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Global containments and local leakages: Structural violence and the toxic flows of shipbreaking

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Abstract

This article explores how ship recycling—an essential part of the shipping economy—results in breaking up toxic vessels that leak hazardous materials into coastal communities and wetlands ecologies of South Asia. Drawing on multi-scaled and multisited ethnographic fieldwork with shipbreaking workers and local fishing communities in Chattogram, Bangladesh as well as with shipbreaking yard owners, maritime consultants, and government officials, we conceptualize toxic flows as a method to trace the lived experiences of those who are exposed to industrial pollution from shipbreaking. First, we propose that shipbreaking with its local toxic leakages constitutes a form of "structural violence" where violence is built into the logic of accumulation strategies in the maritime economy and shows up as unequal power relations that produce the conditions for unequal life chances. Second, we discuss Bangladesh's recent efforts towards ratifying the *Hong Kong Convention* for the Safe and Environmentally Sound Recycling of Ships and its potential to contain these toxic flows. Lastly, we explore how ethnographically tracing 'toxic flows' i.e., the movement of these toxic substances, allows us to shift scales of analysis and make visible the different ways shipbreaking is perceived to negatively affect health and social reproduction beyond the boundary of shipbreaking yards. We conclude that structural violence such as reduced life expectancies due to poisonous exposure risks becoming embedded in the logic of oceanic forms of accumulation without state regulatory enforcement and supervision.

Keywords

Ship recycling, pollution, toxicity, slow violence, *Hong Kong Convention*, structural violence

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Introduction

Since the early 1970s, the global shipping economy has increasingly relied on shipbreaking—the dismantling of devalued vessels for their recycled materials—as a strategy to mitigate financial losses during economic downturns.[1] While a major share of vessels are owned and operated by ship-owning entities in the Global North, the majority of the ships sold for dismantling have ended up in shipbreaking yards in the Global South (Bangladesh, India, and Pakistan) since the early 1990s. Dismantling ships where labor and environmental protections are weak results in both fatal and injurious accidents (spectacular violence) and exposes workers and nearby communities to hazardous materials that may cause health problems over time ('slow violence'). In this paper, we argue that both slow and spectacular forms of violence form part of 'structural violence', i.e. "built into the structure and shows up as unequal power and consequently as un-equal life chances" (Galtung 1969, 171). Tracing the global containment of economic losses to the local leakages of hazardous materials illustrate the *materiality* of 'friction' arising from global connections (Tsing 2005) where violence is built into the logic of accumulation strategies in the maritime economy through the search for the cheapeast labor costs and produces conditions for reduced life expectancies. This entanglement is illustrated by the dismantling of the container ship *Hanjin Rome,* a vessel that connects the financial problems of one of the largest containership companies in 2015 to the shipbreaking yards and the socio-ecologies surrounding them in Bangladesh.

In 2016, the South Korean firm Hanjin Shipping declared bankruptcy. The *Hanjin Rome* was one of 85 ships located at 50 ports around the world left stranded when the company was prohibited from unloading/loading a cumulative $120 billion worth of cargo (Hand 2016). Hanjin's collapse signaled a 'Lehman Brothers moment for shipping' (Park and Salamat 2016) reflecting the financial troubles of the shipping sector writ large.[2] Arrested off the coast of Singapore for unpaid debts, *Hanjin Rome* was auctioned off by the Singapore Supreme Court to a 'cash buyer'[3] who then sold it to a Bangladeshi shipbreaking yard (The Maritime Executive 2017a). The *Hanjin Rome* was intentionally run aground at full propulsion onto the intertidal zone of Sitakunda[4]; it was manually taken apart directly on the beach by workers subcontracted by the local shipbreaking yard. While dismantling the *Hanjin Rome*, Shahinoor, a 26 year-old cutterman[5] fell from a vessel fragment and died. This was the first fatality directly connected to the Hanjin bankruptcy and illustrates how actors in the global shipping sector ignore the environmental and human stakes of their actions and sell scrap ships to the "highest bidder" (The Maritime Executive 2017b).

Shahinoor's death exemplifies the spectacular form of violence that has characterized the shipbreaking industry in South Asia for decades. Since the 'Great Trade Collapse' of 2009, more than 7000 ships have been broken-up in South Asian yards accompanied by 430 fatalities (NGO Shipbreaking Platform 2023). The global ship dismantling market materially ties shipbreaking workers like Shahinoor to an increasingly indebted shipping sector and demonstrates how precarious workers in the Global South carry the ultimate burden of the reproduction of maritime capital: a violent loss of life.

Yet, shipbreaking also gives rise to latent and less visible forms of violence that affect not only workers, but also coastal communities. Ships are filled with hazardous materials such as asbestos, radioactive waste, heavy metals, and crude oil consisting of persistent organic pollutants (POPs), polychlorinated biphenyls (PCBs) and dioxins (Hossain et al. 2016; Hossain 2010).[6] The most toxic and popular vessels in Bangladesh are oil tankers (Abdullah et al. 2013). During the shipbreaking process toxic substances are released and seep into the ground, atmosphere, and tidal zone creating the conditions for 'slow violence': 'violence that occurs gradually and out-of-sight, a violence of

delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all' (Nixon 2011, 2).

The International Maritime Organization's (IMO) 2009 *Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships* (HKC) aims to mitigate accidents and pollution by improving labor and environmental conditions in ship recycling facilities (IMO, 2021). However, toxic residues travel with tides and humid air into entangled coastal ecologies, Sitakunda's 'fluid commons', with detrimental effects on not only shipbreaking workers but also local villages and more-than-human webs of life (Dewan 2023; Hasan 2022). Unless the HKC addresses the spatial extent of 'toxic flows' – how and where toxic substances move – it risks becoming partial in its success. Ethnographically tracing the toxic flows of shipbreaking allows us to shift scales of analysis beyond shipbreaking yards and make visible the different ways shipbreaking affects long-term health and social reproduction.[7] The *Hanjin Rome* was a high-profile ship that led to the 'spectacular' death of Shahinoor but, as this paper reveals, ships broken up along this coast carry with them slower and more toxic implications that produce a broader geography of violence.

Following recent calls from geographers to pay attention to the power relations behind toxic exposure (Davies 2019), this article suggests that tracing 'toxic flows' helps to reveal the *materiality* of friction from global connections. It makes explicit the relational connections between slow and structural forms of violence that arise from dismantling devalued vessels by contrasting regulatory efforts to contain toxic substances from beaching ships to the lived experiences of how such toxic materials impact the health of humans and coastal wetland ecologies. We first conceptualize 'toxic flows' as a method to trace the lived experiences of pollution from shipbreaking and argue that this constitutes 'structural violence'—a violence that is built into the foundations of the global shipping sector and contributes towards unequal life chances for those having to live in close everyday proximity to the dismantling of discarded vessels to make profit from scrap steel. Second, we discuss Bangladesh's path in implementing regulatory directives in accordance with the HKC up until 2021. Finally, we explore the lived experiences of these toxic flows and discuss how gaps in the HKC can be examined through future research.

