

PORT BASED POLLUTION AND ITS EFFECTS ON MARINE ENVIRONMENT: AN OVERVIEW

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Introduction:

Port always plays a strategic role in the development of domestic and international trade of a country whether it is a developing or developed country. However, in a globalised world where distances are becoming virtually squeezed, ports play an active role in sustaining the economic growth of a country. In the modern world of technological era, ports are playing the role of an industry not just a passive actor in transportation but also in complete supply chain management¹. Ports not only play as a chain in transportation for interchange, but they function as self-sustaining industry that is linked with domestic and international trade.

Basically the Ports are classified into two categories major ports and minor ports carrying varieties of operations. When we look into pollution of waters nearby the port area, the port operations is the main reason for pollution. The Port operation ² includes the loading and unloading of cargo, the ship washing, sewage from the ships, release of ballast water, etc causing pollution to the marine environment. The pollution rate may vary according to the nature of the port. The port pollution is one of the major problems faced by the port authorities. It is the duty of port authorities to take adequate measures to reduce the pollution causing during the port operation. There are number of Major Port Act and national legislations stands in preventing the pollution from the port based activities, but these provisions are not strictly implemented by the concerned authorities. The problem of port based

¹ Beresford, A. C. K., et. al.(2004):The UNCTAD and Work port model of port development: evolution or revolution?, Maritime Policy and Management, Vol. 31, No. 2, pp 93-107

² *Assessment of Environmental Impact and port development* , Economic And Social Commission for Asia and Pacific, New York, 1992.

pollution is eradicated only by implementing strict provisions. . In this chapter focusing on the pollution caused from the port based operations which includes pollution caused from the disposal of ballast water, ship washing, loading and unloading of cargos and the leakages of oil from the pipe lines.

Sources of Pollution in Ports:

The port is polluted from two major sources i.e from the ships, offshore installations and pipelines, loading and unloading of cargos; and from the land based sources. Technically these sources of marine pollution can be divided into two broad categories: (1) point source pollution i.e oil and waste dumped by ships, offshore installations and pipelines, sewage from the factories; and (2) non-point source pollution called polluted run-off i.e discharge of sewage, agricultural and toxic industrial chemicals that seep underground, pollute underground water and finally gets deposited in the sea through rivers and estuaries

The Apart from these sources we have not to ignore that one of the major cause for the marine pollution is oil pollution. The United Nation Royal Commission on Environmental Pollution³ considered the issue of oil pollution of the sea and found that of all the oil reaching the sea 60% was through discharges from land; 20% of the oil from tanker operations, while the remaining 20% discharges during the ship voyage. From the statement made in the report we understand that the most of oily pollution sourced from the port operations.

From the source of port pollution adversely affecting the marine ecosystem in the coastal areas, one of the environmental harm caused due to the aquaculture, by this huge wastes should be disposed off and its immediately affecting the water resources and it will not useful for drinking purpose.

SHIP BORNE POLLUTANTS AND ITS IMPACT:

During the operation of ships at the port areas ship are disposed ballast water into the sea to balance the ships and also causing the pollution from the discharge of sewage from the ships, includes the washing of ships, during the washing of ships oily substances will also to be discharged from the ships and disposed into the sea. This may affect the coastal eco system negatively. The environmental impact

³ 8th Report of the Royal Commission on Environmental Pollution, Oil Pollution and the Sea ,1981

of shipping also includes greenhouse gas emissions and oil pollution. Carbon dioxide emissions from shipping is currently estimated at 4 to 5

percent of the global total, and estimated by the International Maritime Organisation to rise by up to 72 percent by 2020 if no action is taken.⁴

Meaning of Ballast Water:

A ballast water system is essential for the safe operation of a ship, but the operation of these systems causes significant threats to the environment and local economy. Loading and discharge of ballast water is an essential part of a ship's operation, and is fundamental to maintaining safe operations under different conditions of load. A ballast water 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. The capacity of ballast water tanks might be millions of gallons on a large vessel. This allows vessels to carry a light or heavy load while maintaining ideal buoyancy and handling conditions in all situations.

