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# Suggestions for improving the effectiveness of environmental education in the maritime sector

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## ABSTRACT

Research shows that many barriers to pro-environmental behaviour in the maritime industry exist despite significant efforts of various stakeholders, and there is a need to put additional efforts to improve the sustainability of shipping. Education has an important role because a lack of environmental knowledge is almost always identified as a barrier to environmental concern and behaviour. However, eliminating knowledge gaps and raising concern does not necessarily translate to behaviour change, because behaviour depends on numerous factors, which moderate and mediate one another. Effectiveness of education activities may be improved if potential barriers are identified and targeted. This paper reviews determinants of pro-environmental behaviour and provides some suggestions for educators to plan and execute educational activities to increase the willingness of seafarers and shore-based personnel to adopt environmentally-friendly practices.

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## 1 Introduction

Achieving 17 Sustainable Development Goals (SDGs) adopted by the UN's 193 member states in 2015 is not possible without a significant contribution of a maritime community (IMO 2019). This is particularly valid regarding SDG 14: to conserve and sustainably manage ocean and marine resources by 2030. Although ships are the least environmentally damaging form of transport ("Marine Environment", n.d.), the environmental impact of maritime transport is significant. Moreover, world seaborne trade is predicted to grow 3.8 per cent annually between 2018 and 2023 (UN, 2019). Therefore, eliminating or reducing adverse environmental impacts from vessels during their entire lifecycle to the fullest extent possible is a necessary step on the way towards restoring and improving ocean health.

Environmental effects of maritime transport have been addressed by numerous measures, which can be categorized into five types: regulations and enforcement, technological solutions, regional and international initiatives, incentive and awarding and awareness (Walker et al., 2019). However, giving full and complete effect to these

instruments depends on many interrelated and complex factors, which can vary significantly among different target groups (Mickwitz, n.d.). Many innate characteristics of shipping (including a broad range of stakeholders, multi-cultural and multinational aspects, ship-based and shore-based personnel, the complexity of ship operation) cause additional challenges for the successful implementation of environmental policy instruments.

Education of seafarers has been recognized as pivotal in enabling their contribution to environmentally sound shipping and the Manila amendments to the STCW Convention and Code in 2010 included new requirements for marine environment awareness training. As stated in Model course Marine Environmental Awareness "Better understanding of the effects of shipping on the environment will lead to better compliance with regulations and better use of technical installations and procedures. The model course aims to inspire people to play a positive and proactive role, to take responsibility, and to contribute to environmentally sound shipping".

However, many studies have found that there is a significant gap between knowledge/awareness/concern and be-

haviour (Kollmuss and Agyeman, 2002). Pro-environmental behaviour is determined by multiple, interdependent factors and a plethora of research focuses on identifying them and understanding their effects. To be effective, interventions, including educational measures, should be well-tuned and aimed at antecedents of the relevant behaviour (Steg and Vlek, 2009). This paper reviews determinants of pro-environmental behaviour and provides some suggestions on how to tailor educational activities performed in a maritime setting to reach the audience and foster behavioural change.

## 2 Background

As one of the most important measures to reduce the environmental effects of human activities, numerous international and national legal instruments have been developed and implemented. However, the effectiveness of these instruments rests on numerous factors, including a level of compliance. Social and personal factors, ability to comply and characteristics of compliance assurance systems such as societal respect for the law, availability of the necessary technology, workload, and level of environmental consciousness determine whether compliance level will be low or high (OECD, 2004). The fact that high environmental compliance levels are rarely observed, even in developed countries with a high level of public awareness on environmental issues, is usually explained by insufficient monitoring and enforcement of law (Ostrovskaya and Leentvaar, 2011).

