Ship breaking industry of Pakistan and its environmental effect on marine life and humans

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Present study contain the overview of ship-breaking industry being the successful industry in Pakistan, existing law for this industry, life of workers involved, and the impact of this industry on marine environment. Some issues have been observed like the existing government laws and enforcement, safety of workers, health and working environment situation, remunerations for workers. This is to highlight the problematic issues of this industry and then analyze the environmental problems in order to help for overcoming the challenges involved in ship-breaking industry.

[Keywords: Pakistan ship breaking Industry, Environmental Effect, Marine Environment]

Introduction

Ship recycling means an activity of a complete or partial dismantling of a ship at a ship recycling facility in order to recover components and materials for re-possessing and re-use, while taking of hazardous and other materials and includes other operations such as storage and treatment of components and materials on site, but not their further processing and or disposal in separate facilities. If these industries are regulated properly by imposing stringent rules and regulations, the ship recycling is ‘green industry’. A good regulatory regime should be one that inspires the transformation from ship breaking to recycling. This is a highly complicated issue as it often includes reconciliation of socio-economic and environmental concerns.

Today, ship breaking in South Asia is still taking place at the cost of environmental destruction and severe health risks for the workers and the local population who are exposed to these hazardous wastes. In 2012, ship owners sold 8508 end-of-life vessels for scrapping in India, Pakistan and Bangladesh. ‘Beaching’, the method currently used in South Asia does not allow for clean and safe operations as it consist of breaking ships directly on the beach without proper structures to ensure containment of pollutants, hazardous waste management, and workers’ health and safety. The ship breaking industry is responsible for many preventable accidents, work-related illnesses and lost human lives, as well as the repartition of hazardous materials and the pollution of the surrounding marine and coastal environment. The ship owners and the global maritime industry, mainly located in the industrialized countries, externalize the real costs for clean and safe recycling to the South Asian countries where laws guaranteeing environmental protection and workers’ health and safety are not properly enforced.

Ship breaking is a hazardous industry for both workers and the marine environment. Despite the fact that Pakistan is one of the world’s largest ship breaking country currently ranking fourth in the annually scrapped volume so far only little attention has been given to the sector in Pakistan both by the government as well as civil society. Despite the dangers presented by ship breaking, workers in Pakistan are still not adequately protected and trained to reduce the risks of associated hazards. The industry is shaken by frequent accidents that injure, maim and kill workers. Hazardous wastes recovered from the ships are not handled, stored and disposed of properly, but dumped around the ship breaking yards or resold on the local market. Due to the lack of adequate technology and equipment, proper waste handling procedures are not followed. So far, the sector can neither prevent pollution and the repartition of hazardous materials into the local market nor mitigate the risks of accidents and occupational diseases.

Pakistan is State party to the Basel Convention and must therefore ensure the environmentally sound management of hazardous wastes if it allows for the import of end-of-life vessels. Moreover, new
legislation such as the EU Regulation on Ship Recycling and the Hong Kong Convention, neither of which have yet entered into force, will demand an upgrade if the sector in Pakistan wants to compete with countries offering “green” ship recycling. The ship recycling industries are highly criticized for causing environmental devastation and health hazards to the coastal area giving.

Material and Methods

An overview of ship breaking industry in Pakistan

The Pakistani ship-breaking industry is for this very reason situated mainly in Gadani, Balochistan, about 50 kilometers away from Karachi. A 10 kilometers long beachfront here plays host to as many old and tired ships as need be, as long as said need is below 125 ships. It produced a million tons of scrap metal each year, thus fueling the Pakistani steel industry. The Pakistan government earns heavy revenue from these kinds of industries and they are promoting the ship recycling industries by reducing the tax rates etc. The government should impose strict rules and regulations regarding the operation of industries then it will be good success otherwise it causes heavy threat to the existence of whole living and non-living things. Until the 1960s, ship breaking was considered a highly mechanized operation, concentrated in industrialized countries - mainly in the United States, United Kingdom, Germany and Italy.