A ship might discharge all ballast water tanks to pass a shallow area or forward tanks only to raise the bow in rough open seas. Physical Components of the system include; 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 equipment.

Effects of Disposal of Ballast Water:

The Ballast Water discharges by the ships create a negative impact upon the marine environment. It affects the existence of living things in the coastal waters like fish, marine aquatic plants and other living organisms.

Ballast water discharge typically contains a variety of biological materials, including plants, animals, viruses, and bacteria. These materials often include non-native, nuisance, exotic species that can cause extensive ecological and economic damage to aquatic ecosystem.

⁴ Vidal, John (2007-03-03). "CO₂ Output From Shipping Twice As Much As Airlines". *The Guardian* (London). <http://www.guardian.co.uk/environment/2007/mar/03/travelsenvironmentalimpact.transporintheuk>.

However, large vessels require thousands of tonnes of water to ensure stability and manoeuvrability, and the environmental impacts of this can be considerable. These impacts

result from the fact that the ballast water can contain hundreds of different species, many of which can have serious ecological, economic and public health effects if transferred to regions where they are not native. The recognition of these effects has made ballast management increasingly important for protection of the marine environment.

Control on Ballast Water Disposal:

In 1991 the IMO's Marine Environment Protection Committee⁵ began the process of creating the framework of regulations which would become the Ballast Water Management⁶ convention. Adoption of the resolution A.868 (20) – "Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens" would not happen until 1997. The final convention was adopted by the IMO in February of 2004⁷.

Generally, the aim of all parties subject to the BWM 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". Ballast water management operations are divided into three main types; ports and terminals, vessel operations, and enforcement.

This convention provides a structure to address the issues of ballast water and provides two performance standards for the discharge of ballast water - D1 and D2. The D1 standard is for ballast water exchange, and specifies the volume of water to be replaced. The D2 standard covers approved ballast water treatment systems, and specify levels of viable organisms left in water after treatment.

During the ballast water treatment under the BWM convention all vessels must have an approved plan for managing ballast water. A detailed plan that is specific to each ship must be developed. The plan must include detailed description of the actions to be taken in order to comply with the BWM convention.

⁵ Hereinafter referred as MEPC.

⁶ Hereinafter referred as BWM.

⁷ The International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004.

Each vessel must keep a ballast water management log book. The log book must provide detailed accounts of ballast water transactions. Any ballast water taken on board, circulated, treated, transferred, or discharged in normal or exceptional circumstances must be recorded⁸.

So the discharge of ballast water becomes negatively affecting the marine environment and should take proper plan should be taken before the disposal of ballast water and to reduce the environmental impact. All vessel owners and crews have a duty to protect and preserve the marine environment from pollution and port authority had the power to control these sought of activities.

Sewage Disposal from the Ships:

The definition of sewage includes: drainage and other wastes from any form of toilets, urinals, and wc 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 the drainages⁹.

Another reason for pollution in port area is disposal of sewage from the ships during berthing. Sewages, waste water from toilets and medical facilities, which can contain harmful bacteria, pathogens, viruses, intestinal parasites, and harmful nutrients. Discharges of untreated or inadequately treated sewage can cause bacterial and viral contamination of fisheries and shellfish beds, producing risks to public health. Nutrients in sewage, such as nitrogen and phosphorus, promote excessive algal blooms, which consumes oxygen in the water and can lead to fish kills and destruction of other aquatic life. A large cruise ship (3,000 passengers and crew) generates an estimated 55,000 to 110,000 litres per day of black water waste.¹⁰

Due to the environmental impact of shipping, and sewage in particular MARPOL¹¹ annex IV was brought into force September 2003 strictly limiting untreated waste discharge. Modern cruise ships are most commonly installed with a membrane bioreactor type treatment plant for all black water and grey water, such as Zenon or Rochem which produce near drinkable quality effluent to be re-used in the

⁸ Lyons, J.M. and S. Birosik. 2007. Water Quality in the Dominguez Channel and Los Angeles/Long Beach Harbor Watershed Management Area Under the Surface Water Ambient Monitoring Program Fiscal Year 2002-2003, California Regional Water Quality Control Board, Los Angeles Region.