Despite significant efforts by various stakeholders, compliance with environmental regulations is still an issue in maritime transport. For example, deficiencies related to oil record book are one of the 5 most frequently recorded during Port State Control inspections carried out by Paris MoU authorities in 2018 ("Annual reports | Paris MoU," n.d.). In addition to common factors present in all sectors, some characteristics of shipping, such as efficiency-thoroughness trade-off combined with a difficulty to notice and/or ascribe certain types of violations to a particular vessel (Possatto et al., 2015) may lead to intentional non-compliance. Furthermore, the practice of swapping the flag of a ship enables avoiding legal, financial and other risks related to pollution prevention ("Flags of convenience," n.d.). On the contrary, inadvertent non-compliance may occur due to different local requirements, logistical difficulties, and actions of supply-chain partners (Akamangwa, 2017a). On the other hand, duties on-board related to environmental compliance contribute to fatigue and stress among seafarers (Akamangwa, 2016), which is particularly important because they can result in a human error, the main cause in most of the maritime accidents. Participants of a study published in 2016 (Akamangwa, 2016) reported that some work activities in regards to pollution prevention increase workload and prolong work hours, and are difficult to perform due to inadequate staffing levels, lack of control over the associated task designs,

communication difficulties between company's management and crew members and lack of support from colleagues and managers. Moreover, according to surveyed sea-going staff, the fear of criminal sanctions and exposure to chemicals may also endanger the health and well-being of ship crews.

Besides duties related to environmental regulatory measures, crew members often perform additional activities related to various voluntary approaches that have been used to address environmental issues in maritime transport (Walker et al., 2019). Namely, many organisations, including numerous global companies recognised that mere compliance with the relevant regulations is not enough and initiated and/or implemented voluntary instruments such as environmental management systems, environmental labelling, voluntary agreements, and environmental charters either to complement existing legislation or in areas where legislation has not been developed. However, motivation for participation and environmental effectiveness of voluntary approaches have been questioned, and many voluntary approaches have been criticised because of vague or non-measurable goals or non-binding nature (Brouhle et al., 2005).

For example, improvement of environmental performance, cost reduction, response to client requests, implementation of a green marketing strategy, improvement of corporate image, improvement in the relationship with local communities, improvement in the relationship with regulators, fundraising, improvement of product quality and competition with certified competitors have been identified as drivers for implementing ISO 14001 environmental management system (EMS) (Arena et al., 2012). Yet, the ISO certification does not necessarily lead to positive effects for the environment (Barla, 2007). There is a possibility that an additional burden on the crew members is placed without a positive impact on the environment in cases when managers decide to implement EMS, while an enhancement of environmental performance was not among the drivers (for example as a response to customer pressure). Moreover, the organizations have to put extra effort in implementing and maintaining ISO 14001 EMS and change of personal attitudes and practices in order to get the necessary level of employee participation have been recognised as one of the major limitations (Plap et al., 2017).

Considering the above-mentioned facts, efficient environmental education of seafarers and shore-based personnel is necessary to manage environmental activities on-board in a way that enables protection of the environment without compromising safety.

## 3 Factors affecting pro-environmental behaviour

A range of different behavioural models from economics, social psychology, and sociology has been developed to understand factors that predispose individuals to pro-environmental behaviour (Axsen and Kurani, 2012).

Nevertheless, systematic reviews of relevant studies indicate that there is no single conceptual framework or model that may predict and explain why do people act environmentally (Kollmuss and Agyeman, 2002). Because many of the influential factors are broadly and vaguely defined, interrelated, and often without clear boundaries, different authors choose, define and categorize them differently. Moreover, some factors are more predictive of some behaviours than others, and distinct aspects of specific factors may interact to influence specific behaviours differentially (Cleveland et al., 2005). A comprehensive review of all relevant models and research on determinants is beyond the scope of this paper. Findings from several studies that reviewed existing literature are presented to illustrate the complexity of the problem.

Steg and Vlek (Steg and Vlek, 2009) reviewed studies by environmental psychologists and identified three lines of research that focus on individual motivation for acting pro-environmentally: weighing costs and benefits, moral and normative concerns, and affect. Goal framing theory presents an integrative framework for understanding environmental behaviour. Because human behaviour does not depend only on motivations, they proposed considering interactions between contextual factors such as physical infrastructure, technical facilities, the availability of products, and product characteristics and motivational factors. Furthermore, they identified habits as an important factor.

