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ABSTRACT

More than 80% of international trade in goods by volume is carried by sea. The shipping industry constitutes a key element in the infrastructure of the world's social metabolism. Ocean-going ships are owned and used for their trade by developed countries but are often demolished, together with their toxic materials, in developing countries. Ship breaking is the process of dismantling an obsolete vessel's structure for scrapping or disposal. The Alang–Sosiya yard (India), one of the world largest shipbreaking yards, is studied here with particular attention to toxic waste management. Ship owners and ship breakers obtain large profits dumping the environmental costs on workers, local farmers and fishers.

This unequal distribution of benefits and burdens, due to an international and national uneven distribution of power, has led to an ecological distribution conflict. The controversy at the Indian Supreme Court in 2006 over the dismantling of the ocean liner 'Blue Lady,' shows how the different languages of valuation expressed by different social groups clashed and how a language that expresses sustainability as monetary benefit at the national scale, dominated. Shipbreaking in the developing world is not just an externality but a successful case of cost shifting, or else, profit accumulation by contamination.

1. Introduction

Rich societies use large amounts of resources. Conflicts of resource extraction and waste disposal, such as the conflict over the excessive production of carbon dioxide, arise as a consequence of this. Rich societies generate large quantities of other kinds of waste, encountering opposition to local waste treatment and disposal sites, such as incinerators and landfills, (Pellow, 2007) and facing rising management costs (Pearson, 1987). This is the background of a rapidly changing and lucrative trade, global in nature, in which waste flows towards developing countries or poorer areas of developed countries (McKee, 1996). Under a world-system perspective, the core, through unequal power relations, manages to export entropy to distant sinks in the periphery (Scott Frey, 1998; Hornborg et al., 2007). These flows, legal or not (with mafias as important players), consist of urban and industrial waste, hazardous and non-hazardous waste, and waste intended for reuse, recycling and final disposal (Clapp, 1994; D'Alisa et al., 2010).

In the 1970s and 1980s scandals of toxic waste dumping in the South led to attempts to stem these flows, such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal of 1989. Yet, India, among others, has been increasingly used as a dumping ground for toxic industrial waste (like asbestos and mercury) from developed countries (Singh, 2001).

The issue of shipbreaking is examined here as an example of toxic waste trade (Alter, 1997). Shipbreaking is the process of dismantling an obsolete vessel's structure for scrapping or disposal. Conducted at pier or dry dock, or directly on the beach as in Alang–Sosiya, it includes a wide range of activities, from removing all machineries and equipment to cutting down the ship infrastructure. It is the destiny of ocean-going ships like oil tankers, bulk carriers, general cargo, container ships and others like passenger ships.

Depending on their interests, stakeholders will call it breaking, recycling, dismantling or scrapping (Stuer-Lauridsen et al., 2004). It is a challenging process, owing to the many problems of safety, health and environmental protection (OSHA, 2001).

The industry provides steel at cheap prices and employment, which contribute to economic growth. On the other hand there are concerns about the health and safety of workers, and the impact on the environment. These are the premises of the debate on whether shipbreaking in India falls under a WIMBY (Welcome Into My Backyard) logic or is a case of (environmental) injustice (Singh, 2001) and application of Lawrence Summers' Principle (Martínez-Alier, 2002). This article discusses the controversy under a framework of ecological economics and political ecology.

Changing social metabolism (meaning the flow of energy and material in the economy) (Fischer-Kowalski, 1998; Foster, 1999), driven by economic and population growth, generates growing quantities of waste. It is generally accepted that under a fair allocation of responsibility, developed countries should deal with their own

Abbreviations: ASSBY, Alang–Sosiya Ship Breaking Yard; DWT, Dead weight tonnage; GMB, Gujarat Maritime Board; GPCB, Gujarat Pollution Control Board; IMF, International Metalworkers' Federation; IMO, International Maritime Organization; LDT, Light Displacement Tons; OSHA, Occupational Safety and Health Administration.

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waste. Principles such as 'the polluter pays' and 'producer liability' appear to be legally settled. However cases in which countries from the North 'externalize the costs' of toxic waste disposal outside their own national borders (notably to the South) are not rare. According to the Lawrence Summers' Principle, Southern countries have an environmental 'comparative advantage' regarding waste treatment (Pearson, 1987). In an internal memo leaked to the press,[1] Lawrence Summers, then chief economist at the World Bank in 1991, wrote: "I think the economic logic behind dumping a load of toxic waste in the lowest-wage country is impeccable and we should face up to that." Pollution should be sent to places where there are no people, or where the people are poor, since "the measurements of the costs of health impairing pollution depend on the foregone earnings from increased morbidity and mortality. From this point of view a given amount of health impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages." The cost of internalizing the externalities would be the lowest.

The question is whether decisions on matters of life and death should be taken only on economic grounds. Poor people that meet "Lawrence Summers" criteria, often complain, as several studies from political ecology document (Martínez-Alier, 2002). Such ecological distribution conflicts express underlying valuation conflicts, actors deploying different languages to affirm their right to use a safe environment (Martinez-Alier, 2009).

This article investigates shipbreaking in India from the vantage point of political ecology, paying attention to the unequal distribution of benefits and burdens (already in the present generation) in a context of growing global social metabolism that leads to greater generation of waste, and with an analytical focus on the ways actors express alternative claims in the political arena and the valuation conflicts that hence emerge.

Section 2 describes the methods and the study region. Then Section 3 introduces the shipbreaking industry, describing the process through which a ship becomes waste for the ship owner, enters the scrapping market through a cash buyer and is finally dismantled by a ship breaker. Section 4 presents different options for the management of the ship's toxic waste and analyzes the socio-environmental impacts resulting from current practices. The conflict in the 'Blue Lady' case at the Supreme Court of India is analysed in Section 5 with particular attention to the valuation languages used by the different social groups. Finally, conclusions are drawn in Section 6.

2. Methods and Study Region

Data from interviews, official documents, direct and participant observation have been combined using the case study research methodology (Yin, 2003). Fieldwork was carried out from April to July 2009. The access of researchers to the industry site is strictly regulated and workers' freedom of expression is limited. Semi-structured or in-depth interviews with 64 respondents were conducted with local villagers (10), farmers (8), fishers (9), shipbreaking entrepreneurs (4), workers (11), political and administrative authorities (6), legal experts (4), academics (5) and activists (7). Interviewees were selected to represent a broad spectrum of interests and knowledge regarding shipbreaking, using both random and snowball sampling methods. Moreover focus groups have been led with farmers, fishers and workers. Interviews were conducted in English or with the help of local translators in Hindi and Gujarati. National and international documentation was researched with special focus on the 'Blue Lady' case at the Indian Supreme Court during 2006 and 2007 (Civil Writ Petition No. 657 of 1995). Official documents were examined under the guidance of the lawyer Sanjay Parikh and the petitioner Gopal Krishna. Media coverage on shipbreaking has been extensively examined on the web and at the Centre for Education and Documentation in Mumbai.

