Chapter 10

Environmental Management at Sea: What Being ‘Green’ Means for Seafarers

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In this chapter the practice of complying with pollution regulations at sea is examined in relation to how work on board ships is affected. The central argument made is that while seafarers mostly perceive pro-environmental practices as morally correct and therefore worthwhile, a number of them believe that being ‘green’ makes great demands on their time and upon the quality of work and life on board the ship.

Some form of waste and garbage management has historically been required aboard most merchant ships. However, in response to global concerns about the need to preserve the environment, regulatory requirements in this area have become increasingly stringent. The transnational nature of commercial shipping activity and the industry’s continued expansion has prompted port states to enforce higher regulatory standards than those prescribed under international law, particularly in instances where there are significant risks to public health and the environment. Pollution from ships has been linked to adverse public health, and socio-economic, impacts including cancer-related mortality, seafood contamination and a decline in the number of recreationally and commercially important fish species. The need to regulate the sector is widely acknowledged today but little is known about how environmental-protection-related tasks are implemented on board because it is an activity which is often hidden from public sight.

Ship staff, play a pivotal role in ‘greening’ the industry yet little is known of the difficulties with which they are often confronted whilst endeavouring to fulfil the requirements of ecological protection. In discussing the understandings that seafarers have of green practices on the ship, reference will be made to the management of specific waste streams (including garbage, sewage, ballast water and oily wastes) on board, as well as to the control of atmospheric emissions.

One of the earliest attempts to regulate pollution at sea was through the enactment of the IMO’s international convention for the prevention of pollution

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from ships (MARPOL) on 2 November 1973. Today, this international treaty addresses almost every aspect of pollution, covering oil, harmful substances, garbage, sewage and atmospheric emissions. It is not only the shipping industry which has evidenced concern. Pressure has come from other quarters too with environmental groups and individual customers making growing demands for greater environmental sustainability in shipping activities (Sampson 2016).

The enforcement of environmental standards in the shipping sector, be they legal or commercial, is complicated by the nature of the business itself. Ships trade at sea and are often far away from those countries exercising authority over them. The vessels and their crews are managed remotely by their employers, consequently it is difficult to keep track of everyday occurrences or to resolve practical difficulties relating to the work on board. Nevertheless, despite these limitations, organisations in the shipping sector have generally upheld environmental standards, arguably because of the international practice of subjecting ships to regulatory inspections when in foreign ports. A report by the International Maritime Organization (IMO 2012) shows a downward trend in the number of ships detained globally in the last decade after undergoing a regulatory inspection. The report also indicates that there has been only a small increase in the number of vessels found to be non-compliant during the same period.

The enforcement of legal requirements for preserving the environment both locally and across borders has been successful in increasing awareness and global recognition regarding the environmental impact of shipping. Strict enforcement of these requirements has also led to a reduction in the number of shipping incidents over the past decade. The circumstances underlying the improvement in compliance levels and the issues that ship crews may have to face up to are not immediately apparent unless examined at the shipboard level of the industry. Seafarers interact with a broad mix of complex legal requirements as they traverse the world's oceans calling at one port after another. It is the difficulties faced by ship staff when fulfilling these different requirements that can shape their interpretation of pollution prevention measures.

The following describes the practical implications of pollution prevention at sea and examines the legitimacy of the practices employed by ship crews.

The Regulatory Framework for Reducing Atmospheric and Marine Pollution from Ships

Legal requirements for protecting the environment from ship-source pollution are embedded in international law and conventions. The international convention for the prevention of pollution from ships, also known as MARPOL, and the ballast water convention are among the most common of those applying to everyday operations on board merchant ships today.

Nation states are required to provide the necessary support to help seafarers comply with the requirements of implementing pollution regulations. However concern is mounting regarding the inadequacy, and in some cases the absence, of provisions for the reception of ship's waste in many ports worldwide. Wastes cannot be retained on board indefinitely, both for operational safety and for legal reasons, consequently the lack of port facilities places great demands upon seafarers tasked with finding solutions. These may include the risky practice of dumping waste overboard or seeking alternatives outside the guidelines.