⁹ MARPOL73/78, Annex IV Reg. 1(3).

¹⁰ The Ocean Conservancy, "Cruise Control, A Report on How Cruise Ships Affect the Marine Environment," May 2002, p. 13.

¹¹ International Convention for the Prevention of Pollution from Ships, 1973/78., Hereinafter referred as MARPOL.

machinery spaces as technical water. So the government of each state should implement the provisions and are required to provide reception facilities for the discharge of sewage from ships at its ports and terminals to meet the needs of ships.

Pollution by Garbage from the Ships:

Apart other sources of pollution from port operations, Garbage from ships can be just as deadly to marine life as oil or chemicals. Garbage 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”.¹² And it prohibits any disposal of garbage into the sea including all plastics, synthetic ropes, synthetic fishing nets and plastic garbage bags. It is significant that the types of garbage are mostly non-biodegradable substances, which can cause suffocation and drowning to marine life and resources. The greatest danger comes from plastic, which can float for years. Fish and marine mammals can in some cases mistake plastics for food and they can also become trapped in plastic ropes, nets, bags and other items - even such innocuous items as the plastic rings used to hold cans of beer and drinks together.

It is clear that a good deal of the garbage washed up on beaches comes from people on shore - holiday-makers who leave their rubbish on the beach, fishermen who simply throw unwanted refuse over the side - or from towns and cities that dump rubbish into rivers or the sea. But in some areas most of the rubbish found comes from passing ships which find it convenient to throw rubbish overboard rather than dispose of it in ports. In order to prohibit the disposal of garbage each state should implement the provisions properly and imposing penalties for the violators.

Pollution from Oil Leakages during Loading and Unloading:

Marine ship-source oil spills can have significant impacts on both the environment and local coastal communities. Spills can occur as a result of accidents or operations, or from the intentional discharge of oily wastes into the water.¹³ Ships and vessels involved in spills can include oil tankers, bulk carriers, barges, fishing vessels, and pleasure craft. Spills can range from large quantities of oil from oil tankers to smaller accidental discharges of oil and fuel from smaller craft in marinas. Ship-source oil spills can have immediate and long-term impacts on marine life, seabirds and whales and habitats, recreational

¹² MARPOL 73/78 Annex V, Reg. 1(1).

¹³ Khee-Jin Tan, *Vessel-source marine pollution: the law and politics of international regulation*. Cambridge: Cambridge University Press, 2006.

activities such as boating, swimming, and fishing; economic activities such as tourism, commercial fishing, and aquaculture; and human welfare such as public anxiety over lost livelihoods.

With regard to oil pollution coasts, the following conclusion of the Warren Spring Laboratory of UK: “from the point of view of pollution of the environment the best thing to do with oil pollution of the beach is to do nothing. With the climatic conditions and the types of sea around the British Islands, oil left alone will fairly rapidly become innocuous or disappear altogether”. The impact of oil spills negatively affect the coastal ecosystem and adversely affecting the existing of mangroves and other living organisms¹⁴.

International efforts to minimize the Pollution from the Port Based Operations:

The sea does not recognize boundaries; any activity with a deleterious effect on the sea can have negative impact well beyond the waters of the responsible port. The pollution caused from the port based activities becomes dangerous to the existence of marine species. During the port operations, huge amount of pollutants are produced and directly disposed into the coastal waters. This can be directly affecting the ecosystem and purity of water is affected. When we look into this problem as an International concern, most of developing nations have their own laws and regulations to prevent the pollution. But the situation is more critical in the developing nations. Sometimes they have not ratified the Conventions too.

Thus several international and regional conventions have been adopted for the purpose of setting new standards and regulations that will not only protect but also sustain the aquatic environment.

International Convention for the Prevention of Pollution from Ships 1973/78:

MARPOL 73/78¹⁵ is the principal international convention in force on matters of pollution of the sea from ships and since ship generated waste is a major source of pollution in ports; the object of

¹⁴2010 Fall Report of the Commissioner of the Environment and Sustainable Development, Office of the Auditor General of Canada from the website, www.oag-bvg.gc.ca, visited on 23th April, 2013.

