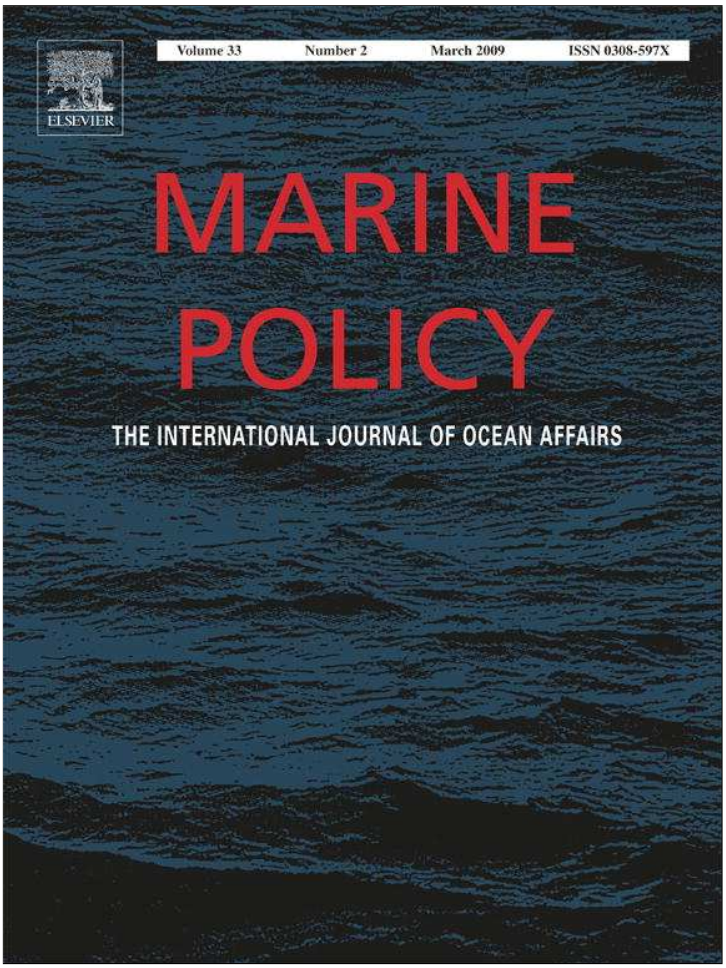

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Public awareness of marine environmental issues in the UK

Stephen Fletcher [a,*], Jonathan S. Potts [b], Carolyn Heeps [c], Kate Pike [d]

[a] School of Conservation Sciences, Bournemouth University, Christchurch House, Talbot Campus, Fern Barrow, Poole, Dorset BH12 5BB, UK
[b] School of Environmental Design and Management, The University of Portsmouth, Portland Building, Portland Street, Portsmouth PO1 3AH, UK
[c] Fred Olsen Renewables Ltd, Kings Scholars House, 230 Vauxhall Bridge Road, London, SW1V 1AU, UK
[d] School of Engineering, Construction and Maritime, Southampton Solent University, East Park Terrace, Southampton SO14 0YN, UK

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ABSTRACT

This paper presents the results of a survey of public awareness of marine environmental issues within the context of the UK's National Maritime Museum. It was found that public interest in marine environmental issues is significant, but that gaps exist in terms of issue-specific awareness and that the availability of independent information on marine issues is limited. It is concluded that there are significant opportunities to develop the Museum's role in raising public awareness of marine environmental issues that build on its current activities and that of the Museum's partners.

1. Public understanding of coastal and marine issues

The research literature on public understanding of marine and coastal issues is limited, although examples do exist [1–6]. Two key themes emerge from the existing literature: firstly that public awareness of marine and coastal issues is difficult to discern making definitive statements about this issue difficult; and secondly that much of the existing research suggests that there is "a very low level of understanding of basic concepts and principles related to the marine environment" [7, p. 160].

The most comprehensive study into public awareness of marine and coastal issues was conducted by Steel et al. [8]. It examined 'ocean literacy' levels amongst adults in the United States (US). This study involved a survey of 1233 members of the US public. Steel et al. [8] found that people living in coastal states had higher levels of self-assessed informedness of ocean and coastal policy issues, greater familiarity with ocean and coastal management terms, and performed better in a 'quiz' about ocean issues. This suggests a clear connection between location of residence and familiarity with ocean issues.

