Public Perceptions of the Irish Marine Environment

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Abstract

This paper presents the results of a nationwide survey in Ireland that explored the values, concerns and preferences of individuals towards the Irish marine environment. The results of the Irish survey are also compared to the results from similar surveys carried out in other maritime countries in the EU. The views of the Irish public towards the seas and oceans around the Irish coast are relatively unknown. This is despite the fact that that Ireland has sovereign rights over 900,000km^2 of seabed (which is an area 10 times the size of the land area of Ireland). The results of the Irish survey demonstrate a reasonable level of knowledge of the main threats facing Ireland's marine environment and of the importance of non-market as well as market ecosystem services provided by the seas around the Irish coast. The results also suggest that the Irish public are sceptical of the ability of government and private industry to manage the Irish marine economy but instead place a large amount of trust in the competency of scientists. The perception of whether or not they consider where they live as being a coastal area would also suggest that the Irish public hold a much more narrow view of what constitutes a coastal area than that held by statistical agencies such as Eurostat.

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1. Introduction

Many people in Ireland rely upon the sea and its resources for their livelihood either directly or indirectly, while for others Irish seas and coasts are important for recreation. In 2007, the direct economic value of the Irish ocean economy was €1.44 billion, with a combined direct and indirect value of the sector of €2.4 billion (Morrissey et al., 2011). However, the views of the Irish public towards the seas and oceans around the Irish coast are relatively unknown. This is despite the fact that that Ireland has sovereign rights over 900,000km^2 of seabed (which is an area 10 times the size of the land area of Ireland).

While the positions of organised stakeholder groups are often captured through responses to policy consultations such as those provided for the recently launched Integrated Marine Plan for Ireland, the opinion of the 'ordinary person in the street' is difficult to include in the decision making process. However, it is the collective choices made by communities through the marine and coastal resources they use, the coastal areas they visit or reside in that drive many pressures on the marine environment. The viewpoint of the Irish public on the seas and oceans around Ireland will also play an important role in supporting policies such as the Integrated Marine Plan for Ireland and the EU Marine Strategy Framework Directive and for policies aimed at the deployment of marine renewable, large scale aquaculture projects, and marine protected areas that have considerable social and economic consequences.

The marine environment policy agenda in Europe is moving forward as a result of directives such as the European Marine Strategy Framework Directive, the Bathing Waters Directive and through regional seas strategies such as the Atlantic Strategy. Across other areas of marine activity, such as planning and maritime development, policy is being driven by the Integrated Maritime Strategy; and for fisheries through the reform of the Common Fisheries Policy (Potts et al., 2011; Hanley et al., 2003). Indeed, the adoption of the Marine Strategy Framework Directive is an opportunity for a comprehensive policy for protecting, improving and sustainably using Europe's environmentally degraded seas. It calls for an ecosystem-based approach to management where humans are regarded as a key system component (Mee et al., 2008).

The ever increasing and diverse use of the marine environment is leading to human induced changes in marine life, habitats and landscapes, making necessary the development of marine policy that considers all members of the user community and addresses current, multiple, interacting uses. In recent times, the governance of the marine environment has also evolved

from being primarily top down and state directed to being more participatory, inclusive and community based. Coupled with this fact is recent research that points to higher levels of citizen involvement in the management of the marine environment would greatly benefit the marine environment (Atkins et al., 2011; McKinley & Fletcher, 2010).

In what follows, Section 2 will briefly review previous studies that have examined public attitudes to the marine environment. Section 3 with present an overview of the survey instrument and the sampling strategy followed in conducting the survey. Section 4 will then present an analysis of the survey responses while section 5 provides some concluding discussion.

2. Previous studies that have examined public attitudes to the marine environment

A number of previous research studies have examined the public awareness, attitudes and perceptions to the marine environment using public surveys to attain their results (Buckley et al., 2011; Cocklin et al., 1998; EU Commission, 2009; Whitmarsh et al., 2009; Brody et al., 2008; Steel et al., 2005, Sant, 1996). A recent European briefing report carried out by Potts et al. (2011) explored the values, concerns and aspirations of the ordinary person regarding the marine environment. It was important to gain the views of the public as they play an important role in supporting reforms. A large sample across seven countries was taken. The findings revealed that the public had a good understanding of the marine environment, especially in relation to ocean and atmospheric systems; that the importance placed on the marine environment for scenery provides a justification for further incorporation of ecosystem services into the decision making process; and in terms of environmental issues that immediate problems, such as the cost of living, health and pollution, were of greater concern to the public than more abstract elements of sustainability. The survey presented an optimistic picture for support for marine planning and protection at the national scale, with considerable goodwill in the public mind for the development of marine planning initiatives.

In 2011 the FP7 project CLAMER (Climate change and marine ecosystem research) prepared a report (Buckely et al., 2011) that discussed what the European public knows and cares about in relation to marine climate change risks and impacts. The survey spanned 10 European countries and was undertaken as a result of the perceived gap between what is

known through research and what policy makers and the public knows and understands about the impacts of climate change in the oceans and seas around Europe. The EU Commission conducted a simular report in 2009 in preparation for the United Nations Climate Change Conference in Copenhagen that was aiming to reach a follow-up agreement to the Kyoto Protocol (EU Commission, 2009). The results from both reports show that the public cares about climate change, ranking it second overall from a list of major global issues, and almost everybody polled believed climate change is at least partly caused by humans. It also showed that estimates provided by the public for rates of sea level rise and temperature change matched well with scientific consensus, suggesting some fundamental messages are getting through to the public domain. However for some issues, especially ocean acidification, public awareness was extremely low. Potts et al. (2011) also highlighted a split between the public and the scientific community over their respective perceptions of environmental problems in the sea. Elsewhere, research by Cobham Resource Consultants (1996) on the attitudes and aspirations of people towards the marine environment of Scotland with respect to its uses, controls and conservation importance concluded that both the public and marine stakeholders appear to have a restricted understanding of the full range of uses and importance of marine resources. However they found that generally, stakeholders had a better knowledge of the environmental issues such as pollution, waste disposal and impact of overfishing.

Several broader socio-demographic themes also emerge from the literature. Staying longer in education, higher income and use of the internet has an impact on people's opinions of the marine environment (EU Commission, 2009). A number of studies comparing responses between genders found that women were more concerned about the issues facing the marine environment than men (Cobham Resource Consultants, 1996; EU Commission, 2009; Wester & Eklund, 2011). Additionally, the proximity to the sea and perceived level of risk to the marine environment has also been found to shape the perceptions of the public towards the marine environment (Brody et al., 2008).

Research has also shown that by enhancing public awareness and knowledge of oceans can lead to increased public support for ocean restoration efforts (Steel et al., 2005). The literature suggests that there has already been some degree of effective communication between policy makers and the public in relation to the marine environment, although there still remains a gap between public and scientific understanding about many of the threats to

marine ecosystems. Steel et al., 2005 conclude that the public is not well informed on the environmental terms and knowledge about ocean issues. The survey conducted by the authors found that coastal residents say that they are slightly more knowledgeable than those residing in non-coastal areas, however both sets of respondents had trouble identifying important terms and answering ocean related quiz questions, implying that both coastal and non-coastal communities need access to better information that is delivered in an effective manner.

More recently, Ahtiainena et al. (2013) contributes to the expanding literature on social preferences for marine ecosystem services by assessing recreational usage and perceptions of the condition of the Baltic Sea from the perspective of the general public within the coastal states surrounding the Baltic. They find that citizens of coastal countries are concerned over the state of the Baltic Sea, especially in Finland, Russia and Sweden and that the Poles, Danes and Finns have the most positive attitude towards contributing financially to improving the state of the Baltic Sea. Other research that has examined the attitudes, values, concerns and aspirations of individuals regarding aspects of the marine environment include work that has focused on climate change (Lorenzoni and Pidgeon, 2006; Featherstone et al. 2009), environmental quality and beach use (Pendleton et al. 2001), cetacean conservation issues (Scott and Parsons, 2005) and off shore wind farms (Haggett, 2008; Portman, 2009).