¹⁵ In 1973, the International Conference on Marine Pollution adopted the International Convention for the Prevention of Pollution from Ships drafted by the IMO.

implementation of this convention is to “achieve the complete elimination of international pollution of the marine environment by oil and other harmful substances and the minimization of accidental discharge of such substances.¹⁶The convention concentrating on a particular source of pollution with extensive regulations on ship reporting systems/ requirement, including guidelines for reporting incidents involving discharge (actual or probable) of oil, dangerous good, harmful substances and marine pollutants. The regulation¹⁷ made under this convention contains the provision relates to measures to be taken to prevent the discharge of oil from ships into the marine environment and it applies to all ships including oil tankers.¹⁸

The provisions in the Convention requires contracting states to provide reception facilities with adequate capacities at all ports, terminals, repair ports, oil-loading terminals, all ports that handle ships with oily residue and sludge to discharge¹⁹. The relevant vessels are required to have segregated ballast tanks; dedicated clean ballast tanks and crude oil washings requirements are set out in detail. The conventions requires the provision relates to the prevention of pollution by sewage from the ship²⁰. The convention defines sewage²¹ and the mention certain conditions with regard to the disposal of sewage into the sea.

The Government of state parties to the convention is required to provide reception facilities for the discharge of sewage from ships at its ports and terminals to meet the needs of ships calling at such ports.

During the voyage ship is required to be fitted with a sewage plant that meets operational needs as determined by the IMO standards²²; a system approved by the flag of the vessel to comminute and disinfect the sewage; a holding tank of adequate capacity for the retention of all sewage having regard to the operation of the ship, the number of persons on board and the holding tank should have a means to indicate visually the amount of its contents; and a pipeline leading to the exterior of convenient for

¹⁶ MARPOL 73, Preamble, para 4.

¹⁷ MARPOL 73, Annex I- Regulations For the Prevention of Pollution by Oil.

¹⁸ MARPOL 73/78, Annex I, Regulation 2

¹⁹ Ibid, Reg. 12.

²⁰ MARPOL 73/78, Annex IV - Regulations for the Prevention of Pollution by Sewage from Ships

²¹ Includes drainage and other wastes from any form of toilets, urinals, and wc 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 the drainages.

²² MARPOL 73/78, Annex IV, Reg.3

the discharge of sewage to a reception facility and that the pipeline is fitted with a standard shore connection.

The MARPOL also stating the provisions relates to the garbage disposal in the regulation²³ and the term garbage²⁴ also defined in the regulation. But the convention prohibits any disposal of garbage into the sea including all plastics, synthetic ropes, synthetic fishing nets and plastic garbage bags. The government of the state had the duty to provide adequate reception facilities for the disposal of garbage at its ports and terminals for the use of ships calling at such ports.

Enforcement of MARPOL:

The convention makes it an offence for a ship to discharge any oil or oily substances, any harmful or noxious substances or effluence 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 all offences under MARPOL. In addition, failure to report any discharge of the prohibited substances, failure to carry on board IOPP²⁵ certificate, shipboard oil pollution emergency plan are violations under the Convention.

Each contracting state is given the responsibility for ensuring enforcement of the convention. MARPOL does not specify the type of punishment for contravention or compensation limits but encourages state parties to impose sanctions and penalty for any violation of the convention in a manner that “shall be adequate in severity to discourage violations” irrespective of where the violation occurred.

The United Nations Convention on the Laws of the Sea²⁶:

The UNCLOS is generally regarded as the grundnorm on matters relating to pollution of the sea and defines the pollution of the marine environment.²⁷ Article 194(3) identifies the sources of pollution to include pollution from off-shore installations, installations used for exploitation of natural resources from the subsoil and sea-bed, pollution from vessels and release of toxic and harmful substances from

²³ MARPOL 73/78, Annex V , Regulation for the Prevention of Pollution by Garbage from Ships.

