after the voyage of the ship creates negative impact up on marine


\textsuperscript{36} Loading and discharging of ballast water is fundamental to maintaining safe operation under different conditions of load. This system allows a ship to pump water in and out of very large tanks to compensate for a change in cargo load, shallow draft conditions or weather. This allows the ship to carry light and heavy load while maintaining ideal buoyancy and handling conditions in all situations. Physical components of the system includes raw water intakes, large and small strainers, pumps, distribution pipes, ballast water tanks, treatment system, discharge system and all the valves, sensors and controls to run the equipments.
environment. It affects the existence of living things in the coastal wetlands\textsuperscript{37}. However large vessels require large tons of ballast water and discharge of this can damage the whole marine environment of the area of discharge. Thus effective management of ballast water is very important. In 1991 the International Maritime Organistaion\textsuperscript{38}’s marine environment protection committee\textsuperscript{39} made the ‘frame work regulations’ resolution was also adopted\textsuperscript{40}. Generally the aim of all parties subject to ballast water convention is “to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships ballast water and sediments”\textsuperscript{41}. All vessels must have an approved plan for managing ballast water. It must specify the description of actions to be taken to comply with the ballast convention. Vessel owners and crews have a duty to protect and preserve the marine environment from pollution and port authority has control over all these activities.

\textbf{viii) Sewage Disposal from the Ships}

Sewage from ships include drainage and other waste from any form of toilets, w c scuppers, drainage from medical premises, such as dispensary, sick bays, via wash basins, wash tubs and scuppers located in such premises, drainage from spaces containing living animals or other waste waters when mixed with drainages\textsuperscript{42}.

\textsuperscript{37} This discharge typically contains a variety of biological materials including plants, animals, viruses and bacteria. These materials often include non-native, exotic species that can cause extensive ecological and economic damage to aquatic ecosystem.

\textsuperscript{38} Hereinafter referred as IMO.

\textsuperscript{39} Hereinafter referred as MEPC.

\textsuperscript{40} The resolution known as A.868(20). These are “guidelines for the control and management of ships ballast water to minimize the transfer of harmful aquatic organisms and pathogens”. Finally the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 2004 was adopted by IMO.

\textsuperscript{41} Ibid.

\textsuperscript{42} MARPOL 73/78, annex IV Reg.1(3).
These sewages disposed in port area contaminate the port. It contains harmful bacteria, pathogens, viruses, intestinal parasites and harmful nutrients. If these are disposed of without treatment it can affect fisheries, shell fish beds and produce risk to public health. It may also lead to algal blooms which reduce the oxygen content in water and kill fishes and destructs other aquatic life.\(^{43}\)

To control the environmental impacts caused by sewage from ships MARPOL IV was brought into force in 2003. It strictly limited untreated waste discharge. Modern cruise ships are most commonly installed with a membrane bio reactor type treatment plant for all black water and grey water. It produces near drinkable quality effluent to be reused in the machinery spaces as technical water. So the government of each state should undertake the required steps to provide reception facilities for the discharge of sewage from ships at its ports and terminals to meet the needs of ship.

**ix) Pollution by Garbage from Ships**

Garbage form ships can be deadly to marine life as oil or chemicals. MARPOL prohibits any disposal of garbage into the sea including all plastics, synthetic ropes, synthetic fishing nets and plastic garbage bags. These types of garbage are mostly non bio degradable substances.\(^{44}\). It can cause suffocation and drowning to marine life and resources. Greatest danger comes from plastics and it can float for years. Each state should take proper care in implementing the norms and punishing the violators.\(^{45}\)Ship oil spills of different types causes special environmental damage.


x) Air Pollution from Ports

Increased traffic at the ports gives rise to increase in the chain of related activities. Shipping activities such as towing, mooring, berthing, piloting, marine survey and sea patrolling involves use of harbour crafts such as tug boats and launches; bunkering and trans-shipment or lighterage operations. In addition, cargo handling, vehicular traffic, movement of cargo to and from ports through heavy duty trucks and rails, deployment of dredgers to deepen the drafts also result in environmental pollution the ports in the form of air emission. The World Ports Climate Initiative initiated by the International Association of Ports and Harbours with the objective of reducing greenhouse gas emissions developed a GHG emissions inventory. They have developed a collaborative approach towards collecting information, estimating emissions and developing plans to reduce the footprint of port operations.