This paper adds to the above body of research by reporting on the results of a nationwide survey in Ireland that explored the values, concerns and preferences of individuals regarding the Irish marine environment. The results of the Irish survey are also compared to the results from similar surveys carried out in other maritime countries in the EU. The results of this study also feed into the emerging literature on 'Ocean literacy' where an ocean-literate person can be defined as one that understands the influences of the ocean on society and society's influence in turn on the ocean, can communicate ocean related information, and is able to make informed decisions that affect the ocean. As Steel et al. (2005) point out; with an understanding of the depth and breadth of ocean understanding held by the general public, more effective public education and marine and ocean information dissemination efforts may be targeted. With this in mind, the depth and breadth of ocean and marine knowledge held by the Irish general public is investigated and reported on in the following sections.

3. Questionnaire Design and Study Sample

A survey of 812 individuals living in Ireland was conducted in the latter half of 2012. A quota controlled sampling procedure was followed to ensure that the survey was nationally representative for the population aged 18 years and above. Quota sampling sets demographic quotas on the sample based on known population distribution figures. The quotas used here were based on known population distribution figures for age, sex, occupation and region of residence taken from the 2011 National Census of Population. Interviews were spread across different days of the week and across different times of day to ensure all population sub groups had an equal chance of being interviewed.

Pilot testing of the survey instrument was conducted in the field by RED C Research & Marketing. This allowed the collection of additional information and amendment of the survey instrument which, along with expert judgment and observations from earlier focus group discussions, was used to refine how the questions were asked and the addition of some new questions. The pilot survey was undertaken during the month of August 2012 and consisted of 56 interviews. The main survey was undertaken during October and November 2012 and consisted of 812 interviews.

To ascertain their personal opinions and attitudes towards the marine environment, respondents were asked a series of attitudinal questions using Likert Scales. More specifically, respondents were first presented with a general statement on the marine environment in Irish seas and the uses to which this environment was being put and were then asked how much of this information they were already aware of. This opening preamble did not just seek to set the context for the survey, but it was hoped that it might also provide a useful indication of the knowledge of the respondents in relation to the state of the seas around the coast of Ireland[1]. Interestingly, 55% of the sample indicated that they knew nothing or "very little" of the information provided. Only 1.2% knew everything.

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[1] The exact wording of the preamble was "The seas around Ireland provide Irish people with many goods such as fish and energy (e.g. gas and off-shore wind) and are also valued by people for recreational purposes. Some people might even just value having clean and healthy seas. However, due to increased exploitation of the marine environment and increased risk of pollution combined with the increased influence of land based activities on the sea, the marine environment (e.g. fish, whales, seaweeds, etc) is at risk of being degraded. Therefore there is a trade off between using the seas versus maintaining or restoring the marine environment to healthy and clean status".

Following this question, information was collected on their attitudes towards different aspects of the marine environment. This was obtained by reading out a number of statements and asking the respondents to indicate the extent to which they agreed or disagreed with them. These statements were developed with the assistance of marine specialists in the Ryan Institute, National University of Ireland Galway and through dialogue in a number of focus groups prior to survey design. A number of the questions asked were also adopted from a similar attitudinal survey by Potts et al. (2011) to allow comparisons from the Irish sample to the responses by representative population samples in UK, Spain, Portugal, Poland, Italy, Germany and France[2]. While some questions related to the actions of marine stakeholders, others were aimed at determining individuals' support for policies aimed at marine planning and protection. The survey was undertaken throughout the Republic of Ireland and was carried out on a face to face basis.

Table 1. Characteristics of this survey versus Census 2011[1]

	This survey (n=812)	Census 2011 – Republic of Ireland
Average Age (Years)	44.6	44.8
Gender (% Male)	49.8	49
Nationality (%Irish)	90	86
Education (% To primary level)	10	16
Education (% To secondary level)	56	53
Education (% To third level)	34	31
Marital Status (% Single)	29	27
Marital Status (% Married)	53	51
Marital Status (% Other)	18	12
Income[2] (€per year)	33,300	36,138

1. Note that that values refer to population aged 18+.
2. Estimated income was only estimated for those working who reported their personal income (n=185) for the sample in order to make similar comparison to available national data which was based on average earnings for third quarter, 2012 (CSO, 2012).

A comparison of a number of characteristics between the survey and the 2011 Census of Population is shown in Table 4. Based on these characteristics the survey respondents are considered to be representative of the general public in the Republic of Ireland. In the next section the responses to the main attitudinal questions asked are analysed and discussed.

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[2] It should be noted however that the Potts et al (2011) study used an on-line sampling procedure and excluded persons over the age of 65 whereas the survey reported in this paper used a face to face survey and included persons over the age of 65. Potts et al. did reweight their samples however to be nationally representative of the population in each of the countries analysed.

4. Results

Respondents were first asked the extent to which they thought the overall environmental state of both coastal and the deep oceans around Ireland was poor or good using a five point likert scale. As shown in Figure 1, approximately 15% of the sample believed that the general environmental state of the Irish coastal and ocean waters was very poor or poor, 17% believed it was neither poor nor good and the remaining 68% believed that it was good or very good. This is interesting in the context of the variety of marine related water management schemes put in place over the last 20 years such as the Water Framework Directive, the Bathing Waters Directive and more recently, the Marine Strategy Framework Directive. These measures coupled with Ireland's geographical location on the edge of the Atlantic, which supplies Ireland with it fresh maritime climate, may explain the Irish general population's positive perception of the state of the country's marine environment.

Figure 1.The rating of the environmental condition of coastal waters and beaches in Ireland and the rating of the environmental condition of the oceans around Ireland by the Irish general public. Scores shown as percentage of responses rated as 'important or very important'*.
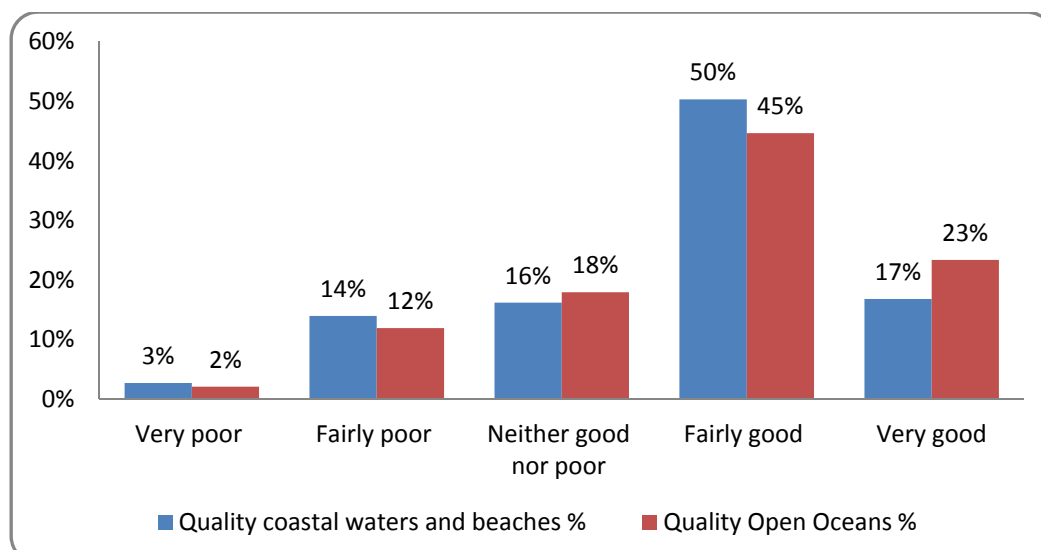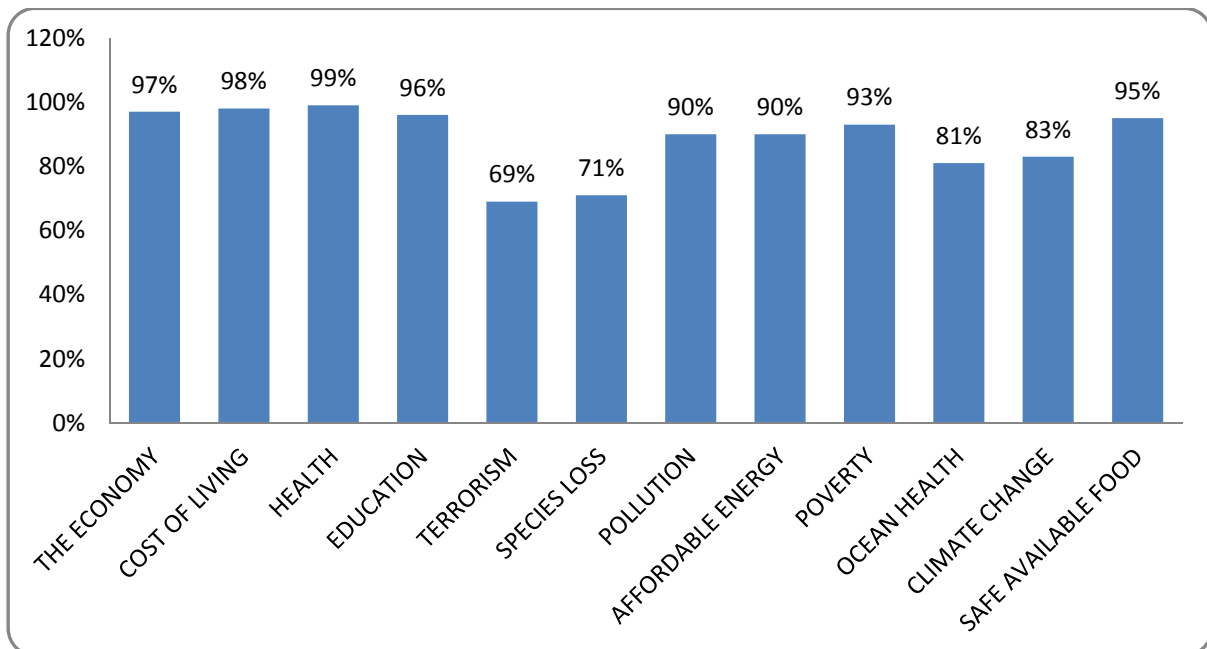