This article draws on multisited ethnographic fieldwork in Bangladesh conducted by a human geographer from 2014 to 2016 (Elizabeth Sibilia) and a social anthropologist (Camelia Dewan) in 2019-2020 with workers, fishermen, government officials, NGO activists, and ship recycling actors (classification societies, cash buyers, brokers, shipping association representatives, and shipbreaking yard owners).[8] Together they have conducted nearly one hundred semi-structured interviews with different global and national stakeholders across the shipping industry, in addition to 50 interviews conducted with shipbreaking workers. They have both visited traditional shipbreaking yards and HKC-compliant facilities and have attended key industry conferences as well as visited yards that have not started to make improvments and those facilities that are HKC-compliant. In addition, Dewan conducted 'participant observation' to learn more about the daily life of shipbreaking workers their families and the Zele fishing communities living in-between shipbreaking yards. Such multiscalar and multisited fieldwork thus enhances our collaborative aim to trace toxic flows from the economic structures of shipping to everyday lived experiences of pollution arising from dismantling the vessels of trade.

Toxic flows: From slow to structural violence

Sitakunda, a subregion of Chattogram division in Bangladesh's southeast coastal zone, forms part of a government-designated industrial economic zone (Bangabandhu Sheikh Mujib Shilpanagar) that supports multiple industries ranging from ship recycling to pharmaceuticals and steel and jute mills. Until the 2000s, this area was primarily an agrarian and fisheries-based

coastal area with much of its coastline covered with mangroves. The heavily trafficked Dhaka-Chittagong highway pierces through Sitakunda: to its west are shipbreaking yards interspersed with Hindu fishing communities. To its east, small villages are embedded in a landscape of steel manufacturing, rerolling mills, other ancillary industrial activities, and a railway line.

The 20 km long Sitakunda Shipbreaking Industrial Zone established by the state in 2011 stretches from Faujdarhat to Kumira and is estimated to supply around 35-40% of raw material for the steel industry across Bangladesh (Saif 2019). This steel, in turn is used for infrastructure development and construction (Sarraf et al. 2010, 48). Based on the amount of tonnage Bangladesh dismantles annually since 2005, it has become one of the most important ship-breaking markets in the world. The signicance of the shipbreaking industy extends beyond the commodity and finance capital it circulates, and the "green steel" recycles and also encompasses the tens of thousands of workers directly employed as shipbreakers or indirectly employed in ancillary industries (See also Mizanur Rahman 2016).

'Emran' is a 30 year-old permanent resident of Sitakunda that lives with his wife and young children.[9] He worked as a cutterman on a temporary subcontract at a Sitakunda ship recycling facility. He shared with Dewan that a common sentiment among shipbreaking workers is that they want shipbreaking to continue in Bangladesh, but like others, he worried about what would happen to his family if he became chronically ill:

> When cutting iron, the smoke enters our lungs, it burns through the masks. I am giving my actual life to this company. If the worker is healthy, he can work for life. But they do not think like that. This is a bishakto dhua [poisonous smoke]. The masks they give us are not specialized masks. The smoke, the gas, enters our shorir [bodies, health].

Emran explained that when cuttermen like himself work for two to three days, they end up bed-ridden and sick with high fevers, respiratory difficulties, and aching muscle pains for days without pay. David, a senior maritime consultant working on upgrading shipbreaking yards to become HKC-compliant, shared with Dewan his surprise over the high number of painkillers workers take out daily in order to work despite having fevers, headaches, and muscle pains.

Farhaz is a 'fitterman' in his mid-30s and removes parts from ships. He previously worked as a cutterman but quit due to emerging health problems: '*Desh bishakto hoyeche* [the country has become poisonous]. Many previous cuttermen can no longer work. Their health deteriorated slowly, and they can no longer do what they once could.' These remarks were frequently made among Sitakunda residents working as shipbreakers but also among the local Zele fisher communities living in-between shipbreaking yards. Prasad kaka, an elderly Zele fisherman, pointed out:

> "Zele in their 20s, 30s, 40s and 50s are dying, lots of people have died. They cough up blood from their lungs. Smoke from shipbreaking and smoke from factories combine to make us sick."

Externally-funded studies found that around one-third of sampled shipbreaking workers in Sitakunda had asbestosis (Muralidhar et al. 2017), while the air surrounding shipbreaking yards is filled with carcinogenic environmental contaminants such as PCBs far beyond World Health Organization thresholds of safe inhalation (Nøst et al. 2015). Nevertheless, to date, there is no state-initiated system monitoring the extent of illness among shipbreaking workers (all their health records are supposed to be kept with individual yards) or Zele communities. In addition, the Department of Environment (DoE) faces significant resource constraints and only collects data on a limited number of chemicals and compounds. Their institutional resources have not matched the expansion of industrial activities throughout Chattogram in recent years.

In Sitakunda, industrial toxicants are slowly secreted into the air, water, and soil accruing over time in ways that are both ubiquitous yet unacknowledged. Nixon (2011) urges scholars to engage with the representational challenges posed by such relative invisibility of slow violence. However, for Emran and Farhaz, this slow violence is ever present in their daily lives. We draw on Davies' probe 'out-of-sight-to-whom?' to illustrate how slow violence is not out-of-sight to the people it impacts (Davies 2019), in order to reveal the power structures that sustain uneven geographies of pollution by keeping pollution out of public view (Davies 2018) and how material entanglements—cellular, chemical, or commercial—might be connected to global politics (Agard-Jones 2013, 185). Making visible local stories of contamination of bodies and how they are made ill through toxic exposure (Iengo and Armiero 2017) forms part of how witnessing gradual changes to the local environment can act as a barometer for perceiving the lived reality of persistent pollution and encourage policy makers to take seriously the knowledge claims of communities who live, work, and play in toxic spaces (Davies 2018, 1549).