IMO convened a Convention to Control Air Pollution by ships consideration of the growing concern toward air pollution triggered by marine industry.

xi) Oil Pollution from Ships and Port

Substantial amount of oil is discharged into port waters during tank washings. Washing of ships cargo tank before going for next loading also creates the problem of oil mixing. This washing is done to avoid sludge formation. The

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47 Hereinafter called as WPCI.
48 Hereinafter called as IAPH.
49 Green House Gases.
50 MARPOL73/78 Annex VI.
51 MARPOL73/78 Annex VI recommends control of –(i) SOx and PM emission through fuel oil and combustion equipments. It also defines the Emission Control Areas (ECA) and specifies the sulphur content of fuel oil to be used inside and outside the area. Sample of the fuel oil is required to be maintained on board the ship to know the fuel quality.
un-authorized discharge of this dirty water into the ports may cause serious environmental pollution.

Engine residues may also cause serious damage to the port environment. Emptying of bilge\(^{52}\) water is a routine process. Oil from machine spaces and usual leakages gets mixed up with the bilge water. The bilge water of oil tankers is typically contaminated with oil that leaks out of the cargo tanks.

The release of fuel oil during bunkering may pollute the ports. Bunkering is identified as a crucial operation under the International Safety Management Code\(^{53}\). Bunker fuel commonly escapes through the air outlets of the bunker, tanks breaches, the save-all’s and plugged scuppers. With the adoption and entry into force of the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001\(^{54}\), the ship owners will have to face even more stringent regulations fixing their liability compensation against oil spills during bunkering operations. Cargo spills occur during routine operations in ports, especially when loading and unloading. Handling of hazardous noxious substances imposes due diligence and strict liability\(^{55}\).

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52 Merriam Webster Dictionary defines bilge as “that part of the underwater body of a ship between the flat of the bottom and the vertical topsides.”

53 The International Convention for the Safety of Life at Sea, 1974 (SOLAS), Annex, ch. IX, herein after to be referred to as the ISM Code.

54 The International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 was adopted by IMO following a diplomatic conference held in March 2001. The Convention establishes a liability and compensation regime for spills of bunker oil. Ships over 1,000 gross tonnage registered in a State Party to the Convention will be required to carry on board a certificate certifying that the ship has insurance or other financial security, such as the guarantee of a bank or similar financial institution, to cover the liability of the registered owner for pollution damage to an amount equal to the limits of liability under the applicable national or international limitation regime. In all cases, this amount should not exceed an amount calculated in accordance with the Convention on Limitation of Liability for Maritime Claims, 1976, as amended, i.e. 1996 LLMC Protocol.

The ports and harbours in India face so many threats as stated above. They are under the control of various legal mechanisms. No operation can be conducted without some damage to the environment. But the dilemma is how far the concept of sustainable development can be brought in through legislations.

**Measures for Sustainable Development of Maritime Ports: India**

Post liberalisation opened the economy and trade became more flexible. Competition among ports and technological changes also added momentum to this situation. Moreover, Indian ports clearly are not yet ready for this changing environment in all sense. Therefore the government felt the urgent need to restructure the port environment to compete globally. This change is highly necessary to improve, conserve and preserve the coastal wetlands.

A major promotional initiative of the Ministry is the National Maritime Development Programme to develop the maritime sector. The policy lists measures for enhancing private investment, improving service quality and promoting competitiveness to meet medium- and long-term objectives. With this objective, the department of shipping has finalised the list of projects to be taken up in major ports under the National Maritime Development Programme up to 2012. The National Maritime Agenda 2010-20 and the Draft Port Regulatory Authority Bill, 2011 are two distinguished regulatory and policy initiatives to ensure the holistic development of the Indian port sector. All ports in India are undergoing massive expansion and development programmes and this brings in more revenue but results in drastic pollution effects. Port development and conservation of coastal wetlands should go hand in hand. Both must build a symbiotic relationship.\(^{56}\)

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Chapter 6

Coastal Zones: Ports and Harbours

Therefore, the new maritime policy\textsuperscript{57} of India aims for sustainable development of ports. India has announced “green ports” mission by 2020\textsuperscript{58}. It incorporates within it emission control areas, particularly sensitive areas, complete prohibition of ship sourced waste discharge in territorial sea, better ballast water treatment, port biological base line and risk assessment. It also promotes best ship building technologies. The agenda envisages a cumulative implementation through three phases. The Draft Port Regulatory Authority Bill, 2011, provides for the establishment of a regulatory authority to regulate rates for facilities and services provided at the ports and to monitor the performance standards of port facilities and services\textsuperscript{59}. The regulatory authority will be tasked with the job of framing guidelines for port authorities and private operators in various operations of port. Further, the authority will also lay down performance norms and quality standards to be met by port authorities and private operators, besides monitoring their performance.