²⁴ 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”

²⁵ International Oil Pollution Prevention Certificate , Hereinafter referred as IOPP.

²⁶ Hereinafter referred as UNCLOS III.

²⁷ Defined in Art 1(4) as, “the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities”.

land-based sources through dumping or the atmosphere. The convention apart from encouraging states to adopt laws and regulations to ensure the prevention, reduction and control of the marine environment. The UNCLOS III stated that Coastal states have sovereignty within their territorial sea and exclusive economic zones, adopt laws and regulations for the prevention, reduction, and control of marine pollution from foreign vessels, including vessels exercising the right of innocent passage.

Efforts made by IMO in the Prevention of Port Pollution:

International Maritime Organization in formulating and elaborating international rules, standards and recommended practices and procedures consistent with the Convention, for the protection and preservation of the marine environment. IMO has produced several relevant conventions and regulations including the Convention on Safety of Life at Sea 1974²⁸, MARPOL 73/78, 1969 Civil Liability Convention and 1971 Fund Convention and the 1992 Protocols to both the Civil Liability Convention and the Fund Convention.

Prevention of Pollution from Port Based Operations: A Comparative Analysis

Legislative mechanisms in United States:

In US, major coastal and marine issues includes the discharge of effluents, decline in fishery stocks and development of off-shore oil platforms, coastal erosion, and natural coastal hazards, including storm surges. The CZMA²⁹ lays down a framework for voluntary cooperation between the federal government and coastal states. The enactment identifies different policies aims at the protection of marine environment and coastal development. Each state possesses coastal areas imposes its own legislations, like California Coastal Act 1976, CCZMA³⁰ and MCZMP³¹. And also in Canada there is an Act called as Ocean Act, 1996 emphasis the framework for protecting the marine environment from the land based activities.

The pollution caused from the discharge of ballast water, loading and discharge of ballast water is an essential part of a ship's operation, and is fundamental to maintaining safe operations under different conditions of load whereby in some United States territorial waters also have regulations controlling

²⁸ Hereinafter referred as SOLAS.

²⁹ Coastal Zone Management Act, 1972

³⁰ Connecticut Coastal Zone Management Act, 1980.

³¹ Massachusetts Coastal Zone Management Program.

ballast water management. If your commercial vessel is over 300 gross tonnes it is not permitted to discharge ballast water in Washington State waters without previously having undergone open ocean exchange or some approved form of treatment³². The U.S Coast Guard has also the duty to protect and preserve the marine environment from the pollution of ballast waters.

Efforts in UK Legislations:

When we compare Indian legislations, UK legislations are more stringent and adequate in nature. An Act which is enacted in UK is mainly concentrating on the prevention of disposal of wastes from ships. In UK, there is a Regulation³³ which regulates the prevention of ballast water and sewage from the ship. Other enactments in UK³⁴ to prevent the pollution are also achieve their by the proper implementation.

Discharge Standards for Ships operating in Australian waters:

MARPOL contains the term “from the Nearest Land” which means from the baseline from which the territorial sea of the territory in question is established in accordance with international law, except off the east coast of the north-eastern coast of Australia where it is measured from a line drawn around the outer edge of the Great Barrier Reef and part of the Torres Strait region. Within this area, generally no discharges are allowed under MARPOL. All ships and small vessels on international voyages into Australian waters will be subject to Australian Quarantine requirements and therefore additional restrictions will apply, particularly in relation to food waste and bio-security issues³⁵. Different discharge standards apply in MARPOL “Special Areas”³⁶. The text of the Convention should be consulted if details are required. The only Special Area in Australian waters is the Antarctic Area being the sea area south of

³² <http://www.portcompliance.org/regulations.cfm>, visited on 4th May 2013.

³³ Merchant Shipping (Prevention of Pollution by Sewage and Garbage from Ships) Regulations, 2008.

³⁴ Statutory Instrument 2003/1809: The Merchant Shipping and Fishing Vessels (Port Waste Reception Facilities) Regulations 2003, as amended by the Merchant Shipping and Fishing Vessels (Port Waste Reception Facilities) (Amendment) Regulations, 2009; MGN 387 Guidance on the Merchant Shipping and Fishing Vessels (Port Waste Reception Facilities) Amendment Regulations, 2009.