Early 1980s to maximize profits ship owners sent their vessels to the scrap yards of India, China, Pakistan, Bangladesh, the Philippines and Vietnam where pay, health and safety standards are minimal and workers are desperate for work. It is estimated that over 100,000 workers are employed at ship breaking yards worldwide. Of the approximate 45,000 oceangoing ships in the world about 700 are taken out of service every year. At the end of their sailing life, ships are sold so that the valuable steel - about 95% of ships mass can be reused. Ship breaking activities present both challenges and opportunities for our coastal zone management. Meeting the increasing demand for raw materials such as steel needs to be balanced with the negative impact this activity is having on our coastal environment and the conditions of the workers. Some of the world’s largest decommissioned ships are today scraped at the shores north of Chittagong, which is the second largest city and major seaport in the country.

Environmental effects of ship breaking industry

Ship breaking has grown into a major occupational and environmental health problem in the world. It is amongst the most dangerous of occupations, with unacceptably high levels of fatalities, injuries and work-related diseases. Ship breaking is a difficult process due to the structural complexity of the ships, and it generates many environmental and safety and health hazards. It is carried out mainly in the informal sector and is rarely subject to safety controls or inspection. Workers usually lack personal protective equipment and have little training, if at all. Inadequate safety controls, badly monitored work operations and high risk of explosions create very dangerous work situations. Workers have very limited access to health services and inadequate housing, welfare and sanitary facilities further exacerbate the plight of the workers.

Though ship breaking has earned a good reputation for being a profitable industry in developing countries there are number of environmental and human health hazards. Depending on their size and function, scrapped ships have an unleaded weight of between 5,000 and 40,000 tons (the average being 13000+), 95% of which is steel, coated with between 10 and 100 tons of paint containing lead, cadmium, organ tins, arsenic, zinc and chromium. Ships also contain a wide range of other hazardous wastes, sealants containing PCBs, up to 7.5 tons of various types of asbestos and; several thousand liters of oil (engine oil, bilge oil, hydraulic and lubricants oils and grease). Tankers additionally hold up to 1,000 cubic meters of residual oil. Most of these materials have been defined as hazardous waste under the Basel Convention. In Bangladesh, ships containing these materials are being cut up by hand, on open beaches, with no consideration given to safe and environmentally friendly waste management practices.

Ships are not properly cleaned before beaching. Generally, an eyewash test is carried out to certify that a ship is free from dangerous chemical and fumes. Ship breaking activities is a threat to both the terrestrial and marine environment as well as to public health. It is like a mini version of a city that discharges every kind of pollutants a metropolis can generate like liquid, metal, gaseous and solid pollutants. Following are some impacts of ship breaking industry on workers and marine environment.

Effect on Workers

In addition to taking a huge toll on the health of workers, ship breaking is a highly polluting industry.
Large amounts of carcinogens and toxic substances (PCBs, PVCs, PAHs, TBT, mercury, lead, isocyanides, and sulfuric acid) not only intoxicate workers but are also dumped into the soil and coastal waters. An average size ship contains up to 7 tons of asbestos, which is often sold in the local communities after scrapping. As the majority of yards have no waste management systems or facilities to prevent pollution, ship breaking takes an enormous toll on the surrounding environment, the local communities, fishery, agriculture, flora and fauna. This naturally causes serious environmental damage with long-term effects for occupational, public and environmental health.

Asbestos

Asbestos powder found near the ship breaking yards. Asbestos was used in old ships as a heat insulator. As there are no asbestos disposal procedures, during scrapping, workers and the surrounding environment are exposed to the asbestos fibers. Exposure to asbestos fibers (even in very low concentrations) especially through inhalation may cause cancer and asbestosis. On the ship breaking beaches, asbestos fibers and flocks fly around in the open air. Workers take out asbestos insulation materials with their bare hands. It has also proven to be one of the most lethal, as inhaling asbestos fibers can lead to a wide range of pulmonary problems such as asthma and asbestosis - and can be the direct cause of mesothelioma.

Heavy metals

Heavy metals are found in many parts of ships such as in paints, coatings, anodes and electrical equipment. These are taken apart with no protective measures in place and reused. Exposure can result in lung cancer, cancer of the skin, intestine, kidney, liver or bladder. It can also cause damage to blood vessel.