The study also found that the level of policy-relevant knowledge held by a member of the public is related to their socio-economic status. In particular, "…lower socio-economic status individuals typically have significantly lower levels of policy-relevant knowledge when compared to those of higher socio-economic status" [8, p. 100]. Steel et al. [8] go on to explain that there are two core reasons for this relationship. The first relates to trans-situational conditions including the relative levels of formal education, income and occupation. The second relates to situation-specific factors that are discrete to the individuals concerned, including motivation, commitment to the cause and policy stake. These factors are important irrespective of the socio-economic status of an individual. Furthermore, recent research suggests that current ways of raising awareness of coastal and marine issues are inadequate, at least as far as the general public is concerned [9].

This paper builds on these preceding studies by presenting the results of a survey of public awareness of coastal and marine environmental issues in the UK, specifically within the context of the National Maritime Museum's (NMM) *Planet Ocean* initiative.

2. The National Maritime Museum

Since opening in 1937, the NMM has been responsible for collecting, interpreting and celebrating the United Kingdom's (UK's) maritime heritage. With over 2 million maritime-related artefacts the NMM is the largest repository of its kind in the world [10]. The Museum receives over 1.5 million visitors a year and holds pre-eminent collections reflecting humankind's relationship with the sea across centuries, cultures and continents. Its mission is to illustrate the on-going importance of this relationship [6].

Over the past 60 years, however, the relationship between humankind and the maritime environment, in all its forms, has changed markedly [2,11]. Fundamental shifts in attitudes toward, and involvement with the sea have occurred within institutional,

* Corresponding author. Tel.: +44 1202 966737; fax: +44 1202 965255.
E-mail address: sfletcher@bournemouth.ac.uk (S. Fletcher).

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academic, commercial and public spheres. The Museum recognised these changes and when it 're-opened' in 1999 it offered both revised interpretations of its existing collections and new approaches to meet the diversity and complexity inherent to marine issues [6,10].

2.1. The NMM's marine environment initiative: Planet Ocean

Arguably, the most important of the new issues being tackled by the Museum is political and public concern for, and involvement with, the marine environment. To promote public awareness of the oceans and the importance of their conservation and sustainable development, the Museum launched *Planet Ocean* in 2002. *Planet Ocean* is a major, long-term programme that allows the Museum to bring together and showcase the past, present and future of the oceans [4–6]. The key themes of the initiative are:

- oceans and environmental change,
- biodiversity and resources,
- sustainable development and stewardship,
- communities and citizenship.

The initiative is now well established and has a strong sector profile and growing reputation with the UK's marine environment community [6]. Phase I (2002–2004) of the strategy was concerned with raising the profile of the NMM in this subject area and establishing the necessary partnerships and other resources to drive the initiative forward. Phase II (2004–2009) is building on Phase I achievements and seeks to deliver an initiative that is a market leader in this field—both nationally and internationally. The focus of this second stage is to improve public interpretation, education, participation and outreach.

2.2. Education, participation and outreach

The marine environment is a complex, challenging and emotive subject area, which is highly relevant to our day-to-day lives. Improving public understanding and awareness of this subject is vital to moving towards a more holistic and sustainable approach to marine resource management [5]. Traditionally, the Museum has placed significant emphasis on both formal and informal learning packages to provide accessible, innovative and inspirational ways to learn about its subjects, collections and role in the wider maritime community. Such packages provide highly effective ways of reaching a range of the Museum's audiences and facilitating public inclusion and participation.

Drawing on this experience, as part of Phase I of the *Planet Ocean* initiative the Museum in partnership with The Crown Estate published a dedicated teacher education pack to support the Geography and Citizenship sections of the UK's national school education curriculum at key stages 3 and 4 (11–16-year-old students). This pack and its subsequent evaluation provided a direction and framework for future resources and related programmes [12]. In effect, this initial work highlighted that developing learning and citizenship programmes would be a core mechanism for delivering the focus of Phase II of the initiative.