³⁵ http://www.amsa.gov.au/Publications/Marine_Environment_Protection/Stow%20it.pdf, visited on 5th May 2013,

³⁶ Under MARPOL Annex V, the areas of: the Mediterranean Sea; the Baltic Sea; the Black Sea; the Red Sea; the “Gulfs” area; the North Sea; the Antarctic area; and the Wider Caribbean region (including the Gulf of Mexico and the Caribbean Sea) are provided with a higher level of protection than other sea areas. Further information on special areas can be found in circular MEPC.1/Circ.778/Rev.1

latitude 60° S. Additional stricter requirements may apply to vessels when in Australian ports and/or operating in the Great Barrier Reef Marine Park.

Legislative Control over Port Pollution in India:

Pollution from the port based operations is also a source of marine pollution. Marine pollution in India is an issue for the country as a whole, where states are often bound to create laws consistent with the overall law of the Central Government. The pollution often created during the Port Operations becomes a major threat to the existences of marine organisms in the coastal waters. The major port operations are ship washing, sewage and garbage disposal from the ships, off shore installations etc causing pollution to the coastal waters. In India lots of legislations are enacted with the objective of protection and preservation of environment, but these legislations are not reaching up to the mark. The Environment (Protection) Act, 1986 was introduced as an umbrella legislation that provides a holistic framework for the protection and improvement to the environment.

Indian Ports Act, 1908:

In Indian Ports Act also containing the provisions relates the prevention of pollution during the port operations, the pollution caused from the port operations shall be controlled and regulated by the port authorities³⁷. The power to make rules for regulating vessels whilst taking-in or discharging passengers, ballast or cargo, or any particular kind of cargo, in any such port, and the stations to be occupied by vessels whilst so engaged³⁸; for regulating the manner in which oil or water mixed with oil shall be discharged in any such port and for the disposal of the same³⁹; and also have the power to make rules for regulating the bunkering of vessels with liquid fuel in any such port and the description of barges, pipe lines or tank vehicles to be employed in such bunkering⁴⁰;

³⁷ <http://www.cochinport.com/writereaddata/pdf/TheIndianPortsAct>, visited on 12th May 2013.

³⁸ Section 6(1)(e), Indian Ports Act, 1908.

³⁹ Inserted by Act 39 of 1923, section 6(1)(ee)

⁴⁰ Inserted by Act 9 of 1925, section 6(1)(eee).

Major Ports (Prevention and Control of Pollution) Rules, 1991:

The Major Ports (Prevention and Control of Pollution) Rules, 1991⁴¹ regulate pollution in port areas.⁴² No vessel shall discharge, throw, allow to leak or flow, or allow to fall from quay, jetty, or pier, materials within the limits of a major port. The vessels are restrained from discharging ballast or oil mixtures within the port limits.⁴³

Where there is simultaneous loading of oils and deballasting, these are to be carried out by the master of the vessel only when he or she is satisfied that the loading pipeline has efficiently separated, and the operation is conducted without polluting any waters.⁴⁴ Use of detergents to clear bilges or oil tanks is prohibited⁴⁵ and tank washings shall not be discharged overboard⁴⁶. No vessel shall discharge, or allow the escape of, oil bilge water or any mixture of bilge water with chemicals or any noxious substance within the limits of a major port, without the written permission of the port authorities.⁴⁷

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.⁴⁸ If a vessel has any oil, water, or pollutant to be discharged at any major port, it shall give notice of at least twenty-four hours in the form annexed to the rules to the competent authority requesting him to arrange appropriate reception facilities.⁴⁹ The sea valves connected to oil cargo pipelines are to be tightly closed during the stay at the port.⁵⁰ No vessel shall bunker without permission in a major port by pipelines, barges, tanker lorries, or any other means.⁵¹

The master of a vessel and its terminal representative shall jointly ensure that the cargo and bunker house to be connected to the vessel are of approved type and quality, possessing at valid test certificate

⁴¹ Published in the Gazette of India, Ext, Part II Section 3(i) dated 1 May 1991.