Judiciary is also active in implementing sustainable development in port activities while interpreting various issues associated with port. In \textit{Research Foundation for Science and Technology and National Resources Policy v. Union of India}\textsuperscript{60}. The Supreme Court had made recommendations to deal with ship recycling. The issue was related to the recycling of a French warship named "Blue Lady" at Alang, Gujarat. At the time of phase out it contains 130tonnes of asbestos and other toxic wastes. The vessel was not in compliance with the Basel Convention. Ship was denied entry into many ports of other countries. The vessel left for braking in 2003 towards India. The Supreme Court ordered not to enter

\textsuperscript{58} Ministry of Shipping, Government of India, Maritime Agenda 2010-20(2011).
\textsuperscript{59} Port of Visakhapatnam is accredited with ISO Certification (ISO 14001) by the Indian Register of Quality Systems for the Environmental Management System standards in all its activities including related support services.
\textsuperscript{60} (2007)8 S.C.C. 853.
into the port without submitting the recycling plan. The Court mentioned the need of precautionary principle. The Court while pronouncing the judgment said that there should be a balance between environment and development. The concept of balance under the principle of proportionality applicable in the case of sustainable development is lucidly explained by Pasayat, J. in in T.N. Godavarman Thirumalpad v. Union of India. It states

“It cannot be disputed that no development is possible without some adverse effect on the ecology and environment, and the projects of public utility cannot be abandoned and it is necessary to adjust the interest of the people as well as the necessity to maintain the environment. A balance has to be struck between the two interests. Where the commercial venture or enterprise would bring in results which are far more useful for the people, difficulty of a small number of people has to be bypassed. The comparative hardships have to be balanced and the convenience and benefit to a larger section of the people has to get primacy over comparatively lesser hardship.”

This indicates that while applying the concept of "sustainable development" one has to keep in mind the "principle of proportionality". It is an exercise in which one has to balance the priorities of development on one hand and environmental protection on the other hand.

In Research Foundation for Science and Natural Resources Policy v. Union of India court examined, whether the ship breaking industry located at Alang, Gujrath had technological sophistication for safe ship dismantling. High level expert committee was appointed by the apex court reported that the industry does not comply with norms. Thus sustainable development of port cannot take place by operating such industry. However, the Court has held that the activity needs to be strictly and properly regulated.
i) Sustainable Development through International Conventions

Before 1960, there was little concern with pollution of the sea\(^\text{61}\). All major international conventions on protection and pollution control arose after tanker accidents. The sinking of the \textit{Titanic} in 1912 resulted in taking up of the first Safety of Life at Sea Convention, 1914\(^\text{62}\). The Intervention Convention, 1969 was enacted due to the \textit{Torrey Canyon}\(^\text{63}\) casualty. The Civil Liability Convention, 1969, the Fund Convention, 1971 and the 1969 and amendments to OILPOL 54 came in the wake of various such incidents\(^\text{64}\).

The MARPOL 73/78 was another major attempt in this field. The object of this convention was to achieve the complete elimination of international pollution of marine environment by oil and other harmful substances and minimization of accidental discharge of such substances\(^\text{65}\). The convention concentrates on a particular source of pollution with extensive regulations on ship reporting systems and requirements, including guidelines for reporting incidents involving discharge of oil, dangerous goods, harmful substances and marine pollutants. Annex 1 deal with the regulation of prevention of pollution by oil. It contains measures to be taken in such instances. This applies to ships including oil tankers\(^\text{66}\). Providing reception facilities is the duty of contracting states. They should have capacities at all ports, terminals, repair ports, oil loading terminals and all ports that handle


\(^{62}\) SOLAS Convention. This convention even though adopted in 1914, entered into force only in 1929 due to the First World War.