Persistent Organic Pollutants (POP's)

The ship breaking activities are the source of persistent organic pollutants. POPs are chemicals that are highly toxic, remain intact in the environment for long periods, become widely distributed geographically, bio accumulate through the food web, accumulate in the fatty tissue of living organisms and pose a risk of causing adverse effects to the human population, wildlife and the environment. There has been a realization that these pollutants, upon exposure of human population, can cause serious health effects ranging from increased incidence of cancers to disruption of hormonal system.

Effect on marine environment

Oil Pollution

Another pollutant discharged during the ship breaking is oil and causes a heavy damage to the marine ecosystem and leads the way to the environmental problem like reducing the rate of oxygen in the sea water and may adversely affect the marine living organisms. It also causes damage to the bird population by coating their feathers with oil which causes buoyancy and insulation losses. Sometimes spilling may cause wide spread mortality amongst the population of fish, mammals, worms, crabs, mollusks and other water organism.

Ship scrapping activities pollute the seawater environment in the coastal areas. As a result, toxic concentration of ammonia, marine organisms found in seawater had an increase in pH levels. Extensive human and mechanical activities accelerate the rate and amount of seashore erosion and results in higher turbidity of seawater. Critical concentration of DO and higher BOD were found with an abundance of floatable materials (grease balls and oil films) in the seawater.

As a result of operation of ship breaking industries, the growth and abundance of marine organisms especially plankton and fishes may seriously be affected. Indiscriminate expansion of ship breaking activities poses a real threat to the coastal inter-tidal zone and its habitat. Through the continuous discharge of wastes and other harmful substances into the coastal waters may affecting the coastal ecosystem and its affecting the life span of mangroves and other aquatic organisms. Ship breaking activities contaminate the coastal soil and seawater environment mainly through the discharge of ammonia, burned oil spillage, floatable grease balls, metal rust (iron) and various other disposable refuse materials together with high turbidity of seawater.

Result and Discussion

International legal framework relating to ship breaking

The ship breaking industries are the recent emergence in the industrial sector. The issue of adopting the safety guidelines in ship scrapping was raised for the first time in the meeting of Marine environmental protection committee of IMO in its 44th session in March 2000. The assembly has
adopted a resolution A.962 (23) on Guidelines on ship recycling in November-December 2003. But this was later amended by Resolution A.980 (24). The guidelines are addressing all stakeholders in the industry including the flag, port and recycling states, intergovernmental organizations and commercial bodies such as ship owners, ship repairs, ship builders and ship recycling yards. By developing these guidelines IMO relied on the “Industry Code of Practice on Ship Recycling” 24, these guidelines produced by the Basel Convention 25 that focused on the issue relates to the ship recycling facilities, and also the guidelines of the International Labor Organization 26 that addressed working conditions at recycling yards. These guidelines are clearly mentioning about the responsibility of maintaining an environmental safety compliance vest with the recycling state. The recycling facilities in consultation with the ship owners are to develop a ‘Ship Recycling Plan’ 27, before when the ship enters into the ship recycling yard. The SRP should clearly mention about the methods and procedures related to the marking and removal of hazardous substances, worker’s safety and health, sound environmental practices and works that may be accomplished prior to and on arrival of the vessel at the recycling facility. The Assembly adopted a new Guidelines 981 (24) 26 also demanded a new legally binding on Ship Recycling, which provided regulations for the design, construction, operation and preparation of vessels for sound recycling; and the establishment of appropriate enforcement machinery to regulate and control ship recycling. The MEPC 55th session had also developed the text of the draft ship recycling regulations for International shipping and recycling activities and also called upon an international conference to discuss the possibilities of adopting the convention on ship recycling. Thus Hong Kong International convention for the Safe and Environmentally Sound Recycling of Ships 2009 comes into existence and plays a dominant role in controlling and regulating the ship scrapping industries.

**Basel Convention**

The United Nations Environmental Program (UNEP) adopted the “Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal” in 1992 following numerous hazardous waste trafficking scandals in the late 1980s. The Basel Convention combines several concepts to protect human health and the environment against the dangers of hazardous waste: the minimization of hazardous waste and waste self-sufficiency, a control system for any Trans’s boundary movement of hazardous waste, including the prior informed consent (PIC) procedure, and the environmentally sound management (ESM) of wastes. It has been ratified by 180 countries and is therefore global in scope. The Convention covers end-of-life vessels when these contain hazardous materials; however, both the PIC and ESM are rarely implemented for ship dismantling. PIC is seldom followed as it is unclear who the exporting state is if there is no port state and flag states have any obligations under the Basel Convention. On the other hand, the importing countries, India, Bangladesh and Pakistan – all State parties to the Basel Convention – do not comply with their obligations for ESM 28.