The case study is located in the Gulf of Cambay, Bhavnagar District of Gujarat State in the north-west of India (Fig. 1). Alang and Sosiya are the two local villages that give the name to the Ship Breaking Yard (ASSBY) (Fig. 2). The District, originally based on farming and fishing, is under rapid industrialization and urbanization. Gujarat State, historically a main center of trade and commerce, has one of the fastest growing economies in India.

3. The Shipbreaking Industry

3.1. The Shipping Industry[2]

The shipping industry constitutes a key infrastructure for the world's social metabolism as more than 80% of international trade in goods (both raw materials and manufactured goods) by volume is carried by sea.

Material flows resulting from international trade (direct import and export flows in terms of their weight) are part of physical accounting methods, such as Material Flow Analysis (MFA) (EUROSTAT, 2001; Vallejo, 2010), used to quantify "social metabolism" processes (Fischer-Kowalski, 1998). In 2007 developed countries accounted for 33.3% of goods loaded and 53.1% of goods unloaded in tons, while developing countries accounted for 63.2% and 46.2% respectively (transition economies for the rest). Some regions are characterized by a physical import surplus while others face a physical trade deficit. This supports the proposition of an unequal distribution of natural resources between different world regions (Giljum and Eisenmenger, 2004).

In the 15 years previous to 2008 'International seaborne trade' (goods loaded) increased faster than world GDP, highlighting the effects of changing production processes, consumption patterns and the deepening of economic integration (globalization). In 2007 this trade reached 8.2 billion tons, from 2.5 billion tons in 1970. Fig. 3 shows the historical evolution per type of cargo for selected years. As a direct consequence, the number and capacity of ships has significantly increased. In 1960, the world ocean-going fleet was composed by 15,000 ships (84 million of DWT[3]), while in 2008 it had reached 97,481 ships (1.12 billion of DWT). Fig. 4 shows the composition of the world fleet by principal types of vessel.

In 2007, developed countries controlled about 65.9% of the world DWT, developing countries 31.2% and economies in transition the remaining 2.9%. The five top ship owning economies (Greece, Japan, Germany, China and Norway) together controlled 54.2% of the world fleet. Fleet ownership, however, does not always reflect ship registration. Foreign flagged ships accounted in 2008 for 67% of the world total, most of them registered in the so called states of convenience (or open registers). The top five registries (Panama, Liberia, Greece, Bahamas and Marshall Islands) together accounted for 49.3% of the world's DWT. Fig. 5 shows ship entries at Alang–Sosiya Shipbreaking Yard (India) in 2004–2005 by shipowner's country: 82.5% of them used a flag of convenience. Flags of convenience, together with fiscal havens, shell companies and cash buyers, allow under-invoicing (resulting in evasion of import tax and money laundering) and facilitate ship owner's access to the shipbreaking market.

This increase in the size of the world fleet does not immediately lead to a general increase in the supply of ships for scrap (Fig. 6). Ship owners evaluate the expected future earning potential and the

[1] "Let them eat pollution." *The Economist*, 8 February 1992.

[2] If not diversely specified, data for this section comes from Review of Maritime Transport (UNCTAD, 2007). All presented data refers to vessels of 100 gross tons (GT) and above.

[3] DWT: deadweight tons is a measure of how much weight a ship is carrying or can safely carry.

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Fig. 1. Location map of Alang–Sosiya in the State of Gujarat (India).

expected cost of keeping the ship in operation against the revenue obtained when the vessel is sold for scrap. This mainly depends on the price of steel. Potential earnings are more important in the decision than the scrapping price. The 2008–2009 economic crisis resulted in a boom of shipbreaking because of excess shipping capacity (Fig. 7), with ship owners associations planning to eliminate 25% of the world fleet. In fact, if in 2006 demolitions were equivalent to only 0.6% of the existing fleet (293 vessels), the economic crisis reversed the situation (288 vessels in 2007, 456 in 2008, 1.006 in 2009). The excess supply was reflected in the spectacular fall in the Baltic Dry Index that measures the rates charged for chartering dry bulk cargoes.

Companies look to sell their ships for demolition at the best price. South Asian yards are main destinations. In 2009 of 1.006 vessels (8.2 million tons), 435 were demolished in India (43%), 214 in Bangladesh (21%), 173 in China (17%), 87 in Pakistan (9%), 42 in Turkey (4%).[4] ASSBY in India and Chittagong in Bangladesh are the world's biggest yards; China might soon take the lead.

3.2. History of an Industry

Shipbreaking first developed in the USA, UK and Japan during WWII because there were many ships damaged by war, and an urgent demand for steel. In the 1960s it moved to less industrialized European countries such as Spain, Italy and Turkey. In the 1970s it left Europe and established itself in Asia, first in Taiwan and South Korea, and then during the 1980s, in China, Bangladesh, India, Pakistan, Philippines and Vietnam. South Asian countries, have benefited from favorable natural characteristics (high tidal ranges, gentle sloping and rocky bottom beaches) which allow the vessels to be beached, turning a highly mechanized industry into a labour intensive one.

3.3. From the Ship Owner to the Ship Breaker Through Cash Buyers

Ship owners sell their ships through brokers operating in London, Dubai, Singapore and Hamburg. All ships are sold per ton (LDT[5]) at a price ranging from 100 to 400 dollars, depending on the ship type and on the market. In the last ten years 'cash buyers' have emerged as important intermediaries officially to assure fulfillment of the contract. They differ from traditional ship brokers because they acquire ship ownership, becoming themselves ship owners (although only for a limited period pending its sale or during the handing over of the ship to a recycling facility). Original (last operational) ship owners get lower prices, but this system allows them to bypass liabilities and regulations.

3.4. ASSBY: Alang–Sosiya Shipbreaking Yard

The first ship, called 'Kota Tenjong,' was beached in Alang on the 13th of February 1983. Alang–Sosiya Ship Breaking Yard (ASSBY), which occupies 10 Km of coastline, became in the 1990s the world largest shipbreaking yard. In 2007 India accounted for 41% of the world's recycling capacity, 90% of it taking place in ASSBY (Table 1).

3.5. Shipbreaking Process

Once a ship arrives in the Gulf of Cambay it is inspected and checked by the competent authorities which issue (occasionally with corruption) the relevant certificates. The ship is then beached by its own propulsion power at high tide and during low tide is laid down stable on its flat bottom. At this point cutters and their helpers, using simple LPG gas and oxygen torches, can start taking apart the vessel structure. All operations take place directly on the beach in a relatively small and congested area called a plot. Machinery and heavy equipment (engines, compressors, generators, boilers), together with other dismantled components (navigation equipment, life saving

[4] Robin de Bois, Information Bulletins on Ship Demolition: #17, September 2009; #18, January 2010. www.robindesbois.org.

[5] LDT (Light Displacement Tonnage) is the mass of the ship excluding cargo, fuel, ballast water, stores, passengers and crew.