A further stimulus for placing significant emphasis on educational programmes for improving public understanding and involvement centred on the recognition that no single organisation had taken the lead in providing marine educational resources in the UK. As such, in addressing both this 'gap in the market' and the aims of Phase II of *Planet Ocean*, the Museum and The Crown Estate are taking the lead on developing marine environmental learning resources. The key aims of this programme are to: identify the requirements of the education sector and produce resources that fulfil this demand; and provide a range of materials and information that have wider appeal with the general public. The programme will be innovative and substantial, engaging:

- teachers, educators and students in developing Museum and classroom-based resources to teach and learn about marine environmental issues and their social, economic and political impacts;
- industry in developing core messages about sustainable development;
- the general public through the provision of balanced information.

The partnership will deliver a broad range of content that is topical, accurate, dynamic and inspirational for a number of key audiences. The formal education content will focus on three core areas of the national curriculum—Citizenship, Geography and Science—all of which form the foundation of the marine environment subject base.

The programme will adopt the broad idea that each and every one of us is connected to the sea by our lifestyles, actions and choices. The main aim is to raise awareness of current issues and debate these in the context of local, national and international situations. The core target audiences will be family, teenage and school groups that will help to promote an inclusive, debate-driven approach to the subject. Importantly, to help develop 'ownership and citizenship' learner opinions will be sought on how they think current issues should be addressed. Feedback will be integral to the various elements of the programme as well as incorporated into future revisions so that learners can understand and respond to other people's opinions as well as encouraging debate and inclusion beyond the Museum. Overall, the new programme aims to empower learners and enable them to make their own decisions and choices about the marine environment and become 'informed citizens'.

This paper examines public awareness of marine environmental issues in the UK; a precursor to the development of marine environmental citizenship. Having already provided an overview of the NMM's '*Planet Ocean*' initiative, the next section of this paper will present the methodology adopted to assess marine environmental awareness in the UK. A summary of results is then presented followed by a conclusion that seeks to identify opportunities for the NMM and its partners to further develop marine environmental awareness, particularly in the context of Phase II of '*Planet Ocean*'.

3. Methodology

A face-to-face interview survey was undertaken with members of the public visiting the NMM to ascertain their awareness of marine environmental issues. In particular, public awareness of offshore renewable energy was examined as an indicative challenge facing the oceans. Members of the public were approached during their visit to the NMM and invited to participate in an interview. The interviews were conducted by six different interviewers during two separate time periods, each of several days. Interviews were generally of 10–20 min duration. A total of 138 interviews were conducted, of which 49% were with women and 51% with men. The age profile of interviewees is presented in Table 1. No age related or gender bias was evident in the survey population. Throughout this paper, unattributed direct quotes from interviewees are presented to illustrate the nature of the comments expressed during the interviews.

The reasons cited by interviewees for their visit to the NMM are presented in Table 2. A majority of interviewees were visiting

Table 1
Age profile of interviewees

Age group	Number	%
Under 16	4	2.9
16–30	37	26.8
31–60	76	55.1
Over 60	21	15.2

$n = 138$.

Table 2
Reason for visit to NMM cited by interviewees

Reason for visit	Number[a]	%
Personal interest	79	57.2
Tourist visit	28	20.3
Child's benefit	24	17.4
Education related	8	5.8
Other	7	5.1

$n = 138$.
[a] Several interviewees cited multiple reasons for their visit.

to satisfy a personal interest in an aspect of maritime heritage (57.2%). Just over 20% of interviewees defined themselves as tourists. Whilst just over 17% of interviewees were visiting the Museum for the benefit of their children. Just under half (48.6%) of interviewees had visited the NMM previously and 26.8% of interviewees commented that they visited the NMM regularly.

4. Results

4.1. General marine environmental awareness

In order to initiate a debate about marine environmental issues, interviewees were asked to identify the marine environmental issues they found interesting. A broad range of topics was identified, with several interviewees identifying more than one topic. A summary of the responses is presented in Table 3. The most commonly mentioned distinctive topics were 'pollution' (16.1%) and 'marine life' (12.9%). Within the general topic of pollution, oil and chemical spills were specifically mentioned, whilst marine life included only marine fauna. Just over 15% of interviewees stated that they had a 'general interest' in marine environmental topics. Climate change, fish stocks and overfishing completed this tier of topics. The remaining topics, cited by comparatively small numbers of interviewees, included oil spills, coral reefs, coastal erosion, sea level rise, ship wrecks, oceanography and whaling.

