

Public perceptions and behaviours towards the water environment

Lessons for theory, communication and action



Prepared for:



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1. Introduction

With a target of restoring all waters to good ecological status by 2015, this year represents an important milestone in the implementation of the EU's Water Framework Directive (WFD), and an important opportunity to review what we know about public perceptions of and engagement with the water environment. Based on the evidence so far, it may be possible to devise new outreach programmes, which can more effectively engage the public with these issues, and increase support for more pro-active action to meet this important target.

This document reviews the literature on public perception and engagement with the water environment, concluding with several suggestions as to how best to engender greater public concern and active care for the water environment.

1.1 The EU Water Framework Directive (WFD)

The EU's WFD 2000/60/EC represents an important opportunity for engaging the public in the management of healthy water bodies across Europe. Its holistic approach to the management of water bodies, combining hydrological, ecological and participatory approaches, led WWF to describe it as "*the most significant piece of European environmental legislation ever introduced*" (Le Quesne and Green, 2005:4). The Directive applies to all water in the natural environment and establishes for the first time a source-to-sea strategic planning framework for river basin management, designed to reduce pollution and protect habitats and biodiversity. It aims to achieve good chemical and ecological status of surface waters by 2015, through a number of stages and mechanisms, from changes in national legislation down to the engagement of stakeholders and individual citizens in the construction of River Basin Management plans and associated programmes of measures.

The goal of this "multi-level governance" approach is to engage people in decisions about the management of the water environment from the national and international policy community, down to regional and local stakeholders, and ultimately to engage individual citizens in the management of their local environment as far as possible. The Directive goes beyond previous attempts to "consult" with stakeholders, to actively encourage participation of "all interested parties" in policy implementation at local levels¹.

¹ "The success of this Directive relies on close cooperation and coherent action at Community, Member State and local level as well as on information, consultation and the involvement of the public, including users" (Article 14, Water Framework Directive). The Common Implementation Strategy Guidance for the Directive says that it is necessary to go beyond consultation, so that "interested parties participate actively in the planning process by discussing issues and contributing to their solution" (para 2.2, EC, 2003). This is in line with the EU's Aarhus Convention, which enshrines participation in decisions about the natural environment as a human right, enabling "the public to participate during the preparation of plans and programmes relating to the environment" (Article 7, Aarhus Convention), and is consistent with Principle 10 of the Rio Declaration in 1992.

1.2 The participatory approach

There is good reason for prioritising public and stakeholder participation in the management of water, given the evidence that effective engagement with stakeholders in environmental decision-making processes can enhance the robustness and durability of decisions (Stelle, 2001; Getliffe, 2002; Lee and Abbot, 2003; Reed, 2008). Although there are examples where engaging with stakeholders has biased decisions, exacerbated conflicts and led to decisions that had unintended consequences (e.g. Cook and Kothari, 2001; Gerrits and Edelenbos, 2004; Scott, 2011), a recent global assessment of participation in environmental management decision-making processes suggested that these failings were most often due to flaws in the way that participation was designed and facilitated (de Vente et al., under review). The research identified a number of factors that could enhance the likelihood of beneficial environmental outcomes arising from participation, including: legitimate representation of all stakeholder interests, professional facilitation to balance power dynamics between participants, and the provision of information and decision-making power to all those involved (de Vente et al., under review).

There are, however, a number of limitations to participation in the WFD. For example, Howarth (2009) points out that the highly technical nature of many decisions is likely to narrow the range of people who can legitimately contribute to a handful of key players, rather than genuinely opening up decision-making to the knowledge and perceptions of new actors.

In the UK, there is a stakeholder group who input to national programmes of measures, and liaison panels at river basin and district level representing key stakeholders, and Government deems that existing networks and arrangements for engagement are sufficiently robust to meet the needs of the WFD (Environment Agency, 2005, 2006a; Defra and Welsh Government, 2006).