A focus on 'toxic flows' connects macro-level analyses of the shipbreaking industry to microlevel analyses of the agentive capacities of ordinary people even in the face of persistent inequalities (Agard-Jones 2013, 185). While global circulations of capital, labor, and commodities are often described as 'flowing' seamlessly and smoothly (Cowen 2014), these global connections often encounter 'friction' through awkward, unequal, unstable, and creative qualities of interconnection across difference (Tsing 2005, 6). With 'toxic flows' we want to emphasize how pollution can be seen as a material element of such 'friction'. Toxic substances are produced through, and by, capitalist processes. When ships are traded as scrap to be taken apart for their steel – the hazardous materials they contain 'leak, ooze, and persist' into the environment, humans, and more-than-human entities (Packer 2021). Toxic residues from shipbreaking sites travel with the waters, tides, and sediments: they are 'transgressive and disobey boundaries' (Boudia et al. 2018, 167). So, while hazardous materials embedded in the structure of the ships are contained when ships travel along trade routes, dismantling them in South Asia releases toxic matter into local waters, ecologies, and bodies, where the materiality of friction manifests has health-harming pollution.

Demaria argues that a system of 'accumulation by contamination' maintained by those in power – shipowners, shipbreakers and regulatory authorities – systematically shifts the costs of environmental damages to the Global South (Demaria 2016, 300). Thus, global ship dismantling can be seen as a system of structural violence where "the power to decide over the distribution of resources is unevenly distributed…" and where "the subsequent differentials in life expectancies constitutes [structural] violence…a form of social injustice" (Galtung 1969, 171). Drawing on ethnographic fieldwork with Sitakunda residents and their own observations of how their bodies and local ecologies are affected by constant air pollution from carcinogenic fumes and contaminated coastal waters helps us recount their inescapable proximity to toxic flows in their daily lives. Their experiences of poor health, limited access to adequate healthcare, and perceived lower life expectancies reveals another aspect of structural violence: when marginalized groups cannot afford the healthcare needed to stay alive (Gupta 2012).

Structural violence refers to reduced and unequal life expectancies caused by inequality (Galtung 1969, 175; Tyner and Inwood 2014). To use Galtung's terms, violence is structural if an act is avoidable. Since ships can be safely recycled in EU-approved sites, arguably toxic exposure from beaching scrap vessels in Bangladesh's intertidal zone is avoidable. Thus, unevenly distributed exposure to toxic flows constitutes structural violence "even though there may be no one committing direct violence" (Galtung 1969, 172). 'Spectacular' accidents are made visible for those who experience, witness, or read about them in the media. However, latent forms of violence are not yet visible. Toxic exposure that is unseen and unmeasured

(whether through POPs, airborne carcinogens or PFAS) is an example of how "structural violence is silent, it does not show - it is essentially static, it is the tranquil waters…It may be seen as natural as the air around us" (Galtung 1969, 173). In the industrial economic zone of Sitakunda, toxic hazards are largely uncontested, all-pervading and uncertain – so much so that that constant pollution becomes internalized as normal (See Shapiro 2015).

Arguably, structural violence is 'built into the system' since shipowners use the higher dismantling costs for safe ship recycling in the EU as an excuse to sell their ships to be beached in South Asia for 'top dollar' enabled by low labor costs. Shipbreaking is part of an extractive economy where non-white bodies are devalued and made disposable (Pulido 2016) just as trading vessels come to be devalued and then disposed of.[10] Tracing the toxic flows of the maritime economy through ship recycling to the local leakages of hazardous materials on the beaches in South Asia thus exemplifies the structural tenacity of white privilege as a means to be protected from pollution and harm (Pulido 2015, 814).

The remaining article examines the materiality of pollution in situated encounters between bodies and the environment (Fisher et al., 2021). We bring attention to the multi-scaled spatio-temporality of toxic flows as we link the sensory experiences of pollution and harm in the everyday lives of Sitakunda residents to larger structures of power and inequalities embedded in the global maritime industry. Such ethnographic explorations of the lived experiences of the unequal distribution and lack of containment of toxic flows reveals how some people are more exposed to harm than others. So, while ideas of 'chemical kinship' and 'chemo-sociality' (Balayannis and Garnett 2020; Kirksey 2020) suggest that 'chemicals are everywhere' and that 'we all' live in a permanently polluted world (Langston 2011; Murphy 2013), the uneven distribution of toxic exposure and unequal access to healthcare reduces life expectancies in ways that could have been avoided.

Shifting landscapes of the *Hong Kong Convention*

The toxic flows through the Sitakunda subregion reflects the haphazard development of an industrial area since the 1980s, when the absence of oversight related to labor and the environmental underpinned economic growth (The Daily Star 2011). In 1989 3.45 km of coastal area was dedicated to shipbreaking, by 1999 the area had doubled (Abdullah et al., 2013). A researcher at a local university shared that the coastal area where ships are broken apart expanded to seven km by 2005, 11 km by 2009 and to approximately 22 km by 2020. Though Sitakunda residents suggest that shipbreaking took off after the 1991 Bangladesh cyclone when hundreds of families vacated sea-facing lands, a conjuncture of factors contributed to the rise of the Bangladeshi shipbreaking industry in the early 1990s[11] As of 2020, 200 yards were registered with the Bangladesh Ship Breakers and Recyclers Association (BSBRA) but the number of active yards—those yards actively buying and recycling ships—fluctuates between 50 and 80.

The 1989 Basel Convention prohibited the export of hazardous waste from OECD to non-OECD countries, while the 1995 Basel Amendment filled a gap left in the Basel Convention and under pressure from NGOs classified ships as a form of hazardous waste (Shipping Watch 2021b).[18] However, the Basel Convention - nor the Ban Amendment - did little to stop shipbreaking on the beaches of South Asia and by the late 1990s, the IMO's Marine Environment Protection Committee (MEPC) pressured the IMO to address concerns about shipbreaking. By the early 2000s, NGOs, intergovernmental organizations and investigative journalists published numerous reports critical of labor and environmental issues related to shipbreaking.[12] These collective efforts pressured government officials of both exporting and importing states to regulate the export of toxic vessels to South Asia and address the appalling environmental and labor conditions produced by shipbreaking practices.

By 2004, the IMO, International Labor Organization (ILO), and Basel Convention adopted guidelines that took into consideration stakeholder concerns (International Labor Organization 2004). In 2009, the IMO adopted the first international convention regulating the shipbreaking industry globally, *The Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships* (HKC), that created a set of directives covering different labor and environmental aspects of dismantling ships. It was the first time the responsibility of improving labor and environmental issues was placed on stakeholders across the supply chain for scrap ships and not just the shipbreaking yards themselves.

