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Contents lists available at ScienceDirect

Marine Pollution Bulletin

journal homepage: www.elsevier.com/locate/marpolbul

Exploring public views on marine litter in Europe: Perceived causes, consequences and pathways to change

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ARTICLE INFO

Keywords:

Marine debris
Public understanding
Perception
Concern
Behaviour
Intention

ABSTRACT

Marine litter is a global challenge and society plays an important role via lifestyles and behaviour, including policy support. We analysed public perceptions of marine litter and contributing factors, using data from 1133 respondents across 16 European countries. People reported high levels of concern about marine litter, and the vast majority (95%) reported seeing litter when visiting the coast. The problem was attributed to product and packaging design and behaviour rather than lack of facilities or accidental loss of items. Retailers, industry and government were perceived as most responsible, but also least motivated and competent to reduce marine litter, whereas scientists and environmental groups were perceived as least responsible but most motivated and competent. Regression analyses demonstrated the importance of psychological factors such as values and social norms above sociodemographic variables. These findings are important for communications and interventions to reduce inputs of marine litter to the natural environment.

1. Introduction

1.1. Marine litter and policy background

Litter in the marine and coastal environment has emerged as a growing concern at the highest level. For example, in 2015, the Leaders' declaration at the G-7 summit stated “We acknowledge that marine litter, in particular plastic litter, poses a global challenge, directly affecting marine and coastal life and ecosystems and potentially also human health.” (<https://www.whitehouse.gov/the-press-office/2015/06/08/g-7-leaders-declaration>). Marine litter consists of any persistent, manufactured or processed solid material discarded, disposed of or abandoned on the coastline or at sea, and it arises as a consequence of

the unsustainable consumption and production patterns of many sectors of society, ranging from industry, fisheries and aquaculture, tourism to individuals. It is a global problem without regard for national borders (Galvani et al., 2010; STAP, 2011; UNEP, 2005). Around 700 species are known to encounter marine debris in the environment, and negative ecological effects include increased harm to marine organisms via ingestion and entanglement (Gall and Thompson, 2015; Gregory, 2009). The socio-economic costs associated with marine litter are increasing, and it is thought to interfere with a range of ecosystem services including cultural services such as psychological and physical health benefits derived from visits to coastal environments (GESAMP, 2015, 2016; Mouat et al., 2010; Wyles et al., 2014). Plastics are regarded as one of the most problematic aspects of marine litter because of their

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<https://doi.org/10.1016/j.marpolbul.2018.05.061>

Received 20 December 2017; Received in revised form 25 May 2018; Accepted 27 May 2018
0025-326X/© 2018 Published by Elsevier Ltd.

abundance, longevity and the fact that large marine litter items break down into ever smaller parts termed microplastics (Law and Thompson, 2014). Whilst there is substantial scientific literature on the abundance, physical causes and impacts of marine litter, little research to date has examined the public's views on both the problem and the potential solutions.

In Europe, marine litter has received major attention because it is one of the eleven Descriptors within the Marine Strategy Framework Directive (MSFD – European Directive 2008/56/EC). Work by European Regional Seas Conventions aids the development and implementation of Regional Action Plans on marine litter in the context of other EU policy frameworks and legislation, including the Waste Framework Directive, the Packaging and Packaging Waste Directive, the Water Framework Directive, and the Cosmetic Products Regulation (Kershaw et al., 2013). While the problems associated with marine litter are focused in the coastal and marine environment, this debris originates mainly from land and the solutions to the problem lie on land. Therefore, actions to reduce marine litter must involve concerted efforts across nations, disciplines and stakeholder groups, considering a variety of pathways. Actions must involve the general public, commercial users of the ocean and coasts, waste management agencies, industry (e.g., product designers and manufacturers), regulators, educators, environmental NGOs and CSOs, national, regional and local government. Focusing on plastics specifically, this ambition is realised in the first-ever Europe-wide strategy on plastics adopted in January 2018. Marine litter is an issue without borders and understanding public views on marine litter is of crucial importance for the successful implementation of any prevention, reduction and mitigation policy measures.

Human behaviour is the sole source of marine litter, and changing perceptions and behaviour is key to tackling litter escaping into the natural environment (Pahl et al., 2017). The general public plays an important role in addressing marine litter through their lifestyles and consumption patterns, waste management practices, and support or other engagement in the implementation of policies aiming to address marine litter such as the plastic bag directive (European Directive 2015/720/EC; Poortinga et al., 2013). Therefore, understanding public perceptions and responses to the issue of marine litter is a critical step in effectively engaging society and in developing and implementing widely acceptable solutions to reduce litter inputs into marine and coastal systems.