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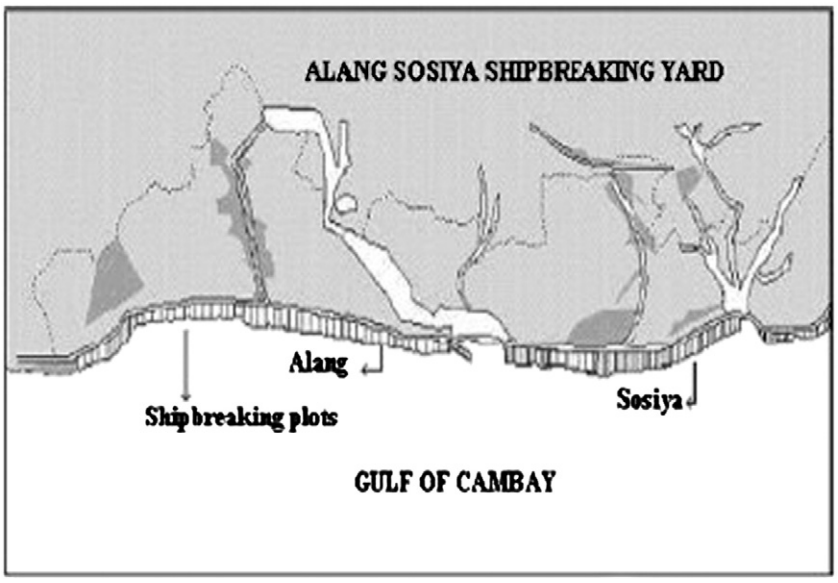

Fig. 2. Map showing shipbreaking plots at Alang and Sosiya.

equipment, furniture, electrical cables, utensils, etc) are sold to traders for reuse.

These operations do not require investment in infrastructure or technology, as they are labour intensive and moving cranes and motorized winches are reused from the same ships. Depending on their size and type, scrapped ships have an unloaded weight of between 5000 and 40,000 tons, with an average composition as shown in Table 2. It requires from 3 to 6 months for an average ship (15,000 tons) to be dismantled with a variable number of workers involved at different stages (from 150 to 300).

The industry requires relatively low fixed capital (plot lease, machinery and equipment) and high working capital. The cost of the vessel itself corresponds to more than 50% of the total cost. Interests on investment, duties (customs, excise, value added tax — VAT, etc.) and port charges represent the second important item. Labour and energy (torch oxygen and fuel) constitute each between 3 and 6% of the total expenditure (Upadhyay, 2002; Dubey, 2005). Environmental, safety and health insurance costs do not appear in the accounting.

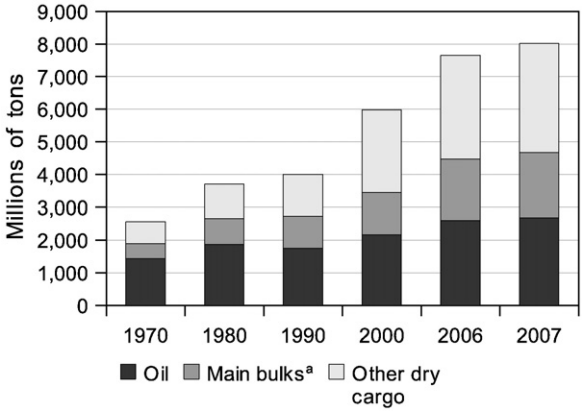

Fig. 3. Development of International seaborne trade, selected years (millions of tons loaded). [a]Iron ore, grain, coal, bauxite/aluminia and phosphate.
UNCTAD, Review of Maritime Transport, various issues.

4. Hazardous Waste and Socio-environmental Impacts

4.1. Hazardous Waste Generation and Management

Ships contain (in-built and on board) hazardous and non-hazardous substances, significant both in quantity and toxicity, which cannot (or should not) be totally reused or recycled. The waste output of the process represents between 0.5 to 10% of the ship's total weight. Composition is diverse, mainly constituted by scrap wood, plastic, paper, rubber, glass wool, thermocol, sponge, PVC pipes, oil, metals, heavy metals, paints, cement, asbestos and radioactive waste. Independent and reliable statistics on quantity and composition are not available, while estimates are difficult because there are many different types of ships, which vary considerably in their structure (Reddy et al., 2005a,b).

The controversy over shipbreaking mainly concerns the disposal of hazardous waste. There are three methods of disposal:

1 Decontamination prior to export
Decontamination is the process of removing hazardous materials contained in the ship structure (partially or totally), normally without endangering sea-worthiness. This must be done by ship owners. It is a costly operation that requires expertise and technology. A totally decontaminated ship would not fall under the Basel Convention.

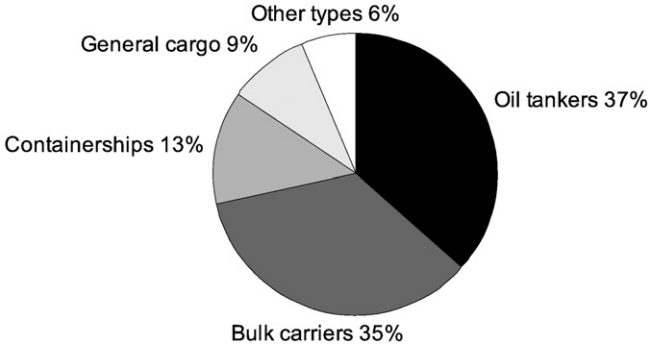

Fig. 4. World fleet by principal types of vessel, 2008. Note: vessels of 100 GT and above.
UNCTAD (United Nations Conference on Trade and Development), 2007.

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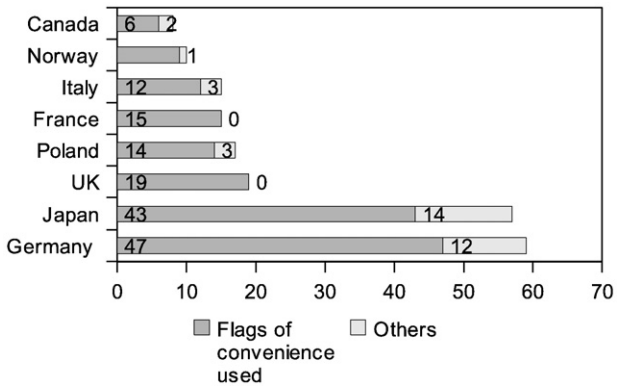

Fig. 5. Ship entries at Alang–Sosiya Shipbreaking Yard (India), 2004–2005. GMB (Gujarat Maritime Board; www.gmbports.org).