* A score of 4-5 on a 5 point scale where 1 means it is not at all important and 5 means it is very important.

Respondents were next asked how concerned, if at all, they were about different issues facing society in Ireland today. As shown in figure 2, health issues and the cost of living were rated

as being the most important issues facing Irish society, closely followed by the economy and education. Only terrorism and species loss ranked lower than ocean health in terms of being an important or very important issue of concern. Interestingly, the Potts et al. study showed a very similar pattern of concerns (see appendix A) for other European countries with ocean health being further down the concerns list. It is also worth nothing however that while the pattern is similar, the Irish sample appear to have a much higher tendency to rate each issue as being important or very important.

Figure 2. Prioritisation of issues of concern. Scores shown as percentage of responses rated as 'important or very important'*
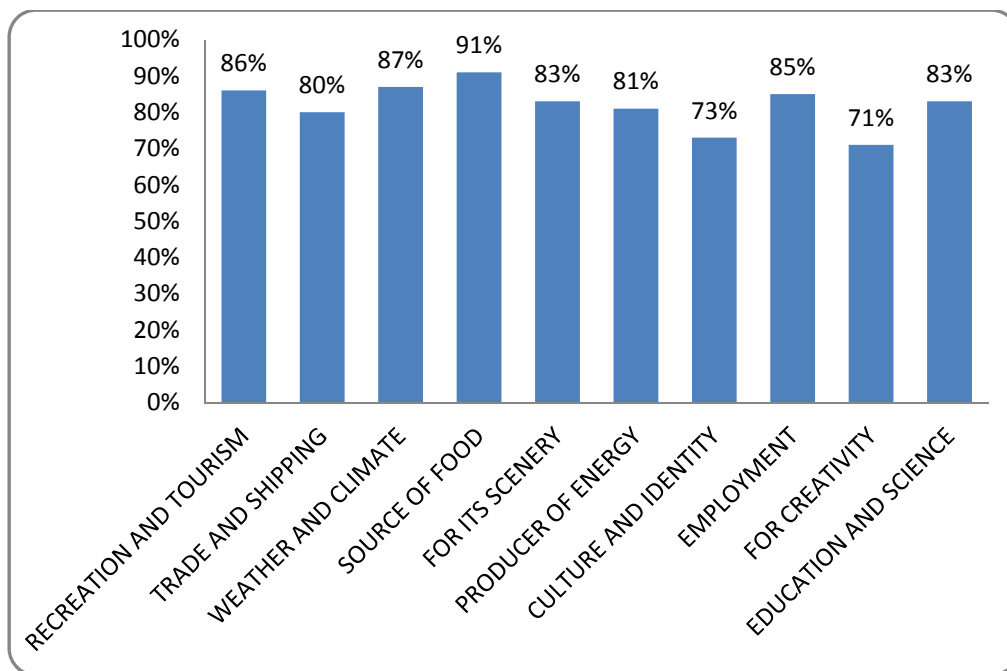

* A score of 4-5 on a 5 point scale where 1 means it is not at all important and 5 means it is very important.

The next question in the survey asked respondents to rank on a scale of 1 to 5 how important they felt various functions of Irish seas and oceans were to them personally (1 being least important and 5 being most important). The results of this question are presented in figure 3. *The seas as a source of food* were given a rank of 4 or 5 (i.e. seen as important or very important) by approximately 91% of all respondents. This was closely followed by "*for the regulation of weather and climate*" *and* "*recreation and tourism*" which were given a rank of 4 or 5 by 87% and 86% of respondents respectively. The importance of Irish seas for

culture and identity and for *creativity* had the lowest 4 or 5 rankings albeit at a still high at 73% and 71% respectively. The latter finding is somewhat surprising given that Ireland is an island nation on the fringes of Europe but having said that the fact that Ireland has tended to turn her back on her marine resources and heritage has been commented on previously (MacLaughlin, 2011; Fahy, 2013).

Figure 3. The value of the oceans to individuals across Ireland. Scores shown as percentage of responses rated as 'important or very important'*
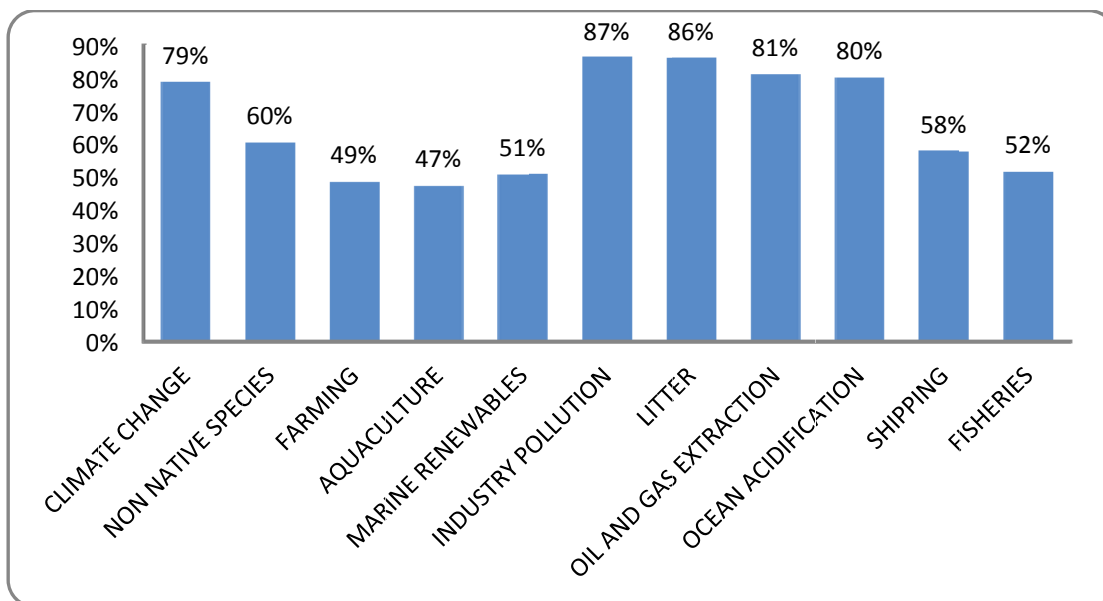
* A score of 4-5 on a 5 point scale where 1 means it is not at all important and 5 means it is very important

While Irish residents emphasise the practical uses of the seas as being important (food source, trade, employment and education) it is also interesting to note that the non-market ecosystem services (climate, recreation, scenery) are rated as important as marine functions and activities. It is often debated whether the general public have enough knowledge in relation to the non-provisioning ecosystem services provided by the marine environment to be in a position to state their value to them personally (Kumar, 2010; Jobstvogt et al., forthcoming) but the attitudes expressed by the Irish general public would suggest that they are aware of their importance and that the inclusion of non-market and non-use ecosystem services in decision making is something that should be happening as standard rather than on an ad-hoc

basis. Once again individuals from across the UK, Spain, Portugal, Poland, Italy, Germany and France would appear to have a similar pattern of preferences to the Irish as well as the same appreciation for the non-market as well as the marketed ecosystem services from the marine environment, although once again the Irish are more generous with their ratings in each case (see figureA2 in Appendix A).