South Asian shipbreaking yards have a history of low-cost manual labor, as well as weak and limited adherence to extensive national environmental and occupational safety regulations. Bangladesh has been on the receiving end of decades of international negative press and critique. Vocal civil society watchdogs such as the Bangladesh Environmental Lawyers Association (BELA), the Brussels-based NGO Shipbreaking Platform, and Paris-based Robin des Bois Ships strongly criticize ships being beached in Bangladesh. After appeals by BELA, the Bangladesh High Court issued a *suo moto* rule (i.e., out of its own accord) on January 19, 2011 and directed the Government of Bangladesh to halt all shipbreaking within the country. This was countered in a petition submitted by the Bangladesh Ship Breakers and Recyclers' Association that resulted in the removal of the stay order and their ability to import of ships. However, it came with an add-on, the embargo of uncleaned oil tankers and vessels containing nuclear residues (Abdullah et al. 2013).

The public debates about labor and environmental concerns and the temporary stop to the industry by the High Court resulted in the responsibility of overseeing shipbreaking shifting from the Ministry of Environment (MoE) to the Ministry of Industries (MoI) (Abdullah et al. 2013). Already in conversation with representatives at the IMO regarding the reality of the HKC, the MoI and the GoB approved the 2011 Ship Recycling Rules (SRR-2011). This set of rules shifted the informal shipbreaking sector into a formal industry subject to state-led scrutiny, regulations, and controls. During both authors' fieldwork in Bangladesh, workers, labor unions, maritime consultants, government officials, and shipbreaking yard owners repeatedly emphasized the importance of shipbreaking for local employment and its role in national economic growth – and that shipbreaking must proceed uninterrupted so that ships continue to be sold to, and dismantled by, Bangladeshi shipbreaking yards.

Between 2011 and 2016, Bangladeshi yards sought to follow the minimum requirements of the SRR-2011. As per its text, all yards must have office buildings, medical centers, as well as enclosed facilities to store hazardous waste materials such as asbestos, paint chips, heavy metals, and empty chemical containers. While some yards had built 'medical centers', shipbreaking workers themselves stated that only a few of the yards had staffed the centers nor were regular medical check-ups conducted. Those that did examine workers did not share the results from chest X-rays and blood samples with patients. By early 2016, the Bangladesh Ship Breakers & Recyclers Association established a hospital for several shipbreaking yards and by 2023 this was also occasionally used by local residents.

The Department of Labor and the Department of Environment conduct independent inspections of shipbreaking yards to enforce compliance with the SRR-2011. However, Sibilia found during her visits to yards in 2016 that buildings designated for waste material were often empty, while unsecured doors gave way to materials spilling out onto adjacent walking paths. Similarly, during Dewan's fieldwork in 2020, workers and government officials pointed out that the required 'oily water separators' in the yards were non-existent or did not function consistently. Environmental inspectors anonymously confessed that they only check whether things are present in the yards and that they lack training to determine whether technologies function as intended. Even though most workers told Dewan in 2020 that ships arriving in Bangladesh for

recycling were cleaner with less oil and waste than before the SRR-2011, they simultaneously spoke of personal protective equipment, medical and hazardous waste facilities, as well as employment documentations as 'decoration' (*shajano*) and 'theatre' (*natok*) by the authorities and shipbreaking interests. These performances were part of making the yards seem compliant with government regulations but without monitoring or addressing labor and environmental issues Figure 1.

The limited compliance with the SRR-2011 came to the fore with Bangladesh's aim to ratify the HKC by 2023.[13] To this end, the GoB ratified the Bangladesh Ship Recycling Act in 2018 (BSRA-2018) and the HKC in June 2023. BSRA-2018 sought to establish a Ship Recycling Board to oversee the recycling of ships and to ensure that ship recycling yards comply with the HKC by 2023 or be shut down by the end of ratification process in June 2025 (pers. Correspondence, Ministry of Industries). The HKC and government efforts to regulate the industry mainly focus on reducing 'spectacular' violence. Since 2018, Bangladeshi authorities fine yards where fatal accidents occur and have in some instances closed them for several months while investigating the case. Victims and their families are increasingly gaining compensation from the state and yard owners, some even from Western shipowners (Karim 2020).

Up until 2020, Bangladeshi stakeholders shared their concerns that media stories of spectacular violence of shipbreaking are detrimental to Bangladesh's aim to become HKC compliant. Since 2009, activists and journalists noted how shipbreaking yards once open to outsiders stopped letting them in. This was exacerbated in 2018, after the GoB proclaimed its intention to ratify the HKC. This made access to shipbreaking yards notoriously difficult, highly restricted, and heavily supervised in 2020 to any non-HKC compliant yard.

Figure 1. Shipbreaking yard compliant with the SRR-2011. Dewan, February 2020.

Becoming HKC-Compliant

PHP is one of the oldest ship recycling facilities in Sitakunda dating back to the early 1980s. In recent years PHP has earned a reputation for going far beyond the BSRA-2018, independently investing six million USD to upgrade its facility. This was motivated by their application to receive a HKC Statement of Compliance (SoC).[14] Both authors were given formal access to the yard through private tours in 2016 and 2020. They observed that the PHP yard was a dramatic contrast compared to other yards they visited. Steel plates, beams, and rods were haphazardly stacked and scattered across often muddy and uneven ground in the other yards and constituted hazards. In contrast, PHP exhibited a much higher level of safety awareness. In 2016, when the prices for scrap vessels had dropped dramatically but not yet reached bottom, PHP took advantage of the market and initiated the construction of a concrete foundation. An area contiguous to the intertidal zone had been levelled with sand and a steel rebar structure placed on top as the internal stability for pouring a concrete floor. Impermeable concrete floors in cutting areas, a requirement of the HKC, is intended to protect the ground from the seeping of toxic materials released during the cutting process. By 2018, PHP had laid an impermeable floor throughout its entire facility and had thus gone well beyond the conditions of the HKC Figure 2.

PHP committed to enacting a series of improvements that made the handling of hazardous waste safer. The private tours were given by the yard's safety manager "Sunil". Sibilia was guided through a landscape in transition, while Dewan had a tour of a fully upgraded yard. Both authors were introduced to the Personal Protective Equipment (PPE) room filled with safety helmets, safety gloves and boots, goggles, flashlights, headphones, respirator masks, and other forms of PPE. The manager shared that all workers are required to register their names and pick up PPE before starting their shifts. Outside the PPE room hung an emergency siren and a large

Figure 2. Image of PHP constructing impermeable floors. Sibilia, March 2016.

white board documenting the different forms of hazardous and non-hazardous waste contained in scrap vessels as they are taken apart: lead acid batteries, oily rags, sand, sludge, asbestos waste, plastic, and rubber waste. PHP also contracted the construction of a custom-designed asbestos removal room.