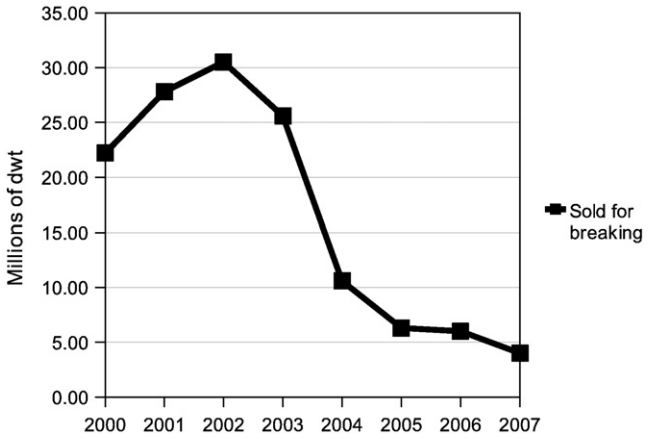

Fig. 6. Tonnage reported sold for breaking at the world level, 2000–2007 (millions of DWT).
UNCTAD (United Nations Conference on Trade and Development), 2007.

2 Environmental sound management on site
Hazardous materials are safely removed and then properly disposed once the ship has been beached. This is the option recommended by the International Convention for the Safe and Environmentally Sound Recycling of Ships adopted in May 2009 by the IMO (International Maritime Organization).
3 Dumping
Hazardous materials are freely released into the environment.

ASSBY, since the beginning, has used the third method (HPC, 2003; Reddy et al., 2003, 2005a,b). Waste, hazardous or not, has generally been directly released into the sea from the ship or the plot, burnt on the plot or dumped during the night in surrounding villages. Some has been transported and dumped in areas (like the surroundings of the city of Surat in the Golden Corridor) where other industries undertake similar actions so that it is impossible to identify the source and enforce any liability.

4.2. Pollutants Discharged

Scrapping activity discharges a number of liquid, gaseous and solid pollutants which are hazardous for the environment and human beings (Islam and Hossain, 1986; Zhijie, 1988; Hossain and Islam, 2006). Most common are oil, bacteria, asbestos, heavy metals[6] and persistent organic pollutants.[7]

4.3. Socio-environmental Impacts

4.3.1. Environmental Impacts

In ASSBY waste materials accumulate over the soil and then ramify incrementally to seawaters in a stepwise manner through tidal and sub-tidal zones, deep sea and their respective sediments. This has led to a deterioration of physico-chemical properties of seawater and intertidal sediments. COD (Chemical Oxygen Demand) and BOD (Biological Oxygen Demand), used as indicators of water quality (organic degradation and tension in the system), are present at high levels. Shipbreaking activity has substantially affected the ecosystem at Alang–Sosiya (GEC, 1997; Tewari et al., 2001; Reddy et al., 2003; Reddy et al., 2004a,b, 2005a,b). System stress has led to a decline in biotic structure: a decrease in biomass, abundance and species diversity has been measured. Pollutants mix with suspended solid and migrate long distances, carried by high currents (Bhatt, 2004). They have been found, to a lesser extent, together with floating objects and oil, all along the 100 Km of coastline on the East and West side of Alang (Pathak, 1997; Mehta, 1997). The exact spatial dispersion of contaminants remains unknown as all selected control sites (10, 30 or 50 Km away from Alang) have always resulted affected by pollution (Dholakia, 1997).

The intertidal zone around ASSBY has practically no vegetation. Mangroves disappeared many years ago, soon after the industry began. The sea off ASSBY has very poor biological production potential with very low phytoplankton pigment concentration, low zooplankton standing stock, very poor macrobenthic standing stock and low numerical abundance of fish eggs and larvae (Soni, 1997; Majumdar, 1997). Exotic species might have been carried in with ballast water, which represents a serious biological risk. The population and diversity of fish have decreased and species tolerant to petroleum hydrocarbons seem to have adapted better to the environmental stress (Mandal, 2004). The absence of sanitation facilities for the workers has led to the presence of pathogenic and non-pathogenic bacteria (fecal and non-fecal coliforms, salmonella, clostridium, staphylococcus) in the water of the ASSBY area (surface and underground) rendering it unsafe for human consumption while marine coastal water has become harmful for fish population and unsuitable for recreation (Desai and Vyas, 1997; Trivedi, 1997; MECON, 1997).

There is a lack of studies into the potential impacts on local terrestrial ecosystems. GPCB (Gujarat Pollution Control Board), a local government agency, claims to keep a complete monitoring, but it has not made data available.

For a comprehensive environmental impact assessment one should go beyond local impacts and analyze the complete material recycling chain (ancillary industries). The furnace emissions of re-rolling mills are rendered toxic by the presence of volatile organic matter of marine paints and anti-fouling paints (such as lead, arsenic and pesticides) which has resulted in acid rain during the monsoon season (Bhatt, 2004).

The 1997 Report by the Gujarat Ecology Commission 'Ecological Restoration and Planning for Alang–Sosiya' (GEC, 1997) remains the most comprehensive study to date. None of its suggestions have been followed, so that the assessment maintains its validity as confirmed by more recent studies of the 'Central Salt & Marine Chemicals Research Institute' (Tewari et al., 2001; Reddy et al., 2003, 2004a,b, 2005a,b; Mandal, 2004).

4.3.2. Impacts on Workers

Workers in ASSBY, mainly seasonal migrants from the poorer states of India (Orissa, Bihar, Uttar Pradesh, Jharkhand), live and work in pitiable conditions (FIDH, 2002; IMF, 2006). They migrate as a survival strategy because with their previous jobs (at $1 per day) and

[6] Mercury (Hg), Lead (Pb), Arsenic (As), Chromium (Cr), Copper (Cu), Manganese (Mn), Zinc (Zn) and Nickel (Ni).
[7] Polychlorinated Biphenyl Compounds (PCBs), Dioxins, Polyvinyl Chloride (PVC), Polycyclic Aromatic Hydrocarbons (PAHs) and Organotins (Monobutyltin — MBT, Dibutyltin — DBT, Tributyltin — TBT, etc.).

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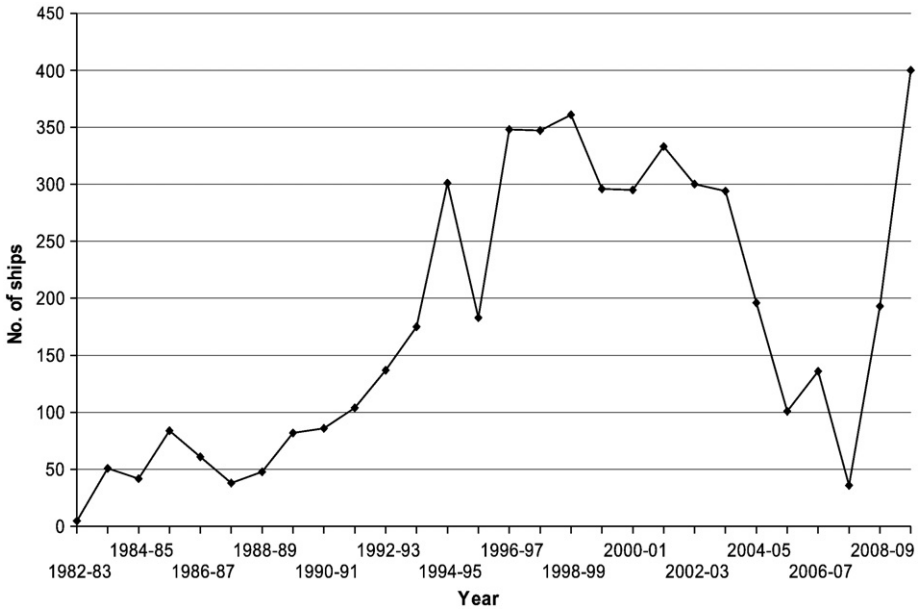