A summary of the most pressing issues facing the oceans, as perceived by interviewees, is presented in Table 4. Pollution was perceived by 40% of all interviewees as a pressing issue, particularly its effects on the environment. This was by far the most dominant issue in the view of interviewees. Pollution as a topic was therefore perceived to be both the key pressing issue and one of the most interesting marine environmental topics. A second tier of issues was formed by climate change, the depletion of fish stocks and overfishing, whilst sea level rise ("and its effects on low lying countries"), marine litter, sewage disposal and tourism formed a third tier. In addition, several other topics were mentioned once only. These included "threats to coral reefs", shipping, "the decommissioning and dumping of oil rigs", "extinctions of marine species", whaling and "invasive species from ballast water".

Table 3
Marine environmental topics perceived to be 'interesting'

Marine environmental issue	Number[a]	%
Pollution	30	16.1
General interest in marine topics	28	15.1
Marine life in general	24	12.9
Climate change	22	11.8
Fish stocks and over-fishing	16	8.6
Oil spills	8	4.3
Coral reefs	7	3.8
Coastal erosion	5	2.7
Oceanography	5	2.7
Shipping and ports	5	2.7
Marine conservation	4	2.6
Extinctions	3	1.6
Sea level rise and flooding	3	1.6
Marine exploration	2	1.1
Naval history	2	1.1
Offshore renewable energy	2	1.1
Ship wrecks	2	1.1
Whaling	2	1.1
Other	7	3.8
None or not sure	9	4.8
Total	186	100

$n = 138$.
[a] Several interviewees cited multiple answers.

Table 4
Perceptions of the most pressing problems facing the oceans

Most pressing issues	Number[a]	%
Pollution	80	40.8
Climate change	34	17.3
Over-fishing and stock depletion	33	16.8
Oil pollution	14	7.1
Sea level rise	8	4.1
Marine litter	6	3.1
Sewage disposal	5	2.6
Shipping	3	1.5
Tourism	3	1.5
None or not sure	3	1.5
Other	7	3.6
Total	196	100

$n = 138$.
[a] Several interviewees cited multiple answers.

When asked if they would return to the NMM if the marine environmental issues of interest were included in interpretive material, 44.9% responded positively. Those interviewees who stated they would not return cited practical reasons for this, particularly not living in London. This figure rose to 55.1% when asked if people would visit the NMM website if the same issues were included. Again, this figure represented practical rather than substantive barriers, with computer literacy and access to the internet presenting the primary barriers.

There was very strong support (94.9%) for the NMM being an appropriate place to raise marine environmental issues. It was commented that marine environmental issues "fit in with other exhibits" and that the NMM "can act as a confluence of issues [as it is a] good context to bring issues together". To some interviewees, the inclusion of marine environmental issues was self-evidently appropriate because the NMM "is for the sea" and "about the sea". Several interviewees also considered the nature of the audience attracted to the NMM as suitable to greater marine environmental content, particularly as "people that visit the museum are most likely to have a general interest in this area"

and that "it is a good place to impart information". Other interviewees expressed concern that that there would be "some tension between the traditional and modern roles" of the NMM with a view to including more environmental resources.

4.2. Offshore renewable energy production

The next phase of the research interview sought to explore interviewee awareness of offshore renewable energy production as a specific example of a marine environmental issue. Considered to have the best wind resource in Europe, along with an excellent marine skills, technology and manufacturing base, the UK is well placed to take advantage of its natural marine resources [13]. A requirement to tap into the potential benefits available from offshore renewable energy is a change in public perception and awareness to gain widespread acceptance for large-scale offshore renewables projects, particularly given the potential impacts on the marine environment and marine nature conservation [14].

In December 2000, the offshore wind energy industry took a major step forward with The Crown Estate's launch of the first round of site awards in UK waters. The Crown Estate, as landowner of the seabed out to the 12 nautical mile territorial limit plays an important role in the development of the offshore wind industry by leasing areas of the seabed for the installation of turbines and ancillary works such as cables and anemometry equipment. Current UK government policy towards renewable energy production has a stated target that 10% of UK electricity should be produced from renewable sources by 2010.