⁴² Major Ports (Prevention and Control of Pollution) Rules, 1991, Rule 3.

⁴³ *Ibid.*, Rule 4.

⁴⁴ *Ibid.*, Rule 5.

⁴⁵ *Ibid.*, Rule 6.

⁴⁶ *Ibid.*, Rule 7.

⁴⁷ *Ibid.*, Rule 9.

⁴⁸ *Ibid.*, Rule 11.

⁴⁹ *Ibid.*, Rule 12.

⁵⁰ *Ibid.*

⁵¹ *Ibid.*, Rule 13.

for the use on the date, and the master shall be responsible for any pollution caused due to the bursting of a cargo bunker house.⁵²

Merchant Shipping Act, 1958⁵³:

In MSA also mentions the provisions relating to the prevention of pollution⁵⁴. Merchant Shipping (Amendment) Act, 2003⁵⁵ stating the provisions relating to oil tankers of one hundred and fifty tons gross or more, other ships of four hundred tons gross or more and off-shore installations; an incidents of marine casualty or acts relating to such casualty occurring with grave and imminent danger to Indian coast line or related interests from pollution or threat of pollution in the sea by deliberate, negligent or accidental release of oil, ballast water, noxious liquid and other harmful substances into sea including such incidents occurring on the high seas.⁵⁶

The Director General of Shipping in consultation with the Central Government enacted certain rules in relating to the prevention of pollution from the sewage of ships.⁵⁷ The rules⁵⁸ enacted in order to prevent the pollution by sewages from ships within the territorial waters of India and the rules relates to restriction of disposal of garbage into the sea⁵⁹

Coast Guard – As a Security of Maritime Zones:

India has the Coast Guard Act, 1978 for the constitution and regulation of the armed forces for the union to ensure the security of the maritime zones of India and to protect maritime and other national interests in such zones and matters ancillary to this. This duties and functions of the Coast Guard includes the protection, by measures it deems fit, of the maritime and other national interests of India in the maritime zones of India. Such measures include taking necessary preventive to preserve and protect the maritime environment, and prevent and control the marine pollution.⁶⁰ They have the duty to

⁵² *Ibid.*, Rule 14

⁵³ Hereinafter referred as MSA.

⁵⁴ *Ibid.*, Section 356 C

⁵⁵ <http://www.legalindia.in/the-merchant-shipping-amendment-act-2003>

⁵⁶ Section 356 A (1), Merchant Shipping Amendment Act 2003

⁵⁷ http://www.dgshipping.com/dgship/final/rules/Notification_GSR_sewage_annexIV.pdf, visited on 5th May 2013.

⁵⁸ Merchant Shipping (Prevention of Pollution by Sewages from Ships) Rules, 2010.

⁵⁹ Merchant Shipping (Prevention of Pollution by Garbage from Ships) Rules, 2009.

⁶⁰ Coast Guard Act, 1978, Section 14(c)

protect the artificial islands, off-shore terminals, installations, and other structures and devices in any maritime zone.

Water (Prevention and Control of Pollution) Act, 1974:

The Act aims with the objective of preventing water pollution and the maintaining or restoring of wholesomeness of water for the establishment, with a view to carrying out the purposes aforesaid, of board for the prevention and control of water pollution or purposes aforesaid of boards for the prevention and control of water pollution, for conferring or and assigning to such boards powers and functions⁶¹. The purpose of the legislation is not only the prevention and control of water pollution but also the maintenance and restoration of the wholesomeness of water. This legislative measure is designed to tackle one facets of environmental pollution. Its main objectivities are: To provide for the prevention and control of water pollution and maintaining or restoring of wholesomeness of water⁶².

To establish control and state boards for the prevention and control of water pollution; The Indian legal system provides sources of law for addressing water pollution problems. *Andhra Pradesh Pollution Control Boards vs M.V. Naidu*⁶³. The state government may by notification in the official Gazette, alter any water pollution, prevention and control area whether by way of extension or reduction or define a new water pollution, prevention and control area in which may be merged one or more water pollution prevention and control areas, or any part or parts thereof. However it has been held in that state government cannot be grant exemption from prohibition against polluting industry to be setup.