As the Basel Convention remains the only international regulation which aims at protecting developing countries from the dumping of toxic wastes exported from industrialized countries and has successfully been used in court cases in South Asia, the NGO Ship breaking Platform has been continuously demanding that the Convention be enforced for end-of-life vessels.

In 1995, State parties to the Basel Convention adopted an amendment, banning the export of wastes intended for recovery and recycling to developing countries. In order for the Ban Amendment (“the Ban”) to enter into force 15 more countries need to ratify it. At the European level, the Ban Amendment has been continuously demanding that the Convention be enforced for end-of-life vessels.

In 2002, the Basel Convention adopted the “Technical Guidelines for the Environmentally Sound Management (ESM) of the Full and Partial Dismantling of Ships”, a document for countries that already have or are establishing ship dismantling facilities. The Guidelines provide information and recommendations on procedures, processes and practices that must be implemented to attain safe and environmentally sound ship dismantling. The Guidelines also provide advice on monitoring and verification on environment performance. Moreover, they outline a phase-out for the beaching methods following a ten-year transitional phase.

In 2007, the Secretariat of the Basel Convention (SBC) launched the global programme for sustainable ship recycling in order to encourage collaboration between key stakeholders to facilitate improvements in workers’ health and safety and environmental conditions. The SBC has offered a variety of technical
capacity building activities upon Basel Parties’ request. It has lately published a case study and a feasibility report on alternatives to the beaching method, which offers guidance to Pakistan on how to make ship breaking yards compliant.

**Hong Kong Convention**

The International Maritime Organization (IMO) decided to develop a new global ship breaking regime in December 2005. The International Convention for the safe and environmentally sound recycling of ships was adopted by a diplomatic conference under the auspices of the IMO in Hong Kong in May 2009. Guidelines supporting the Convention have recently been developed by the IMO. The Hong Kong Convention is not expected to enter into force before many years. To date only Norway has acceded to the Hong Kong Convention (in June 2013), and several other states have signed it. So far, none of the ship breaking countries in South Asia have signed or acceded to the Convention.

The platform calls for the co-existence of the Basel and Hong Kong Conventions and to combine elements from both. The Hong Kong Convention alone does not provide an equivalent level of protection for developing countries from hazardous waste coming from industrialized countries, lacks important elements such as the ‘polluter pays’ principle, waste prevention, and provisions regarding downstream waste management. The Hong Kong Convention comprises requirements for ships – such as having an IHM prior to recycling and for ship recycling facilities, as well as reporting requirements. The Convention requires ship recycling facilities to be authorized by the authorities. The facilities are required to implement a ship recycling plan (SRFP) that covers worker safety and training, protection of human health and the environment, roles and responsibilities of personnel, emergency response, and systems for monitoring, reporting and record-keeping.

Although the Hong Kong Convention does not rule out the beaching method as non-compliant, so far only a couple of Chinese ship recycling yards have received, or are awaiting, a statement of compliance. If Pakistani yards seek compliance with the Hong Kong Convention, the yards must be upgraded with regards to all the requirements listed above.

**The International Labor Organization (ILO)**

The ILO has called ship breaking one of “the most dangerous occupations” in the world. In March 2004, the ILO unanimously endorsed a set of criteria to govern the disposal and recycling of ships. The criteria are outlined in “Safety and Health in Ship breaking: Guidelines for Asian Countries and Turkey”. The Guidelines suggest a national framework defining the general responsibilities and rights for employers, workers and regulatory authorities in ship breaking. In addition, they provide recommendations on safe ship breaking operations including the management of hazardous substances, protection and preventive measures for workers against hazards and suggestions for a competency-based training program.

Pakistan has neither ratified the Occupational Safety and Health Convention (No. 155) nor the Convention on a Promotional Framework for Occupational Safety and Health (No. 187). The implementing Act for the latter has been pending at the Parliament since 2008.