\(^{65}\) MARPOL 73, Preamble, para. 4.

\(^{66}\) \textit{Id.}, Annex 1 regulation 2.
The relevant vessel should have segregated ballast tanks, dedicated clean ballast tanks and crude oil washing requirements. It also contains provision to regulate sewage from ships. The Convention defines sewage, and mention conditions for disposal of sewage into sea. During the voyage ship is required to be fitted with a sewage plant that meets operational needs as determined by IMO standards. It also provides provisions relating to the garbage disposal in the regulation. The term garbage is defined in the regulation. The convention prohibits disposal of garbage into the sea including all plastics, synthetic ropes, synthetic fishing nets, and plastic garbage bags. The convention makes it an offence for a ship to discharge any oil or oily substances, any harmful or noxious substances or effluents containing such substances in violation of the provisions contained therein. The discharge of ballast waters, tank washings and residues, sewage and garbage within the prescribed areas are offences under MARPOL. In addition failure to report any discharge, failure to carry on board International Oil Pollution Prevention Certificate and ship board oil pollution emergency plan are violations under the convention. Each contracting state is given responsibility for ensuring enforcement of the convention.

The Paris memorandum of understanding on Port State Control, 1982 was another major development in this area. It came in the aftermath of the Amoco Cadiz incident in 1978. Major inclusions of provisions for the control of vessel

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67 Ibid., regulation 12.
68 Ibid., Annex IV.
69 Id., Regulation 3.
70 Id., Annex V.
71 Garbage is defined as “all kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically”.
sourced pollution in the third Law of the Sea Convention, 1982 also is a leap in this regard.

The law of the sea convention and conventions on international organizations concerned with merchant shipping\(^{73}\) covers provisions to control ship based pollution to port and the allied ecosystems. Scientific and operational conventions such as SOLAS, 74, LOADLINES, 66 and COLREG, 72 deal with safety of navigation, pollution free shipping operations, tonnage measurements, traffic separation schemes and unification of private maritime laws. The third Law of the Sea Convention, 1982 acts as an umbrella convention. It deals with jurisdiction and competency of states over different maritime zones. The OILPOL 54 established a prohibition zone where the discharge by oil tankers above the prescribed level was illegal\(^{74}\). This is mainly done to protect the marine environment intact. The flag state primacy was retained under the OILPOL\(^{54}\). The first and second Law of the Sea Conferences was convened in 1958 and 1960 respectively. The coastal states were given limited jurisdictional powers for sanitation purposes within the contiguous zone that extended up to 12 nm from the shore and it included marine pollution control\(^{76}\). To make additional requirements of safety, a conference was held in 1967 to amend the OILPOL54. Establishment of total prohibition zone was the achievement of the conference\(^{77}\). Again the Torrey Canyon incident resulted in amendment to OILPOL in 1969.

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74 The International Convention for the Prevention of the Sea by Oil, 1954, Art. VIII.

75 Id., Art. X.


In 1972, the United Nations Conference on Environment was convened in Sweden, which adopted the Stockholm Declaration on Human Environment. This necessitated the need for comprehensive approach towards the environment. Marine ecosystems deserved special consideration under the convention. Consequent to this the combined International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 was adopted. The law on control of vessel sourced pollution achieved a major milestone with the adoption of the third United Nations Conference on Law of the Sea, 1982. The dialogue during the conference witnessed the emergence of the new concept of ‘port state jurisdiction’. The right of a state to exercise jurisdiction over vessels entering the ports and to deny access is known as port state jurisdiction. Power of inspection and detention in case of non compliance to the adopted standard is adhered to under the conference. Other enforcement measures against vessels for violation of these standards, when the vessel is at its port is also part of the measures for protection of port and ecosystems associated with it. The UNCLOS III is generally regarded as the grundnorm on matters relating to pollution of the sea. It defines pollution of marine environment. The sources of pollution include

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79 UNCLOS III.
81 UNCLOS III, Art. 211(3). The port state can deny access on certain conditions. Some of them are, if the visiting vessel is not complying with the requirements on construction, design, manning and equipment in the ports.
82 Id., Art.218.
83 Id., Art. 1(4) defines marine pollution as “the introduction by man directly or indirectly, of substances of energy into the marine environment, including estuaries, which results or likely to result in such deleterious effects as harm to the living resources and marine life, hazards to human health, hindrance to marine activities, hindrance to marine activities including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of sea amenities”.
the pollution from offshore installations\textsuperscript{84}, installations used for exploitation of natural resources from sub-soil and sea bed, pollution from vessels and release of toxic and harmful substances from land based source through dumping or the atmosphere. This conference got implemented in India under the Merchant Shipping Act, 1958. The Merchant Shipping (Amendment) Act, 2003 and the allied rules and port regulations incorporates this convention.