Since 2011, the UK has pioneered a Catchment Based Approach to WFD implementation, which was adopted across 93 catchments in England to secure catchment level engagement from stakeholders and local communities². In this way, it was hoped that more ambitious River Basin Management Plans could be developed that could more effectively meet WFD targets. A recent review of the pilot phase by Kingsley-Rowe and Conlan (2015) suggests that catchment-based partnerships are delivering additional value by securing engagement and additional funding to support programmes of measures under WFD³. However, the main barriers (apart from funding) preventing partnerships being effective were a “lack of enthusiasm/interest and local knowledge in the catchment”, and “stakeholder fatigue”. Even with significant investment in pilot catchments, facilitating engagement with members of the public around the health and future management of water bodies remains a major challenge and this challenge is

² <https://www.gov.uk/government/publications/catchment-based-approach-improving-the-quality-of-our-water-environment>

³ Focusing on partnerships that started before 2013, Kingsley-Rowe and Conlan (2015) found that 81-90% of those they surveyed agreed that partnerships had increased involvement of stakeholders (44% estimating this to be a >50% improvement).

multi-faceted. Partly it is related to a lack of understanding about water bodies, including aquatic and marine ecosystem health, the societal benefits and problems arising from these bodies of water, the threats that face them and how water can be managed more sustainably. As such, the rights and responsibilities of the public and decision-makers in relation to the water environment are typically poorly defined and poorly understood. One of the reasons for this is that the majority of water bodies in the UK provide open-access, public goods (such as provision of fish, recreation opportunities and flood risk alleviation), which are non-rival and non-exclusive. This means that many different groups may use the water environment simultaneously, and it is not typically possible to exclude people from using water bodies in particular ways. In addition to this, there are a number of negative “externalities” arising from land use and industrial activities, that can have a significant impact on water quality (e.g. diffuse water pollution from agriculture and point-source pollution from industry) and quantity (e.g. low summer flows due to irrigation or increased flood peaks due to changes in land cover or drainage). These impacts can adversely affect downstream users who rely on clean water and reliable flow regimes.

A number of options exist to tackle these challenges. These may be broadly grouped as:

1. Regulatory mechanisms may be put in place to limit or require certain activities or behaviours, with penalties for non-compliance (e.g. fines for pollution incidents);
2. Economic mechanisms that provide incentives to promote sustainable management and use of water (e.g. agri-environment payments for riparian restoration and management) or that create markets for clean water (e.g. Payments for Ecosystem Services schemes, such as peatland restoration by water utilities to reduce Dissolved Organic Carbon in drinking water); and
3. Capacity building and information provision for those who use and manage (or can otherwise influence) water bodies, for example via communication campaigns and training programmes.

A combination of these mechanisms is likely to be most effective in improving the health of water bodies (Reed et al., 2014). However the majority of research and policy activity has focused on regulatory and economic mechanisms, with much less attention paid to capacity building and information provision.

1.3 This review

The review presents evidence from around the world about public perceptions of the water environment, comparing the perception of water issues to the perception of other environmental issues, and exploring public attitudes and perceptions regarding water quality, flooding and other concerns, and considers approaches to communicating more effectively with the public about the water environment.

2. Public perceptions of environmental issues

Concern for environmental issues has reached a 20-year global low, according to time-series polling data across 22 countries (GlobeScan & SustainAbility, 2013). Fewer respondents now view a range of environmental concerns to be “very serious” compared to 20 years ago (Figure 1). This is supported by another recent multi-country analysis, which shows that environmental concerns are five times less likely than economic concerns to be cited as a top priority in public opinion surveys, with the UK ranking 20th out of 33 countries surveyed on the basis of the percentage of people who selected environmental concerns as their top priority (Smith, 2010; Figure 2). The relatively low importance of environmental issues compared to more immediate or tangible concerns may reflect perceptions that the level of personal risk from these issues is low, spatially and temporally remote, and most likely to affect future generations and people in other countries (Bord et al., 2000; O’Neill and Hulme, 2009).