Fig. 7. Number of ships broken per year at ASSBY.
GMB (Gujarat Maritime Board; www.gmbports.org).

small farms they are unable to maintain their families. Their number varies from 5000 to 50,000. They work under contractors, on a daily basis and with no contract or rights. They work 12 h per day, six days per week. During the field work in Spring 2009, their daily salaries ranged from a minimum of 150 Rs (3 USD$) for helpers and loaders to a maximum of 375 Rs (7 USD$) for experienced cutters. They live, without their families, in shared shanties, locally called Kholi, close to the yard with no running water, electricity or sanitation. They are continuously exposed to pollutants, from the air they breathe, the water they drink and the fish that they eat. Notably their jobs present a number of hazards. Frequent accidents find their causes in fire and explosion, falling objects, trapping or compression, snapping of cables, falls from heights, and lack of personal protective equipment, housekeeping standards, and safety signs (ILO, 2004). In case of injury or death, they are rarely compensated (Rousmaniere and Raj, 2007). Local fishers report that severely injured workers are sometimes dumped at sea and left to drown.

The Final Report of the Technical Experts Committee, presented in 2006 to the Indian Supreme Court, offers an insight of the hazards faced by these workers. With regard to accidents, the Final Report notes that "the average annual incidence of fatal accidents in the ship breaking industry is 2.0 per 1000 workers while the all India incidence of fatal accidents during the same period in the mining industry, which is considered to be the most accident-prone industry, is 0.34 per 1000 workers." This is based on official data from 1995 to 2005 (roughly 40 traumatic work fatalities per year). It would be methodologically more accurate to correlate the number of fatal accidents to the number of dismantled ships, as workers do when they say 'one ship, one death.' Others say, 'one per day.'

With regard to pollutants, the Final Report cites the "Medical Examination of the Asbestos Handlers" by a team from the National Institute of Occupational Health (NIOH) which concludes, "The X ray examination by NIOH showed linear shadows on chest X rays of 15 (16%) of 94 workers occupationally exposed to asbestos. These are

Table 1
Number and LDT (Light Displacement Tonnage) of ships broken at ASSBY [a] LDT (Light Displacement Tonnage) is the mass of the ship excluding cargo, fuel, ballast water, stores, passengers and crew.
GMB (Gujarat Maritime Board; www.gmbports.org).

Year	No. of ships	LDT
1982–1983	5	24.716
1983–1984	51	259.387
1984–1985	42	228.237
1985–1986	84	516.602
1986–1987	61	359.139
1987–1988	38	244.776
1988–1989	48	253.991
1989–1990	82	451.243
1990–1991	86	577.124
1991–1992	104	563.568
1992–1993	137	942.601
1993–1994	175	1.256.077
1994–1995	301	2.173.249
1995–1996	183	1.252.809
1996–1997	348	2.635.830
1997–1998	347	2.452.019
1998–1999	361	3.037.882
1999–2000	296	2.752.414
2000–2001	295	1.934.825
2001–2002	333	2.727.223
2002–2003	300	2.424.522
2003–2004	294	1.986.121
2004–2005	196	938.975
2005–2006	101	480.405
2006–2007	136	760.800
2007–2008	36	643.437
2008–2009	193	–
2009–2010(estimated)	400	–
Total	5033	31.877.972

Table 2
Average components (both in Weight and Value) obtained by a demolished ship. Interviews with ship breakers; Upadhyay, 2002.

	Weight (%)	Value (%)
Re-rollable ferrous scrap and iron plates	75–85	65
Re-conditioned machinery	10–15	25
Re-melting scrap	3	2
Non-ferrous metal	1	7
Furnace oil and oils	2	0.50
Wooden and furniture	2	0.50
Burning, cutting losses and waste	5–10	0
	100	100

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consistent with asbestosis…" There are no medical records on the short and long term effects of the workers' exposure to contaminants.

4.3.3. Impacts on Fishing Communities

The South Saurashtra coastal area has always been well known for fisheries of Bombay Ducks (Harpodon neherius), Hilsa, Prawns and other species. Fish catch in the gulf of Khambat is found to be rich on the western side over 100 Km away. Data for fish catch for 1991 and 1995 are indicative. Table 3 shows the fish landing situation at Gogha, Bhavnagar Lockgate and Katpar. Gogha and Bhavnagar Lockgate are on the East side of ASSBY about 50 Km away. Katpar is on the West side of ASSBY again 50 Km away. From the data available for the commercially important fishes, a definite fall can be observed in the fish catch, apart from disappearance of certain species.

In the same area there are about 2500 fishers living in small communities on the beach and in villages (from East to West: Gogha, Mithi Virdi, Sosiya, Alang, Talaja, Sartampar, Gopnath — Gadhula, Mahuva — Katpar). Fishing activity constitutes the main source of livelihood for about 10,000 people. Apart from Gogha where the majority is Muslim, they all belong to the Koli community. Kolis belongs to the Scheduled Tribes (ST), that (together with the Scheduled Castes, SC) are unprivileged population groups explicitly recognized by the Constitution of India.

Fishers report that, since shipbreaking began, the quantity, variety and size of fish has decreased, the flavour has changed, and a number of species have disappeared. Others like mudskippers (an amphibious fish with a special air breathing system) have better adapted, but are normally less commercially valuable (apart from being contaminated). Fishers report not to have noticed any damage to their own health due to pollution. However a number of pollutants can bio-accumulate and enter the food chain. Heavy metals bioconcentrated in the fish have been found to be many times higher than the maximum prescribed (Mehta, 1997). These highly toxic fish are not suitable for human consumption. However they are locally caught, consumed (mainly by fishers and shipbreaking workers) and go in dried or fresh form all over India and abroad. Fish can swim long distances and be caught elsewhere. High levels of butyltin, a POP, have been found in fish for consumption in the entire Asian–Pacific region. Shipbreaking, along with sewage disposal and anti-fouling paints, is considered the main source of this (Kannan et al., 1995).

There is no simple solution for fishers. They cannot easily fish elsewhere for a better quality of catch: the area of pollution is very wide, and fishers are not readily mobile. They are also constrained by legal restrictions on where they may fish. In consequence, the quality of life of all the community has worsened significantly. The most vulnerable have to work as unskilled labourers while others have emigrated in search of better opportunities. This picture is very similar to the one of Chittagong (Bangladesh), the second world largest shipbreaking yard: "As the commercially important species are replaced by low priced species and scarcity of fish, many coastal fishers are leaving their hereditary profession and moving around everyday as environmental refugees in a state of under employment and poverty to unemployment and grim poverty" (Hossain and Islam, 2006).