The Port State Jurisdiction on the territorial waters and the exclusive economic zone and contiguous zone was established under the Third United Nations Conference on Law of the Sea, 1982. Even a foreign ship entering voluntarily into a port is under the temporary allegiance to the territorial sovereignty of the coastal state\textsuperscript{85}. The foreign ship is to comply with customs, health, safety, navigation and environmental laws of the port state under the sovereignty principle. The UNCLOS states,

“…states may establish particular requirements for the prevention, reduction, and control of pollution of the marine environment as a condition for the entry of foreign vessels into their ports or internal waters or for calls at their offshore terminals”\textsuperscript{86}.

Based on this provision, port states are given powers to enact national laws in conformity with the international rules and standards for the prevention of marine pollution. The port states can detain a vessel violating applicable international rules and standards, which is a threat to marine environment\textsuperscript{87}.


\textsuperscript{86} UNCLOS III, Art. 211(3).

\textsuperscript{87} Id., Art.219.
The concept of Memorandum of Understanding\textsuperscript{88} for maintenance of standards is another development to control pollution to the marine environment. The purpose of this is to get rid of poor quality and unseaworthy vessels. Therefore this attempts to protect the marine environment. The Port State Control Officers enter on board of the vessel in the port and will check all documents and conditions as per international rules and standards on seaworthiness. In the Hague\textsuperscript{89} first MOU was adopted in 1978. A study shows the member states carried out 5051 assessment in 2012. India had done 634 inspections. Out of this 518 inspections were identified with deficiencies. The total number of detentions was just 119\textsuperscript{90}.

Newer and advanced versions of pollution in marine environment have given birth to stringent international norms to control it. The Ballast water convention, the bunker convention, antifouling convention, ship recycling convention and the latest amendments to the International Convention on Standards of Training, Certification and Watch keeping for Seafarers are all depictions of nation’s concerns over various types of marine pollution. Under these international regulations, shipping is being operated in ports under special scrutiny of the port authorities. External control is exerted by port administrations in the form of manning requirements, pilotage, vessel traffic surveilling and policing\textsuperscript{91}.

International Maritime Organization is formulating and elaborating international rules and standards for preservation of marine environment. IMO has produced several conventions and regulations including the Convention on Safety of Life at Sea, 1974.

\textsuperscript{88} Hereinafter referred to as MOU.

\textsuperscript{89} The Memorandum of Understanding between Certain Maritime Authorities in the Maintenance of Standards on Merchant Ships, Hague MOU(1978).


\textsuperscript{91} George C. Kasoulides, “Jurisdiction of the Coastal State and Regulation of Shipping”, 45 \textit{Revised Human Development Index} (1992), p.33.
ii) Sustainable Development through Indian Legislations

The Indian Ports Act, 1908 contains provisions relating to the prevention of pollution during port operations. The pollution caused from port operations should be controlled and regulated by the port authorities\textsuperscript{92}. The power to make rules for regulating vessels regarding all matters is contained in various provisions of the Act. After getting independence, the Parliament had passed a consolidated law to govern maritime operations. The Merchant Shipping Act, 1958 was the first attempt. The Amendment in 1966 to the Act incorporated the provisions of SOLAS 1960. The Amendment in 1983 incorporated the provisions of the International Convention on Control and Prevention of Pollution of Sea by ships and Oil Pollution damage\textsuperscript{93}. The 1988 amendment inserted the provisions of the International Convention on Civil Liability for Oil Pollution Damage, 1969 and the 1976 Protocol\textsuperscript{94}. The Indian coast guard is also given powers to mitigate marine pollution damage under the Indian Coast Guard Act, 1978. The duties and functions of the coast guard include the protections by measures it deem fit for maritime and other national interest. Such measures include taking necessary preventive steps to preserve and protect the maritime environment, and prevent and control marine pollution\textsuperscript{95}. In addition to these legislations, many other legislation\textsuperscript{96} have application on the control of vessel sourced pollution in ports. No vessel shall discharge, throw, allow or leak or flow, or allow falling from

\textsuperscript{92} See for pollution controls in ports, http://shipping.nic.in/writereaddata/linkimages/Indian%20Ports%20act%201908%20232... Visited on 10/12/2010.