The HKC also demands that only ships with an updated Inventory of Hazardous Materials (IHM) are dismantled so that the facility can easily locate where different toxic substances are located. The requirement of IHM is quite new, with few ships having updated IHMs upon arriving to Bangladesh. This, along with the fact that Bangladesh did not yet have a toxic materials sampling laboratory., resulted in PHP sending samples for analysis to a laboratory in Southeast Asia to update the IHM. Furthermore, while awaiting the construction of a Treatment Storage Disposal Facility for hazardous waste, PHP was using specially-designed concrete cylinders to store such waste on its premises Figure 3.

The disposal of bilge water, i.e. water from ships that contain oil, chemicals, and other hazardous substances, is one of the main environmental polluters from shipbreaking since the early 1990s as it is flushed out to sea without any filtration system. With the SRR-2011, all yards must treat their bilge water through oily water separators and the one at PHP is certified by the reputable classification society ClassNK. Workers transport bilge water from the ship to a large bilge water tanks where it is pumped through an adjacent room. The separated oil becomes sludge that is then stored in barrels while the clean water is pumped out and eventually released back into the sea.

Sunil also shared that PHP was the first yard in Sitakunda to build a medical center on the premises. This center is staffed with a doctor who does routine check-ups, treats minor, cuts and sprains, and attends to breathing issues. The center also stores patient journals, examination results, and X-rays in locked file cabinets. Even with the improvements made at PHP, there are still accidents but less fatal ones and as Emran said to Dewan: “if all yards were like PHP,

Figure 3. A model yard. Dewan, February 2020.

that would be much better for us workers." It was clear that PHP was committed to following global standards laid out by the HKC and exceeding the SRR-2011 and BSRR-2018.

On October 10, 2017, PHP received a Statement of Compliance (SoC) from the Italian classification society[15] RINA, making PHP the first ship recycling yard in Bangladesh to become HKC-compliant (Maritime Executive 2017b). Not content with the RINA-rating, the PHP yard owner applied for a SoC with the highly reputable ('blue-chip) classification society ClassNK, and on January 15, 2020 they received it. By 2020, PHP had become a "model green yard", a vision for how other yards can implement the upgrades necessary to achieve HKC-compliance and remain competitive with their Indian counterparts by replacing manual labor with cranes, magnets, and other sophisticated machinery. Parts of the vessel are now cut from the sea and brought in by crane and ship to the yard facility, as seen on PHP's promotional video PHP SBRIL The Change Maker of Sustainable Ship Recycling proudly shared at international conferences (Greenbee Communications 2018).

A 'model green yard': Containing spectacular and slow violence?

The "Safe and Environmentally Sound Ship Recycling in Bangladesh" (SENSREC) project started with Phase 1 in January 2015 and in 2023 is entering its fourth phase. This is a project funded by Norwegian donor Norad and is co-implemented by Bangladesh's Ministry of Industries and the International Maritime Organization. SENSREC-stakeholders in Bangladesh use PHP as an example of a 'model green yard' for international stakeholders, but also to Bangladeshi ship recyclers alike. PHP has claimed that the investments made in yard infrastructure offer an HKC-compliant ship recycling facility in Chattogram to global shipowners. Thus far, PHP's high-cost undertaking has produced returns that outweigh their investment and because of PHP being a 'first mover', more than 10 other yards, those owned by established and wealthy businessmen and family conglomerates, have started their own transformations.

The announcement of Bangladesh's intended ratification by 2023 came with a warning to yard owners: if they do not undertake the necessary investments to make their HKC-compliant ship recycling facilities, they will be forcibly closed by the state. By February 2020, approximately 70 yards submitted "Ship Recycling Facility Plans" (SRFP) to the MoI for approval. An SRFP is designed by independent consultants hired by the yards and outlines the renovations the yard owners plan to undertake to ensure their facilities comply with HKC standards. Leading classification societies, such as Class NK and Lloyds Register were offering commercial packages for yard owners to develop these plans. Indeed, in 2020, some shipbreaking yard owners were already busy renovating existing sites to achieve a similar standard to that of PHP. However, the extent to which each yard installs impermeable floors varies in the personalized SRFP. Only cutting areas must have impermeable floors, not the entire yard as in PHP's case. Once implemented, the yard must be independently inspected by a classification society and be awarded an HKC SoC to continue their operations after 2023.

The movement towards 'greener' yards in Bangladesh is taking place at a time of national defiance, where Bangladesh, a lower-middle income country since 2015, is aiming to become a middle income country by 2031 (World Bank 2022). A young generation of cosmopolitan businessmen like the western-educated PHP yard owner want to show foreigners (*bideshi*) that Bangladesh is no longer a 'poor basket case' (Tripathi 2021). This determination to elevate Bangladesh's global reputation and push against backward stereotypes of Bangladesh and barefooted workers wading through muddied beaches is illustrated also in GoB's drive to show that Bangladesh is just as, if not more, capable than India to recycle ships according to global standards. The MoI was proactively coaxing domestic steel giants and shipbreaking yards to invest in becoming green high-tech ship recycling facilities – able to contain toxic flows of

hazardous materials. In 2020, the MoI together with SENSREC aimed to create a permanent and trained workforce of metal workers as well as were setting up the foundations of constructing a Treatment, Storage and Disposal Facility (TSDF) for safe downstream handling and treatment of hazardous waste and professional asbestos removal. The MoI also started coordinating various government departments to increase the inspection standards of ships arriving for dismantling by creating a one-stop solution for the integrated needs of ship recycling.

The MoI aims are to create a landscape of "serious ship recycling stakeholders", those committed to making improvements. In the process they hope to discourage the unserious yard owner who, to them, represents a vision of the past. One strategy they are using to weed out these yard owners is by not offering state support or state-backed financing to help upgrade their yards. While some yard owners complained about this, many of them belong to an industrial class of family conglomerates—some of the wealthiest families in Bangladesh. Indeed, they are able to fly first class and maintain offices in financial hubs such as Wall Street and Singapore. These wealthy Bangladeshi elites form part of global maritime finance networks and they are deeply embedded in intricate social and economic relations with classification societies, cash buyers and shipping companies. They are also able to avoid the environmental effects of their lucrative practices, living far away and safely from the health-harming hazardous materials that leak out from ships during dismantling processes, including crude oil, bilge water, asbestos, and PCBs.

The HKC mandates 'impermeable concrete floors' in a portion of the yard to contain and control leakages of toxic materials released during the cutting stages and has several standards in place to limit environmental pollution in waters and soils. However, to what extent can these measures to upgrade yards to become HKC-compliant address and mitigate crude oil, PCBs and dioxins that are already present in the coastal waters and sediments upon which local villagers depend on?