Seafarers are aware that a range of sanctions is applicable when violations are detected. In Northern Europe, where strict requirements are in operation, vessels can be fined for not complying with pollution control measures. For example, in the UK the master and ship owners can be fined up to £250,000 for illegal discharge of oil and up to £5000 and/or 6 months imprisonment for falsifying entries in the ship's oil record book. Across the EU the penalties are generally capped at between EUR 150,000 and EUR 300,000 for minor offences; and between EUR 750,000 and EUR 1,500,000 in the most serious cases, including intentional infringements.¹ In the US the sanctions are much more severe and individual crew members can be personally fined or even imprisoned (Mukherjee 2006). While these punitive measures should serve to deter any acts of infringement, critics have argued that the measures also undermine the welfare (Mitropoulos 2004) of today's 1.5 million seafarers who work to support the flow of international trade.

Ship operators have developed standard procedures for seafarers to follow on board to ensure that seafarers follow international regulations and also to avoid being fined. In addition, individual customers hiring the company's ships (commonly referred to as charterers), trade associations such as the Oil Companies International Marine Forum (OCIMF) and the Chemical Distribution Institute (CDI), and organisations certifying quality management systems used by shipping companies to help reduce their environmental impact, provide best management practice guidelines for preserving the environment. These supply chain influences and economic considerations have come about because in the current global economic climate many firms are seeking to secure a competitive edge, especially in the tanker sector of the industry where strict requirements are in operation (Walters and James 2009). They are also, to some extent, prompted by the shipping industry's own desire to promote a positive image.² Such voluntary initiatives make a worthwhile contribution to the environment but their implementation on board ships places demands on seafarers that add to those they are already dealing with in the psychosocial setting of work at sea.

¹Council Framework Decision 2005/667/JHA of 12 July 2005 to strengthen the criminal-law framework for the enforcement of the law against ship-source pollution [2005] OJ L255/164.

²See, for example, the Sustainable Shipping Initiative's (SSI) Case for Action white paper which can be downloaded at https://www.ssi2040.org/wp-content/uploads/2017/01/SSI_fullreport.pdf.

Greening the Shipping Industry: Seafarers' Practices and Perceptions

The following account is based on qualitative interviews conducted by the author as part of a wider study as to how environmental governance affects seafarers (Akamangwa 2013, 2014). In the interviews, seafarers talk about green practices on board the ship and the benefits. They speak about the experience of fulfilling the requirements at work, about the prospect of criminalisation and about regulatory enforcement practices in EU and US ports. They also speak about their greatest concern: the fear of going to jail.

The original 34 interviewees were from Asia, Europe and the Pacific, and were working and living aboard two OECD-registered container ships, some trading between North Europe and the Mediterranean and others between Central and South America and the Caribbean. They were working to earn a living to support their families and to develop their careers. They are not statistically representative of the world's more than one and a half million seafarers but their views provide a sense of what it might mean for a seafarer to be 'green'.

The first thing to note is that in terms of environmental protection, many seafarers express a genuine commitment to pollution control despite the demands that international regulations place on them. One of my interviewees from the Philippines explained that: 'It's good for us so that the nature is good'. His colleague, a second officer, also from the Philippines, held a long-term perspective arguing that 'If everybody is not caring for the environment then it's very bad future for the next generation'. The case for preserving the environment in the interest of posterity was echoed by a Russian chief officer who warned against the potential socio-economic and ecological impacts in the next 5–10 decades:

You just imagine if nobody will follow; nobody will take care about the environment. So what will we get in the next 50 years? No white sand, no cold beer, no sunshine, no clear water [...] yeah. You just come to the beach and plastic around you. No fish, no animals, no birds, no anything. It will come shortly. Ok let's give it another 50-100 years. Three to four generations and it's no more green world.

Time on the planet and the natural balance of the ecosystem were also among some of the arguments advanced by seafarers for protecting the environment, as expressed in the following view by a trainee deck officer from Scotland:

I guess it's necessary to manage the environment because global warming is honestly a big issue. If somebody doesn't manage it then who knows how long we would be here for. The [rules] are important for keeping the life at sea like dolphins [laughs], try not to affect their populations, and the sharks. They all need to be present; the ecosystem needs to be present for us to function as well.