\textsuperscript{93} See the Merchant Shipping Act, 1983, Part XB.

\textsuperscript{94} See the Merchant Shipping (Amendment) Act, 1983, inserted Part X C.

\textsuperscript{95} See the Indian Coast Guard Act, 1978, s. 14(c).

quay, jetty or pier materials within the limits of major ports. The vessels are restrained from discharging ballast or oil mixtures within the port limits\(^{97}\). Where there are simultaneous loading of oils and deballasting these are to be carried by the master of the vessel only when he or she is satisfied that the loading pipelines has efficiently separated and the operation is conducted without polluting any waters\(^{98}\). No vessel should discharge or allow the escape of oil bilge water or any mixture of bilge water with chemicals or noxious substance within the limits of major ports, without written permission of the port authorities\(^{99}\). The precautions prescribed in the Manual of Prevention of Oil Pollution and International Safety Guide should be strictly followed while loading, discharging or transporting bunker ballast or deballast in port limits\(^{100}\). The sea valves connected to oil cargo pipelines are to be tightly closed during the stay at the port\(^{101}\). The master of the vessel and its terminal representative should jointly ensure that the cargo and bunker house to be connected to the vessel are to be approved type and quality, possessing valid certificate for use. The master is responsible for any pollution caused due to bursting of cargo bunker house. The statutory provisions of the Merchant Shipping Act, 1958 are inadequate to solve many issues of port pollution. India is a party to all major international conventions on shipping. India needs a consolidated admiralty law comparable with the international system and to meet the dynamic requirements of the maritime law comprehensively\(^{102}\).

The Admiralty Bill was amended in Parliament in 2005. The Bill was introduced to consolidate the admiralty law in India, to confer civil jurisdiction

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\(^{97}\) *Id.*, rule 3.  
\(^{98}\) *Id.*, rule 5.  
\(^{99}\) *Id.*, rule 9.  
\(^{100}\) *Id.*, rule 11.  
\(^{101}\) *Id.*, rule 12.  
\(^{102}\) *Id.*, rule 14.
with the High Court regarding admiralty jurisdiction\textsuperscript{103}. The bill confers jurisdiction on Admiralty courts to adjudicate any claim for damage caused by the ship including civil liability for damage caused by oil pollution covered under the Merchant Shipping Act 1958\textsuperscript{104}. The Bill is still pending. Unless the Admiralty Act is enacted, there cannot be efficient adjudication of maritime claims in India. The evils of forum shopping will continue to happen.

Similarly, the Indian Ports Bill, 2011 is also under consideration of the Parliament\textsuperscript{105}. The Shipping Ministry in India had appointed a committee in 1997 to review the Indian Ports Act, 1908 and the Major Port Trust Act, 1963. The New bill consolidates the provisions of both the Acts. Unless, the Indian Ports Act, 1908 is amended to incorporate the sweeping changes made in most countries on the enforcement of maritime claims the Indian law will not be contributing to the IMO vision of clean ports.

**iii) Legislations to Protect Biodiversity of Coastal Wetlands**

The Wildlife (Protection) Act, 1972 provides protection to wildlife habitats in protected areas. Wildlife species listed in its six schedules are protected depending upon their conservation status. In India there are four legal categories of Protected Areas. They are National Park, Wildlife Sanctuary, Conservation Reserve and Community Reserve. Highest level of legal protection is given to National parks. It prohibits any consumptive utilization of land or natural resources. In a wildlife sanctuary some form of resource utilization may be permitted. This permission is given to meet the needs of local people in a manner that is compatible with conservation of its biological values. Marine protected areas in India comprise national parks and wildlife sanctuaries and cover coastal

\textsuperscript{103} See the Admiralty Bill, 2005.