This paper explores public views on marine litter in Europe, specifically focusing on perceived causes, consequences and pathways to change. The work was done in the context of a wider study on stakeholder perceptions, carried out as part of the European MARLISCO project (Veiga et al., 2016b). In this paper we focus on findings related to responses from the general public rather than all stakeholders and offer new insights into how the European public perceives and responds to the issue of marine litter. First, we review relevant social-psychological theories of environmental behaviour and then summarise the (limited) literature on marine litter perceptions that is currently available.

1.2. Social-psychological theories and research on environmental behaviour

Human behaviour plays an important role in both contributing to and mitigating environmental problems, and it is crucial to understand the determinants of environmental behaviour (Klöckner, 2013; Pahl and Wyles, 2016). There is a substantial body of theory and research on environmental behaviour and perceptions for different environmental challenges, e.g., climate change and energy use (Gardner and Stern, 2002; Gifford, 2014; Klöckner, 2013; Schultz, 2001; Stern, 2000). For example, the *Theory of Planned Behaviour* (TPB, Ajzen, 1991), *Norm-Activation-Theory* (NAT, Schwartz and Howard, 1981; Thøgersen, 1996), and *Value-Belief-Norm-Theory* (VBN, Stern, 2000) are some of the most commonly used theories in the environmental psychology domain. Klöckner (2013) recently tested an integrative model, combining data

from 56 data sets targeting different environmental behaviours. He identified intentions, attitudes, perceived responsibility and awareness of consequences as relevant predictors of behaviour. This is in line with Gifford's (2014) review, which listed psychological predictors of behaviour (e.g., knowledge and awareness, concern, perceived control, values, attitudes, personal responsibility, moral and social norms, personal experience of and proximity to the problem) as well as demographic characteristics (e.g., age, gender, education level). Our study broadly but selectively draws on these underlying theoretical frameworks and factors, but it does not test a specific theory. Instead it is a first exploration of the psychological behaviour change approach as applied to the issue of marine litter in Europe, to identify and describe current understanding and perceptions as well as relevant predictive factors in this novel context.

1.3. Public perceptions of threats to the marine environment

Emerging literature describes public perceptions and understanding of marine environmental issues broadly. Initial studies focused on specific populations or contexts. For example, Fletcher et al. (2009) explored the views of visitors to the UK's National Maritime Museum on marine environment related issues, and Scott and Parsons (2005) explored the opinions of Scottish respondents on cetacean conservation issues. "Pollution" was rated as the most pressing issue in the Fletcher et al. (2009) study, and oil spills, reduction of prey and marine litter (in this order) were perceived as the most serious UK threats in the Scott and Parsons (2005) study. A larger recent survey asked participants in ten European countries to list the three "most important environmental matters" regarding the coastline or the sea. General pollution was the top category with 33% of responses (Gelcich et al., 2014). This category included mentions of water pollution, oil pollution, sewage etc., but not mentions of solid marine litter as defined above. Gelcich et al. (2014) were also the first to present data on perceptions of organisations or societal actors in the complex system of marine environmental matters. They found that scientists and environmental organisations were among the most trusted, with industry and government among the least trusted to provide information on marine environmental issues. These are important insights but the focus of the trust question was on "climate change impacts on the coastline and the sea" (p. 3), and trust itself is determined by a range of different elements including perceived motivation and competence that are worth exploring further (see Section 1.4). Finally, Potts et al. (2016) report data from a large-scale survey exploring the links between society and the sea in seven European countries. Next to perceived threats they also investigate the perceived value of the ocean, in line with an ecosystems services approach (e.g., Sandifer et al., 2015). Potts et al. (2016) were the first to investigate perceived threat from specific marine issues, and pollution from industry, litter, and oil and gas extraction were perceived as the most severe threats by their European respondents. They also distinguished coastal and inland populations in their analysis but intriguingly found little effect of distance to the coast. However, a mere residential distance measure might have been unable to pick up more subtle effects of frequency of actual visits to the coast and of noticing marine litter.

In summary the small academic literature on public perceptions of marine environmental threats is growing but to date there is very little data on one of the biggest societal challenges of our times, marine litter, specifically (Brennan and Portman, 2016). There are a few exceptions. In an early study, Bonaiuto et al. (1996) showed that strong local identity was associated with defensive perceptions of beach quality in the UK. A small-scale study by Wyles et al. (2015) found that general public respondents rated coastal litter originating from the public (e.g., food packaging) more negatively than they rated fishing litter (e.g., nets). Hartley et al. (2015) showed that British children were more concerned and had higher intentions after a marine litter educational intervention. A qualitative study by Brennan and Portman (2016)

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