Gifford and Nilson (Gifford and Nilsson, 2014) grouped personal and social factors that influence pro-environmental behaviour into 17 categories: childhood experience, knowledge and education, personality, sense of control (locus of control and self-efficacy), values (egoistic, altruistic, biospheric), political and world views, felt responsibility, place attachment, norms (personal, subjective, local), age, gender, social class, chosen activities, religion, urban-rural differences, proximity to problematic environmental sites, and cultural and ethnic variations. They also mention people without presumed pre-requisites, who engage in pro-environmental behaviour for other reasons. They posited that persons who “are likely to have spent time in nature as a child, have accurate knowledge of the environment, its problems and potential solutions, to have an open, agreeable, and conscientious personality, to consider the future consequences of their actions, feel in control of their behaviours, harbour biospheric, post-material, liberal values and responsibility for environmental problems, are upper-middle-class, hold personal and descriptive norms about pro-environmental action, adhere to a religion that teaches a stewardship orientation to the earth, and spend time in non-consumptive nature activities” will more likely act on the behalf of the environment.

Blankenberg and Alhusen (Blankenberg and Alhusen, 2018) grouped determinants of pro-environmental behaviour into three categories: socioeconomic, psychological and further (individual, social, institutional). Socio-economic determinants include age, education,

income, household structure, and gender. Psychological determinants include beliefs, attitude, awareness, norms, values, identity, environmental knowledge, environmental concern, emotions, habits, and locus of control and personal responsibility. Further determinants include another individual (subjective well-being, connectedness to nature, place attachment, political ideology), social (peers), and institutional (sanctions, development status of the country).

Frederiks et al. identified individual predictors and situational predictors (contextual and structural factors) of residential energy consumption (Frederiks et al., 2015). They grouped the most commonly-examined individual factors into two broad categories: socio-demographic factors (age, gender, education, employment status, income, household size, dwelling type/size, dwelling age, homeownership, stage of family life cycle, geographic location, ownership of home technology and technical expertise) and psychological factors (knowledge and problem awareness, values, beliefs and attitudes, motives, intentions, and goals, personal norms, perceived responsibility, locus of control, self-efficacy, and perceived behavioural control, perceived cost/benefit ratio, need for personal comfort, and normative social influence).

Ding et al. (Ding et al., 2018) reviewed research results related to low-carbon consumption behaviour and classified determinants into self-factors, family factors and situational factors. The self-factors include psychological factors (environmental value, personal norm, sense of responsibility, attitude, perceived behavioural control, subjective norms, behavioural intention, habits, self-efficacy, self-identity, knowledge) and demographic factors (gender, age, education level, income). Family factors include family structure, family size, and household ownership. The situational factors include policies (information policy, economic policy, technology policy, and administrative regulation), social norms and geographical/climate factors.

Factors that influence ocean-related behaviour were summarized by Stoll-Kleemann (Stoll-Kleemann, 2019). According to the proposed model personal factors and external factors shape behaviour toward the ocean. Personal factors include personality traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism), socio-demographic factors, self-efficacy (perceived behavioural control), values and attitudes, emotions, moral disengagement, cognitive dissonance, knowledge and awareness, habits and comfort. External factors include socio-cultural factors (culture, religion, gender, proximity to coast, social norms, social identity, and lifestyles) and politico-economic factors (growth orientation, implementation of political agreements, infrastructure and availability of products).

Considering the number and correlations between influencing factors and a wide range of investigated pro-environmental behaviours it is not surprising that studies show that the impact of certain factors is not consistent.

For example, depending on the examined variables (environmental attitudes, knowledge, concern, or behaviours) the role of gender differs: gender may have an effect or no effect and women or men may be more likely involved in pro-environmental behaviours (Ding et al., 2018). Similarly, some behaviours are positively influenced by a higher education level, while some are positively influenced by a lower education level (Blankenberg and Alhusen, 2018).

#### 4 Suggestions for educators

An overview of determinants of pro-environmental behaviour suggests that greater efforts must be made for certain groups of people and that education activities should be strategically tailored to reach different audiences (Heimlich and Ardoin, 2008). Due to the abundance and complexity of the influencing factors, there is no one-size-fits-all model and research that identifies obstacles preventing each specific group to act pro-environmentally is necessary.