\textsuperscript{104} Id., s. 5(2) (f).

\textsuperscript{105} See the Indian Ports Bill, 2010.
wetlands, especially mangroves, coral reefs and lagoons. They have been notified under the Wildlife (Protection) Act, 1972. Fifteen Category I areas are located on the mainland in the states of Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh, Odisha and West Bengal\textsuperscript{106}. Protected Areas on mainland have terrestrial or freshwater ecosystems which constitute boundaries with seawater or partly contain marine environment but are not listed as Marine Protected Areas as per criteria. Ten Ecologically Sensitive Areas have been identified and notified by the Ministry of Environment and Forests since 1989 under the Environment (Protection) Act, 1986. Two such coastal areas have been notified\textsuperscript{107}.

Under the Coastal Regulation Zone Notification, 1991 and the 2011 Amendment Notification issued under the Environment (Protection) Act, 1986 coastal regulation zone -I includes ecologically sensitive areas such as mangroves, corals and coral reefs and associated biodiversity, sand dunes, mudflats which are biologically active, national parks, marine parks, sanctuaries, reserve forests, wildlife habitats and other protected areas\textsuperscript{108} including biosphere reserves, salt marshes, turtle nesting grounds, horseshoe crabs habitats, seagrass beds and nesting ground of birds. No new construction should be permitted in these areas. In addition, CRZ Notification 2011 envisages critically vulnerable coastal areas identified under the Environment (Protection) Act, 1986 to be managed with the involvement of coastal communities including fishermen\textsuperscript{109}.

\textsuperscript{109} Such areas include the entire Sunderbans mangrove area and other identified ecologically important areas such as Gulf of Kambat and Gulf of Kutchch in Gujarat, Malvan, Achra-Ratnagiri in Maharashtra, Karwar and Coondapur in Karnataka, Vembanad in Kerala, Gulf of Mannar in Tamil Nadu, Bhartarkanika in Odisha, Coringa, East Godavari and Krishna in Andhra Pradesh.
Environment Protection Act, 1986 and Attempts to Regulate Port and Harbours

The Environment (Protection) Act, 1986 empowers the Central Government to establish authorities\textsuperscript{110} charged with the mandate of preventing environmental pollution in all forms. This provision tries to tackle specific environmental problems that are peculiar to different parts of the country. The concern to preserve and conserve the coast was initiated in nineteen eighties. The first attempt was issuing of the Coastal Zone Regulation Notification in 1991. This notification defined the prohibited, permitted and regulated activities in a 500 metre stretch from the high tide line. These prohibitions are enlisted after classifying the coast into four zones. Broadly they are categorized as ecologically sensitive areas, built up areas, rural areas and islands. In the subsequent decades, CRZ, 1991 was amended over 25 times. In 2005, a committee chaired by Prof. M. S. Swaminathan brought out a report recommending a move towards integrated coastal zone management and the replacement of the CRZ notification with the Coastal Management Zone Notification\textsuperscript{111}. The draft CMZ Notification resulted in extensive protests by coastal communities, especially the fishing communities, across the country. They apprehended that this would result in the rampant development of the coast and the complete loss of livelihoods of the fishing community. In 2009, a committee once again chaired by Prof. Swaminathan brought out another report called the Final Frontier\textsuperscript{112}. This report recommended the lapse of the draft CMZ Notification and suggested that keeping the CRZ 1991 Notification as the basic framework, suitable changes be incorporated to take into

\textsuperscript{110} The Environment (Protection) Act, 1986 s.(3).

\textsuperscript{111} Report of the Expert Committee to Review the Coastal Regulation Zone Notification, 1991 MoEF(2005). This committee was chaired by Prof M.S. Swaminathan.

\textsuperscript{112} “Agenda to protect the ecosystem and habitat of India’s coast for conservation and livelihood security”, Final Frontier, MoEF(2009).
account the needs of coastal communities. It also incorporated the growing pressure of population and development activities on coastal resources. The committee pointed out that testimonies from fishermen had described their struggle against the large development activities such as ports which had displaced their livelihoods and homes. In the “Future Agenda”, the Committee recommended that there is a need to introduce regulations to manage the proliferation of ports along the coasts, with possible impacts on the coastline, by considering cumulative impacts of these developments. The Committee contended that currently, the shoreline of the country is undergoing a major change because of a large number of port and harbour projects. These projects involve large quantities of dredging, shore protection works, breakwaters and reclamation. The problem is that there is little information of the cumulative impacts of these projects on the coastline though it was clear that such developments have led to serious threats to the coast, with beaches facing severe erosion and shorelines changing’. The Committee opined that the government should study the cumulative impacts of projects on the coastline. Until the study there should be a moratorium on port projects.