The preferences of respondents differed markedly between socio-demographic groupings. For example, those who have relatively lower annual incomes rate the importance of the ocean as a source of food as less important than those who have higher income levels. It could be that for those with relatively lower incomes seafood is relatively expensive to other alternatives and is therefore not as relevant a concern as it might be for higher income households where purchases on seafood generally account for a higher percentage of the overall household food budget. Also, in general, households with an income of less than €40,000 have a higher tendency to give a ranking of 1 or 2 (not at all important or a little important) across all the marine related values.

Figure 4. Rankings of perceived threats to the marine environment by the Irish Public. Scores shown as percentage of responses rated as 'threat or severe threat' (score of 4-5).

* A score of 4-5 on a 5 point scale where 1 means it poses no threat and 5 means it poses a significant threat.

Respondents were then asked to indicate how much of a threat different issues posed for Ireland's marine environmental (see figure 4). The factors that were deemed to be the most of a threat were industry pollution (87%) followed by litter (86%). Interestingly an additional 11% of those on lower annual incomes (less that €40,000) consider that litter poses a significant threat (i.e. give litter a ranking of 5) than those who earn more. Oil and gas extraction and ocean acidification was a close third with 81% and 80% of the sample rating them as posing a threat or severe threat to Ireland's marine environment. The perceived threat of non-native (invasive) species by the Irish general public is relatively high at 60%. While invasive species have been shown to have major impacts on marine ecosystem services (Oguz et al 2008), invasive species in Irish marine waters has not been a major problem to date. The perceived threat of oil and gas is surprisingly high considering the extensive nature of such activity in Irish waters but may reflect exposure to the long running media coverage of the conflict between a local community groups and the Shell oil company over construction of a natural gas pipeline and refinery at a site in Co. Mayo.

Less than 50 % of all citizens considered farming or aquaculture as posing a threat or severe threat to Ireland's marine environment and only approximately 52% of respondents felt that fishing posed any significant threat. This is an interesting finding given that the Irish Environmental Protection Agency (2008) identified the discharge of nutrients and other contaminants (much of which is likely to come from farming), marine litter, commercial fishing, aquaculture and the effects of climate change as key pressures on Ireland's marine waters. Indeed, eutrophication driven by agriculture has been shown to pose a major threat on the marine environment, causing hypoxia, anoxia and mass benthic die-off (Mee et al 2005). It would appear that except for marine litter, what the scientific community/experts see as the most significant threats on Ireland's marine environment are not fully in line with that perceived by the general public. The low perceived threat of fisheries may explain the surprise expressed by Fahy (2013, p19) that the public is not more effective in obtaining a change in what the author sees as poor fisheries management policy in Ireland. Fahy also comments on the fact that "commercial fishing has a warm spot in the people's hearts and the way it operates is profoundly misunderstood".

Also, in an international survey of the perceptions of scientists in relation to threats to the ocean, Halpern et al. (2006) found that climate change and commercial fishing are the two

chief causes of concern for scientists. It is also surprising that fishing, farming and aquaculture do not rank higher given the significant media coverage often given to these sectors impact on the marine environment relative to many of the other categories that are perceived to be of a higher threat. Once again however the general pattern of perceptions of threats would appear to be very similar to those held by citizens in the UK, Spain, Portugal, Poland, Italy, Germany and France where the factors that were deemed to be the most of a threat were the same as in Ireland; industry pollution and marine litter (see figure A4). These may be perceived to be the most significant threats by the public as perhaps they see litter on the beaches and the spread of industry on the coasts, where as they may not see as readily commercial fishing activity that takes place off shore or the impacts of nutrient run-off from farming.

The next question in the survey asked respondents how competent they felt a number of different groups were when it came to managing and protecting Ireland's ocean environment. As can be seen from figure 5 only 25% and 27 % of respondents felt that local government or national government, respectively, were competent or highly competent (score of 4 or 5) when it came to the management of the marine environment. Indeed even private industry was seen as being more competent than these institutions when it comes to marine management. It should be noted that these questions were asked only shortly after the Irish government put in place the first Integrated Marine Plan for Ireland and as such the attitudes of the general public may have altered in regard to this institution's competency since then. It would appear that the many marine and coastal related policies and Directives the EU has drafted in recent years have made some impact in terms of the perceived competency of this institution with 40% of responds believing that this level of government is competent or highly competent when it comes to the management of the marine environment.

Figure 5: Perceived competence of different groups to manage the marine environment. Scores shown as percentage of responses rating 'competent or highly competent' (rating of 4 -5).
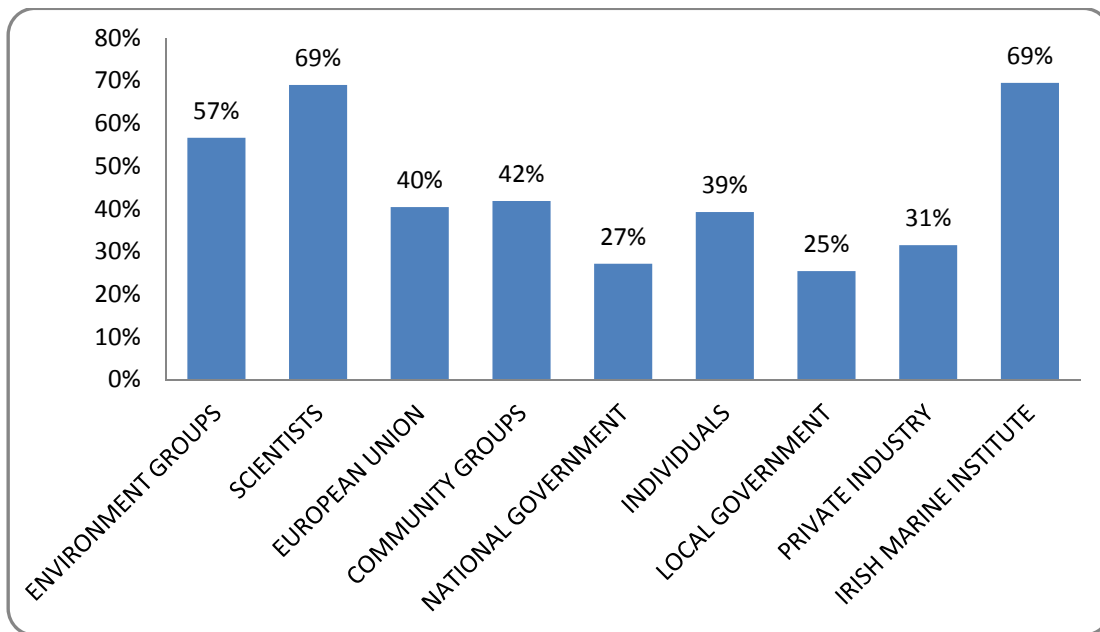

* A score of 4-5 on a 5 point scale where 1 means it is not at all competent and 5 means highly competent.

The one group that the public would appear to have some faith in when it comes to the management of the marine environment are the scientist where 69% of respondents believe that this group are competent or highly competent when it comes to the management of the marine environment. This high level of faith in the ability of a group to manage the marine environment (69%) is also shown for the Irish Marine Institute which is the national agency responsible for marine research, technology development and innovation[3]. Once again a very similar pattern of rankings is shown for the different groups across the countries in the Potts et al. (2011) study as well (see figure A5 in the appendix). As Potts et al. (2011) point out the apparent mistrust of government organisations and industry with the management of the marine environment may reflect the public's discontent at environmental problems in general (even when not ocean related) and the failure of government policy to tackle such problems.

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[3] While there are many other agencies in Ireland with a marine related remit such as the Environmental Protection Agency, Bord Iascaigh Mhara, Sea Fisheries Protection Authority, etc., only the Marine Institute was included in the question as this is the agency with the widest remit when it comes to the management of the Irish marine environment and would be the most recognisable marine related agency to the general public.