However, a large number of influencing factors listed in the previous section are beyond the reach of educational activities performed in a maritime setting. Seafarers are not homogenous in their perceptions and it is not feasible to perform research to explore factors involved in pro-environmental behaviours to adapt each training to target individuals. Moreover, environmentally sound shipping involves a broad range of pro-environmental behaviours. Nevertheless, in our opinion, some feasible options for improvement of education effectiveness exist.

How information is framed and communicated has an effect on its effectiveness (Byerly et al., 2018). Namely, framing, “selectively emphasizing certain dimensions of an issue over others, setting the context for perception and discussion around specific causes, risks, policy actions, and costs/benefits that might result from these actions” (Myers et al., 2012) appears to present simple and effective way to encourage pro-environmental behaviour (Newell et al., 2014). Because ships are mostly (about 80% of the merchant fleet) manned with multicultural crews there is a potential danger that problems with communication and performance appear due to insufficient level of multicultural awareness and cross-cultural understanding, causing additional stress for seafarers. Indeed, cultural differences affect safety to such an extent that casualties happened more often on ships with multinational crews (Oldenburg et al., 2009).

According to the Hofstede model (“The 6 dimensions model of national culture by Geert Hofstede,” n.d.), there are six dimensions of national cultures: “1. Power Distance, related to the different solutions to the basic problem of human inequality; 2. Uncertainty Avoidance, related to the level of stress in a society in the face of an unknown future; 3. Individualism versus Collectivism, related to the integration of individuals into primary groups; 4. Masculinity versus Femininity, related to the division of emotional roles between women and men; 5. Long Term versus Short Term

Orientation, related to the choice of focus for people’s efforts: the future or the present and past and 6. Indulgence versus Restraint, related to the gratification versus control of basic human desires related to enjoying life”.

Differences between behaviours and concepts in different cultures may also influence the willingness of crew members to adopt environmentally-friendly practices and consequently impair environmental performance. Moreover, the failure of colleagues to perform environmental protection activities may cause frustration and fear of sanctions for crew members responsible for that activity (Akamangwa, 2017b). Because a cultural dimension influences pro-environmental behaviour, chances that desirable pro-environmental behaviour change will occur as a result of environmental education are much better if it is planned taking into account cultural differences among the crew and/or shore-based managers.

For instance, identifying the level of collectivism of the target audience may help in the design of marine environmental awareness training. For example, a study performed in Germany, Spain, and Mexico, countries with low, medium and high levels of collectivism, respectively, revealed that collectivism has a positive impact on consumers’ adoption of renewable energy systems (Higueras-Castillo et al., 2019). Similarly, findings of the research performed in the USA (individualistic culture) and China (collectivist culture) showed that collectivism positively affects green purchase behaviour (Clark et al., 2019). Based on the results of a survey performed in China, which indicated that individualist/collectivist status affects climate change inaction, recommendations for policymakers have been provided (Xiang et al., 2019). Namely, research had shown that the perceived intractability, defined as “one’s belief that climate change cannot be addressed by individual action” plays a mediating role. Therefore, encouraging the public to believe in the necessity and efficacy of their individual actions has been suggested. Furthermore, information should emphasize that climate change is solvable, not only potentially catastrophic.

Another feasible option regarding framing, particularly for education as activity related to an environmental management system, is audience segmentation. Audience segmentation may help shipping companies to carefully plan usage of human and financial resources to target audience segments whose members are crucial for achieving specified goals and adapt messaging to engage them effectively. Namely, audience segmentation (based on demographic, geographic, psychographic, attitudinal, cultural and behavioural attributes) has been recognised as an important tool to improve the effectiveness of educational activities (Kidd et al., 2019). For example, six audience segments of the American public for global warming public engagement campaigns have been identified: Alarmed, Concerned, Cautious, Disengaged, Doubtful, and Dismissive, and appropriate framings and communication channels have been proposed (Maibach et al., 2011). Global Warming’s Six Americas emotionally reacted differ-

ently to the environment (consequences of climate change to ecosystems), public health (health risks associated with climate change), and national security (risks to U.S. national security) framed messages and findings indicated that certain frames may have potential boomerang effect within some segments (Myers et al., 2012).