4.2.1. Public awareness of offshore renewable energy generation

As presented in Table 5, almost 76.8% of interviewees claimed to be aware of offshore renewable energy production. When pressed to substantiate their claim, interviewees generally made reference to specific methods of offshore renewable energy production. Most commonly cited was "wind farms" with tidal power, and "wave and wind power" cited together. When combined with the awareness of individual energy production methods, the total awareness of offshore wind farms was strong. Few interviewees were able to volunteer any further information or issues surrounding offshore renewable energy production. However, those that did, appeared to be well informed. For example, one interviewee commented:

> I am aware of the controversy surrounding offshore renewable energy and that we need to have more of it for energy sustainability in the future.

A total of 37% of interviewees claimed to be aware of UK government policy on offshore renewable energy. When these claims were explored, interviewees were generally able to substantiate their claim. The most commonly cited aspect of awareness was that the government is "encouraging its development" and that "the government is trying to make more use of it". Other comments demonstrated an awareness of a target for renewable energy production, although the details were often inaccurate: "I know the government is seeking a certain percentage over time"; "10% of all energy is to come from renewable sources in the future"; "the government intends to produce 10% by 2012". Another interviewee commented, with reference to the renewable energy target, "the government's timescales are moving". When asked how they knew about offshore renewable issues, most interviewees commented that they had heard about them through radio or newspaper reports and TV programmes, and in one case through a visit to a renewable energy demonstration site.

Table 5
Awareness of offshore renewable energy

Question	% Answering Yes
Do you know what offshore renewable energy is?	76.8
Are you aware of the UK government policy towards offshore renewable energy?	37.0

$n = 138$.

4.2.2. NMM provision on offshore renewable energy topics

The development of an exhibition about offshore renewable energy in the NMM was supported by 86.2% of interviewees. Interviewees were generally enthusiastic about such an exhibition, typified by comments that they would "definitely" be interested and some would be "fascinated". A small number of interviewees, whilst expressing support for greater offshore renewables provision, qualified their support; for example, "the Museum is a grab bag of things, an [offshore renewable energy] exhibit would fit in well, but I would not go out of my way to visit the Museum to see it". In general, the view of this minority was that an exhibition on offshore renewables would be interesting, but would not be significant enough to attract them to the Museum. Discussion with other interviewees revealed general considerations related to the way in which visitors were initially attracted to the NMM. Most of the adult visitors to the Museum did not visit to see a specific exhibit, but were attracted to specific exhibitions once inside the Museum.

4.2.3. Content of NMM provision on offshore renewable energy

Interviewees who expressed an interest in an NMM exhibition on offshore renewables were asked what information they would like to be contained in such an exhibition. Most interviewees indicated multiple areas of interest in offshore renewables. For example, one interviewee commented that they would like to know "how it works, the draw backs, practicalities, statistics, where it will be and what it will look like". The preceding statement also provides a general summary of the key areas of interest amongst interviewees. In specific terms, the most commonly specified content for an exhibition on offshore renewables was information on "how it works", in particular, "how the energy capture actually takes place". The second most desirable content was "facts and figures" concerning offshore renewable energy production. Particular issues mentioned included "the amount of energy produced", "cost of development", "time needed to recoup energy expended in constructing [the infrastructure]" and "the number of wind turbines needed to power certain things".

Environmental impacts identified as being of interest by interviewees were generally in relation to "side effects" of offshore renewable energy development and "effects on the environment", impact on bird populations and "sea bed damage". Consideration of environmental impacts was also related to a broader interest in the comparative advantages and disadvantages of offshore renewable energy against other sources of energy. For example, one interviewee wanted to see an evaluation of "benefits and comparisons between conventional energy production and renewable". Also of particular interest was the potential (and actual) locations of offshore renewable energy installations in the UK. It was apparent that very few people actually knew where offshore renewable energy infrastructure could be located. The construction of offshore renewable energy infrastructure was also cited as a topic of interest. Generally, this related to "engineering details", the "time and cost of construction" and "reliability and maintenance". Interestingly, the controversial nature of some

offshore renewable installations was identified as a potential angle for interpretation by some interviewees. It was suggested that the NMM "should select one [geographic] area developing offshore energy and cover it properly". In this context the exhibition should "show different points of view… the politics of it".