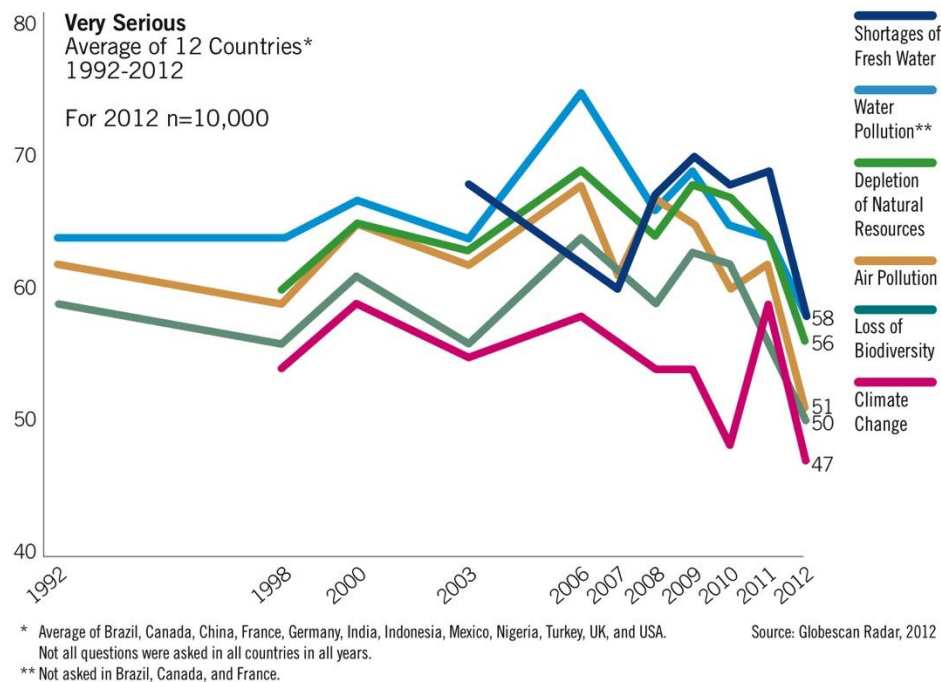


Figure 1: Perceived seriousness of environmental issues between 1992-2012 (source: GlobeScan Radar (2012) cited in GlobeScan & SustainAbility (2013)).

It has been suggested by some that such a trend may be explained as an inverted “U” relationship between wealth and environmental sustainability where pro-environmental behaviours are highest in the wealthiest and poorest nations, but these behaviours may decline as richer nations enter recession (the “environmental Kuznets curve”; Kuznets, 1995). However, more recent analyses have repeatedly failed to find any robust empirical evidence to support the existence of such a relationship (e.g. Stern et al., 1996; Dasgupta et al., 2002; Harbaugh et al., 2002; Stern, 2004). There is no evidence at present to suggest

that perceptions of, or interaction with, the water environment has been affected by economic cycles.

Although people consistently rank environmental concerns lower, relative to other issues, this does not mean that the public is not concerned about damage to the natural environment. The Monitor of Engagement with the Natural Environment (MENE) survey has shown a relatively stable, high proportion of respondents who are “concerned about damage to the natural environment” (85-88% agreed or strongly agreed with this statement in surveys conducted between 2009-2014). The majority of MENE survey respondents said that visiting the natural environment made them feel refreshed and revitalised, calm and relaxed, close to nature and they said that they took time to appreciate their surroundings. This finding is echoed in studies about perceptions of the English water environment, with a 2009 ComRes survey (n = 1000) finding that the majority of respondents associate the words “important” (94%), “beautiful” (87%) and “full of wildlife” (75%) with the water environment, although they also described these locations as “undervalued” (82%), “at risk” (75%) and “polluted” (62%).

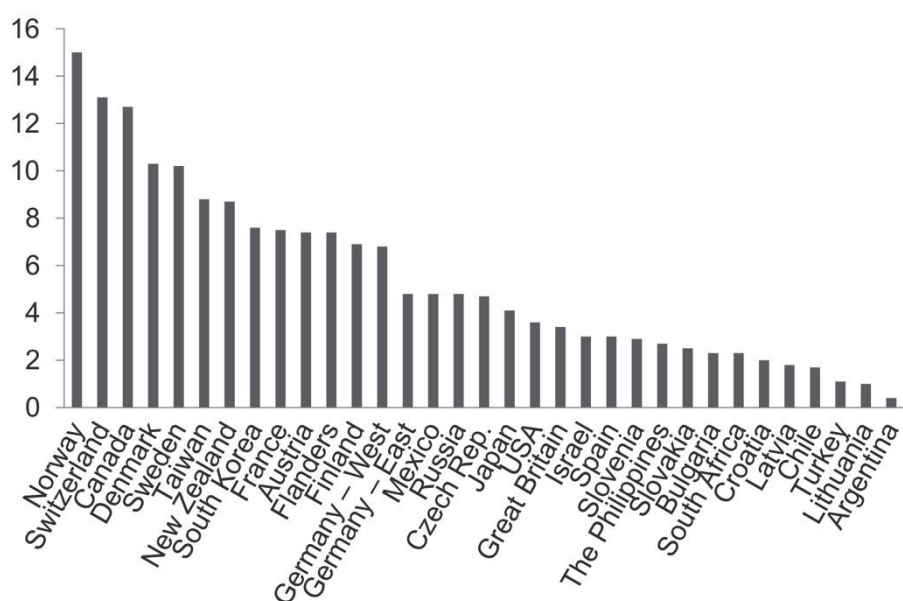


Figure 2: Countries ranked by the proportion of people who rank environmental concerns as their top priority (source: Smith, 2010).