Emotional reactions (pride, hope, gratitude, fear, sadness, anger) play a significant role in shaping personal norms, which indirectly influence intentions to engage in protective behaviour towards the environment (Kollmuss and Agyeman, 2002). For example, exposure to an eco-dystopian science fiction film had an indirect effect on intentions to behave pro-environmentally by increasing guilt (Bilandzic and Sukalla, 2019). Therefore, an alternative knowledge transfer may be considered as an option for educators involved in the delivery of courses offered by maritime universities. For instance, an activity named 'I am the Ocean' has been created in collaboration between an artist and a scientist (Dupont, 2017). Field trips, open discussions, and sensory immersion were used to evoke emotions and to develop a personal connection to marine global changes. Similarly, to foster hope, success stories may be used to illustrate that positive results for the environment may occur due to personal behaviour change (Stoll-Kleemann, 2019).

Finally, institutions may induce behavioural change not only by providing educational information but also by implementing, promoting and signalling desirable social and pro-environmental norms (Santos and Linden, 2016). For example, the Princeton Drink Local Program was established to decrease disposable bottled water consumption on campus (Santos and Linden, 2016). Providing incoming students with reusable water bottles decreased the consumption of bottled water and increased normative support for a campus bottled water ban. Therefore, education activities should be executed in an environmentally-friendly way (e.g. reducing transportation needs, reducing paper consumption, providing sustainably produced food and beverages) to promote pro-environmental behaviour.

## 5 Conclusions

Educators in the maritime sector have a responsibility to encourage and facilitate the pro-environmental behaviour of seafarers and on-shore personnel. To accomplish that goal it is not enough to transfer knowledge related to prevention of ship-generated pollution, but also to address barriers that prevent translating awareness into behaviour.

The list of options presented here is not exhaustive and we hope that creative dialogue between educators involved in education/training in the maritime sector and experts from other disciplines may result with further suggestions.

Importantly, institutions and educators that provide maritime education and training should lead by example, because it is important that they do not possess "Do as I say, not as I do" attitude.

## References

- [1] Akamangwa, N., 2017a. Regulatory influences on environmental protection: Why shipping companies comply and when they don't. *Ocean Development and International Law* 48, 158–180. <https://doi.org/10.1080/00908320.2017.1290485>
- [2] Akamangwa, N., 2017b. Understanding Environmental Requirements and Their Implementation Aboard Merchant Ships. *Ocean Yearbook Online* 31, 345–380. <https://doi.org/10.1163/22116001-03101014>
- [3] Akamangwa, N., 2016. Working for the environment and against safety: How compliance affects health and safety on board ships. *Safety Science* 87, 131–143. <https://doi.org/10.1016/j.ssci.2016.03.027>
- [4] Annual reports | Paris MoU [WWW Document], n.d. URL <https://www.parismou.org/publications-category/annual-reports> (accessed 10.18.19).
- [5] Arena, M., Azzone, G., Platti, M., 2012. ISO14001: Motivations and Benefits in the Italian Metal Industry. *International Journal of Engineering Business Management* 4, 41. <https://doi.org/10.5772/54786>
- [6] Axsen, J., Kurani, K.S., 2012. Social Influence, Consumer Behaviour, and Low-Carbon Energy Transitions. *Annual Review of Environment and Resources* 37, 311–340. <https://doi.org/10.1146/annurev-environ-062111-145049>
- [7] Barla, P., 2007. ISO 14001 certification and environmental performance in Quebec's pulp and paper industry. *Journal of Environmental Economics and Management* 53, 291–306. <https://doi.org/10.1016/j.jeem.2006.10.004>
- [8] Bilandzic, H., Sukalla, F., 2019. The Role of Fictional Film Exposure and Narrative Engagement for Personal Norms, Guilt and Intentions to Protect The Climate. *Environmental Communication* 13, 1069–1086. <https://doi.org/10.1080/17524032.2019.1575259>
- [9] Blankenberg, A.-K., Alhusen, H., 2018. On the determinants of pro-environmental behaviour: A guide for further investigations. <https://doi.org/10.2139/ssrn.3186089>
- [10] Brouhle, K., Griffiths, C., Wolverton, A., 2005. The Use of Voluntary Approaches for Environmental Policymaking in the U.S., in: Croci, E. (Ed.), *The Handbook of Environmental Voluntary Agreements*. Springer-Verlag, Berlin/Heidelberg, pp. 107–134. [https://doi.org/10.1007/1-4020-3356-7\\_6](https://doi.org/10.1007/1-4020-3356-7_6)
- [11] Byerly, H., Balmford, A., Ferraro, P.J., Wagner, C.H., Palchak, E., Polasky, S., Ricketts, T.H., Schwartz, A.J., Fisher, B., 2018. Nudging pro-environmental behaviour: evidence and opportunities. *Frontiers in Ecology and the Environment* 16, 159–168. <https://doi.org/10.1002/fee.1777>
- [12] Clark, R.A., Haytko, D.L., Hermans, C.M., Simmers, C.S., 2019. Social Influence on Green Consumerism: Country and Gender Comparisons between China and the United States. *Journal of International Consumer Marketing* 31, 177–190. <https://doi.org/10.1080/08961530.2018.1527740>
- [13] Cleveland, M., Kalamas, M., Laroche, M., 2005. Shades of green: linking environmental locus of control and pro-environmental behaviours. <https://doi.org/10.1108/07363760510605317>
- [14] Ding, Z., Jiang, X., Liu, Z., Long, R., Xu, Z., Cao, Q., 2018. Factors affecting low-carbon consumption behaviour of urban residents: A comprehensive review. *Resources, Conservation and Recycling* 132, 3–15. <https://doi.org/10.1016/j.resconrec.2018.01.013>