**MARPOL 73/78**

The MARPOL was adopted on 2nd November 1973 at IMO and covered pollution by ships from oils, chemicals, and harmful substances in packaged form, sewage and garbage. This convention bans oily discharge, and applies to ship breaking yards as they discharge oil and other greasy materials. This convention also ensures that the ship owner will be liable to pay compensation for cleaning up the pollution from his ship.

**Comparative analysis of the practices of different Asian Countries**

The ship breaking industry in South Asia has been under pressure because of alleged abuse of the environment and occupational health hazards. It is seen as a polluting industry that has adverse effects on the ecosystem and human lives, particularly the workers. Enforcement of regulations in the ship breaking industry is weak. Ship breaking activity is associated with dirty jobs, numerous deadly accidents, insecure labor, environmental injustice, and violation of human rights. At present, the global centre of the ship breaking and recycling industry is in South Asia, specifically Bangladesh, India, and Pakistan. These three countries account for 70–80 percent of the international recycling market for ocean-going vessels, with China and Turkey covering most of the remaining market. Only about 5 percent of global volume is scrapped outside the South Asian countries.

**Position in India**

Nowadays, the ship recycling industries are one of the major concerns in India, due to the disposal of
hazardous waste disposal into the coastal waters. One of the major questions comes for the union governments that how can it be restricted and what are steps to be taken by the authority to minimize the pollution caused from the ship recycling industries. In India at present there is no specific law relative to the international waste shipment. When it comes to the ship breaking, jurisdiction is conferred on multiple authorities under various laws such as Maritime zones Act 1976, the Coast Guard Act 1978, Environmental Protection Act 1986, the Gujarat Maritime Board Act1981, and Ship Recycling Regulations 2006. These legislations are specifically covered the control environmental pollution during the ship breaking. The ship breaking in India is strictly done in compliance with the honorable Supreme court decision in Clemenceau case. The recommendations made Supreme Court as follows: The proposed Ship Recycling Code is aimed at ensuring that ships, when being recycled after reaching the end of their operational lives do not pose any unnecessary risk to human health and safety or to the environment, the said order, the officials of Gujarat Maritime Board along with officials of the Gujarat pollution control board, the customs department, National institute of occupational health and atomic energy regulatory board shall oversee the ship breaking arrangements and implementation of the recommendations of CTE until further orders.

Position in china
The situation in china is similar to other Asian countries. In China, ships are broken in docks with cranes and machinery. But the working conditions are almost the same in ship-breaking yards as all over Asia, such as, insufficient protection. In 2000, in an inspection of four Chinese ship-breaking yards it was found that workers were insufficiently protected against toxic and hazardous materials. Toxic waste was burnt in open fires. Asbestos was removed without proper protection for workers. The carcinogenic material was sold for reuse to industries producing heating systems. Yards were heavily polluted by oil, heavy metals and other toxic substances. Pollution had spread outside the yards as well.

Position in Bangladesh
Ship breaking activities in Bangladesh is concentrated in Sitakund (Bhatiary to Barwalia), just north of Chittagong city on the Bay of Bengal. It is of paramount importance to the macro and micro economies of poverty stricken Bangladesh. Ship breaking activities present both challenges and opportunities for our coastal zone management. Meeting the increasing demand for raw materials such as steel needs to be balanced with the negative impact this activity is having on our coastal environment and the conditions of the workers. Some of the world’s largest decommissioned ships are today scraped at the shores north of Chittagong, which is the second largest city and major sea port in the country. Environmental policies and laws were not enforced, labor salaries were among the lowest in the world and there were no standards for occupational health and labor safety. Obviously there were plenty of opportunities to exploit people and the environment when moving forward with the ship breaking business.

Ship breaking on the beach, which already at that time was prohibited in most countries, could be done in Bangladesh without any concern. Poverty and millions of people without education were looking for livelihood opportunities. They provided cheap and exploitable human man power needed for the ship breaking industry. No major investments were required for engaging in ship breaking. The present type of ship breaking in Bangladesh just requires a large winch, some blowtorches and maybe a bulldozer. Rest of the operation is just raw human man power. Labour is extremely cheap, environmental and labour standards are loosely applied and no pre-cleaning of the ships are required for entering the ship breaking beach in Chittagong.