2.1 Public perceptions of the recreational and aesthetic benefits of the water environment

Despite robust data on broad public perceptions of the natural environment, both globally and in the UK, evidence is sparse on public perceptions of the UK water environment. Although it is difficult to demonstrate a direct link between public perceptions and many types of engagement with the water environment, there is evidence for a link to recreational engagement. For example, in a part of the UK where beaches had consistently failed to meet water quality standards

under the Bathing Waters Directive, Hanley et al. (2003) found that that improvements in water quality would lead to significantly more visits to beaches (63% of a sample of 414 residents said that they would visit the beach more frequently if water quality were better). Scaled up to the local population, this equated to 2.6 million more trips per annum to beaches in this part of the country, which the authors estimated could be worth £1.25M per year to the local economy. This indicates the economic value of not just improving water quality, but improving people's perceptions of water quality, which may be used in communication campaigns (see section 4). Where environmental damage is not so severe however, social values (such as peace and tranquility versus noise pollution) may be more important than environmental values for recreational purposes (Dalrymple and Hanley, 2005).

More broadly, Dalrymple (2006) analysed characteristics of water bodies and underlying social, economic and demographic factors that influenced engagement with the water environment. She concluded that water “*adds a positive economic value to the environment*” and found respondents valued water bodies for recreation more if vegetation was present (p1). Other studies have found that visual preferences for landscapes is greater when they contain water features, for example, due to their association with feelings of tranquility, or their ability to act as a focal point that increase depth of field (Ulrich, 1983). Goetgeluck and Priemus (2005) provide evidence from the Netherlands that the aesthetic qualities of water increase the value of properties in residential areas near water. Similarly Bourassa et al (2004) found that wide views of water added 59% to water-front properties in New Zealand, and Goetgeluck and Priemus (2005) found that the aesthetic qualities of water added 10-15% to the value of residential properties on the seashore, 5-10% to riverside properties and 5% to lakeside residences in Norway.

There is wider evidence that the value ascribed to aesthetic benefits from nature can feed into attitudes of care and concern for the environment (Hettinger, 2008), and that these attitudes in some cases may drive environmental protection (whether for the sake of nature or NIMBYism) (Kenter et al., 2014). Having said this, it is important to note that “*even unspectacular rivers provide a source of enjoyment and tranquillity for many who use only the riverbanks, view the river from afar, or who only know that it is there and available*” (Asakawa et al., 2004, p168).

Perceptions of the water environment differ particularly between different recreational user groups and by location of the water body (Dalrymple, 2006). For example, Eggert and Olsson (2003) illustrated the divergent values of fish to commercial versus recreational fishers and members of the public. This finding was echoed by Kenter et al. (2013), who contrasted the value of the marine environment for anglers versus divers, estimating that the current recreational value of marine protected areas is between £148-248 million for divers and £1.86–3.38 billion for anglers per year (a figure that far outweighs the cost of designating these areas). Building on this, Kenter et al. (2014) showed the multi-faceted nature of the values held by different user groups for the water environment, including both use (e.g. to harvest or see fish) and non-use values

(e.g. spiritual benefits derived from engagement with the water environment). These values were often linked to specific locations or features of the water environment. For example, one diver related, *"I ticked all of these [values] and more, I added religious which is strange really because I am an atheist. I was in one place and visibility opened up and it was like a cathedral, with jewel anemones lighting up everywhere. I felt like I was in the presence of God, if there is such a thing. I was crying when I came out of the water"* (p23). This echoes findings from Accent (2008) that an approximately equal number of households they interviewed valued improved water conditions for direct use benefits and improved habitats. Despite the very different ways that divers and anglers use the water environment, Kenter et al. (2014) found that both groups cited similar benefits from their experiences in these places. Both groups cited therapeutic benefits and described engaging in *"caretaking behavior"*. Divers described an immersive engagement with nature through their activities, whereas amongst anglers, this connection derived from being a solitary observer of, rather than being immersed in, the water environment.