'John' is a maritime researcher based in the Global North and expressed skepticism against the 'green recycling' agenda in Bangladesh. He specifically pointed out that prior to the HKC, exporting toxic ships to non-OECD countries fell under the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes:

> The Basel Convention states that if you generate toxic waste, you are liable and in charge of disposing it - or you must justify that you do not have the capacity to do so. With the *Hong Kong Convention*, in contrast, the shipowners have no such burden. They only decide what yard [shipbreaking facility] to sell it [the ship containing hazardous materials] to. The HKC was tailormade to protect ship owners. India reacted to this, and it is now having to assume the burden of disposing of hazardous waste.

Such a critique is common among Global North consultants, regulators, and NGOs, and has grounded much debate since its adoption. The argument proposes that the HKC enables maritime stakeholders to appear as though they are complying with global environmental and labor standards while in practice, countries like Bangladesh, India, and Pakistan must now accept a considerable transfer of liability related to waste management, and themselves take on the economic and environmental costs of building hazardous waste infrastructure. Bangladesh has still not constructed a Treatment Storage and Disposal Facility for Hazardous Waste (TSDF) at the time of writing, but feasibility studies and the support of Japan are underway. While awaiting the TSDF, PHP is storing hazardous waste within its yard and increasingly disposing it to state-certified vendors. Yet in 2020, European ship recycling consultants anonymously remarked that it is odd that any facility in Bangladesh can be HKC-certified when there is no TSDF able to safely dispose of the toxic waste generated from ship recycling. So, blue chip

classification societies, the primary non-governmental certifying agency for technical standards related to ships, and now ship recycling, is certifying yards in markets where the HKC directives are explicitly not met.

The critiques put forth by EU member states and European-based NGOs emphasize the need for downstream hazardous waste management, but their main critique is the 'beaching method'. To quote the UN Special Rapporteur on Human Rights & Hazardous Substances & Wastes, Baskut Tuncak (2017):

> "Beaching cannot be done by its very nature in an environmentally sound manner. The conditions just don't allow it. The toxicity of the ship is such that the releases are significant. To me the practice of beaching is very troubling in that the toxic chemicals are entering the environment".

While the 2009 HKC permits the beaching method, the EU created the 2018 EU Ship Recycling Regulation (EUSRR) that strictly prohibits European-flagged ships from using ship recycling facilities where beaching occurs. EUSRR proponents claim there are enough EUSRR-listed yards to handle the necessary capacity. However, more European-owned ships have changed flags and the tonnage of ship recycled at EU-listed facilities have decreased since 2018.[16] The age-old value-added strategy of 'flagging out' continues to be employed by European shipowners to circumvent the EU-SRR in order to sell their ships for 'top dollar' to South Asian facilities, where e.g. companies like Maersk beach their ships in HKC-compliant yards in India over using their EU counterparts (Shipping Watch 2021a).

So, while the HKC is creating the impetus for the government and yard owners of Bangladesh to improve, it also legitimizes both the beaching method and the transboundary movement of toxic materials embedded in the scrap vessels to flow into non-OECD countries like Bangladesh. The HKC exemplifies how international stakeholders are able to cost-shift pollution by retaining active and lucrative shipbreaking capacity in the 'poorer nations of the world' (Prashad 2013) and thus encouraging the continued flow of toxic materials into peripheral sites of the Global South.

With the 2023 IMO Strategy on Reduction of GHG Emissions from Ships, the maritime sector is seeing to reduce carbon emissions by 2050 by replacing their existing fleets with 'green ships' running on 'alternative fuels', such as ammonia. This, in turn, increases the need to recycle fossil fuel-driven ships and several maritime stakeholders have asserted the importance of HKC-compliant yards that can undertake ship recycling that they expect will increase in demand in the next 10 years. While carbon emissions globally may decrease, the cost of recycling the ships in terms of pollution and health effects is borne by coastal communities and ecologies. Close attention must therefore be given to ensure that local seepages of toxic flows in the present and future are contained, and that compensation for past pollution is put on the agenda for those determined to recycle vessels in South Asia.

Local leakages of toxic flows among fishermen communities

To what extent, and with what implications, may the *Hong Kong Convention* fail to consider the lived experiences of toxicity in an area already polluted with hazardous materials and persistent organic pollutants? Furthermore, while work to upgrade yards to conform to HKC standards may prevent further leakages in the future, little is known about the magnitude and persistence of such toxicants in the water and sediments, and its effects on multiple species (including humans) across generations (see Lamoreaux 2016; Murphy 2013). In this final section, we explore the lived experiences of pollution despite international regulatory efforts to contain the leakages of hazardous materials from scrapped ships.

Much of Bangladesh's HKC reform agenda focuses on efforts to protect shipbreaking workers and treats the yard as a bounded space they work within. While the standard worker protections at the yards include PPE, the HKC-certified yards remain open-air facilities. Toxic fumes arising from burning heavy-metal laden painted steel spreads beyond the yard and into nearby communities such as the lower-caste Hindu Zele fishing villages wedged between the borders of different shipbreaking yards.

Members from these low-status fishing communities do not derive benefits from industrial employment like their Muslim neighbors, nor do they receive any compensation from industries that damage their livelihoods. For example, when a ship is beached onto the tidal zone, its propeller destroys the expensive large oceanic fishing nets the Zele have laid out at sea. These nets cost them hundreds of thousands of Bangladeshi taka that they have borrowed from money lenders. Thus, shipbreaking materially tears the source of Zele livelihoods apart. Rini Kaki, a Zele housewife in her late 60s, shared her frustration: 'We are never compensated for this. We Zele are blamed for having our nets there in the first place.'

While shipbreaking workers complain about breathing difficulties and toxic smoke, Zele are also significantly affected by toxic exposure in their day-to-day-lives. Zele elders, men, and women alike, pointed to the industrial pollution arising from the path to economic development. Rini Kaki, described how the cutting of ships impacts fishing

> "Our whole livelihoods depend on fishing. When ships are cut down and broken, they leak black oil into the waters. This kills fish, the nets also get caught in the black oil, so the fish we catch end up smelling like oil. We cannot sell them; we cannot eat them. When the fish come with the high tide, the tide also brings in polluted water, resulting in the black oil you see in our homestead ponds."

Figure 4 While some fish species have disappeared from the shallow coastal waters, interlocutors shared that fish they catch tastes worse than before. Such 'toxic layering',[17] i.e. the existence of several competing sources of pollution: the shipbreaking yards, garment factories, oil refineries, steel processing plants, and other factors that reduce fish populations like overfishing, makes it difficult to establish any singular vehicle of harm for the Zele. The constant reference to loss of taste highlights the importance of sensory experiences as a form of embodied witnessing of pollution and toxicity (Agard-Jones 2013; Senanayake 2019) and the necessity to monitor the flows of toxicants beyond the yards and into the contiguous socio-ecologies.