Arguing that the planet was the only home to mankind, a ship's captain from Russia believed that it was imperative to safeguard the environment for future generations:

We must save our earth; our planet. So that is why for my opinion we must have control; we must have special organisations; and we must have these rules and we must follow these rules. We must be thinking about our children, our future. Who knows how long we can stay in this planet. Everybody is dreaming that they will stay forever. How to stay forever if you are damaging this: our air, our water, our earth?

Other seafarers found a moral argument to comply with green practices on board ships. An able-bodied seaman from the Philippines was convinced that even without penalties, perpetrators of pollution will ultimately be punished by God. He explained:

You throw it yourself and nobody sees but someone will see – God. So I think you cannot escape from this because God created the world, the oceans. So from the Christian or Catholics they say that: 'Protect our globe earth'.

The AB went further to describe the act of wilfully polluting the environment as a boomerang, recounting his experience of growing up in the Philippines:

The Philippines now is crowded by garbage every time because some people are throwing everywhere and when bad weather comes, strong rains and the rivers flood, the garbage is coming. And they say in Tagalog: 'Basura mo itanpon ay babalik din sayo. . .' [If you throw garbage, it will come back to you. (Adapted from local religious song)]

Ship crews' environmental practices at sea also appeared to be linked to their environmental behaviours at home, suggesting that the company message about sustainability was attractive. A junior engineer who was using the knowledge of recycling in his private life confirmed this, remarking that he had carried the message into his community:

I have a small beach resort in Manila. So during summer time plenty [customers] coming. I instruct my [staff] that you must segregate. This is ship's instruction [laughs]: bottles, metals, cartons, paper and food waste.

Notwithstanding these views, tensions were also mounting among seafarers in this study about the practices of land-based dwellers. Ship crews appeared to be assessing green practices at sea against similar requirements to protect the environment ashore. In the view of one chief officer, the rules were somewhat disproportionate because 'nobody' was 'interested' in the environmental impact of land-based activities, and perhaps because acts of pollution on land were less noticeable. He argued:

So if you, for example, will spill the kind of oil somewhere in your garden. Who will see? Nobody will see. On a gasoline station if there is some drop of gasoil which is falling down, nobody taking account right? Who will complain on a gasoline station? Nobody will complain because nobody interested. You can imagine the pressure on the pipe while we're bunkering. Just one second [burst] and everybody will pay attention. Maybe it's because other people are taking care more about the sea or the environment at sea and less about the environment ashore.

Because seafarers are up-to-date with the smaller contribution of the shipping industry to global pollution when measured against that of other sectors, they might easily perceive green practices as excessive and out of proportion with environmental goals. This was the view held by a second engineer from Ukraine:

I know from news [reports] especially from Greenpeace; of 6 per cent of the whole world industries which [emit into the atmosphere], fleet [ships] represent only 5 per cent. So the world fleet work without damage to the environment. It's only high for the [other] industries - I see in world news.

Perhaps it is fair to say that seafarers generally agree about the necessity of protecting the environment but they do have mixed views about the legitimacy of some regulatory requirements and reservations about a number of green practices. Seafarers believe that environmental rules have become stricter for shipping in spite of the industry's lower environmental impact. The stringency of environmental regulations was reflected in the interpretation by one trainee deck officer of how things were expected to be done:

Garbage [is] number one; do not dispose plastics in any areas. That's very strict. When it comes to bilge water - oily water - that water should pass through the oily water separator with a maximum of 15 parts per million of oil in it before it will be pumped out of the ship.

According to a ship's captain who worried about the growing stringency of environmental rules and the effect it had on his crew, working conditions on board the ship had become more difficult with the growing demands for the industry to take action on the environment:

Since last year, especially since last year international rules have become too strict. Our life; the seafarers' life has not become too easy with these strict rules.

Many seafarers regard the penalties imposed by some countries as disproportionate and unfair. For example, a third engineer told me about his anxiety levels when refuelling the ship. He said:

During bunkering; suppose you make this pollution you must report immediately to the [authorities] or the Coastguard that we have pollution here. So that emergency action must be done not to spread this oil from how many miles. So you cannot hide this one. And then after that, big problem for the ship; big problem for the crew [laughs]; and for whom is in charge, especially for me. That's why I am very strict during connection [coupling of hoses]. I don't like it. I do not want to go in jail [laughs]. Yeah that's it. Five thousand US dollars fine! No, this is not a joke.