- [15] Dupont, S., 2017. I am the Ocean – arts and sciences to move from ocean literacy to passion for the ocean. *Journal of the Marine Biological Association of the United Kingdom* 97, 1211–1213. <https://doi.org/10.1017/S0025315417000376>
- [16] Flags of convenience, n.d. NGO Shipbreaking Platform. URL <https://www.shipbreakingplatform.org/issues-of-interest/focs/> (accessed 10.24.19).
- [17] Frederiks, E.R., Stenner, K., Hobman, E.V., 2015. The Socio-Demographic and Psychological Predictors of Residential Energy Consumption: A Comprehensive Review. *Energies* 8, 1–37.
- [18] Gifford, R., Nilsson, A., 2014. Personal and social factors that influence pro-environmental concern and behaviour: a review. *Int J Psychol* 49, 141–157. <https://doi.org/10.1002/ijop.12034>
- [19] Heimlich, J., Ardoin, N.M., 2008. Understanding behaviour to understand behaviour change: a literature review. <https://doi.org/10.1080/13504620802148881>
- [20] Higuera-Castillo, E., Liébana-Cabanillas, F.J., Muñoz-Leiva, F., Molinillo, S., 2019. The role of collectivism in modeling the adoption of renewable energies: a cross-cultural approach. *Int. J. Environ. Sci. Technol.* 16, 2143–2160. <https://doi.org/10.1007/s13762-019-02235-4>
- [21] IMO, 2019. IMO and the Sustainable Development Goals [WWW Document], n.d. URL <http://www.imo.org/en/MediaCentre/HotTopics/Pages/SustainableDevelopmentGoals.aspx> (accessed 4.16.19).
- [22] Kidd, L.R., Garrard, G.E., Bekessy, S.A., Mills, M., Camilleri, A.R., Fidler, F., Fielding, K.S., Gordon, A., Gregg, E.A., Kusmanoff, A.M., Louis, W., Moon, K., Robinson, J.A., Selinske, M.J., Shanahan, D., Adams, V.M., 2019. Messaging matters: A systematic review of the conservation messaging literature. *Biological Conservation* 236, 92–99. <https://doi.org/10.1016/j.biocon.2019.05.020>
- [23] Kollmuss, A., Agyeman, J., 2002. Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research* 8, 239–260. <https://doi.org/10.1080/13504620220145401>
- [24] Maibach, E.W., Leiserowitz, A., Roser-Renouf, C., Mertz, C.K., 2011. Identifying like-minded audiences for global warming public engagement campaigns: an audience segmentation analysis and tool development. *PLoS ONE* 6, e17571. <https://doi.org/10.1371/journal.pone.0017571>
- [25] Marine Environment [WWW Document], n.d. URL <http://www.imo.org/en/OurWork/Environment/Pages/Default.aspx> (accessed 10.25.19).
- [26] Mickwitz, P., n.d. A Framework for Evaluating Environmental Policy Instruments 22.
- [27] Myers, T.A., Nisbet, M.C., Maibach, E.W., Leiserowitz, A.A., 2012. A public health frame arouses hopeful emotions about climate change. *Climatic Change* 113, 1105–1112. <https://doi.org/10.1007/s10584-012-0513-6>