Position in Pakistan
The pollution generated from the ship recycling industries is regulated only by imposing strict rules and regulations regarding the disposal of wastes from the industries into the coastal waters. The Pakistani ship breaking sector is covered by international environmental and waste trade laws, first and foremost the Basel Convention. As a state party to the Convention, Pakistan has to ensure that its ship breaking yards practice the environmentally sound management (ESM) of hazardous wastes as laid down in the Basel Convention and the technical guidelines. Moreover, the Hong Kong Convention prescribes the authorization of facilities, requirements for their operation as well as a ship recycling plan for every vessel. Pakistan can in order to maintain its competitiveness seek early compliance with the provisions under the Hong Kong Convention, which
need to be combined with the already legally binding obligations under the Basel Convention. In order to comply with its legally-binding and future obligations such as the Hong Kong Convention and the EU ship recycling regulation, the ship breaking industry in Pakistan needs to adopt more advanced methods, as practiced in other parts of the world such as China or Turkey, and move its activities from breaking ships directly on the beaches to structures that allow for the containment of pollutants, proper handling of hazardous wastes, the safe use of heavy lifting equipment and the rapid access of emergency response in case of accidents. Detailed guidance has been provided, amongst others, by the aforementioned Basel. Pakistan has ratified the Basel Convention; however, a compliance instrument is yet to be established. Moreover, there is no sector-specific regulation exclusively for the industry in compliance with the BC and the future Hong Kong Convention. Generally, the enforcement of the law which is already in place such as the Pakistan Environmental Protection Act 1997 is weak. Certain legal provisions are implemented partially. The United Nations Environmental Program (UNEP) adopted the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal in 1992 following numerous hazardous waste trafficking scandals in the late 1980s. The Basel Convention combines several concepts to protect human health and the environment against the dangers of hazardous waste: the minimization of hazardous waste and waste self-sufficiency, a control system for any trans boundary movement of hazardous waste, including the prior informed consent (PIC) procedure, and the environmentally sound management (ESM) of wastes. It has been ratified by 180 countries and is therefore global in scope. The Convention covers end-of-life vessels when these contain hazardous materials; however, both the PIC and ESM are rarely implemented for ship dismantling. PIC is seldom followed as it is unclear who the exporting state is if there is no port state and flag states have any obligations under the Basel Convention. On the other hand, the importing countries, India, Bangladesh and Pakistan all State parties to the Basel Convention do not comply with their obligations for ESM. As the Basel Convention remains the only international regulation which aims at protecting developing countries from the dumping of toxic wastes exported from industrialized countries and has successfully been used in court cases in South Asia, the NGO Ship breaking Platform has been continuously demanding that the Convention be enforced for end-of-life vessels.

**Conclusion**

Due to the ship recycling industries, large amount of non-degradable wastes are disposed into the sea, this may cause harm to the marine environment. The disposal of low level radioactive wastes, oil pollution from vessels, and the pollution from land based sources are the main threats to maintaining a healthy environment in the world. One of the recent development in the field of industrialization that the commencement of ship recycling industries. These industries are also one of the major causes for the marine pollution because huge amount of wastes are disposed into the sea this may adversely affecting the marine ecosystem. The ship recycling Industries are causing a major threat to the living and non living system existing in the coastal waters. The pollution generated from the ship recycling industries is regulated only by imposing strict rules and regulations regarding the disposal of wastes from the industries into the coastal waters. The Pakistani ship breaking sector is covered by international environmental and waste trade laws, first and foremost the Basel Convention. As a state party to the Convention, Pakistan has to ensure that its ship breaking yards practice the Environmentally Sound Management (ESM) of hazardous wastes as laid down in the Basel Convention and the Technical Guidelines. Moreover, the Hong Kong Convention prescribes the authorization of facilities, requirements for their operation as well as a ship recycling plan for every vessel. Pakistan can in order to maintain its competitiveness seek early compliance with the provisions under the Hong Kong Convention, which need to be combined with the already legally binding obligations under the Basel Convention. In order to comply with its legally-binding and future obligations such as the Hong Kong Convention and the EU Ship Recycling Regulation, the ship breaking industry in Pakistan needs to adopt more advanced methods, as practiced in other parts of the world.

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