Table 3
Fish landing in Kg for some species at different centres near ASSBY. Dholakia, 1997.

Name of fish	Ghogha		Katpar		Bhavnagar Lockgate	
	1991	1995	1991	1995	1991	1995
Bombay Duck	102,069	93,862	116,865	46,129	74,792	32,596
Hilsa	7020	Nil	31,762	15,860	–	–
Culpid	1860	Nil	22,905	23,390	–	–
Mullet	44,308	24,809	112,695	12,776	–	5689
Catfish	21,715	–	13,950	2250	Nil	–
Colmi (shrimp)	175,250	909,151	30,015	48,072	20,240	62,004
Medium prawn	704,179	408,121	108,534	18,690	78,180	27,831
Jumbo prawn	214,314	80,400	30,225	Nil	–	–
Lobster	87,141	21,199	1500	2769	3162	110,639
Colia	–	–	3348	–	–	–
Dhoma	–	–	11,487	3565	–	–
Other fish	420,538	186,427	106,951	27,854	34,056	–

4.3.4. Impacts on Villagers

The ten villages in a radius of 12 Km (Alang, Sosiya, Manar, Sathara, Kathwa, Bharapara, Mathavada, Takhatgadh, Jasapara, Madva) have experienced great economic and social changes because of shipbreaking (UNESCO, 2001). Previously working mainly in agriculture, after the arrival of ASSBY they could find new employment and business opportunities (often in accordance to their caste) in transportation, trade and retail (Chaudhari, 1999).

Some of the environmental impacts are of concern for the villagers. Those living close to the operation yards are affected by noise pollution. More generally people complain to Sarpanches (heads of villages) and local authorities about the dumping of waste from the dismantled boats as there are hundreds of dumping sites in all the surroundings. Preferred sites are waste lands, traditionally used for grazing, but also farming fields; people report that oxen and cattle have died because of eating waste. Villagers report respiratory and skin problems particularly when the waste is set on fire. Most of the villages along the coastline in this region suffer from water scarcity and salinity. The industry has worsened the problem inducing overexploitation of water reserves (through population growth and workers immigration) leading to a decrease in groundwater level. Apart from the deterioration of agriculture and animal husbandry, villagers report kidney diseases that are related to both salinity and pollutants. A number of wells are so polluted that they have been abandoned. Modern and traditional forms of agriculture co-exist — for respectively large and small farms — growing mangos, chikos, coconuts and onions. Since the industry has settled, land and labour prices have increased locally. On the other hand quantity and size of crops have decreased, and the flavour has changed.

4.4. Emergence of a Conflict: From Material Origins to Cultural Discourses

If this was the end of the story, it would simply confirm the Lawrence Summers' Principle. Instead the next section shows the emergence of a conflict where disputes about values are vocalized. The conflict has material origins that are then shaped by cultural discourses. As discussed in social movement theory, diagnosing a problem (such as shipbreaking) turns out to be a very contentious process, where the different actors try to affirm and impose their interpretative frame to the detriment of representations proposed by the others (Snow et al., 1986). The construction of reality is inextricably linked to asymmetries of power (Della Porta and Diani, 2006).

5. Looking Closer at the Ecological Distribution Conflict: The 'Blue Lady' Case at the Supreme Court (2006–2007)

5.1. Three Spatial Scales for the Conflict: International, National and Local

In the late 1990s, the Alang and Sosiya landscape attracted worldwide interest in terms of its aesthetics as an industrial and social inferno. Although environmental and labour groups started structuring their complaints, its socio-environmental aspects are still neglected.

The conflict has developed at three different scales (international, national and local) with environmentalists playing a major role,

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accompanied by trade unions and human rights groups, together with industrial lobbies, the Gujarat and Indian governments, and as so often in India, the judiciary.

At the international level, environmental NGOs, including Greenpeace and BAN (Basel Action Network), carried out campaigns to raise public awareness in developed countries and lobby for the implementation of regulations (notably the Basel Convention). In 2005 the 'Platform on Shipbreaking' (www.shipbreakingplatform.org) was created as an International Network of environmental, human and labour rights organizations to challenge the global shipping industry.

In India, environmental NGOs (like Toxic Links, Corporate Accountability Desk, Human Rights Law Network) and independent activists (like the researcher Gopal Krishna, the activist Madhumitta Dutta, the lawyers Bushan Oza and Colin Gonsalves) engaged in judicial activism and fight to this day on the Civil Written Petition on Hazardous Waste Management first filed in 1995 to the Supreme Court by the 'Research Foundation for Science, Technology and Natural Resources policy.'

At the local level the conflict has remained latent. Seasonal workers are vulnerable because of their precarious social and economic condition and so can be easily kept under pressure and domination. A local trade union (Alang Sosiya Ship Recycling and General Workers' Association), with limited power, exists, accepted since 2005 by ship breakers to negotiate wages. Workers report the use of violence (by the local police) against sporadic attempts of strikes over dispute about salary, safety, working and living conditions. Villagers have expressed oral complaints to authorities, normally through the heads of villages. Some attempts of frame bridging (Snow et al., 1986) are being undertaken by national activists between villagers (environmental issues) and workers (working and living conditions). The alliance could potentially be strong, especially in case a common organizational base can be built. Shipbreakers actively oppose the process with threats and a 'divide et impera' strategy.

Media coverage of the human and environmental conditions at ASSBY obliged competent Indian authorities and International Organizations (UNEP, ILO and IMO) to react. Both attempted to assess the main issues at stake, tackling them with detailed policy-making initiatives (mostly technical guidelines) and more effective implementation (Basel Convention, 2002; IMO, 2003; ILO, 2004). The proposed practices (i.e. technology to improve labour safety and environmental protection) are similar to the ones used in developed countries. The industry left those shores to avoid the rules. Technically correct, but politically naive, none of them has been enforced.

Instead, in order to understand the situation, the case of the 'Blue Lady' at the Supreme Court of India is presented hereafter. This is not the most famous one (this would be the Clemenceau in 2006) but it illustrates the issues at stake, the decision making process and the valuation languages deployed at different scales by different actors of the conflicts over this type of waste disposal.

5.2. History of the 'Blue Lady' Last Voyage

SS France was built in 1960 by the French Line and was at that time the longest passenger ship ever built. It had a mass of 45,000 tons, was 316 m long and 34 m wide, and had 16 floors and 1400 rooms.

In 1979 it was sold to Norwegian Cruise Line (the mother company Star Cruise Ltd — SCL), renamed SS Norway and transformed into the world's most glamorous cruise ship. Seriously damaged in 2003 by a boiler explosion in Miami, it was towed to Germany where repairs were planned. A feasibility study, in 2004, estimated that to decontaminate part of the in-built asbestos would cost 17 million - Euros. In 2005 the ship left Germany, its official destination being Singapore, for reuse. The ship owner intentions were to discard the ship, and therefore the SS Norway became 'waste' under the EU Waste Shipment Regulations. Moreover, since it contained hazardous substances, it could have been considered hazardous waste for the purpose of the Basel Convention. Under Article 9 and Basel Ban Amendment, the export of ships from OECD countries to non-OECD countries, should be conceived as illegal traffic (Moen, 2008). The ship arrived in Malaysia and was planned to be scraped in Bangladesh. However, due to protest by BELA (Bangladesh environmental lawyers association) the sale was declared invalid. In 2006 SS Norway left Dubai the authorities being informed that it was going for repairs, as in reality it was sailing towards Alang, to be dismantled.