Figure 6. Rankings of national responses to marine spatial planning. Shown as percentage of responses rated as 'agree or strongly agree' by the Irish general public compared to the rated response from individuals across UK, Spain, Portugal, Poland, Italy, Germany and France*
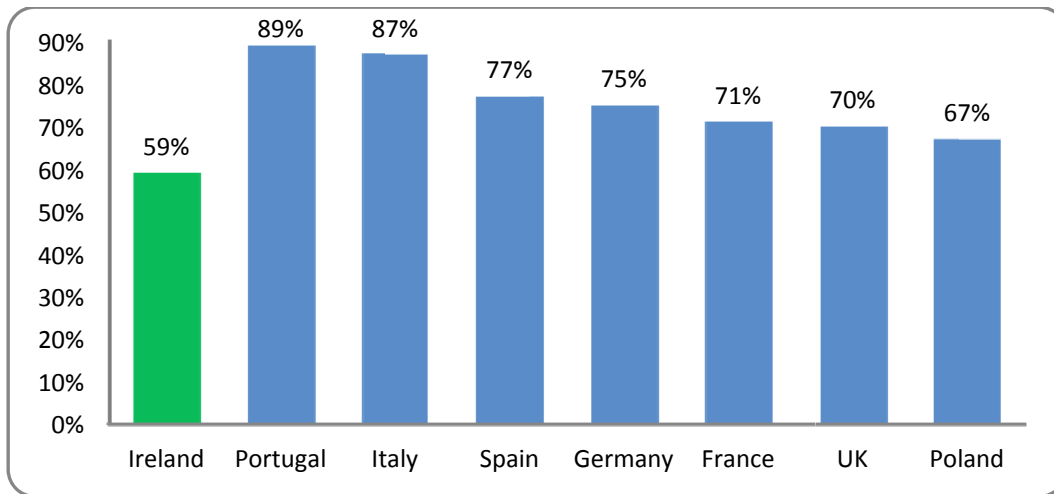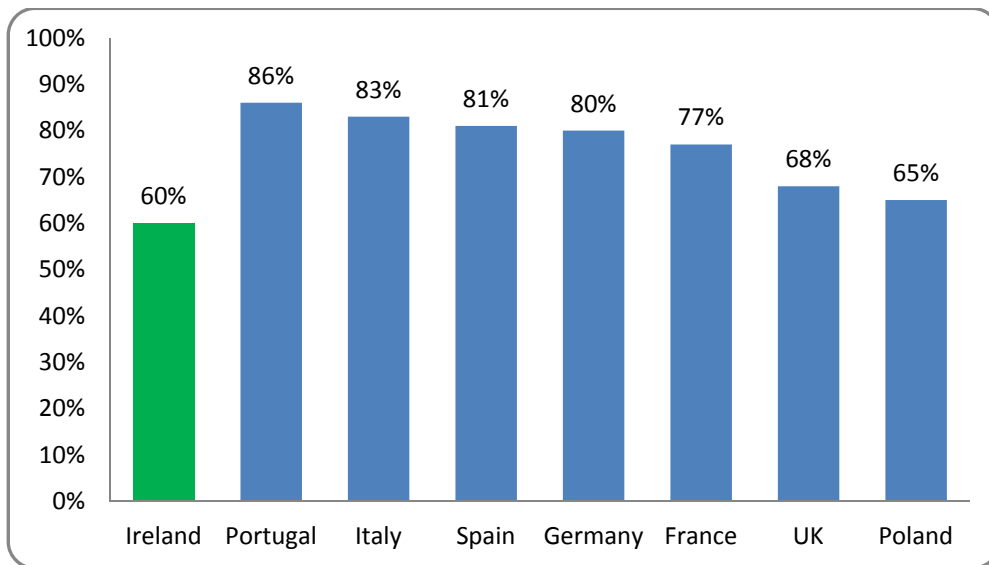

*Score of 4 or 5, from a scale of 1 to 5 where 1 means strongly disagree and 5 is strongly agree.

The next two questions in the survey were asked in order to gage the support from the general public for marine planning and protection. As Pomeroy and Douvere (2008) point out management of the marine environment is a matter of societal choice and "involves decision making in terms of allocating parts of three-dimensional marine spaces to specific uses to achieve stated ecological, economic and social objectives". People are central to this decision-making process and are the agents for the use change of the marine resources. As such, the attitudes of the general public to marine management and planning are vital to the success of any form of marine spatial planning.

The respondents were first told that it had been suggested that governments should make plans that specify the different activities that can happen and where they can happen in the sea. Respondents were then asked to what extent they agreed or disagreed with this idea on a scale of 1 to 5 where 1 means strongly disagree and 5 is strongly agree. As can be seen from figure 6 there was relatively low agreement to this statement from the Irish general population relative to that in the countries from the Potts et al. (2011) study. This may be related to the perceived competency of the government by the general public in relation to the management of the marine environment.

Figure 7. Designation of marine protected areas. Percentage of responses rated as 'agree or strongly agree' by the Irish general public compared to the rated response from individuals across UK, Spain, Portugal, Poland, Italy, Germany and France*

*Score of 4 or 5, from a scale of 1 to 5 where 1 means strongly disagree and 5 is strongly agree.

Similarly, the following question then informed the respondents that some people have suggested that governments should designate parts of the ocean as protected areas, in the same way that they do with national parks on land, while others have said this is not a good idea. The respondents were then asked to what extent they agreed or disagreed with this suggestion. Once again, and as can be seen from figure 7, there was relatively low agreement to this statement from the Irish general population relative to that in the countries from the Potts et al. (2011) study. This is all the more interesting result given that the Irish sample consistently gave higher rankings across all the other questions prior to these two questions compared to the UK, Spain, Portugal, Poland, Italy, Germany and France samples.

While marine protected areas (MPAs) do exist in Irish waters they have a much narrower definition than what is used internationally. In Ireland MPAs are designated specifically for the protection of habitats and species under the Birds and Habitats Directives. The existence of the Irish Conservation Box off the south west coast of Ireland also represents a kind of MPA in Irish waters, but its main purpose is for the management of commercial fish stocks. Also seven marine sites have been identified as being of significant ecological importance and were proposed by the Irish government as Special Marine Areas of Conservation in 2012. As Johnson et al. (2008) point out; the designation of marine SACs or MPAs in Irish waters

presents opportunities for marine conservation and has the potential to bring wider benefits to society. However, evidence from the response to the last question suggests that Irish society may not be aware of these benefits as there does not appear to be a high level of support for marine spatial planning or designated protected areas in general

Finally, respondents in the survey were also asked if they considered where they lived as being in a coastal area. They were also asked how far they approximately lived from the coast. As discussed by Hynes and Farrelly (2012) the range of definitions available for coastal zone boundaries raises difficulties between those who prefer to use an ecological-natural system based boundary to those who prefer a legal/administrative/economic boundary consistent with government jurisdictions. Often these definitions do not coincide with communities own perceptions of living in a coastal area. For example, Eurostat defines EU coastal regions as standard statistical regions (NUTS level 3), which have at least half of their population within 50 km of the coast (Eurostat, 2009). In Ireland's case NUTS level 3 regions are represented by almost the entire country except for four counties in the centre. The results of this survey would indicate that this is a much broader definition than peoples own perceptions of whether the area they live in is coastal or not.

Figure 8. The probability of considering where you live a coastal area as a function of the distance of residency (km) from the coast (probability based on a simple logit model of the response 'yes' (1) or 'no' (0) as a function of distance).
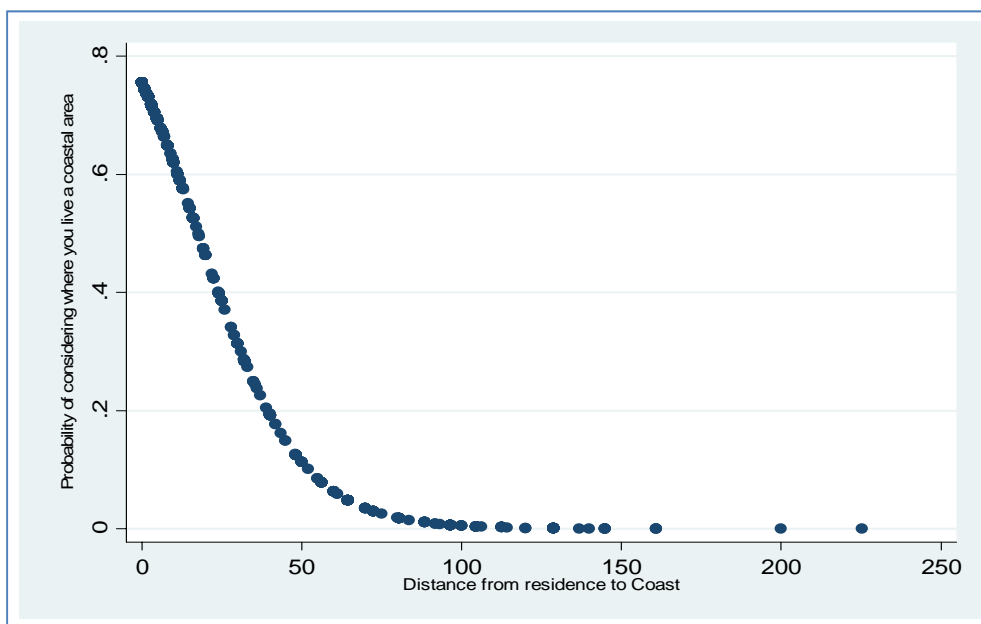
In total, 41% of the sample considered where they live as being coastal. More interestingly, the average distance to the coast of those who considered themselves as living in a coastal region was reported at 9.4km but ranging from 0 to 80km. A simple binary logit model was also used to estimate the probability that someone considers where they live is in a coastal zone as a function of their reported distance to the coast. The results are graphed in Figure 8 and indicate that a person has a 0.5 probability of considering themselves living in the coastal zone if they are within 15km of the coast. This is significantly below the inland boundary distance for a coastal region in Ireland as defined by Eurostat.