With oil and other hazardous materials leaking into tidal beaches, the toxicants move to nearby sediments, soils, canals, and rivers. When Dewan voiced that Zele rights and views are not part of Bangladesh's reform agenda, several ship recycling stakeholders and government officials discounted Zele experiences of shipbreaking. Arguably "contests over what counts as violence are intimately entangled with conflicts over who bears the social authority of witness, which entails much more than simply seeing or not seeing" (Nixon 2011, 16). Counting Zele experiences of shipbreaking, counting them as witnesses, help us frame our findings and questions—for whom is slow violence 'out-of-sight'? (See Davies 2018).

When asked if there is any link between pollution and poor health, Rini's daughter-in-law exasperatedly replied:

> 'If doctors in Dhaka can't say why we're getting ill, how can I? What does it matter if we know what causes it, what can we do? Deaths are decided by the heavens.'

This reluctance to make claims about environmental damage and health highlights not only a political sensitivity surrounding the issue of toxic causality (see Lora-Wainwright 2017;

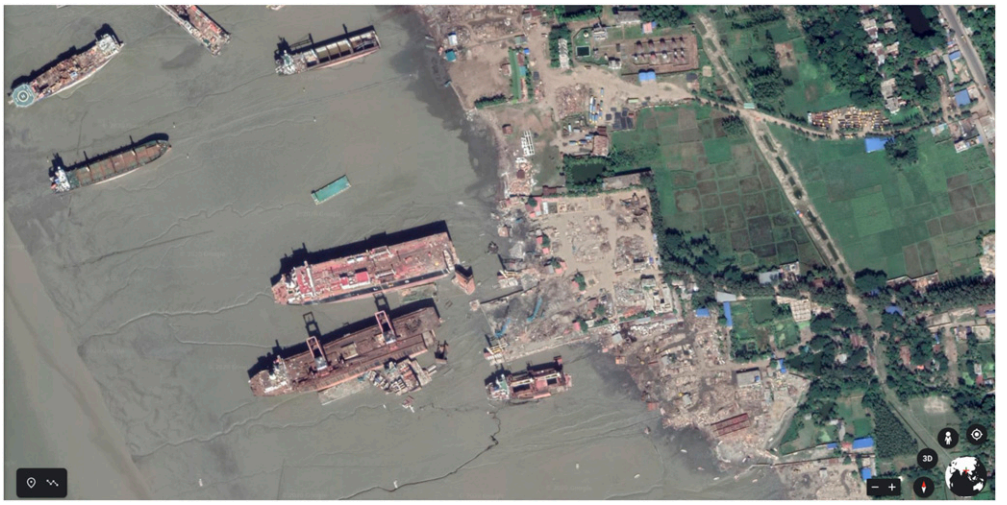

Figure 4. Google Satellite Image of black oil leaking in Sitakunda's intertidal zone.

Ippolito 2022, this issue), but also a sense of despair and powerlessness similar to the invocation of "rien à faire" (nothing to be done) in Martinique when faced with the widespread nature of the local environment's contamination (Agard-Jones 2013). As Agard-Jones notes, Martinican residents' bodies are produced through and via engagements with the local, regional, and global forms of power that have made the island's chlordecone contamination possible. In Sitakunda, industrial pollution on bodies and the environments are produced through multi-scaled forms of power – not only shipping stakeholders who evade international and national regulations in ways that make waste dumping possible in the Global South – but also in the domestic context where industrial processes are undergirded by domestic efforts to replace agrarian livelihoods with more industrial forms of economic growth.

Socio-economically marginalized minority groups like the Zele are not partaking in industrial development, yet they are more exposed to health-harming toxic substances than those who live further away from the coastal ship recycling zone. Despite being prohibited, asbestos and PCBs continue to make their way into shipbreaking yards in Bangladesh and have health-harming effects on workers and local communities. The materiality of toxic flows, and how toxic matter moves through peripheral areas, illustrates how particular interests may strategically benefit from keeping pollution 'out-of-sight' from some eyes, while the toxic effects are painfully present for those must live and breathe pollution in their day-to-day lives. Rural Bangladeshis dying from slow violence become light-weight, disposable casualties due to the persuasive but elusive violence of delayed effects from contamination (Nixon 2011, 13).

Government officials tasked with monitoring compliance with existing labor and environmental laws admitted to us that they are too understaffed and under-resourced to monitor all forms of pollution that arise from shipbreaking. The to date lack of systematic monitoring helps to sustain a culture of doubt around the science of contamination and its long-term health effects in ways that make it easier for global corporations to sustain an evasive geopolitics of deferral in matters of environmental injury, remediation, and redress (Nixon 2011, 39). While EU regulators are trying to get to grips with such evasion though the 2018 EU Ship Recycling Rules, sending ships to HKC-approved yards in South Asia continues an evasion of liability from pollution by externalizing the costs of toxic waste disposal outside their own [highly regulated] borders (Demaria 2010, 2).

Such evasion and the attritional violence that occurs over time illustrates both the spatial and temporal character of toxic flows. If temporality is a way of bringing into focus the lived and embodied experiences of toxic matter, the spatiality of tracing the movement of toxic materiality beyond shipbreaking yards to local bodies and ecologies reveals how toxic landscapes are produced by multi-scaled strategies grounded in the continued circulation of capital through the shipping economy. Ship recycling brings together an arrangement of stakeholders from various financial, regulatory, and industrial global networks that rely on stable markets in South Asia to beach ships as a value-added strategy (Sibilia 2019). International regulations like the EUSRR and HKC propose to contain the local leakages of toxic substances from ships in the present and future – but what about the uncounted voices who exist outside shipbreaking and remediation for past and ongoing damage caused by toxic exposure beyond the yards?

Sending functional, yet devalued, vessels to be scrapped highlights how shipbreaking is essential for the global shipping industry (Sibilia, 2019a; 2019b). However, the materiality of friction from these global connections comes to the fore when we track the way hazardous materials from ships being dismantled such as asbestos, glass wool, heavy metals, and crude oil seep into waters, sediment, air, and ultimately bodies in and around shipbreaking yards. According to Melamed (2015), capital can only be capital when it is accumulating, and it can only accumulate by producing and moving through relations of severe inequality among human groups. Selling ships for scrap arises from the devaluation of vessels – when a ship's steel is worth more than its capacity to transport goods. In parallel, sending ships to where the environmental enforcement is struggling and where labor costs are the lowest (partnered with a high domestic demand for recycled steel) reveals how the circulation of capital through the shipping economy is underpinned by the continued devaluation of non-white bodies to facilitate the accumulation of more profit than would otherwise be possible (Pulido 2016).