In June 2006 the mother company Star Cruise (Malaysia) sold it through Norwegian Cruise Line (Bermuda) to the Liberian (shell) company Bridgeed Shipping for, officially, $10 (as indicated in the Bill of sale for Bahamian ships). Bridgeed sold it, after 1 month, to the Indian shipbreaking company Hariyana Steel Demolition Pvt. Ltd. The ownership was then transferred again to another shipbreaking company, Priya Blue Industries Pvt. Ltd. The ship, finally renamed Blue Lady, apart from the common practice of under-invoicing, had a real price of about 15 million dollars.

On May 2006, the ship was initially prevented from entering Indian waters by an application of the activist Gopal Krishna to the Supreme Court of India. On humanitarian grounds, because of the monsoon, the ship was allowed, on June 2006, to anchor at Pipavav port near Alang. It was finally beached (without permission) on the 3rd of August 2006 and allowed to be dismantled by the Final Court Order of the 11th September 2007.

5.3. The Case in the Supreme Court: Arguments and Languages of Valuation

The analysis of a judicial case, such as the 'Blue Lady' one, offers an insight into the framing conflict, meaning the struggle over reality construction. Different actors participated in the 'politics of signification' (Hall, 1982). There were environmentalists, villagers, shipbreakers and the Indian authorities. Actors involved are signifying agents engaged in the production of alternative and contentious meanings (Benford and Snow, 2000). They undertook two core framing tasks: diagnostic and prognostic. The first concerns the definition of what the problem is and who is responsible; the second regards the proposed solutions. In particular, this section analyses the different attitudes expressed by these actors to the three methods of waste management, and the different valuation languages they used to frame the issue.

5.3.1. Environmentalists

Indian environmentalists, in alliance with international organizations, challenged shipbreaking according to languages of justice, economics and legality. Using a justice discourse and invoking the Basel Convention they described it as an 'illegal export of toxic waste' from rich to poor countries highlighting impacts on the environment, and the health and livelihood of workers and local communities. "Blue Lady" was a case of 'toxic imperialism,' Gopal Krishna argued. The practice is perceived as environmental injustice or environmental racism on a global scale (Lipman, 1998) and a human rights violation. Orthodox economic language (such as 'internalising externalities' or 'polluter pays principle') was also strategically adopted by Greenpeace, BAN and the Shipbreaking Platform. While they are conscious of the pitfalls of economic values, the polluter pays principle offered a suitable language to link questions of economics with questions of justice. Finally, the last language used was one of compliance with the rule of law. Indian activists often claimed that existing legislation had been violated. Gopal Krishna, in his application, called for respect for the 2003 Supreme Court Order including prior informed consent, inventory of hazardous waste mandatory for ship owner, decontamination by the ship owner prior to export, proper removal and waste management (with special attention to asbestos) and transparent pollution monitoring by GPCB. He pointed that the Blue Lady carried 1250 tons of asbestos, the import of which is banned under the Basel Convention and Indian Hazardous Waste (management and

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handling) Rules, 2003. Lastly, he claimed that ILO standards on occupational and environmental health hazards had not been respected.

5.3.2. Ship Breakers

The position of ship breaking companies has always been articulated by Mr. Nagarsheth, historical president of the Iron Steel Scrap and Shipbreakers Association of India (ISCSAI). The argument was basically made on economic values, though also environmental values were employed.

In their Application on February 2006 (IA 25) they highlighted ASSBY's contributions to the economy claiming that more than 100,000 people were in direct and indirect employment, up to 2.5 million tons of good quality and cheap steel (approximately 5% of the domestic demand) had been returned to market, and that 20 billion of Rs (400 million USD$) had been raised by the authorities in the form of customs duties, income and sales taxes.

Mr. Nagarsheth presented shipbreaking as an environmentally friendly activity because, by recycling the materials, it saves non-renewable resources (such as iron ore and the energy needed to produce primary steel). In contrast to other methods of manufacture, especially steel manufacturing, it does not produce solid waste. This position is apparently supported by the IMO (International Maritime Organization) which has declared shipbreaking a Green industry.

Mr. Nagarsheth claimed that occupational hazard is the issue, and not the environmental impacts as publicized by media and activists. The recognized hazard could be met by resorting to new technologies. In fact Mr. Nagarsheth declared to be committed to proper waste management without causing any harm or damage to human life or to the environment. Finally he refused to see ships as hazardous waste, so that national and international legislation for the transport of hazardous waste would not apply.

What is interesting here is that while business interests employ the same languages (economic, environmental, distributive) as the environmental groups, they frame very different and at very different scales the issues, to come to very different evaluative conclusions.

5.3.3. Indian Authorities

The ministry of Environment and Forestry (MOEF) together with three other ministries (steel, shipping and labour) are in charge of the policy-making on shipbreaking; GMB (Gujarat Maritime Board) and GPCB (Gujarat Pollution Control Board) deal with the local implementation of rules and regulations. Their valuation premises and positions were very close to those of ship owners and ship breakers, emphasizing public benefits in terms of economic and environmental values at the national scale. According to the authorities, ships are not waste, hazardous substances are managed in an environmentally sound manner and workers safety is under control. Since there was never any pollution, no remediation is necessary.

The Menon Committee (HPC), constituted by the Supreme Court in 1997, presented a Report (background to the 2003 Court Order) that represents the sole governmental admission of severe pollution and inhuman conditions of the workers.

In the 'Blue Lady' case, MOEF was in charge of the Technical Experts Committee (TEC) on Management of Hazardous Wastes that the Supreme Court had established on March 2006, to investigate environmental protection, workers` safety and health. Committee ship-inspections, such as the routine ones by GPCB, are visual, because in ASBBY there are no proper laboratory testing facilities. Gopal Krishna proved the conclusions of these inspections to be wrong. The Committee had declared that "presence of radioactive materials in a passenger ship like the 'Blue Lady' is quite unlikely." In fact, it contained 5500 fire detection points containing 1100 radioactive elements in the form of Americium-241.

5.3.4. Villagers

On March 2007, Mr. Bhagavatsinh Halubha Gohil, Sarpanch of Sosiya (head of the village), filed an application on behalf of 12 sarpanches and 30,000 people who live within a distance of 1 to 25 Km from the shipbreaking yard. The applicants were opposing the dismantling of the ship because of the damage it would do to the health of workers and villagers and the environment (the soil, sea food, water, air, flora and fauna) on which the livelihood of the people depend (the majority of the population consist of farmers and fishers).