This belief among ship crews that reporting oil pollution incidents ultimately causes them to incur fines and other penalties was also articulated in the following description of a related incident by one ship's captain. According to him no matter how minor the pollution incident and how effective the ship's response oil spills always result in punitive action from the shore. He explained how:

It happened on a rainy day during cargo operations, [the ship was] rolling and the water coming down the side. Some small film of the lube oil went into the water and maybe one glass of oil. It was Antwerp port, so the stevedores are just crazy really. They immediately contacted the authorities. I was summoned to the Harbour Master but I had plenty of evidence. We sounded of course immediately the general [emergency] alarm and the crew proceeded correctly and quickly. So we did everything - just in five minutes and everything was secured. When I was summoned to harbour master I spoke to him and so he said many things to us; to the captain to the crew because we resolved the situation very fast - secured everything. But in accordance with the local regulations, the minimum we should pay some fine. It was the minimum.

It is not surprising therefore that seafarers sometimes feel penalised even when they believe that they are doing their best in challenging circumstances. The fear of being held liable or punished for incidents for which other stakeholders, including bunker suppliers and stevedores, are often partly to blame, also affects the perceptions of ship crews about the legitimacy of environmental protection requirements.

This highly punitive enforcement regime can serve to distract seafarers from their commitment to the greater good (in this case environmental protection) which can be potentially negative. One seafarer explained how:

I tell you very frankly, sometimes even if we discharge some prohibited garbage into the sea, it may be small amounts but it cannot cause big damage. But first thing I am afraid of is the authorities or some disciplinary regulations. Yes, this is my first worry I tell you very frankly. This is our first worry. Second, we worry about some damage to the marine environment but our first worry is we want to avoid any fine, any disciplinary actions against [us from] the shore or Coastguard or something like that.

Interviewees reported participating in the management of a variety of waste streams to comply not only with the standards enforced by legal requirements but also with voluntary initiatives pursued by their company. In relation to recycling, the company had in place a garbage management plan that was being followed by all vessels, as required by MARPOL regulations. According to this plan, solid waste generated on board the ships was segregated into various categories. The quantities were then recorded and discharged to a shore reception facility. As one deck officer described the plan, where possible some of these wastes could be incinerated at sea:

Well we have to comply with garbage disposal. For instance, we keep a garbage disposal log on board. We have to segregate all garbage; from plastics, recyclables, oily waste. We have separate containers for all these and these are discharged mainly ashore. We do have incinerators on board where we can burn a lot of these stuff. So we can incinerate it.

While their company took steps to reduce ship emissions within its fleet by purchasing compliant fuels from approved bunker suppliers, on board the ships seafarers were cautious about consuming bunkers which would damage the ship's engine or reduce its performance, causing it to burn more fuel and adding to emissions. One engineer explained:

We would only go to approved bunker suppliers you know. Obviously the Sulphur content has to be, I think it's one percent now. And then we get the bunkers analysed for chemical contamination as well. Once the samples leave the ship, they go to the agent. The agent then courier them off to the laboratory. It could take up to three weeks. It's not used until we get the analysis through. Because we've just had a case actually where we had an engine problem and that was because of contaminated fuel. It was very abrasive and the piston rings fractured, went into the bottom and we had big problems with the engine.

One junior engineer who confirmed that this practice was being adhered to on board the ships stated further that fuel oils were taken through a purification process to remove any impurities prior to consumption as an added precaution:

You know bunker is the lowest grade so plenty impurities from this. Especially Vanadium which can destroy the engine. That's why we have this sample before bunkering. After we finish bunkering we bring to the laboratory to make sure that the oil is good. If it passes the laboratory [test] then we can use. But we have the purifiers that all the fuel goes through to

remove as much of the damage in power so that by the time that fuel gets to the fuel injector where it's going into the engine all the nasty bits have gone.

In taking these precautions, seafarers were in effect ensuring that essential engine components (including fuel pumps and injection systems) which can affect the International Air Pollution Prevention (IAPP) certification for their ships' compliance with Nitrogen Oxide emissions limits were adequately maintained.