In addition to differences between user groups and the location of water bodies, the values placed on the water environment by recreationalists may be affected by other factors, such as social, economic and demographic differences (gender, age, education, residence, religion, social class, income and employment); cultural context; prior knowledge of an environment; and the type of water environment being considered (Dalrymple, 2006). For example in Ireland, Kelly et al. (2003) found that educational status was the main predictor of concern about the water environment. Burger et al (2003) found that increasing age, income and education were the main predictors of concern about water pollution in New Jersey. Cooper et al (2004) found that individuals were willing to pay for water quality improvements to a nearby lake in East Anglia, but their willingness to pay varied from person to person depending on factors such as whether and how they used the water environment, and personal values and beliefs, such as altruism (levels of concern that other people can enjoy the water environment), a desire to leave the environment in good condition for future generations, and beliefs that the water environment should exist even if no one sees it (existence values), a sense of obligation, that the public have a responsibility to respect the water environment. Similarly, Faulkner et al (2001) found that the perceptions of local residents towards remediation of a brook in London varied depending on how frequently they visited and observed the brook, and how long they had been resident locally, with the longest-standing residents valuing the work most. Doran (2012) found that 40% of people were unwilling to pay extra on their annual water bills to reduce river damage resulting from excessive water abstraction. Of those who were willing to pay, their willingness depended on: i) age, social classification and region; ii) the extent to which Government was involved in improving water quality; iii) the level of information provided about benefits arising from the schemes they would be paying for; and iv) the perceived fairness over who pays (preferably with heaviest users paying most). Linked to this, Doran (2011) found that once focus group participants in the south of England understood the social and environmental benefits of sustainable water use, they were strongly supportive of universal water metering, to encourage more responsible use. Dalrymple and

Hanley (2005) found that recreationalists most willing to pay for environmental improvements to Loch Lomond were older people, females, those with high incomes and those living closer to the water (Figure 3).



Figure 3: Loch Lomond shoreline just north of a small pier that the Inchcailloch passenger ferryboat uses (source: Colin Smith and licensed for reuse under a Creative Commons Licence)

2.2 Public visits to the water environment

Similar factors may also influence the frequency and purpose of visits to the water environment. For example the MENE survey showed that those aged 55 and over were most likely to be motivated to visit the natural environment for health and exercise, while old age (13%), physical disability (9) and factors linked to income level (e.g. “too expensive” (5%) or “no car access” (4%)) were cited as reasons for not visiting the natural environment (Natural England, 2015).

According to MENE survey results, in 2013-14 (the most recent year for which data is available), 9% (269M), 5% (157M) and 3% (93M) of visits by members of the public to the natural environment were to UK rivers, lakes and canals, beaches, and other coastline respectively. Figure 4 shows how the number of visits to the water environment contrasts with visits to other environments. Overall visits to these water environments accounted for 12% of all visits to the natural environment in 2013-14.

It is not possible to disaggregate results from the MENE survey by different types of environment, so it may not be appropriate to assume that general travel behaviours and motivations for visiting the natural environment apply equally across all water environments. However, if these figures can be assumed to be

broadly valid for the water environment, they may be instructive for the development of any communication strategy designed to increase engagement and change attitudes towards water bodies in the UK. In particular, the survey found that the majority of people were only prepared to travel less than a mile (43%) or between 1-2 miles (25%) from their home to visit the natural environment, mainly on foot (64%) or by car (28%), and mainly for between 1-3 hours (50%) or for less than an hour (28%). This was also found by Accent (2008), whose interviewees valued improvements to local water bodies more than distance ones, concluding that attention should be paid in particular to improving water quality in more populated areas. This may present particular challenges for those living further away than 1-2 miles from a water body, in particular those without access to a car. It may also be useful to note that 85% of all visits to the natural environment in 2014 consisted of walking (50% with a dog, an additional 26% without a dog) and playing with children (9%) (a fifth of visits included children in the party). Figure 5 shows the main motivations for visiting the natural environment from the MENE survey.