5. Discussion and Conclusions

The general public's demands for new functions from the marine environment are continuously changing. Society increasingly utilises the marine environment for a variety of purposes and its protection is now seen as much more important by modern consumers. Similar to terrestrial based ecosystems there are numerous push and pull factors that can lead to significant changes in marine ecosystem processes and outputs. The push factors are connected with trends in marine related commercial activities such as shipping or fishing, which can result in intensification of the use of the marine space as well as new functions such as off-shore energy production and marine tourism. The pull factors relate to what the consumer rather than the direct marine stakeholders want from the marine environment. With increased urbanization and improved infrastructure allowing even quicker access to the coastline, there is increasing demands for recreational activities and nature conservation from the modern consumer. Given these multiple dynamics the sustainability of any particular marine activity may only be guaranteed through the commitment of all the parties involved: fishermen, shipping operators, marine policymakers, recreationalists, spatial planners, and perhaps most importantly society in general (who are also the taxpayers funding the marine policy initiatives).

While food security was a dominant concern for consumers at the time of the formation of the European Union, concerns surrounding the environmental impacts of human activity on the environment are now   as important to citizens of the EU. Citizens are now more aware that certain marine related activities can have negative impacts on, among other things, biological diversity, water quality and seascape and habitats (Shackeroff et al., 2009; Ahtiainena et al.

2013; Hynes et al. 2013). Marine environmental management and legislation has also moved away from management efforts organized around particular uses such as fishing or tourism, resulting in separate governance regimes for each sector, towards an ecosystem based management approach which recognizes that plant, animal and human communities and activities are interdependent and interact with their physical environment to form distinct ecological units called ecosystems. This approach to management also allows policy makers to include societal values for marine ecosystem services into the decision making processes where the trade-off between economic use and marine protection can be fully assessed.

With these issues in mind, this paper presented the results of a nationwide survey in Ireland that explored the values, concerns and preferences of individuals regarding the Irish marine environment. Many of the questions asked on the marine environment of the Irish sample were also asked in a similar survey in other maritime countries in the EU by Potts et al. (2011). The results of both of these surveys would suggest similar attitudes toward the marine environment across Ireland, the UK, Spain, Portugal, Poland, Italy, Germany and France, although the Irish respondents tended to give a higher ranking on many of the questions asked. Previous to this survey being carried out the views of the Irish public towards the seas and oceans around the Irish coast were relatively unknown. This is despite the fact that that Ireland has sovereign rights over 900,000km^2 of seabed (which is an area 10 times the size of the land area of Ireland).

The results of the Irish survey demonstrate a reasonable level of knowledge of the main threats facing Ireland's marine environment and of the importance of the non-market as well as market ecosystem services that the seas around the Irish coast provide. The results also suggest that the Irish public are sceptical of the ability of government and private industry to manage the Irish marine economy but instead place a large amount of trust in the competency of scientists. This would imply that a greater, more transparent role for scientists in marine policy formation and the decision making process would result in marine policy measures receiving greater support from the public than measures that are perceived to be mainly driven through government departments. Indeed this increased role for scientists (including social scientists!) is already becoming more evident in policies such as the EU Marine Strategy Framework Directive with its integrated assessment approaches which incorporates the viewpoints of many stakeholders and the current reforms of the Common Fisheries Policy

which is attempting to boost participatory decision making and co-management (Farrell et al. 2012).

The Irish public's response to marine special planning and designation of MPA's by the government was less enthusiastic than their European counterparts.   This may be related to the perceived competency of the government by the Irish general public in relation to the management of the marine environment. With the establishment of MPAs and the use of marine spatial planning likely to increase in the coming years the relevant Irish authorities will need to find a way to communicate the importance of such marine planning and protection approaches to the Irish public and to educate them on the flow of benefits that could flow from any further MPA designations in Irish waters; benefits from both an economic and social as well as a conservation perspective. The differences between the public and scientific perception of the main threats to the marine environment also suggests that better communication between the relevant authorities and the public on marine issues and policies is needed. Finally, the perception of whether or not they consider where they live as being a coastal area would also suggest that the Irish public hold a much more narrow view of what constitutes a coastal area than that held by statistical agencies such as Eurostat.

Given the increased impetus on marine spatial planning for commercial and environmental sustainability regulation in areas such as fisheries, marine energy, and aquaculture, national governments and marine policy makers are in need of a range of social and economic indicators for the sector, including information on the opinions and preferences of the persons and communities using Ireland's coastal and marine resources. While the positions of organised stakeholder groups are often captured through responses to policy consultations such as those provided for the recently launched Integrated Marine Plan for Ireland, the opinion of the 'ordinary person in the street' is difficult to include in the decision making process. However, it is the collective choices made by communities through the marine and coastal resources they use, the coastal areas they visit or reside in that drive many pressures on the marine environment. The viewpoint of the Irish public on the seas and oceans around Ireland will also play an important role in supporting policies such as the Marine Strategy Framework Directive, the deployment of marine renewable devices, large scale aquaculture projects, and marine protected areas that have considerable social and economic consequences. Ultimately, management of the marine environment is a matter of societal choice and knowing what the values, concerns and preferences of individuals regarding the

marine environment are is the first step in ensuring that policy decisions are broadly in line with society's wishes.

References

Ahtiainena, H., , Artella, J., Czajkowskib, M. , Haslerc, B., Hasselströmd, L., Hyytiäinena, K., Meyerhoffe, J., Smartc, J., Söderqvistd, T., Zimmerf, K., Khaleevag, J., Rastriginah, O.,Tuhkaneni, H. (2013). Public preferences regarding use and condition of the Baltic Sea—An international comparison informing marine policy, *Marine Policy*, 42: 20–30.

Atkins, J. P., Burdon, D., Elliott, M., Gregory, A. J. (2011). Management of the marine environment: integrating ecosystem services and societal benefits with the DPSIR framework in a systems approach*, Marine Pollution Bulletin*, 62(2): 215-226.

Brody, S., Zahran, S., Vedlitz, A., Grover, H. (2008). Examining the Relationship between Physical Vulnerability and Public Perceptions of Global Climate Change in the United States, *Environment and Behavior,* 40: 72.

Buckley, P., Pinnegar J., Dudek A., Arquati, A. (2011). *Report on European Public Awareness and Perception of Marine Climate Change Risks and Impacts*. CLAMER FP7 Project report. http://www.clamer.eu/images/stories/deliverables/deliverable%202%202%20%20polling%20 report%20%20-%20final%20v3.pdf (accessed 11/12/2012)

Cobham Resource Consultants. (1996). Review of the Attitudes and Aspirations of People towards the Marine Environment of Scotland With Respect to its Uses, Controls and Conservation Importance. Scotish Natural Heritage Review, 67.

Cocklin, C., Craw, M., Mcauley, I. (1998). Marine reserves in New Zealand: Use rights, public attitudes, and social impacts, *Coastal Management*, 26(3): 213-231

Environmental Protection Agency (2008). 2008 State of the Environment Report, EPA Publication, Wexford.