- [28] Newell, B.R., McDonald, R.I., Brewer, M., Hayes, B.K., 2014. The Psychology of Environmental Decisions. *Annual Review of Environment and Resources* 39, 443–467. <https://doi.org/10.1146/annurev-environ-010713-094623>
- [29] OECD, 2004. Assuring Environmental Compliance. Toolkit for building better environmental inspectorates in Eastern Europe, Caucasus, and Central Asia.
- [30] Oldenburg, M., Jensen, H.-J., Latza, U., Baur, X., 2009. Seafaring stressors aboard merchant and passenger ships. *Int J Public Health* 54, 96–105. <https://doi.org/10.1007/s00038-009-7067-z>
- [31] Ostrovskaya, E., Leentvaar, J., 2011. Enhancing Compliance with Environmental Laws in Developing Countries: Can Better Enforcement Strategies Help? <https://doi.org/10.13140/2.1.4413.0249>
- [32] Plap, P., Tk, W., Su, N., 2017. Potential Drivers, Limitations, and Benefits in Implementing ISO 14001 Environmental Management Systems for Organizations in Sri Lanka. *Environmental Science: An Indian Journal* 13.
- [33] Possatto, F.E., Spach, H.L., Cattani, A.P., Lamour, M.R., Santos, L.O., Cordeiro, N.M.A., Broadhurst, M.K., 2015. Marine debris in a World Heritage Listed Brazilian estuary. *Marine Pollution Bulletin, Marine pollution and assessment of marine status in Latin America* 91, 548–553. <https://doi.org/10.1016/j.marpolbul.2014.09.032>
- [34] Santos, Linden, S., 2016. Changing Norms by Changing Behaviour: The Princeton Drink Local Program. *Environmental Practice* 18, 116–122.
- [35] Steg, L., Vlek, C., 2009. Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, Environmental Psychology on the Move* 29, 309–317. <https://doi.org/10.1016/j.jenvp.2008.10.004>
- [36] Stoll-Kleemann, S., 2019. Feasible Options for Behaviour Change Toward More Effective Ocean Literacy: A Systematic Review. *Front. Mar. Sci.* 6. <https://doi.org/10.3389/fmars.2019.00273>
- [37] The 6 dimensions model of national culture by Geert Hofstede [WWW Document], n.d. . Geert Hofstede. URL <https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/> (accessed 11.15.19).
- [38] United Nations Conference on Trade and Development, 2019. Review of Maritime Transport 2018. United Nations, S.I.
- [39] Walker, T.R., Adebambo, O., Del Aguila Feijoo, M.C., Elhaimer, E., Hossain, T., Edwards, S.J., Morrison, C.E., Romo, J., Sharma, N., Taylor, S., Zomorodi, S., 2019. Chapter 27 - Environmental Effects of Marine Transportation, in: Sheppard, C. (Ed.), *World Seas: An Environmental Evaluation* (Second Edition). Academic Press, pp. 505–530. <https://doi.org/10.1016/B978-0-12-805052-1.00030-9>
- [40] Xiang, P., Zhang, H., Geng, L., Zhou, K., Wu, Y., 2019. Individualist–Collectivist Differences in Climate Change Inaction: The Role of Perceived Intractability. *Front. Psychol.* 10. <https://doi.org/10.3389/fpsyg.2019.00187>