The style and presentation of a future display on offshore renewable energy produced very strong consensus amongst interviewees. A majority of interviewees felt that any exhibition should be "interactive". When explored further, interviewees felt that the exhibition should be "mixed media" featuring "video clips, models and interactive displays", be "PC based", have "something kids can touch and pick up", and "something to keep kids' attention". The justification of an interactive approach was explained by one interviewee who commented that the material "should challenge children and draw them in". A small minority of interviewees were in favour of static text-based displays. One interviewee specifically commented, "interactive computer [displays] are annoying—especially if they do not work". It was also commented, "text is simpler to see and quicker than watching a video—you can also skip bits that you want to".

4.2.4. Awareness of The Crown Estate

As a key player in the offshore renewable energy sector, awareness of The Crown Estate presented an indicator of detailed awareness of the management of marine environmental issues. Table 6 presents a summary of the results of the questions related to public awareness of The Crown Estate. Just under half (49.3%) of interviewees had heard of The Crown Estate, with 31.9% claiming to be aware of the role of The Crown Estate. When asked to substantiate this awareness, it was almost exclusively the land and property ownership role that was cited. Typical comments concerning the function and role of The Crown Estate included "something about land ownership", "manage land and properties owned by The Crown", "administer Crown held property", "biggest land holder in the UK", "raises revenue from properties and land" and "manages property, land and seabed belonging to The Crown". Only 16.7% of interviewees were aware of The Crown Estate's role in the ownership and management of the seabed. Once the role of The Crown Estate in the management of marine environmental and offshore renewable energy production was briefly explained to interviewees, 59.4% indicated that they would like to know more about The Crown Estate.

5. Conclusion

The evidence presented in this paper suggests that the UK public has a genuine interest in the marine environment and is able to demonstrate reasonable factual knowledge about specific marine environmental issues. This in turn suggests that the NMM should continue to develop the marine environment as a key theme within its portfolio of interpretive provision. Brand recognition of the NMM was strong and a majority of interviewees considered that the NMM to be a credible source of marine information.

Table 6
Awareness of the crown estate

Question	% Answering Yes
Have you heard of The Crown Estate?	49.3
Do you know what The Crown Estate does?	31.9
Did you know that The Crown Estate owns the seabed?	16.7
Would you like to know more about The Crown Estate?	59.4

$n = 138$.

Regarding offshore renewable energy, significant opportunities exist to build upon the current level of public awareness and to develop awareness of national strategy and its impact on the environment. The level of interest in this issue amongst members of the public was significant, and it is suggested that the NMM work with partners, particularly The Crown Estate, to develop appropriate interpretational materials—within the Museum, through outreach activities and online. Awareness of the existence The Crown Estate amongst those interviewed was approximately 50%, however this was predominantly related to its terrestrial role. Awareness of The Crown Estate's marine role was much lower at 16.7%. This suggests that there is considerable opportunity to develop public awareness of The Crown Estate, potentially using offshore renewable energy as an appropriate interpretation pathway.

Obtaining web-hosted information concerning marine environmental issues was problematic for the public, with very few individuals having a clear idea where to source reliable information. In contrast, it was noted that the NMM was seen as a credible source of information on marine environmental issues. However, few members of the public stated that they would independently visit the NMM website. A clear opportunity for the NMM would be to develop a web gateway that provided objective information about marine environmental issues suitable for a public and educational audience. Evidence from the survey suggested that the public were willing to re-visit the NMM site to pursue information.

Finally, it is clear that awareness of marine environmental issues and marine environmental citizenship is not yet fully developed in the UK. This presents a challenge to the NMM to develop materials to engage the public in meaningful and effective ways. As marine issues begin to have greater significance on citizen's lives in the UK, the need to interpret such issues will increase. International events, such as the Asian tsunami add to the need and appetite for reliable marine environmental information. The NMM and equivalent institutions elsewhere are well placed to meet this need. Within the NMM, Phase II of *Planet Ocean* will explicitly address marine environmental citizenship ideas and the role each person can play in the stewardship of the marine environment. Such innovations suggest that the NMM is already facing up to this challenge, whilst also grasping the opportunity to play a central role in how marine environmental issues are explained to the UK public.

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