Table 1 summarises findings from RSPB research based on focus groups with residents in Poole Harbour, Sheffield, Bristol and Norwich in 2012, showing the social, economic and leisure uses and benefits of local waterways (RSPB, 2013). This research found that although most focus group participants felt that they were less concerned about their local waterways than they were 20 years ago, a number of common concerns persisted, notably around litter, industrial pollution discharges (including from nuclear plants, with some still believing raw sewage was being discharged directly into water courses). Less commonly cited concerns included: scum and foam on the water surface; pollution and river bank damage from boating; invasive non-native species; and human health problems arising from polluted waterways. These findings concur with research by Accent (2008) that found removal of litter was the most important priority for the water environment expressed by respondents they interviewed (Table 2). Many concerns identified by RSPB (2013) were related to specific waterways, for example problems with water colour (due to Dissolved Organic Carbon in water from peaty catchments in the Peak District flowing through Sheffield), and algal blooms in Norwich and Poole Harbour. There was a low awareness of problems arising from diffuse water pollution from agriculture, despite the severity of this issue in the areas surveyed. Once aware of the role of farming in diffuse pollution and the magnitude of this problem for meeting Water Framework Directive targets, focus group participants suggested that farmers should be primarily responsible for improving water quality through more effective management. However, although some felt farmers should be doing more to reduce diffuse pollution (especially given the amount of subsidies they receive), the majority saw farmers as struggling financially, and questioned whether it was fair or feasible to ask them to do more. As a result, participants suggested that farmers might be paid more in (ideally performance-related) subsidies to deliver improvements to the water environment, be better educated about ways they could reduce run-off, be more tightly regulated (with more controls, monitoring and enforcement) (RSPB, 2013).

In addition to this primary focus on the farming community, RSPB (2013) found that there was wider recognition of others who could play a role in tackling problems in the water environment, including:

- Government departments and agencies: respondents thought Government should be responsible for all aspects of the water environment, including developing and enforcing policies and rules, reducing pollution, supporting farmers and educating the public;
- Local statutory bodies (such as National Parks and local authorities): were often seen as playing a similar role albeit at a more local level and more hands on;
- The food industry and supermarkets were seen as having the potential to drive up standards of agricultural production and reduce waste, but only with regulation, and increased costs to customers;
- Environmental NGOs were not always suggested as having a role unless prompted. This could include monitoring, lobbying Government, raising public awareness and advising farmers. They were seen as expert, independent and free of commercial pressures, and therefore more likely to be trusted by the public;
- The public were recognised as also being 'part of the problem' (due to behaviours that could lead to pollution of waterways) and in need of education about issues such as food waste. However focus group participants did not link low prices in supermarkets and environmental impacts, and most were not prepared to buy more organic food on grounds of affordability;
- In addition to farmers, grouse moor owners were perceived to be sufficiently wealthy to contribute more towards addressing the impacts of diffuse pollution; and
- There were mixed views about the role that water companies should play: some assumed that they had relevant expertise to address problems in the water environment, but others felt that they did the minimum required to maximise profits and may use water quality issues as an excuse to raise prices.

Such information may help effectively target and differentially tailor communications towards these different groups.

Table 1: Uses and benefits of local waterways in Poole Harbour, Sheffield, Bristol and Norwich (adapted from RSPB, 2012).

Social	Economic	Leisure
<u>Community cohesion</u>	Tourism	Personal enjoyment
Festivals, regattas	Restaurants, bars, clubs	Water sports
Bathtub/duck races	Commercial fisheries	Walking/cycling
Voluntary activities	Ferries/shipping/boat hire	Visiting beaches
<u>Historical/Cultural</u>	Boat building	Swimming/paddling
Bristol's history and city symbol	Real estate/development	Fishing, crabbing, cockling

Industrial archaeology	Oil/wind farms	Experiencing wildlife
	Drinking water	Visiting riverside pubs
		Photography

Table 2: Priority ranking of water environment attributes for improvement (from: Accent, 2008)

Priority Rank	Attribute
1	General litter
2	Abundance and variety of plants, fish and other animals
3=	Bad smells
3=	Foam or slime
4=	Erosion of banks/shores
4=	Murkiness or discolouration
5	Algae or bindweed
6=	Man-made features
6=	Crowds of people