Sewage generated on board the company's ships was drained into separate holding tanks for grey and black water, before being taken through a treatment plant. Then treated sewage was pumped over the side as clear water within the guidelines. Similarly, oily wastes in liquid form occurring in the ship's machinery spaces were retained in the sludge holding tanks and the oily bilge tank on board the ship in accordance with MARPOL regulations. A second engineer described the separation process:

So it's a question of putting the raw mixture into a holding tank, allowing it settle out and then you usually pump that water up to a further tank which is the immediate tank for the oily water separator, allowing you a little bit further separation. So in effect there should be hardly any oil going into the oily water separator; it should be just water.

Seafarers also reported that there was an alarm system to monitor the content of oil in wastewater being recycled so that the effluent discharged did not exceed the maximum legal limit of 15 parts per million. According to a crew member who confirmed this, every step of the process was carefully documented in the ship's oil record book which had to be 'kept religiously' by the chief engineer. During a tour of the engine room on one of the ships, I learnt that sludge was not incinerated on this particular ship. The duty engineer had commented that the crew were 'very busy' and the process required a lot of preparation, including heating the sludge for evaporation before igniting it and so they simply discharged it in port.

Some of the tasks associated with preserving the environment on board ships described above require time and effort on the part of ship crews. In complying with the requirements, many seafarers are aware of the trade-offs involved. One second officer described how he believed there was a very good return for seafarers on their additional efforts as they meant that seafarers could guarantee a better future for their families:

Actually, it's a little bit more work for us unlike before you just take everything easy. But now it's additional work for us but it's not really hard work. But only additional work but this additional work in exchange for that it's good for our world - for everybody; for the environment because it's not only for us but for the children of the future.

But seafarers also questioned the feasibility of these requirements, especially when they were perceived as allowing for inflexible implementation as in the case of the prevention of oil pollution from ships. According to one chief engineer who had reservations about the practicability of recycling oily wastes using the ship's oily water separator, the mandatory equipment made the process difficult by restricting the discharge of effluent which did not contain oil:

In general, if we carry out all requirements I think it will be ok. But sometimes it's very difficult to carry out. For example, about bilge water I tell you it's a problem. It's not oily water [being discharged]; just mud. It means it's not so good this design of the oily water separator. It should only restrict oily discharges not everything.

The view that some of the requirements were difficult to fulfil was echoed by their shore-based managers who argued that rules about changing ballast were 'ridiculous' for ships trading on shorter seas routes because of the limited time between port calls.

Seafarers in this study worried less about the workload implications of being green at sea than they did about the unpleasant prospect of penalties and criminal sanctions for infringing environmental protection requirements and it was only reluctantly that they acknowledged any negative impacts on their well-being. A third officer explained:

Since I commenced my seaman life [green practices] already existed. So it's nothing special for me. But about ten years ago maybe, no such action; no such strict regulations. So nowadays the seamen they have to do more work. But I think this is nothing special; just a normal way of working.

Ship crews have become accustomed to the practice of adjusting to new work environments and the changes that come at the start of a fresh tour of duty. Therefore it seems plausible to assume that because of the nature of seafaring as a career the regulatory changes and practices which affect their work and well-being might easily go unnoticed. Conversely, while some of the consequences of being green at sea may be obvious to seafarers, the precarious nature of their employment and their inability to voice their views at work may make it difficult for them to comprehend whether their lives aboard have been adversely affected.

Fatigue at sea is not new to the shipping industry. Nevertheless, the accounts of ship crews in this study suggest that some green practices at sea might be exacerbating their experience of fatigue. A typical example is air quality emissions regulations in some regions of the world, including North Europe and California.³ Ship crews are expected to be familiar with the procedures required when they enter these regions and to change over to cleaner fuels when entering the restricted areas. Ships normally run on heavy fuel oil which emits air toxins and other particulate matter into the atmosphere during combustion. Of particular interest to regulators is