Such 'accumulation by contamination' (Demaria 2016) exemplifies how capital accumulation may require disposability and the unequal differentiation of human value and disposability of human and more-than-human life. This, in turn, gives credence to the notion that racism enshrines the inequalities that capitalism requires (Melamed 2015, 77). Ethnographically tracing the lived experiences of toxic flows exposes the environmental racism of spectacular and slow violence, and how both are part of larger scaled structural violence that arises from sending ships to be beached for 'top dollar' in South Asia. Ship owners want a 'global level playing field' – if so, they must also pay for higher fixed operating costs that HKC-compliant yards in Bangladesh must bear for safer and environmentally sound ship recycling practices.

Conclusion

Global environmental regulations like the *Hong Kong Convention* seek to make ship recycling 'safe' and 'environmentally sound' and incentivizes national reforms in the Global South. Bangladeshi yard owners, many of whom are corporate elites, must upgrade their on-the-beach shipbreaking yards into HKC-compliant ('green') ship recycling facilities with impermeable concrete floors by June 2025, after which they will no longer be able to legally dismantle vessels. Yet according to the 1995 Basel Amendment: ships are hazardous waste. When taken apart, the toxic materials once contained within ships move into and through the environment and affect local livelihoods in ways that challenge social reproduction. Despite several improvements in Bangladesh's ship recycling industry, HKC reform efforts do not yet entail strengthening regulatory enforcement agencies at the national scale nor the systematic monitoring of industrial pollution and their health effects on wider local geographies. For decades, asbestos, dioxins, and PCBs moved beyond shipbreaking yards and will risk continuing to do so in the foreseeable future in Bangladesh without stricter and comprehensive enforcement.

By analyzing the unequal distributions of toxic flows as the material 'friction' of global connections, this article argued that some bodies/peoples are more exposed to harmful toxic exposure than others. While ship recycling helps to contain economic crises, the practice of dismantling ships has material effects on humans and ecologies. Breaking vessels on beaches makes it difficult to contain the local leakages of toxicants that affect not only shipbreaking workers, but also coastal ecologies and communities. To conclude, shipbreaking and the continued preference of shipowners to beach ships in South Asia under the guise of the HKC illustrates how capital circulation integrates peoples and places in highly uneven and differentiated ways and in doing so produce places where toxic substances are allowed to leak and seep in ways that are strictly regulated against in the EU. The poisonous exposure arising from shipbreaking on South Asian beaches for several decades is thus inherently unequal in that it produces unequal life chances and constitutes structural violence.

To make Bangladeshi ship recycling truly 'green and environmentally sound' and not simply 'green washing' requires that key stakeholders promptly prioritize the construction of a functioning TSDF with laboratory capacity, engages a third-party overseer of each ship recycling operation, follows social auditing practices to ensure the rights and wages of workers, engage in corporate social responsibility and compensate local communities for past and present damages (including Zele), and strengthen the capacity of state enforcement agencies.

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Notes

1. Devaluation refers to the loss of value related to fixed capital (ocean-going trade vessels), see Sibilia (2019a).
2. The container sector experience overcapacity since the financial crisis of 2007-2008 (Deloitte, 2016).
3. A 'cash buyer' specializes in the purchase and logistics of scrap vessels (NGO Shipbreaking Platform, 2023).
4. This is to as the 'beaching' method as opposed to being dismantled by a dry dock.
5. Cutter-men 'cut' steel with acetylene torches.
6. Asbestos, radioactive waste, heavy metals, and crude oil consisting of persistent organic pollutants (POPs), polychlorinated biphenyls (PCBs) and dioxins (Hossain and Rahman Chowdhury, 2016; Hossain, 2010).
7. Ojeda describes social reproduction as "the social and ecological structures, relations and institutions that sustain life at the individual, local and planetary level" (2021, 87). This builds on Marxist understandings of social reproduction as encompassing daily and long-term reproduction such the 'fleshy, messy, and indeterminate stuff of everyday life,' but also as a "set of structured practices that

unfold in dialectical relation with production, with which it is mutually constitutive and in tension." (Katz, 2001, 711).

8. All names and rural places are pseudonyms to ensure the anonymity of our interlocutors.
9. This contrasts with seasonal migrant workers who arrive from northern districts in Bangladesh to work in shipbreaking and live in crowded labor sheds without their families.
10. Nixon (2011) and Demaria (2010) refer to the 1991 internal memo circulated by Larry Summers, chief economist at the World Bank who stated that it would be a win-win situation to export toxic waste from rich to poor countries in the Third World that were out-of-sight and removed from green activists concerns.
11. These include shipping stakeholders needed a new location for scrapping oversupply after Taiwan left the market in 1989; investments by Japanese shipowners were made in Bangladesh; the creation of the high-yield shipping bond market in 1992; and the easing of global credit markets which reactivated the flow of capital into shipping economy were all contributing factors at the global scale (Sibilia, 2019a).
12. Civil society made visible the negative effects shipbreaking had on labor and the environment (Rahman, and Tabarok Ullah 1999; A Greenpeace/FIDH/YPSA collaboration, 2005; FIDH, 2002; Greenpeace, 2003). Investigative journalists focused on issues in South Asian yards in popular publications, short pieces of nonfiction, films, and videos. A coalition of NGOs was established in Brussels under the name, NGO Shipbreaking Platform in 2005 to raise awareness about shipbreaking and collect, aggregate, and analyze data and information from activists working on the ground in South Asia.
13. The GoB sees HKC-compliance as the way to remain competitive with the Indian market. In 2015, China stopped recycling non-Chinese vessels, with Scandinavian actors such as Maersk trying to find South Asian ship recycling facilities that comply with international environmental and labor standards in its stead (Dewan 2023).
14. Saying a yard is HKC-compliant means it has received a Statement of Compliance from a classification society that has deemed the yard to have achieved standards in line with the HKC-2009.
15. Classification societies establish and maintain technical standards for construction and operation of marine vessels and offshore structures in the shipping industry (Maritime Connector 2021).
16. Based on a presentation by Ecorys for a Workshop on EU Ship Recycling Regulation NO 1257/2013 at the European Commission, Brussels, 27th June 2023.
17. The "accumulation of multiple and potentially interacting industrial toxins" (Goldstein and Hall, 2015, 640).
18. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal Ban Amendment, Decision II/12, UNEP/CHW. 2/30, adopted as a decision of the 2nd meeting of the Conference of the Parties, March 1994, entered into force December 5, 2019.

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