The Moratorium on Ports

A temporary moratorium was imposed on the ports by MoEF. They directed the Ministry of Earth Sciences to do a study of the state of the impact of port structures on the coastline. They made an extensive study and submitted their report with the recommendations to MoEF. The study suggested avoiding port structures at least 5 km on either side of eroding locations. Further, location of Ports should be avoided around 10 km on either side of ecologically sensitive areas such as estuaries and lagoons. If this is done due to accretion and erosion

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may change the particular ecosystems and reduce the tidal water flow in the water body. For other locations especially for the locations selected to construct ports and harbours the status of erosion should be verified in consultation with state government. If they are found prone to erosion, those areas are to be avoided. Fishing jetties and embarkation facilities for local communities could be set-up with Environment Impact Assessment. The EIA should be cumulative. It should have sufficient ground data through public discussion.

The EIA 2006 Notification

The Environmental Impact Assessment Notification (2006) was issued under the Environment (Protection) Act, 1986\textsuperscript{114}. It outlines the required procedure for the prior environmental clearance of development projects listed in the schedule of the notification. There are two categories of projects; Category A requires clearance from the MoEF while the Category B projects can be cleared at the State level. In the case of ports, the notification is clear\textsuperscript{115} regarding the EIA model to be undertaken by the ports.

Conclusion

Ports open the way to international trade. If proper conservation measures are not taken the economy of India would have to suffer. The Indian Constitution caste a duty on the Centre as well as state government’s to safeguard the interest of the nation. It also considers the importance of international norms. There should be a proper balance between environment and development. The coastal wetlands are invaluable. To achieve this objective India should have strong legal provisions. Enforcement, measures should be strengthened. For better trade, clean

\textsuperscript{114} The Coastal Regulation Zone Notification, 2011, MoEF, Government of India (2011).
\textsuperscript{115} Id., Table: 7.1 Project categories for clearances from MoEF (A) or State Government (B).
environment is a necessary element. India should have a clear admiralty law. Indian admiralty law is far behind the developing trade relation and shipping transport.

In India, provisions to ensure sustainable shipping lay scattered in a number of legislation. It is difficult to co-ordinate the enforcement of their laws under a single agency. The Coast Guard Act, 1978 authorizes the Indian Coast Guard, to ensure the security of maritime zones of India, which includes control of marine pollution. The Coast Guard has the responsibility to prevent and protect the marine environment of the country and to ensure safety in territorial waters.

Under the provisions of the Indian Ports Act, 1908 and the Major Port Trust Act, 1963, the port trust through the conservator of ports has to ensure safety and pollution control within the Port area. The conservator, deputy conservator and harbour master are to enforce rules framed under the Act. The Act empowers the above mentioned officers to deny port clearance unless the charges for violation of these rules are levied. Therefore, the above mentioned authorities can prescribe port entry conditions and refuse to grant port clearance for transgressing vessels. In addition to these measures, criminal prosecution can be made against master and owner of the vessel for violations of port rules.

At present the ICG is exercising its functional responsibilities such as surveillance, combating oil spills, central co-ordination of the National Oil Spill Disaster Contingency Plan, inspection of vessels to ensure seaworthiness and detention of violators of anti-pollution provisions beyond the port limits. The Port conservator should get sufficient information from the ICG before taking any action against the violators. Unless this process is well co-ordinate and fast, timely detentions and control measures may not be effective. The Ministry of Environment and Forest also has functional responsibility to monitor and take remedial action in the event of marine pollution along the coast.
By clearly defining the role and hierarchy of enforcement agencies and by streamlining their activities under a central agency, namely the ICG, the enforcement regime could be made more efficient. The Indian Coast Guard Act should confer definite powers to ICG as the nodal agency to monitor, survey, enforce and punish the offenders contributing to pollution in the Indian waters instead of demarcating the same under different laws upon a handful of bureaucratic agencies.