³At the time of conducting this study, the EU regulations required ships berthing in member states' ports to use fuel oil on board with a sulphur content of no more than 0.10%, much lower than the 1% limit enforced under MARPOL Annex VI (Regulation 14 which addresses the Prevention of Air Pollution from Ships). Much of the EU region included emission control areas established under MARPOL Annex VI for SOx: that is the Baltic Sea and North Sea areas. In California which is also a designated emission control area for North America, ocean-going passenger, container and refrigerated cargo ships subject to the At-Berth Regulation must reduce emissions from their diesel auxiliary engines while berthing at a California Port. The regulation currently requires that these ships turn off auxiliary engines and connect to some other source of power; or use alternative control technique(s) that achieve equivalent emission reductions. More information on the At-Berth Regulation is available from the California Air Resources Board (ARB) online at <https://ww3.arb.ca.gov/ports/shorepower/shorepower.htm>.

Sulphur Oxide emission. The legal limit for Sulphur content in fuel oil varies according to where a ship is trading, consequently when a restricted area is entered seafarers must follow a changeover procedure in which the ship must switch to burning marine gas oil which is lower in sulphur content but more expensive (currently about US\$ 260 more per metric tonne).

A chief engineer explained that on the normal trading routes their ship will run on heavy fuel oil which is cost-effective for ship operators. When going into a designated sulphur emission control area (SECA), including ports and anchorages in countries where additional limits apply, seafarers begin the changeover period 24 hours before entering the SECA. This ensures that their ship is running on compliant fuel before entering the area. However, the process is not straightforward and cannot be achieved by simply flicking a switch. On board the ship, the crew have to carry out a fuel consumption calculation to determine exactly when to start changing over, and to address the associated logistical demands. Engineers on board the ships in this study complained about having to perform the fuel switch-over during their hours of rest to ensure that the ship was burning the correct fuel at the required nautical mile mark. One senior ship's officer reported that such complaints, together with a related concern about accumulating unpaid overtime, were simply dismissed by their shore-based managers who argued that the crew were not managing their time efficiently. Additional technical difficulties are experienced by ship crews when they are required to use low-sulphur fuels. Previous studies⁴ have highlighted problems with the supply and storage of low-sulphur fuel particularly for ships with single service tanks. Ship crews also have to grapple with incompatibility between fuel types and delays when changing over from one to another

A third engineer described the extent of the problem:

It's planning. Also you cannot mix this fuel; suppose the density is 0.988 and another one is 0.999 so you must consume first: make to the lowest from the tank before you use the other one. Otherwise you will [have] too much problems for the purifier. You will become crazy about the density [laughs].

In relation to health impacts, seafarers did not generally believe green practices on board ships exposed them to any health hazards. Those who did were concerned, in part, about coming into contact with bacteria from decaying waste in the ship's general garbage. But there are other potentially hazardous green practices of which ship crews might simply be unaware. When asked how medical waste was handled at sea, seafarers quickly dismissed the possibility of contamination arguing that such wastes only occurred in limited quantities because serious incidents were evacuated ashore. However the management of first aid cases at sea⁵ and the self-medicating

⁴For more on technical issues relating to fuel switching on ships refer to US Environmental Protection Agency 2010, *Clean Fuels in the Marine Sector*, New York: Nova Science. See also AGCS (2012). Issues relating to the practicality of fuel change over on board ships are discussed in Bloor et al. (2011)).

⁵For the occurrence of hygiene or non-infectious medical waste in ships' garbage see National Research Council (1995).

practices (Acejo et al. 2011) of ship crews can in fact contribute to medical and hygiene wastes occurring infrequently in the ship's garbage. This places ship crews responsible for sorting the ships general waste at risk of infection, especially if they are not using adequate protection when performing the task.

Seafarers also appeared to be underestimating the potential for harm to their health if they came into contact with oil and chemicals when dealing with spills on deck. While personal protection is recommended in written procedures for responding to pollution incidents at sea, it is not clear whether ship crews are taking the guidance seriously when cleaning up spills of a smaller nature, especially when they believe that the products are 'safe' and 'environmentally-friendly'.