European Commission (2009). *European attitudes towards climate change*. Brussels (Special Eurobarometer 322, Available at: http://ec.europa.eu/public_opinion/archives/ebs/ebs_322_en.pdf, accessed 10/12/2012)

Eurostat (2009). Statistics in Focus – Agriculture and Fishing. European Commission Report 47; 2009.

Fahy, E. (2013). Overkill – The Euphoric Rush to Industrialise Ireland's Sea Fisheries and its Unravelling Sequel, Amazon Publishing, Marston Gate, England.

Farrell, N., Breen, B., Hynes, S., Cuddy, M. (2012). Addressing failures of the Common Fisheries Policy: How principles of devolved community-based governance may improve the sustainability of Irish fisheries, *The Irish Review of Community Economic Development Law & Policy*, 1 (3): 53 - 74.

Featherstone, H., Weitkamp, E., Ling, K., Burnet F. (2009). Defining issue-based publics for public engagement: climate change as a case Study, *Public Understand. Sci*., 18: 214–228.

Hanley, N., Bell, D., Farizo-Alvarez, B. (2003). Valuing the benefits of coastal water quality improvements using contingent and real behaviour, *Environmental and Resource Economics*, 24: 273-285.

Haggett, C. (2008). Over the Sea and Far Away? A consideration of the planning, politics and public perception of offshore wind farms, *Journal of Environmental Policy & Planning*, 10 (3): 289-306.

Halpern, B.S., Selkoe, K.A. Micheli, F., Kappel, C.V. (2006). Evaluating and ranking the vulnerability of the global ecosystem to anthropogenic threats. *Conservation Biology*, 21:1301-1315.

Hynes, S., Farrelly, N. (2012). Defining standard statistical coastal regions for Ireland, *Marine Policy*, 36: 393–404.

Hynes, S., Tinch, D., Hanley, N. (2013). Valuing improvements to coastal waters using choice experiments: An application to revisions of the EU Bathing Waters Directive. *Marine Policy,* 40: 137–144.

Johnson, M., Jessopp, M., Mulholland O.R., McInerney C., McAllen R., Allcock A.L., Crowe, T.P. (2008). What is the future for marine protected areas in irish waters? *Biology and Environment: Proceedings of the Royal Irish Academy*, 108B (1): 9-15.

Jobstvogt, N., Hanley, N., Hynes, S., Kenter, J. and Whitte, U. (forthcoming). Twenty Thousand Sterling Under the Sea: Estimating the value of protecting deep-sea biodiversity. Ecological Economics.

Kumar, K (ed.). (2010). *The Economics of Ecosystems and Biodiversity (TEEB)*, Ecological and Economic Foundations, Washington DC.

Lorenzoni, I., Pidgeon, N. (2006). Public views on climate change: European and USA perspectives, *Climatic Change*, 77: 73–95.

Mac Laughlin, J. (2011). *Troubled Waters: a social and cultural history of Ireland's sea fisheries*, Four Courts Press, Dublin.

McKinley , E., Fletcher, S. (2010). Individual responsibility for the oceans? An evaluation of marine citizenship by UK marine practitioners, *Ocean & Coastal Management,* 53: 379 – 384.

Mee LD., Jefferson RL., Laffoley DD., Elliott M. (2008). How good is good? Human values and Europe's proposed Marine Strategy Directive, *Marine Pollution Bulletin* 56(2):187-204.

Mee, L.D., Friedrich, J., Gomoiu, M.T. (2005). Restoring the Black Sea in times of uncertainty, *Oceanography*, 18:100-111.

Oguz, T., Fach B., Salihoglu, B. (2008). Invasion dynamics of the alien ctenophore Mnemiopsis leidyi and its impact on anchovy collapse in the Black Sea, *Plankton Research* 30(12): 1385–1397.

Morrissey, K., Hynes, S., Cuddy, M., O'Donoghue, C. (2011). Ireland's Ocean Economy, SEMRU Report Series No. 1. Available at:http://www.nuigalway.ie/semru/documents/final_report_small.pdf

Pendleton, L., Martin, N., Websters, D. (2001). Public perceptions of environmental quality: A survey study of beach use and perceptions in los angeles county, *Marine Pollution Bulletin*, 42(11): 1155-1160.

Pomeroy, R., Douvere, F. (2008). The engagement of stakeholders in the marine spatial planning process, *Marine Policy* 32(5):816-822.

Portman, M. (2009). Involving the public in the impact assessment of offshore renewable energy facilities, *Marine Policy*, 33: 332–338.

Potts T., O'Higgins T., Mee L., Pita C. (2011). *Public Perceptions of Europe's Seas – A Policy Brief.* EU FP7 KNOWSEAS Project. Available at: http://www.knowseas.com/links-and-data/project-publications/Knowseas%20Marine%20Social%20Survey%20Final.pdf/view (accessed 11/12/2012)

Sant, M. (1996). Environmental sustainability and the public: responses to a proposed marine reserve at Jervis Bay, New South Wales, Australia, *Ocean & Coastal Management,* 32(1): 1-16.

Scott, N., Parsons, E. (2005). A survey of public opinion in south-west Scotland on cetacean conservation issues, *Aquatic Conservation: Maine Freshwater Ecosystems,* 15: 299–312.

Shackeroff, J., Hazen, E., Crowder, L. McLeod, K., Leslie, H., (ed.) (2009). *The oceans as peopled seascapes*. In *Ecosystem-Based Management for the Oceans*, (ed.) K. McLeod and Leslie, H. 33–54. Washington, DC: Island Press.

Steel, B., Smith, C., Opsommer, L., Curiel, S., Warner-Steel, R. (2005). Public ocean literacy in the United States. *Ocean and Coastal Management*, 48: 97 – 114.

Wester, M., Eklund, B. (2011). ''My husband usually makes those decisions'': Gender, behavior, and attitudes toward the marine environment, *Environmental Management*, 48:70–80.

Whitmarsh, D., Palmieri Giovanna M. (2009). Social acceptability of marine aquaculture: The use of survey-based methods for eliciting public and stakeholder preferences, *Marine Policy,* 33: 452–457.
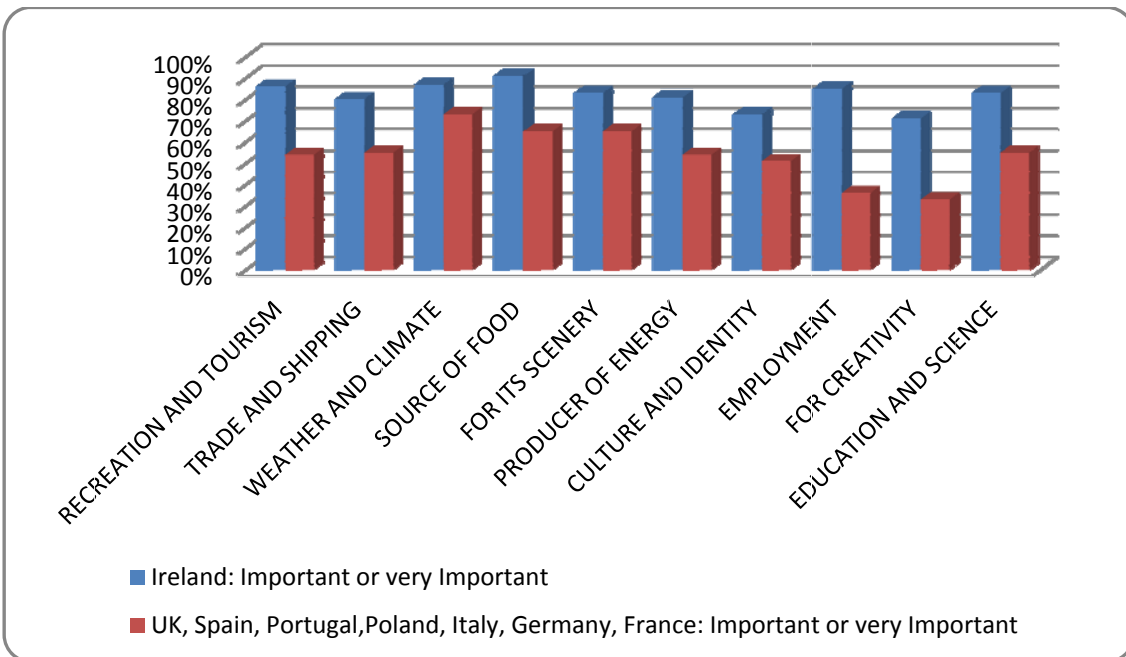
Appendix A