They acknowledged that the "scrapping of the ship was vigorously opposed by environmental groups in India, as the Indian breakers did not have the facility or technology to safely dispose off the estimated 1000 tons of asbestos." Three main reasons prompted them to take legal action. Firstly, they presented a study that they had commissioned to a consultancy about the potential health dangers due to cancerogenic effects of the airborne dispersion of the asbestos fibres contained in the ship. Secondly, they mentioned how open dumping of waste into the sea had affected fishers forcing them out into the sea beyond five or six kilometres because of the oil that spreads over the water, ruining fishing. Thirdly, they explained how in the past 15 to 20 years farmers had been noticing that the yield of their crops was diminishing. Even though its cause had not been easy to pinpoint, they had come to the conclusion that this was related to air, water and soil contamination brought on by the work at ASBBY.

The villagers requested their inclusion in the Civil Writ Petition No. 657 of 1995[8] (a public interest petition on the question of hazardous waste import), that the Blue Lady not be allowed to be dismantled at ASSBY and asked for social and environmental justice.

Notably, in an interview for the Indian magazine *Frontline*, Mr. Gohil, promoter of the petition and Sarpanch of Sosiya, clarified their intentions declaring: "we don't want to stop shipbreaking because that would mean loss of jobs for hundreds of people. All we are asking is that it should be done in a responsible manner and our lives and earnings are not affected."[9]

Witnesses report that a Judge snubbed the petition and the validity of the knowledge of the local people commenting "What do these people know about asbestos?."

5.4. The Final Court Order on 'Blue Lady'

The final Court Order was passed the 11th of September 2007. The villagers' petition was never taken into consideration. The Court considered whether permission should be granted for dismantling of the ship "Blue Lady" at Alang, Gujarat.

The Court mentioned that the vessel Blue Lady would give employment to 700 workmen, provide the country with 41,000 tons of steel and reduce pressure on mining activity elsewhere. So that, in the framework of sustainable development (recognizing recycling as a key element), the precautionary and polluter pays principles (said to be accepted and settled in Indian Law) should be considered together with the concept of balance (between economic development and environment) under the principle of proportionality (declared to be important in an emergent economy).

These considerations, together with the technical and scientific suggestions by the Technical Expert Committee (TEC), supported the conclusion that: "It cannot be disputed that no development is possible without some adverse effect on the ecology and the 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

[8] Available at http://www.elaw.org/node/1400.
[9] Shipload of trouble, Lyla Bavadam, Frontline, 16 Nov 2007.

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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."

The intention, as declared by the Court, was to balance the priorities of development (generation of revenue, employment and public interest) on one hand and environmental protection on the other. Under a general admission that activity needed to be strictly and properly regulated, the breaking of the Blue Lady was allowed. No quantification of costs and benefits was asked for by the Supreme Court, and neither was a multi-criteria evaluation carried out.

6. Conclusion

Economic development, through economic growth and globalization, has considerably increased the magnitude of the global social metabolism. The shipping industry represents the key infrastructure through which material flows travel around the world. The increase in physical trade flows leads to a proportional increase in the shipping capacity (the number and size of ships), which leads — sooner or later — to an increase in the supply of ships for scrap.

This article investigated shipbreaking in India's greatest yard, ASSBY, contextualing it within the world's social metabolism and analysing the social, economic and institutional logics at play. At the Supreme Court of India competing value frameworks, languages of valuation and truth claims came at clash. Environmental and civil activists as well as business interests and public authorities framed the issue as one of economic, environmental and equity values. The former emphasized the injustice of an unequal distribution of costs and benefits and the disproportionate environmental and social damages at the local scale, considering local livelihood and ecosystem losses as incommensurable with benefits at other scales. The latter instead valued monetary and environmental benefits at the national scale, assuming them commensurable with local losses, and finding a positive balance. Facts apart, different languages of valuation clashed and the Supreme Court decided in the favour of the language of the powerful, interpreting sustainable development as a positive economic benefit at the national scale. 'Development' turned out to be the dominant ideology with a substantive power to signify. The Supreme Court's decision is based on a (controversial) utilitarian reasoning rather than on (Kantian) rights and, instead of recognising value pluralism, the so called 'principle of balance' is based on a trade off between development and environment that does not recognize the incommensurability among the expressed values. It rests upon the idea that economic benefits can compensate for environmental degradation. It would be interesting to know how would the Court undertake a cost–benefit analysis (CBA) and how much would it count a worker's life, how much the loss of livelihood and how much the irreversible damage done to local ecosystems.

The above are not just rhetorical questions. They show the irreducible difficulty in the call made by economists to internalize externalities. Furthermore, our analysis shows that there are important reasons why externalities are not internalized. The dumping of toxic waste, rather than a market failure, can be seen as a cost shifting success (Kapp, 1950) this being made possible by social asymmetries in the distribution of political and economic power, property rights and income (Martinez-Alier and O'Connor, 1999). Racism should also be accounted as a driving social force for environmental inequality (Pellow, 2007), both at international and national levels, where in the Indian context, caste plays an important role (losers tend to be of lower caste than winners). Shipbreaking can also be seen as an ecologically unequal exchange because of the 'externalization' of environmentally damaging disposal activities to the periphery of the world-system as a consequence of exchange relations with more industrialized countries (Hornborg, 1998). This is based upon the usurpation of waste assimilation properties of ecological systems in a manner that enlarges the domestic carrying capacity of the industrialized countries to the detriment of peripheral societies (Rice, 2009).

Things could be done in a different (better) way and it is technically feasible to have a proper if more expensive dismantling operation (as in Europe). There are in fact many guidelines (Basel Convention, 2002; IMO, 2003; ILO 2004) which are simply not implemented. Ship owners could pay a deposit (or guarantee) throughout the ship life to be spent for proper dismantling, established as a requirement for allowing entrance at any harbour. This could allow investments to take the activity off the beach because dry docks operations potentially offer better labour and environmental standards. But all this would increase their costs, which is precisely the reason why they send boats to unregulated shipyards like those of ASSBY in the first place. Using the terminology proposed by Martinez-Alier, ASSBY is therefore an example of the 'waste disposal frontier' of the world's social metabolism, where those who maintain the power (ship owners, ship breakers and authorities) manage to perpetuate a system of 'accumulation by contamination,' exercising de facto property rights. Just as in the case with climate change, the crucial question is not only who is to pay and who is to be paid, but who is the owner of the sinks?

Whether improvements in ASSBY or other wasteyards of the global economy will ever become true, are then a question of social and political struggle and the ability of those who currently loose to affirm their own rights. From this perspective, greater and effective opposition encountered by ship owners and ship breakers regarding their shifting of environmental costs would result in improved sustainability, potentially both locally and globally. Locally for the pollutants that would not be discharged into the environment; globally because an increment in the operations' costs for the shipping industry, might slow down the social metabolism (by increasing the costs of trade) and its multiple impacts. People who struggle for environmental justice potentially contribute to the environmental sustainability of the economy (Martínez-Alier, 2002).

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