So what really matters to seafarers when it comes to being green at sea? Contrary to what one would expect, the issues relate more to welfare concerns than to those of health and safety. The fear of being punished for inadvertently infringing environmental rules and the general psychosocial anxiety associated with green practices on board, are among seafarers' major preoccupations. Many ship crews, including some whose views are expressed in this chapter, do not come from communities where environmentally green practices are of concern. Even those who do, and this includes seafarers who have received the appropriate training and support from their employers, cannot go about their duties confidently because of the uncertainty of regulatory inspections in different parts of the world. This is particularly so where additional requirements apply in some jurisdictions, and the enforcement of criminal sanctions for even the smallest infringements, has the potential to contribute to seafarers' experience of psychosocial stress. These experiences of workplace stress can also trigger events of a more serious nature. Extrinsic environmental performance pressures are often matched by the need for strict observation of company programmes and control measures. When preventing or responding to environmental incidents and hazardous occurrences crews might easily overlook safe working procedures. For example, failure to use the recommended personal protection when carrying out pollution prevention activities on board could expose ship crews to dangerous levels of toxic chemicals or other substances hazardous to their health. However, we are still a long way from knowing the extent of occupational health problems among sea-going workers from such exposure.

Conclusions

In exploring the methods used by ship crews to protect the environment this chapter has considered seafarers' commitment to activities related to environmental sustainability and the practices that support this engagement. It is clear from the findings that the environment does matter a great deal to seafarers. All of those interviewed in this study acknowledged the need to protect the environment, frequently citing posterity among the arguments advanced. The certainty that there was a high level of awareness and understanding of sustainability among sea-going personnel is further reflected in seafarers' accounts connecting the impact of everyday actions

at work with sustainability using negative socio-economic and ecological impacts as illustrations of how a dystopian future may unfold under practices which encouraged pollution.

In spite of these drivers and the perceived benefits of adhering to green practices at sea, ship crews did not hesitate in expressing disapproval of the strict environmental regulations imposed on the industry. The majority of seafarers said they believed that the shipping industry has become more strictly regulated as a result of the threats to biodiversity and climate change despite what they describe as the industry's 'lower' environmental impact. They argued that the rules were stricter for shipping than for land-based industries where 'green' regulations were not being equally enforced.

Seafarers' mixed views about the legitimacy of environmental requirements described in this chapter mirror concerns by their shore-based managers about the 'unreasonableness' of pollution prevention requirements reported in a wider study (Akamangwa 2013). Elsewhere, such concerns have been found to undermine regulatory objectives (Bardach and Kagan 1982). Such judgments about the compliance practices of other regulatees, arising from the unfair and unequal imposition of regulatory burdens across different sectors, need to be taken seriously in the interest of ensuring a level-playing field in the industry but more importantly, in order to encourage behaviour change among sea-going employees (Tudor et al. 2008) and to promote long-term compliance.

While differences in national and legal regulatory systems mean that some countries legitimately adopt more stringent pollution control standards,⁶ it is the scaling of enforcement practices that seafarers are concerned about. The detailed, complex and uncertain nature of some local requirements mean that ship crews could almost always be in breach of the provisions. In regards to the sanctions for violations, the general feeling among seafarers is that such penalties are unfair especially because they target violations which are often unintentional. Additionally, the very prospect of sanctions causes ship crews to experience recurrent moments of fear and anxiety. Not only does this impact adversely on crew morale on board but there are possible health and safety implications to consider in seafarers fulfilling the requirements.

In the current context of environmental sustainability, basic seamanship requires today's sea-going personnel to learn to become part of a green shipboard community. The obligation to cope with regulatory enforcement issues and the environmental responsibilities bestowed upon them is rarely considered. The experiences of seafarers as described in this chapter suggests a difficult situation faced by a community actively seeking to contribute their quota to contemporary global goals of environmental sustainability but who are often constrained by conflicting requirements and resource limitations both within their organisations and also the countries where they trade.

⁶For a discussion of the substantive scope of port state jurisdiction, refer to Molenaar (2007).

So what can we learn about green practices at sea? Are green regulations and company practices putting the environment before workers? Clearly seafarers are employed in a range of environmentally-friendly processes, but what remains a matter for debate is whether the consequences for seafarers are sufficiently considered. If shipping companies and society as a whole continue to benefit from seafarers' commitment to green practices at sea, without turning attention to the implications for work and wellbeing for front-line personnel, ship crews will continue to face unfavourable working conditions.

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