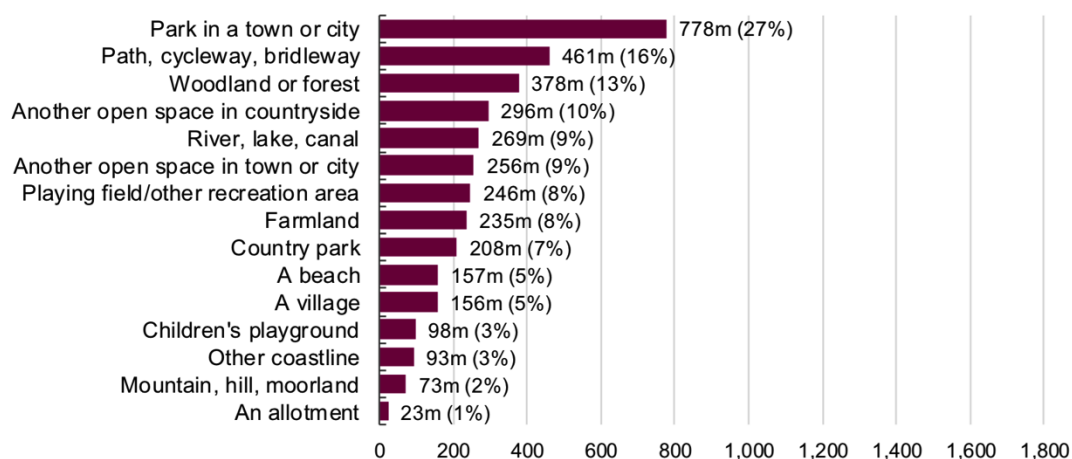


Figure 4: Specific places in that natural environment visited by members of the UK public in 2013-14 (source: Natural England, 2015).

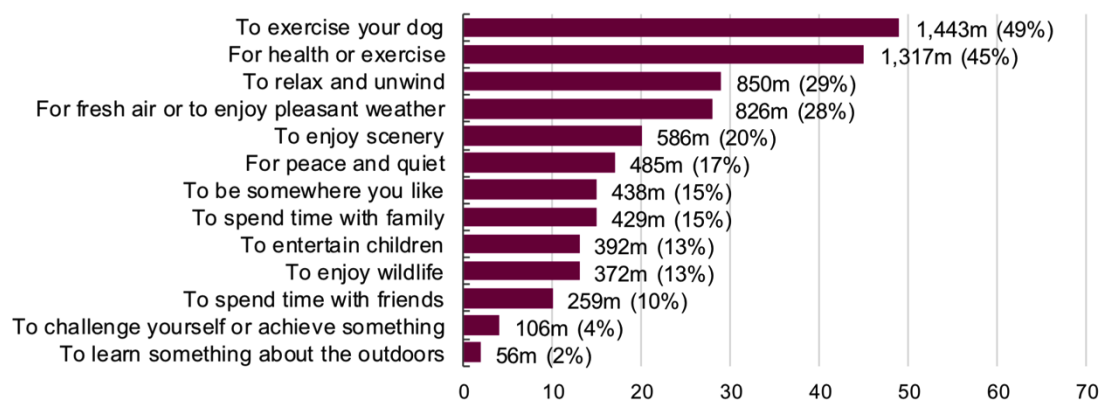


Figure 5: Motivations for visiting the natural environment in 2013-14 (source: Natural England, 2015).

2.3 Public perceptions of water quality

Although there is limited evidence on public perceptions of water bodies, the majority of evidence that does exist, focuses on perceptions of water quality.

Defra (2001) found water pollution to be the environmental issue over which respondents had most concern, and when prompted, over half (54%) were “very concerned” about pollution in rivers, bathing waters and beaches. Research commissioned by Scottish Government in 2006 also demonstrated the importance of the water environment to people's quality of life, with around half stating that the water environment was very important to them and only 7% stating that it was not important (Dalrymple, 2006). In another survey conducted at this time, the majority (89%) of Scottish water users were satisfied with their services, but the majority wanted to see improvements in the quality of coastal and bathing waters (58%) and the quality of river waters (53%), with 54% prepared to pay more to improve water supply services (Braunholtz et al., 2005). This echoed an earlier survey conducted by Scottish Executive (2005) in 2002, in which 30% of respondents said they were “very concerned” about pollution of rivers, lochs and seas, 49% were very concerned about raw sewage being discharged into the sea, and 27% were very concerned about the quality of drinking water. Similar results have been found across Europe, with respondents to a recent EU survey from most countries citing water quality as one of their most important environmental concerns (TNS, 2005, cited in Dalrymple, 2006). Similarly, there is significant public concern about water quality in Ireland (Irish EPA, 2006, cited in Dalrymple, 2006). Hughey (2004) found that a 96% increase in the number of people in New Zealand considering water pollution to be the most important environmental issue facing the country between 2002-2004.