To provide for conferring on and assigning to such board powers and functions relating thereto and for matters; To establish control and state water testing laboratories to enable the board to assess the extent of pollution lay down standards and established guilt or default.

*T.Rama Krishna Rao vs the Chairman, HUDA and other*⁶⁴, The division bench of Andhra

Pradesh High court has held that the protection of the Environment is not only the duty of citizens but also the obligation of the state and it all other organs including the courts. The enjoyment of life, its

⁶¹ Mathur, *A federal legislative history of control of water pollution in India in legal control of environmental pollution* – 86-94.

⁶² R.K Trivedy, “*Ecology and Pollution of Indian Waters*”, S.B Nangia for Ashish Publishing House, New Delhi,(1st edn.,1998), p.23

⁶³ A.I.R 1999 SC 812.

⁶⁴ 2002(2) ALT 193

attainment and fulfilment are guaranteed under Article 21 of the constitution of India. The protection and preservation of nature's gift without which the life cannot be enjoyed fruitfully.

The court observed that the water pollutants are two kinds-

(i) Conventional water pollutants

(ii) Non conventional water pollutants.

Indian judiciary has also play better role in keeping the standards for regulating the pollution of water from the different sources of pollution. Apart from the legislations enacted by the central government, each state has implement rules and regulations for the protection water resources from the pollution.

Gujarat Maritime Rules and Regulations:

The Gujarat maritime board implemented certain rules for the protection of port rules and conditions of use APM terminals Pipavav⁶⁵. The rules enacted for the safe operation of Pipavav port in Gujarat with the aim to restrict the port pollution from the disposal of ballast water and ship operations.

These are major legislations in India regulating the pollution from port based operations and but the major drawback is lack of implementation of laws.

The pollution control board had also the duty to protect the environment from the pollution, if these authorities are fulfilling their roles in protection and preservation of marine environment from the pollution then the result will be the polluted free environment.

CONCLUSION

The ports and harbours straddle the interface between land and sea. Port development and operations have the potential to impact environment. The environment may be impacted due to vessels and vehicular traffic, handling and storage of materials and shore based facilities. The pollution caused from the port based operations causes depletion of marine resources in the coastal waters and its may affect the human life also.

When considering the issue of port pollution the rate of pollution is increased day by day. Most of the developing countries have their own laws and regulations for the protection of the marine eco system from the pollution. Comparing to the developed countries Indian situation becomes worst and pathetic, in India there is no insufficiency of legislations only problem is the proper implementation. This

⁶⁵ Indian Ports Act 1908 (No.15) sections 5, 6 & 21; GMB Act 1981; and Gujarat Government Notification No G/J/72/MPT/9867/88559/(Amend-50)/M dated 30th January, 1968, the Government of Gujarat vide notification no.G/FF/11/94/IPA/1393-100(1)/GH dated December 8,1994 ,hereby further extends the limit of port of Pipavav and declares that the said port limits of the Pipavav Port is bounded by 2059N 0713400E, 2056N 07128E, 2054N 07128E, 2053N 07132E.

situation is changed only when the Government takes adequate measures for the proper implementation of these protection laws.

When the considering the port pollution Ministry of Environment and Forest ⁶⁶ and Port Trust Authority are the regularity authorities which have the responsibility of ensuring that the Port adequately attends to its environment related responsibilities. To regulate the port pollution the Port has a systematic documented environmental management plan and conduct environmental management audits. The Port's pollution control cell was adequately equipped to meet the situation. The port authorities control pollution of harbour waters. The Port needs to attend to its environmental responsibilities through a concerted action plan with particular focus on compliance with the environmental legislative requirements. A comprehensive Environment Management along with periodical Environmental Audit, coordination with MPCB and MCGM to ensure treatment of sewage and use of improved disposal methods for oil slops and dirty ballast may help improve environmental conditions.

⁶⁶ Hereinafter referred as MoEF.