Figure A1. Prioritisation of issues of concern by Irish general public compared to the average response from individuals across UK, Spain, Portugal, Poland, Italy, Germany and France*.
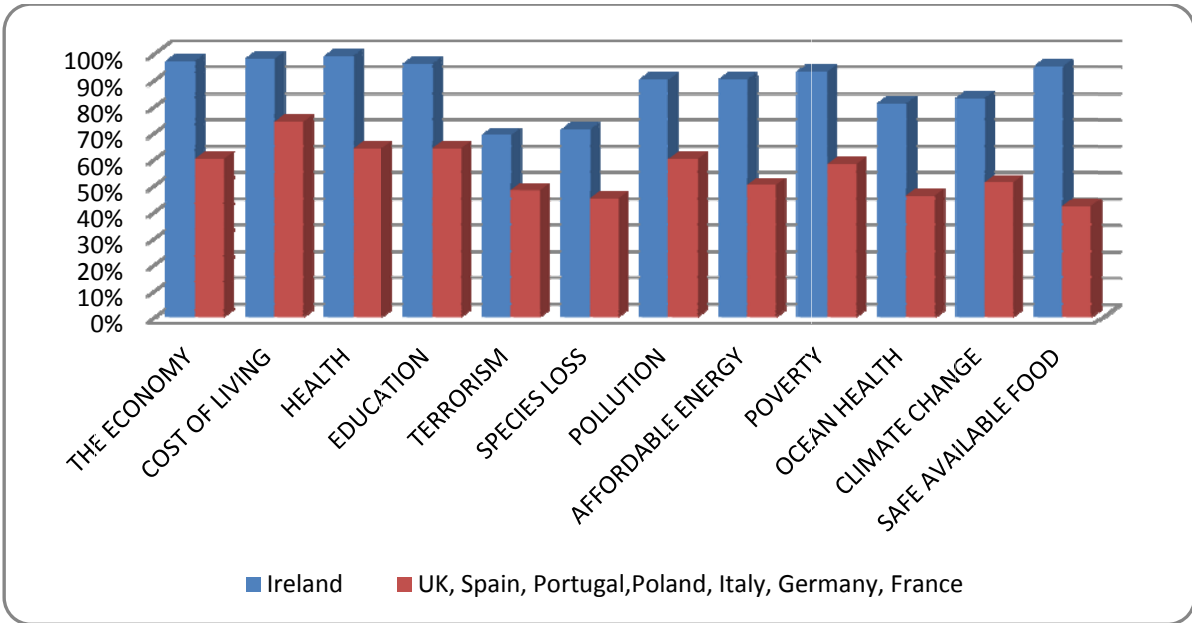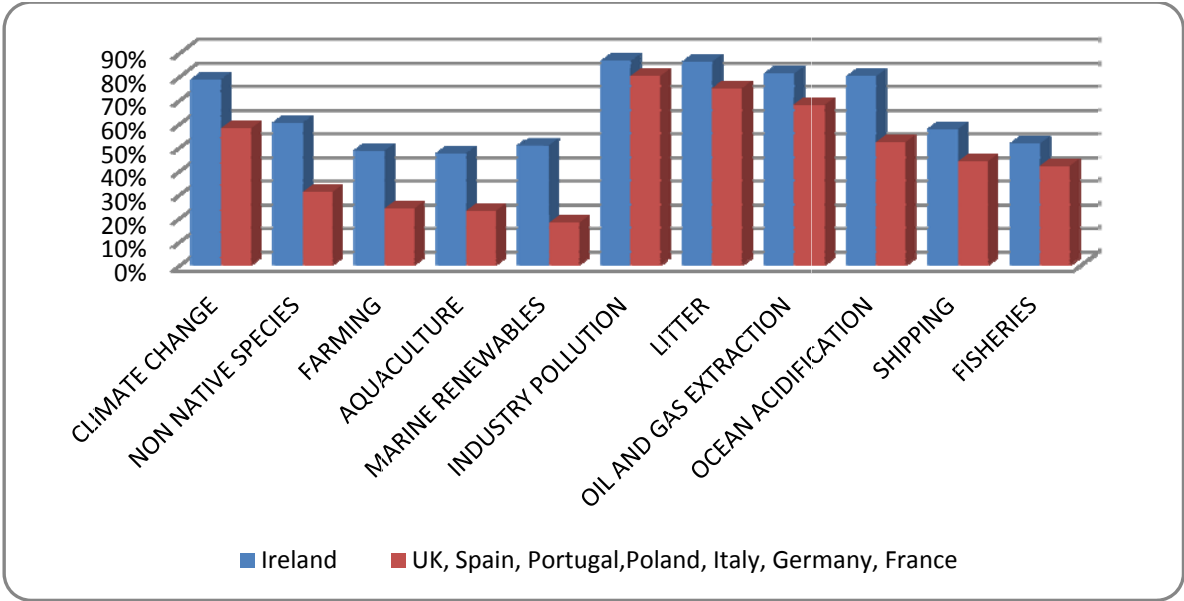
* A score of 4-5 on a 5 point scale where 1 means it is not at all important and 5 means it is very important.

Figure A2. The value of the oceans to individuals across Ireland compared to the average response from individuals across UK, Spain, Portugal, Poland, Italy, Germany and France. Scores shown as percentage of responses rated as 'important or very important' (a score of 4-5).
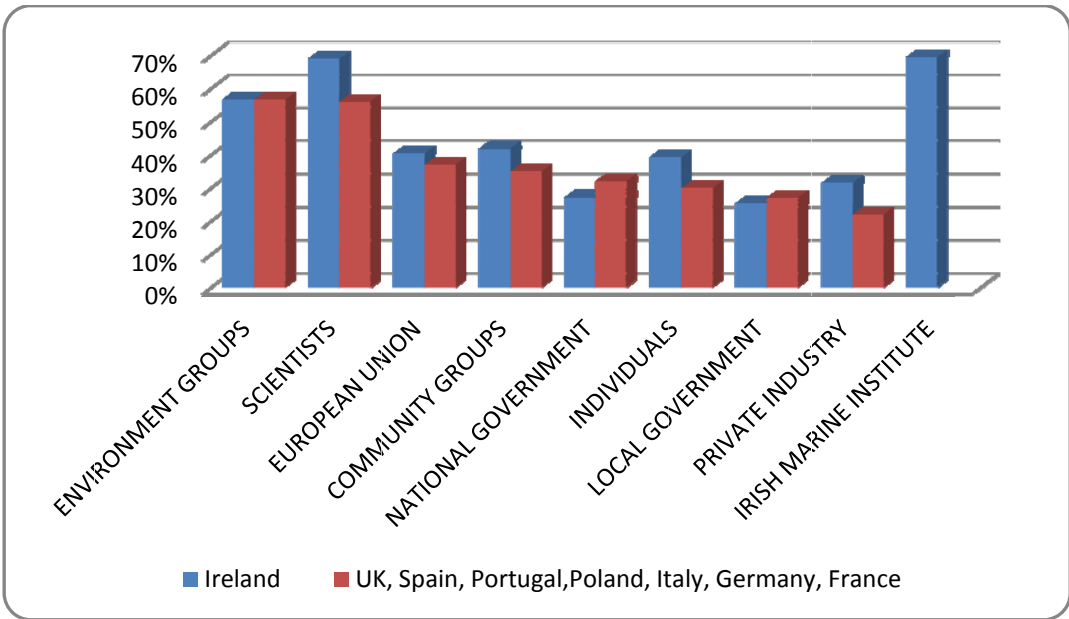

* A score of 4-5 on a 5 point scale where 1 means it is not at all important and 5 means it is very important.

Figure A3. Rankings of perceived threats to the environment by the Irish general public compared to the average response from individuals across UK, Spain, Portugal, Poland, Italy, Germany and France*.

* A score of 4-5 on a 5 point scale where 1 means it poses no threat and 5 means it poses a significant threat.

Figure A4: Perceived competence of different groups to manage the environment by Irish general public compared to the average response from individuals across UK, Spain, Portugal, Poland, Italy, Germany and France. Scores shown as percentage of responses rating 'competent or highly competent' (rating of 4 -5).

* A score of 4-5 on a 5 point scale where 1 means it is not at all competent and 5 means highly competent.