2.4 Public perceptions of water supply, flooding and water safety issues

Although a small proportion of the public are concerned about future water shortages due to climate change, water availability is not a major concern for most people living in the UK (Dalrymple, 2006). For example, Scottish Executive (2005) found that just over half of those they surveyed were satisfied with current standards of protecting homes and gardens from being flooded with sewage. However, there is evidence that more socially deprived communities are more likely to live in areas prone to flooding in England and Wales (Environment Agency, 2006b). They found that residents in deprived neighbourhoods were also likely to be less well prepared to cope with flooding, and that the most deprived sections of the population were 62% more likely to live in areas at high risk from flooding.

Similarly, people that perceive flood risk is low tend to be disproportionately vulnerable to flooding events, due to their lack of preparedness (Messner and

Meyer, 2006). Conversely, people that have previously been directly affected by flooding tend to perceive a much higher risk of future flooding, and hence tend to be better prepared (Baan and Klijn 2004). For example, In the Rhine River basin two major flood events of comparable size occurred in 1993 and 1995. Although people were less aware of the flood risk in 1993, their experience of flooding in 1993 increased their perception of risk and preparedness. As a result, half the amount of damage occurred in 1995 compared to 1993 (Kron and Thumerer 2002).

Perceptions about how to deal with flood risk is an area of contention between upstream, more rural, versus downstream, more urban, stakeholder groups. Particular issues of contention are the role of soft (planning) versus hard (engineering) approaches, and the use of (often highly productive agricultural) flood plains to slow water reaching built up areas (e.g. via tree planting) or to act as a buffer to coastal flooding via managed retreat and the creation of salt marshes (Wilby and Keenan, 2012). Historically, there was little consideration given to soft engineering and non-structural approaches to mitigating flood risk in the UK, despite the fact that hard engineering approaches are significantly more expensive and do not always solve the problem (Johnson and Priest, 2008). In fact, Ashley et al. (2008) argue that hard engineering solutions to flood risk are unaffordable on the scale that is likely to be necessary in the face of predicted levels of sea level rise. There is also ample evidence of hard engineering solutions simply displacing flood risk to downstream communities, and of unintended consequences, such as negative impacts of coastal defenses on fish stocks (e.g. Hallegatte, 2009). However, they are typically perceived more positively by local communities who want properties protected, and statutory liability is easier to establish for engineering works that causes flooding compared to the larger scale and more complex processes through which soft approaches typically operate (Wilby and Keenan, 2012). In contrast, cheaper soft engineering approaches, such as tree planting in flood plains, can have significant benefits, but are less visible and tangible to the public (Roca and Villares, 2012). As such, effective communication and public participation in the design of flood risk mitigation schemes is essential to engender support for more diverse, flexible and resilient approaches to the problem (Ashley et al., 2008; Roca and Villares, 2012).

3. Conclusions

By understanding the public's current attitudes to the water environment and their wider perceptions of and engagement with the natural environment and environmental issues, this review has provided a number of insights that could be harnessed in future communication campaigns in relation to the water environment. Although there are many similarities between attitudes towards the water environment and other environmental issues, there are a number of key findings that relate specifically to people's relationship with water as a unique environment.

In places where water quality is particularly low, there is evidence that significant improvements in water quality may lead to more recreational use of the water environment, with consequent benefits for human wellbeing and the local economy. Given the clear and significant public benefits of such changes, combined with imperatives to restore such water environments under WFD, it may be beneficial to target communication campaigns towards these locations to encourage engagement with the RBMP process and build support and pressure for key investments or changes in policy that would deliver water quality benefits.

To communicate more effectively with the public and gain support for improvements to water bodies, attention should be paid to aesthetic improvements alongside water quality enhancements. There is evidence that this in turn may help engender further care, concern and protection for newly restored water bodies from local communities. Attention should be focussed on groups that regularly visit the water environment, who typically live nearby (within 1-2 miles), as it is these groups who have most to gain from improvements to the water environment and who are most likely to be motivated to invest time and energy in the RBMP process.

It may be beneficial to focus communications primarily on water quality issues and water pollution, as these are of highest concern to the public, as well as being central to meeting WFD targets. For specific locations, flooding is a major concern, and communications may usefully combine messages about soft engineering approaches to flood risk alleviation for these communities, to further help meeting WFD targets and engage the public with the RBMP process.

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